Guides to Torque Theory and Tohnichi Products

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TOHNICHI

TORQUE HANDBOOK vol. 9

Your Torque Partner

TOHNICHI

Celtic Necklaces

The Origine of Torque

The word ‘torque’ generally means the ‘twisting moment’ or ‘turning moment’ and is widely used as an engineering term. However, torque meant ‘necklace’ in ancient times. The Celts who conquered ancient Europe wore these around their necks as a symbol of being a nobleman and also as a good luck charm for going into battle. The origins of torque are derived from these unique personal ornaments. The name ‘torque’ was given by the ancient Romans, who in Latin described these necklaces as twisted and spiral screw-shaped using the word ‘torquere’, meaning ‘twisting’ and ‘turning’. The spiral pattern was a sacred symbol of the soul for the Celts and these personal ornaments came to represent the enemies of the Romans. In recent times, torque is no longer thought of as the twisting of Celtic necklaces, but rather ‘torque’ shows the degree of screw and bolt tightening and the rotational force of engines. The purpose is no longer that of a good luck charm in battle, but torque still carries with it the charms of safety and power.

Mayumi Tsuruoka

Professor of Tama Art University Art Science

[Brief Profile]

Born in 1952. After graduating from Waseda University Graduate School of Literature, studied overseas at Dublin University in Ireland, researching medieval Celtic culture and decorative manuscript art. Her first book in 1989, “Keruto: Soshokuteki Shiko” (Ornamental Ideas in Celtic Art) (Chikuma Shobo Publishing), sparked a surge of interest in Celtic culture in Japan. Has been a professor at Ritsumeikan University since 1996. Has written many books, including "Ashura no Juerii" (Ashura Buddhist Statuary and Jewelry) (EastPress, Tokyo), "Keruto no souzouryoku" (Celtic Imagination) (Seidosya), "Sosyoku Dezain wo Yomitoku Sanju no Sutori" (30 Stories to Read Decorative Design) (Nihon Vogue Sha) etc.

Brand Policy

Safety is essential to an affluent and convenient society based on advanced technologies. Our mission is to support social safety through quality improvement by adequate screw tightening control. Based on our developed torque technology and track record over the past 70 years, Tohnichi has been providing high-quality torque products and technical services to contribute to realization of an anxiety-free society as a comprehensive partner of torque technology which helps enhance reliability of your products and business.

Core Identity Core Identity

Contributing to a safer society through advances in torque technology

- Through excellent torque control technology, we contribute to the creation of a safersociety worldwide by helping to realize the highest level of product safety in transportation, information technology, and many other fields that affect our daily lives.
- Promoting the importance of torque control, we strive to improve and spread knowledge of screw tightening control and torque measurement technology

Brand Personality Brand Personality

Creating innovative torque products and services that exceed customer expectations

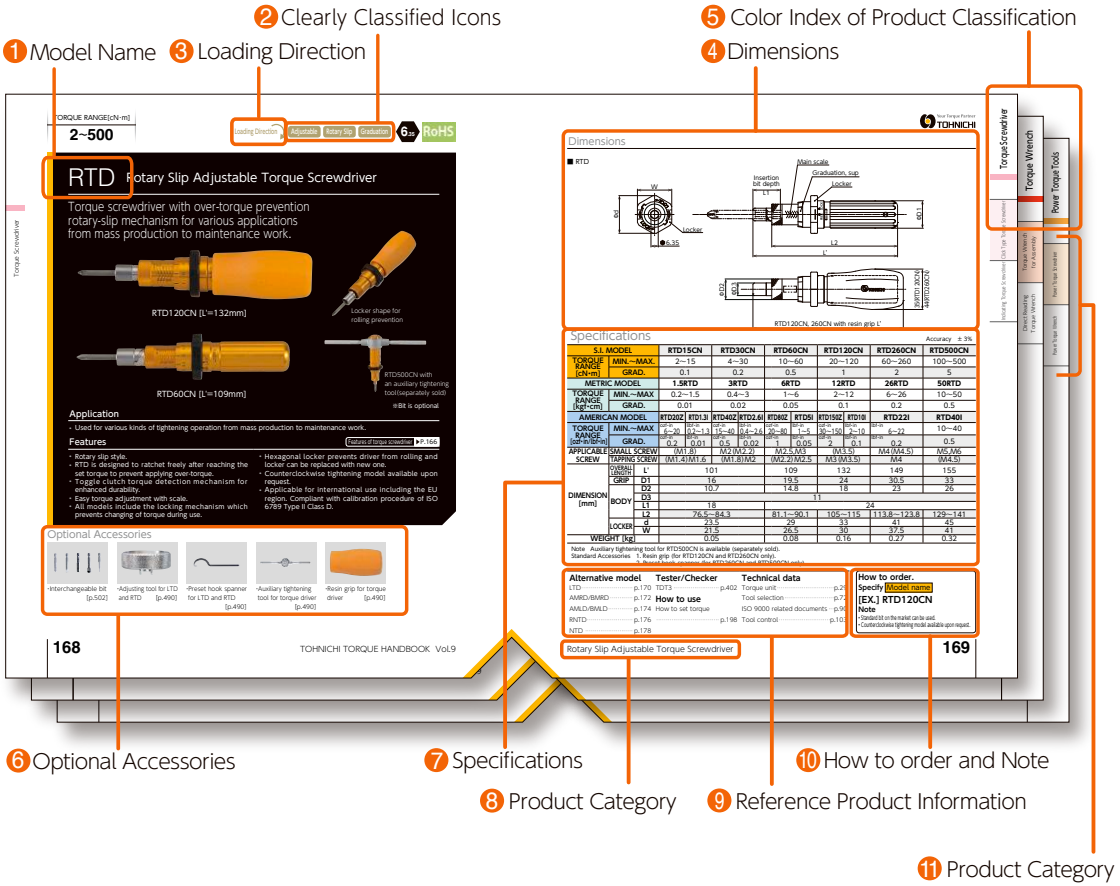
- As the world's only specialist manufacturer of unique torque products, we know our customers and technology better than anyone else, and strive to create innovative products that exceed customer expectations and services that surpass those that have been offered before.

Brand Value Brand Value

Improving customer product and business reliability

- Through offering torque tools that realize a value greater than the total values of highquality, high accuracy and speed, we enhance the reliability of our customers' products and businesses.

HANDBOOK GUIDE



CUD (Color Universal Design) Engagement

The color perception of human beings is not uniform. In Japan, there are said to be more than five million people who have different chromatic vision from ordinary people due to the difference of gene types or eye illness. Color Universal Design (CUD) is designed to provide information accurately to variety of people, taking into consideration those with color anomalies.

The CUD scrutinized inconsistent color schemes in which the number of colors tends to increase in a disorderly manner, and established valuable design concepts for viewing by all people regardless of color anomalies, considering the priority of the information provided and the impressions and psychology of those receiving the information.

Tohnichi is taking into the CUD ideas not only Torque Handbook but also products as TUD (Tohnichi Unified Design) and paying attention to the color schemes and displays to allow eye-friendly viewing for many people irrespective of individual differences in color vision.

TUD TOHNICHI UNIFIED DESIGN

TOHNICHI PRODUCT CLASSIFICATION

Torque Screwdriver

Torque Wrench

Power Torque Tools

Multiple Unit

Tester/Checker

Torque Measuring Equipment

Optional Equipment

Force Measurement Instrument

Accessories

Pride of the World Brand Leader

Pursuit of Quality

Torque Equipment is a measure instrument, and they are used as a work tool under severe working environment.
Precision and Reliability are required, and also Durability and Usability that are necessary.
Tohnichi provides torque instruments with them to the world.

NEXT TOHNICHI DESIGN

Tradition and design lead a torque equipment to a new era

TOHNICHI
CONCEPT CUBE

[Quiet confidence for Passion and Technology]

Embodying our product durability, stable accuracy, sharp and graceful line of design with robustness on this cube.
The orange color of embossed brand logo expresses our overflowing enthusiasms for manufacturing.

For various kinds of small quantity production- Tohnichi craftsmanship provides torque products with high quality

Tohnichi provides a large variety of torque equipment. There are hundreds torque wrenches in our catalogue and more than 10,000 kinds of specialty made models. We respond to our customers who desire tightening and measuring work effectively and ideally. High Quality Tohnichi products are produced from our factories in Omori Tokyo, Kofu Yamanashi and Tsukuba Ibaraki. Refer page 20 & 21 for R&D information.

Kofu Factory

Kofu factory in Yamanashi surrounded by mountains of Japan Southern Alps, Tohnichi's principal facility of machining and assembling of torque wrenches and drivers.
Tohnichi original production control, similar to "Kanban" system flexibly supports from various kinds of small quantity to mass production.
This factory includes a machine shop where milling machines and presses are used for torque wrench production.
At the assembly side, there are more than 30 number of torque wrench testers and torque driver tester which are traceable to accredited standards, and are used to control Tohnichi productions.

Machine Pressing for Torque Wrench

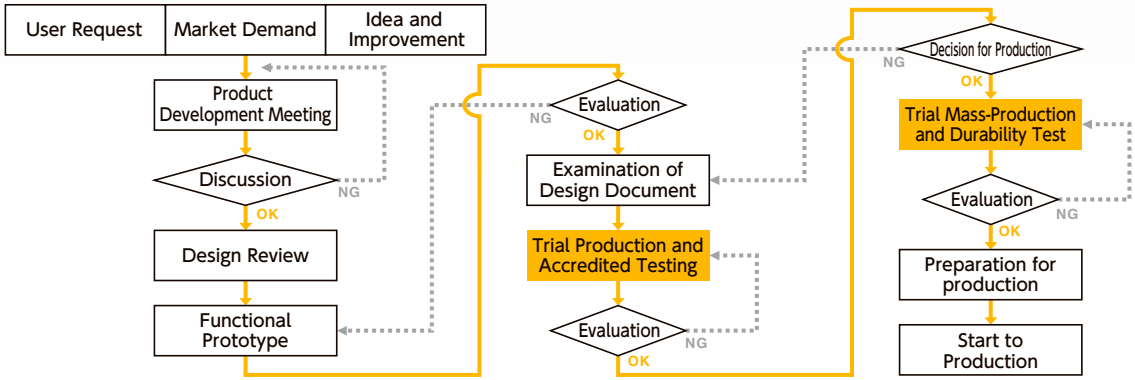
Calibration of tester by a reference standard in inspection room.

Measuring Torque Value of Torque Driver

Measuring Torque Value in Assembling Process

TF ▶P414 TDT3-G ▶P402 Traceability ▶P81

Flow Chart: From development to production



※Under the accredited and durability test, each products meet more than 100,000 cycles at highest torque value.

Omori Factory

Omori factory in Tokyo mainly produces electric and digital torque equipment including: TF, automatic torque tester, CEM3-G-BT, digital torque wrenches, STC2-G, digital torque screwdriver and others.
Under actual Tohnichi assembling process of torque wrench testers, each fasters are tightened by using error proofing methods.

Tightening Assurance System at Omori factory

STC2-G ▶P184 RNTDFH ▶P194 CEM3-G-BT ▶P314
Tightening System ▶P64

Tsukuba Factory

Tsukuba factory in Ibaraki specializes the machining processing. Making Tohnichi interchangeable head, parts of QSPCA models and others. Milling Machines and Hobbing machines are there, and also inspection for dimensions and hardness of products are performed.

Hob Machining Unit for Gear Cutting

Interchangeable Head ▶P492 QSPCA ▶P252

There is always a Tohnichi Torque Solution

Tohnichi Torque Equipment are used in every industry.

Fitting Nuts of Vehicle Tire

A common usage example, there is torque management when changing a tire. Tohnichi global standard model, QL series with resin grip and metal handle model QL-MH are used for passenger car, and DQLE2 models and TW2 are used for large vehicles maintenance.
Tohnichi torque wrenches are also used for motor-sports vehicle. Under inspection or before racing, Tohnichi torque wrenches help to prevent troubles caused by lack of torque control.

DQLE750N2 ▶P224

QL200N4-MH ▶P218

Plastic Bottle Lid

Opening lids on plastic bottles and aluminum cans is controlled using rotary torque. To keep the torque with in usable ranges that are comfortable for consumers, manufactures use Tohnichi digital torque meter TME2 and analog TM.

2TME1000CN2 ▶P432

Aviation & Communications

In the field of aviation,one bad fastener tightening may cause serious accidents.
In space exploration, satellite maintenance and global communication a defect in bolt tightening may cause errors. Tohnichi torque drivers and wrenches are used for these fields.

RTD120CN ▶P168

NSP100CNX8 ▶P278

BTGE-G w/Table ▶P428

Cosmetics

In fact, Tohnichi torque equipment are used on cosmetic industry. Tohnichi torque gauge, ATGE-G and BTGE-G series are used for rotary torque inspection in product development and manufacturing. The rotary torque inspection is suitable for developing cosmetic packaging.

SH Head ▶P492

CLE550N2X27D ▶P234

PHL100N ▶P228

Construction on Ocean

For development of oceanic resources, there are construction of oil/gas product platform, storage and shipping facilities. Tohnichi large scale torque wrenches, QLE2, CLE2, DQLE2 and PHLE2 are separated into two pieces, body and extension bar for storage. Tohnichi, provides a great variety of interchangeable heads, for various application choices.

QL25N5 ▶P212

CEM3-G-BT ▶P314

Solar and Wind Power Generation

Tohnichi torque products are used in the field of solar energy and wind power generated electricity. These facilities are built outside, and make power supply without any trouble. To manage s olar panel mounting, Tohnichi torque wrench provides proper torque assurance. Tohnichi helps natural energy supply.

History of TOHNICHI

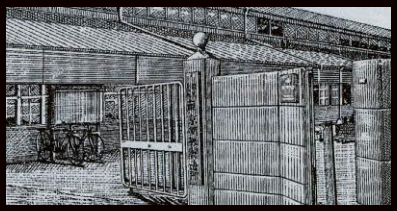
The history of Tohnichi 70 years is the history of torque tools in Japan.

Tohnichi Manufacturing was established in 1949. In that period when the idea of quality control had not yet taken root in the manufacturing industry in Japan, Tohnichi focused on the importance of screw tightening control and developed the country's first torque wrench. The control of torque is fundamental for quality control in various industries, particularly the automobile industry, and over the following 70 years Tohnichi has developed as the leading company for torque products.

1949

Tohnichi Establishment & Torque Wrech

In May 1949, Tohnichi Manufacturing was established through a tie-up between Shu Tsuji, who had led the technical team at the Hitachi Aircraft Company, and Shizuo Nanbu of Tokyo Koki Seizosho Ltd. Tohnichi developed Japan's first torque wrench in 1951, acquiring a major pillar of development. In 1956, Tohnichi developed a torque wrench that used a toggle mechanism followed by a torque screwdriver and torque meter in 1957.



1959

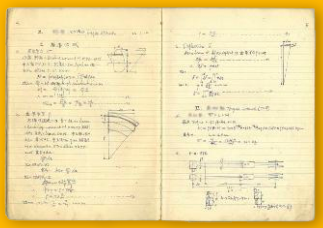
Tokyo Factory and Production Growing

Ten years after the foundation, Tohnichi first company factory, Omori factory was built. The amount of production doubled in one year. The Omori factory was expanded afterwards in 1976. Tsukuba factory in 1969, Kofu factory in 1974 and Kofu second factory in 1986 were built in sequence. Tohnichi current production system has been established.

episode. 1

Birth of Japan's First Torque Wrench

For Tohnichi, which started out as a subcontractor of Hitachi, the development of its own original products was a major dream at the time of its establishment. At that time, the use of impact wrenches by automobile manufacturers was mainstream and difficulties had to be overcome for the introduction of torque wrenches. However, the advantages of Tohnichi's product, such as the accuracy of the torque and the strength of the arm, were recognized, and this greatly contributed to setting the course of the management at the time of the company's establishment. Afterwards, the product lineup was rapidly broadened through the addition of ratchet mechanisms, and of click methods using toggling mechanisms.



Design document of the 1st Japanese torque wrench

1971

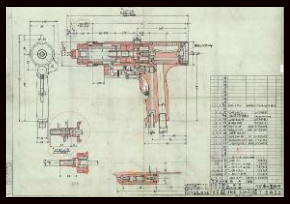
To Europe and America

After the first order from Huber Company in Austria in 1971, Tohnichi has set Tohnichi sales network in Sweden, Denmark, the former West Germany, England, Italy, Greece and Spain. Tohnichi first overseas office was started from Dusseldorf, Germany in August 1971. In 1980s, Tohnichi Europe and Tohnichi America has been established, and Tohnichi torque technologies have begun to be exported to the world.

1968

The world first Air Torque Wrench

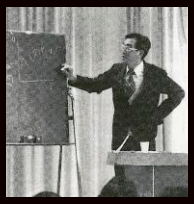
The world first Pneumatic Torque Wrench, “Unitork” was developed, and it changed into tightening operation by the power, and brought dramatic improvement of the work efficiency. The Unitork was awarded Tokyo invention prize, and Tohnichi remarkable torque technology has caught the attention of the whole world.



1976

Quality Improvement

With the spread of quality control idea, Tohnichi as a torque wrench manufacture was expected socially. Torque seminars, explanation of the torque equipment and tightening management were often held, and Tohnichi torque management manual was produced. As well as Japanese, it is translated into English, Chinese, Korean and many languages and the knowledge has been spread all over the world.



episode. 2

Design Ideology of Tohnichi Founder, Shu Tsuji

❶.It is not possible to go from test manufacture to a finished product without finding defects.
❷.When a defect becomes apparent, be certain to face it squarely.
❸.Try to pin down the cause of the defect. Any phenomenon will not occur without a reason.
❹.Do not make easy improvements in a haphazard manner simply according to appearances.
❺.There is surely a way to realize any wish for improvement. Young people and others may say, “There is no way to improve this product further”, but they should be made to consider more deeply.
❻.Repeatedly try to make improvements a number of times without giving up. If the design has been revised 3-5 times, a fairly good product will be realized.
❼.Prioritize quality rather than price.

1989

Advanced Function with Industrial Design

"High-Quality Product" means with advanced function with upgrade intelligence. Reviewed Tohnichi services and products, and introduced industrial design to develop products. Tohnichi products design changed to be more user-friendly and comfortable to use.

1999

Provision of Torque Knowledge

In 1999, the 50th anniversary of the establishment, "Torque Center" as a base of outbound service was opened. Also, "Torque Handbook" covered much technical information of torque was published, and Tohnichi service has been expanded. Tohnichi have started exhibition to international trade show such as Tokyo Motor Show and Koelnmesse, and begun to show knowledge of the torque equipments.

2014

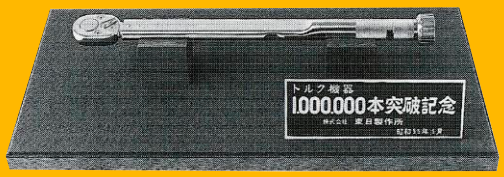
Further Evolution

As a top maker of torque tools, Tohnichi established "Tohnichi Technical Center" which became a base of torque technology. It is completed on March, 2014. Tohnichi was the first company setting up "a torque standard room "officially registered by measurement law and also established "Product examination room" for the breakdown test of torque wrench/driver and "measurement room" for various analyses. Besides, solar panels are installed on the roof of Tohnichi Technical Center, machine processing factory, and product warehouse. Tohnichi contributes to prevention of global warming by the CO2 reduction.

episode. 3

1 Million Torque Tool Sales in Total

In 1980, the total number of torque tools sold by Tohnichi since its founding exceeded one million units. The fact that only 100,000 torque tools were sold in the 14-year period from the company's start to 1964, when the Japanese economy was booming due to high economic growth and the Tokyo Olympics, shows how rapid the growth became during the following 16 years. Another major cause of this growth can be said to be the spread of recognition of the indispensability of torque control in improving product quality and safety.



2008

Widespread Tohnichi Global Network

As Tohnichi entered the 21st century, it has proceeded to expand its manufacturing and sales bases both in Japan and overseas. In 2002, Tohnichi established a manufacturing base in Shanghai, China, while in 2006 it set up a Torque Center in Tohnichi Europe to begin service and support for users and dealers in the EU zone. In 2008, theTohnichi subsidiary Tohnichi America opened its Atlanta Office to enhance support for users and dealers in the southern United States. In the future, Tohnichi will continue to globalize its manufacturing, sales, and servicing to contribute even further to worldwide safety and assurance through its torque technology.

2017

Attract a great deal of public attention at the Tokyo Motor Show.

At the 45th Tokyo Motor Show 2017, Tohnichi released Next-generation digital torque wrenches, such as "CEM4.0+" capable of face authentication function, "Pokayoke CAM" instruction for the correct tightening order by a CCD camera, "JIXY" bolt tension measurement wrench and "Partner torque wrench TONY" which can communicate with operator and works together as reference exhibit.
These were taken up not only by visitor but also in the media, and received a lot of voices wishing to be released early after the exhibition.


CEM4.0+


POKAYOKE CAM


JIXY


TONY

episode. 4

Supporting the Needs of the Era for Safety of

Large-size Vehicle Wheels with TW1000N

From around 2003, the torque control of large-sized vehicle wheel nuts became an issue of social concern in Japan, and sales of theTohnichi DQLE1000N torque wrench for large-sized vehicle wheel nut tightening showed rapid growth. In 2007, the year that Tohnichi's total sales of torque tools surpassed 6million units, the company exhibited torque multiplier wrench exclusively for large-sized vehicle wheel nut tightening as a reference product at the Tokyo Motor Show in response to the need for "One person to be able to carry out tightening easily, cheaply and precisely". Sales of this model are due to begin next year as the torque multiplier wrench for truck & bus TW1000N.

Tightening tasks for bolts Pursuing the fundamentals, Think about screws

Throughout our 70 year history, we have specialized in High precision torque devices, Continually researching and developing more effective ways to tighten bolts and screws. Our mission is to support our customers in making high quality products.

Tohnichi Mfg. Co., Ltd.
CEO
Osamu Tsuji

Products demonstrating our desire to help customers improve their product quality

Thank you for your interest in our Tohnichi Torque Handbook. We're glad you're looking at all of the products Tohnichi has to offer, and call your attention especially to the technical data section that begins on page 25. Once every five years, we publish the latest information on torque management, to support and thank our customers.

Information in the Handbook ranges from effective bolt and screw tightening to inspections and reliability assurance.

In 1951 we developed the first torque wrench to be manufactured in Japan, and since then we have released a wide variety of products. Design drawings for that first wrench were recently discovered within our company premises (see page 10). Hand-written calculation formulas for the design are still readily visible. The drawings attest to the qualities the developers wanted: tough, durable, easy-to-use, capable of tightening tasks at the torque required.

The many formulas attest to the importance Tohnichi Manufacturing has always placed on high precision, safety and quality improvement. This dedication, continuing uninterrupted to this day, is also seen in R&D efforts in support of customer workmanship, greater value, functionality, and need fulfillment.

Better torque device design for greater customer satisfaction

Our goal is to continue designing and manufacturing torque devices that are one step ahead of the market. New products we release in the future will have the same

and screws: while aiming for future.

and imagine the possibility

Innovation torque vision of Tohnichi

The Tohnichi Concept Cube illustrates three key properties for tools: tough, durable and easy to use.

tough, precision-oriented characteristics of our current devices, while incorporating new design elements and the latest technologies.

Product design reflecting Tohnichi Manufacturing's identity

Hand-friendly, sturdy, easy to use: These qualities are part of the "personality" of Tohnichi's torque devices. They also indicate the direction our new products will take. Their personality can be demonstrated in condensed form by the Tohnichi Concept Cube. Stylish lines and surfaces, shapes for fluid motion, toughness, striking orange as our corporate color — these all express our technical expertise and dedication to effective workmanship. By taking responsibility for the quality and precision of our own products, Tohnichi wants to grow with our customers. Let us play a part in your drive for excellent workmanship.

The product designer who created the Tohnichi Concept Cube Mr. Someya talks about the future of Tohnichi design.

Product designer
Representative Director of Someya Design Co., Ltd.

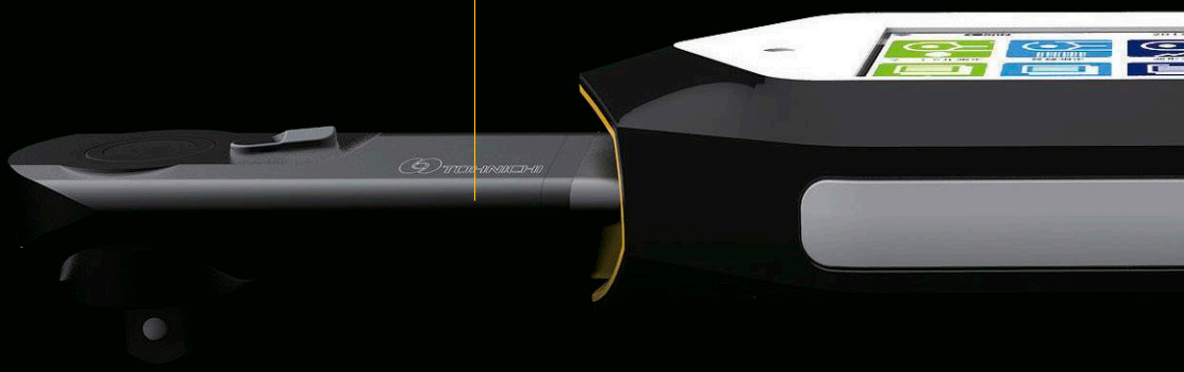
Shusaku Someya

Shusaku Someya

Born in Chiba Prefecture, Japan in 1976. Graduated from Nihon Kogakuin College, Hachioji Campus, after specializing in Industrial Design
Worked for two manufacturers of household products and a design agency, then set out on his own and established Someya Design Co., Ltd in 2018.
Offers services for a wide range of manufacturing industries, from concept and product design to graphic and interface design.

Imagine | next-generation

Innovation | torque vision of Tohnichi



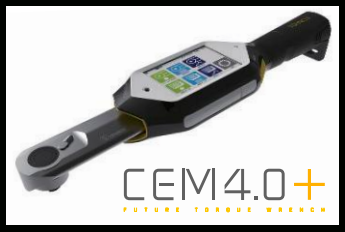
The torque wrench that packs in Tohnichi's technologies for the future.

Next-Generation Digital Torque Wrench
CEM 4.0+

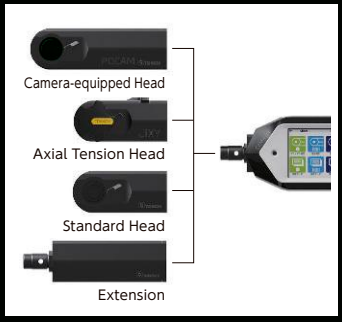
LCD touch panel for all kinds of possibilities Sound, light and vibrations to inform your work

"Use today's technologies for the torque wrenches of the future." This goal was at the heart of a project to develop a next-generation concept model for Tohnichi, and the result was the groundbreaking CEM 4.0+ digital torque wrench. It boasts a 3.5 inch thin-film-transistor (TFT) liquid crystal touch panel. It comes with facial recognition for worker identification, WiFi connectivity, Bluetooth® technology, and a camera. Characters, sound, light and vibrations help ensure the job is completed accurately. Waveform measurement graphs indicate torque and rotation angle. IC chip permits automatic torque value corrections. The device has memory for 10,000 measurement data items, and enhances safety with a traceability function for recording tightening task information (e.g., who did the tightening, where, and was it completed as required?).

The normal head can be interchanged with the Pokayoke (error-proofing) camera head or axial tension head, extending CEM 4.0+ functionality further. Attach the Pokayoke camera head to use the camera to determine location. Prevent double tightening and manage tightening task order, without the need for a cumbersome system. Attach the axial tension head for axial tension measurements, which are increasingly required for engine development, etc. With a conventional tool, you may be required additional bolt strain gauges and ultrasound equipment, but these are unnecessary with this torque wrench, since it can measure bolt axial tension.



Touch screen display with plurality of icons



Expanding various functions by changing head part

# of torque equipment

In-house competition focused on development of a “Dream Torque Wrench”
The concept model for this next-generation torque wrench was presented at the 45th Tokyo Motor Show in 2017.

Communicating with operator as partner.

TONY
PARTNER TORQUE WRENCH

Your Torque Wrench Partner TONY

The CEM 4.0+ leads torque devices into the future. Yes, a worker and a torque wrench can communicate with each other

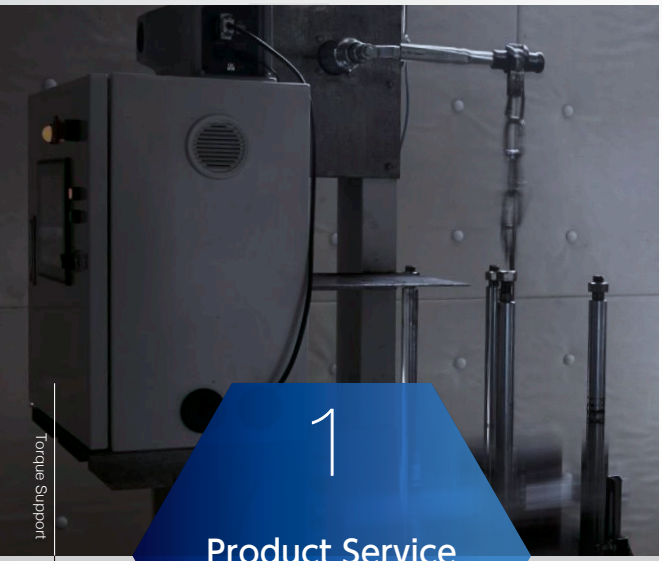
Tony the communicating torque wrench is something like an on-the-job partner for tightening tasks. Using facial recognition technology, a smile lights up the LCD panel when Tony senses an authorized user.
After a greeting, Tony provides task information and the tightening torque value. Tony expresses his emotions: if over-tightening at excessive force occurs he displays a crying face and whirls his eyes. If he is treated roughly or swung about wildly, he will “cry out in pain.”
We at Tohnichi Manufacturing believe that the CEM 4.0+ anticipates the future of torque wrenches, and we intend to transform that future into reality.

In addition to emotion depiction, voiced sound, light and vibrations serve as a guide for the task at hand. Tony can also be used as a training tool.

Display booth at the 45th Tokyo Motor Show in 2017. It demonstrated the Pokayoke (error-proofing) and axial tension measurement capabilities of the new Interchangeable Head System.

TOHNICHI provides the world class support

TOHNICHI Torque Solution



1 Product Service

Torque equipment is required to have durability, ease-of-use, and even more importantly, high accuracy as working tools. Utilizing its know-how and its leading technology built up over the years, Tohnichi delivers highly reliable products.

P20-21

- Research and Development System
- Study on Screw-Tightening Reliability
- Durability Studies
- Torque Measurement Studies

2 Before Service

Tohnichi provides information on the importance of torque, correct usage of products, and disclosure of measurement data. By holding seminars and making various proposals, we are carrying out enlightenment for deepen understanding and knowledge about torque.

P22

- Technical Laboratory and Showroom Opening
- Torque Engineering Seminars
- Web Services
- Technical Reference Materials on Torque Control

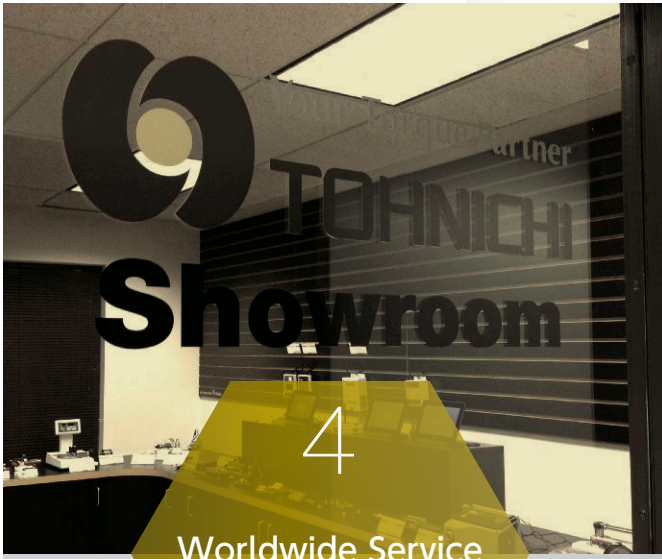
Tohnichi Manufacturing has always been ahead of the times in delivering products that embody new values to customers. From product research to before-sales and after-sales service, Tohnichi strives with various challenges in an aim to further spread and develop torque.

3 After Service

For long and continuous use of products, a supply service is maintained for smooth provid of consumables and parts replacement. In addition, training services are also carried out to allow customers to implement repair and adjustment.

P23

- Issuing of Calibration Certificates
- Calibration and Repair Services
- Workshops for Repair and Adjustment
- Parts Supplies
- Internet Inventory Information Service



TOHNICHI AMERICA CORP.

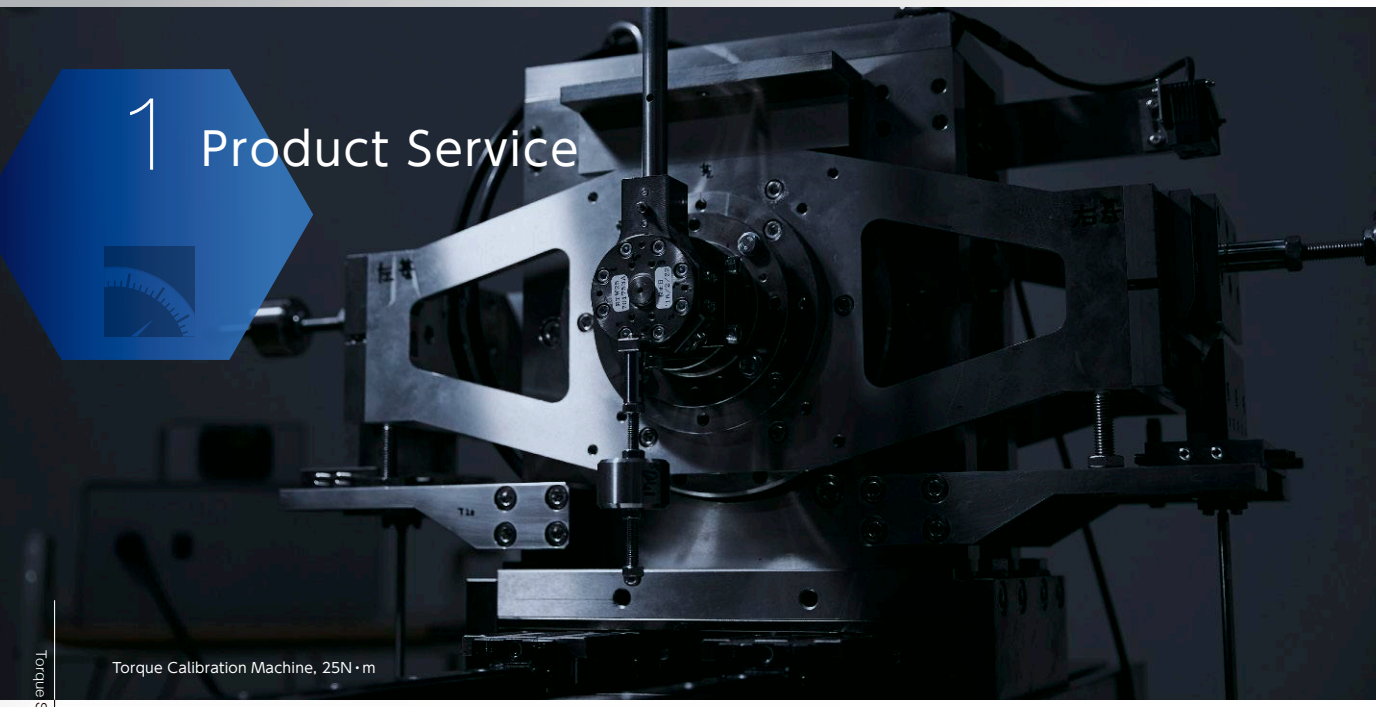
4 Worldwide Service

As the world's leading brand, Tohnichi has developed sales and servicing in 40 countries worldwide including Japan. Aiming to become the global standard, Tohnichi introduces highly detailed services.

P24

- Tohnichi's International Service Network
- The World's Premier Brand
- English Services
- Overseas Seminars
- Technical Laboratory and Showroom at Overseas

1 Product Service

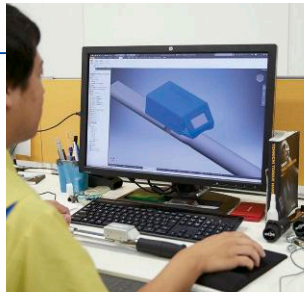


Torque Calibration Machine, 25N・m

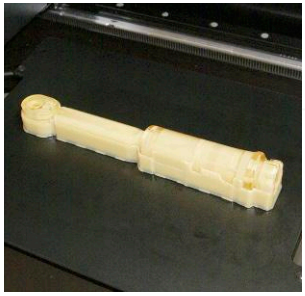
Research and Development System

Torque equipment used as work tools are subject to a severe working environment in daily operation. To lessen the load placed on workers as much as possible, Tohnichi products are developed through the use of sophisticated ergonomic studies.

Among the many Tohnichi innovations resulting from this approach are lightweight tools made of titanium and aluminum, which ar e ideal for the growing numbers of elderly or female workers on the production floor. Also introducing 3D CAD, FEMa(Finite element method) system and 3D-printer, Tohnichi develops the ergonomics designed hand tools.



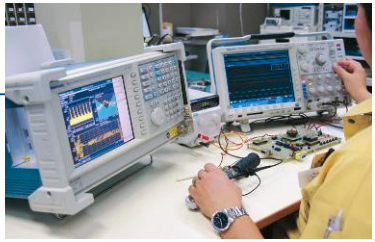
Design and development by 3D CAD



Searching for user-friendly shape by using 3D printer

Studies on Screw-Tightening Reliability

Tohnichi continuously studies to enhance the reliability of bolt tightening. Notably, our studies on error-proofing (Pokayoke) techniques to prevent missed tightening have resulted in the development of FH-type wrenches and marking torque wrenches. These tools help operators to ensure that all bolts are tightened to the appropriate degree. Tohnichi has also developed a variety of checking devices designed to improve the reliability of tightening equipment. Moreover, we provide devices and software to allow management of tightening data on a computer.



Wireless transmitter development for error-proofing (Pokayoke) system

Durability Studies

While torque equipment requires high accuracy as a measurement device, it must also have sufficient ruggedness to ensure its performance as a work tool under severe conditions. In response, Tohnichi conducts research studies to help maintain the required levels of accuracy durability. In fact, the quality of our products is guaranteed via accuracy maintenance and durability testing of 100,000 and 1 million cycles, respectively. Tohnichi endurance test room installs 10 machines, and operates the "type certification test" and "durability test" at the every new production development in order to assure accuracy and durability.
*Please refer P.06 for more information on "type certification test".


Durability test machines


Durability test machines for large size torque wrenches


Durability test machine for torque screwdrivers


Thorough quality management under durability test

Torque Measurement Studies

In order to measure and evaluate the accuracy of torque equipment, a more thorough research and development are required. In November 2011, Tohnichi Accredited Room was registered as an authorized calibration service provider of JCSS secondary stage that assure the traceability to National standard. And until March 2018, reference torque wrenches and manual torque tools has been registered to JCSS. Tohnichi is the first torque calibration service laboratory that acquired all the stage of JCSS in Japan. (Registration No. JCSS0281, refer to P91 for details) In addition, Tohnichi manufactured torque measurement equipments that traced to National standard and we are also working on research of uncertainty in torque measurement.


Calibration of Reference Torque Wrench by Torque Calibration Machine, 25N・m


Torque standard room


Calibration of 100N・m Torque Wrench Calibration Machine by 100N・m Designated Secondary Standard Equipment


JCSS calibration for digital torque wrench tester by maximum 100N・m reference torque wrench

2 Before Service

Showroom in Torque Center

Technical Laboratory and Showroom Opening

Tohnichi operates "Torque Center" in Tokyo, Nagoya, Osaka, Chicago, Belgium and Shanghai. The each Torque Center is consisted of "laboratory" where customers can try our products with the work brought by the customers, "Showroom" exhibits our main products, "Seiner room" for torque related technical seiner, and "Training room" for repair training. Each torque center is useful for solving customer's problem.

Torque Engineering Seminars

Tohnichi's torque engineering seminars are held regularly at our "Torque Centers" We offer several programs oriented towards the business and level required such as considering the necessity for torque instruments, the key points for tightening torque, the correct method of using torque instruments, and repair and calibration for torque tools, These seminars are ideal for employee training and quality improvement initiatives. In foreign countries, seminars are also carried out upon request at your facilities. For more details, please contact Tohnichi or your nearest distributor

Torque Seminar

Web Services

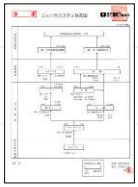
The Tohnichi website provides easy and quick searching for all products including specifications, and accessories, The website also offers a wide variety of torque-related information including technical materials, product catalogs, instruction manuals, CAD drawings, and FAQs.

https://www.global-tohnichi.com

Tohnichi Website

ISO9000 certification Acquisition Support

Tohnichi supports a quality assurance system of torque calibration and the traceablity establishment. The calibration certificate is attached on Tohnichi torque equipment.

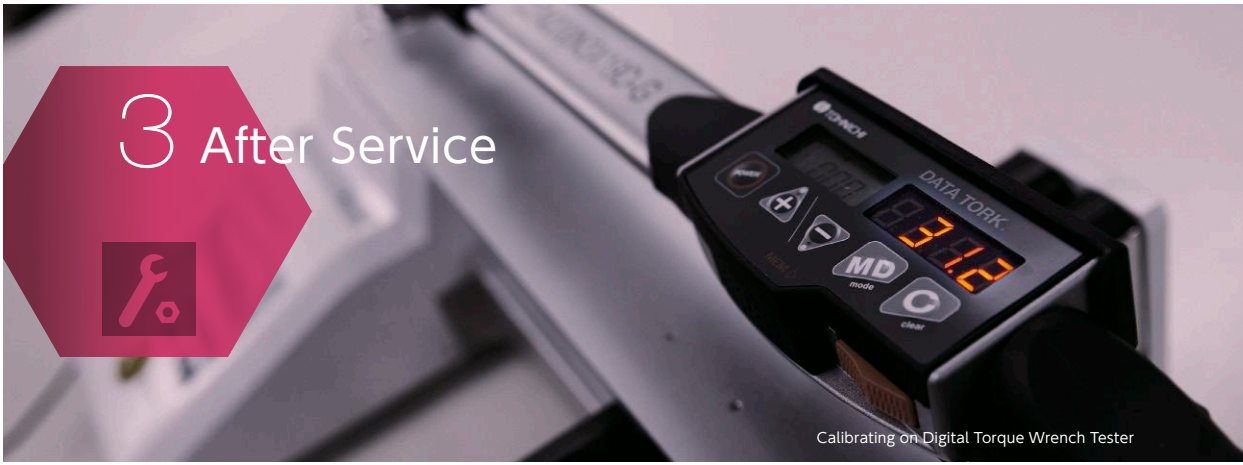


Traceability Chart

Technical Reference Materials on Torque Control

Tohnichi has published a number of papers addressing the basics of bolt tightening and assurance systems. Reference materials are available to download through the Tohnichi website.

①Torque Control Methods ②The Bolt-Tightening Assurance System ③Loosening Mechanisms of Bolt-Tightened Bodies ④Determining Tightening Torque and Tolerance ⑤How to Choose Tightening Tools



3 After Service

Calibrating on Digital Torque Wrench Tester

Issuing of Calibration Certificates

All Tohnichi products are provided with a calibration certificate free of charge at the time of delivery, making it possible for you to begin using the equipment immediately upon delivery. In addition, we can test your equipment after a specified period has elapsed from the date of purchase, and then re-issue certificates for calibration and traceability with a charge.

Workshops for Repair and Adjustment

As measuring tools, torque equipments may need periodic overhauling. Power tools in particular contains rotating parts and thus require special skills for repair. In order for your service personnel to repair and adjust the equipment appropriately, Tohnichi offers seminar on repair and adjustment. We also provide special tools for specific repair needs.

Repair and Adjustment Work

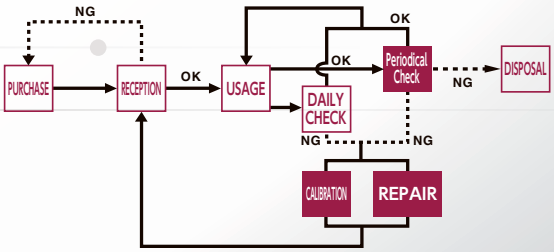
Parts Supplies

Tohnichi supplies consumable parts for all its standard products, facilitating prompt repair by users and service agents. The corresponding part numbers are conveniently located in our Parts List, which can be ordered through Tohnichi or nearest distributor. The parts list is also available to see on the Tohnichi website. For optimal efficiency, the parts inventories are managed by computer system.

Calibration and Repair Services

Tohnichi offers periodic calibration services for torque equipment. Expert calibration and timely repair help ensure the maximum useful life of your equipment, minimizing its overall cost over the long run. In order to ensure that calibration and repairs are carried out effectively, a fixed repair service is carried out.

■ Torque tools control flow chart



Items marked with■are carried out by the user, calibration service firm or manufacturer.

Internet Inventory Information Service

Available the stock inquiry of main products on website

https://www.global-tohnichi.com

Note: The Inventory status displays the end status for that day or the status at the end of the previous day. It is not real time information.

4 Worldwide Service

Tohnichi's International Service Network

Tohnichi sales and service agencies now operate in 80 countries and regions through 200 dealers, supplying products and calibration/repair services to customers around the world. Specific technical skills required for services are provided by the Tohnichi headquarters in Tokyo for the Asia, Oceania and Africa regions, by Tohnichi America for the North/South American and Canadian regions, and by Tohnichi Europe for the European and Russian regions.

World's Premier Brand

Tohnichi torque products, as the world's top brand, are now used by choice in over 100 countries and regions worldwide. MRA (Mutual Recognition Agreement) enables our JCSS calibration certificates to be globally valid. Tohnichi production facilities satisfy ISO and other national standards indicates Tohnichi as a top global player in the torque product field.

English Services

All documents of Tohnichi products, including instruction manuals, calibration certificates and parts lists, are published in both Japanese and English to be used overseas. This torque handbook is also available in English in addition to Japanese in order to aid employee communication for companies expanding worldwide. Tohnichi also publicizes and provides the information such as product information, instruction manuals, and so on at its English website.

Overseas Seminars

Tohnichi conducts technical seminars relevant to torque tightening in the global market place in order to enhance quality improvement of clients' industrial products in countries worldwide. Seminar materials are also prepared in English and other languages and distributed free of charge for use in the training of overseas local employees.

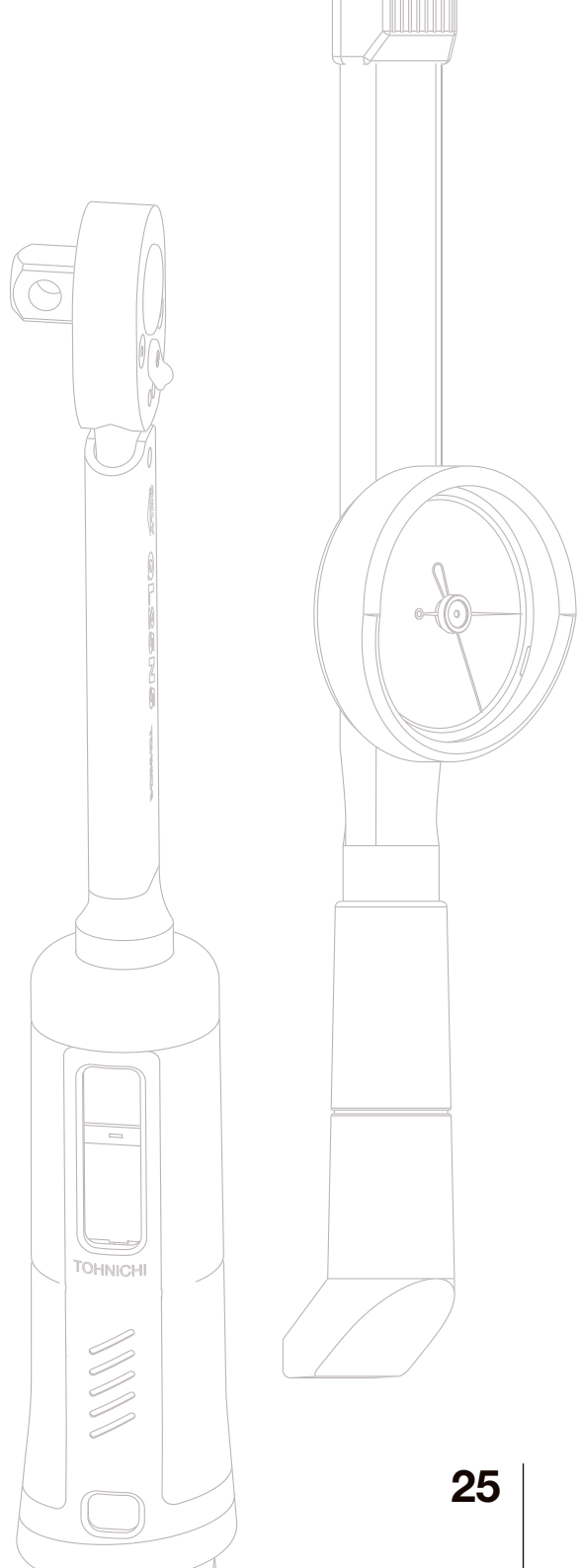
Technical Laboratory and Showroom at Overseas

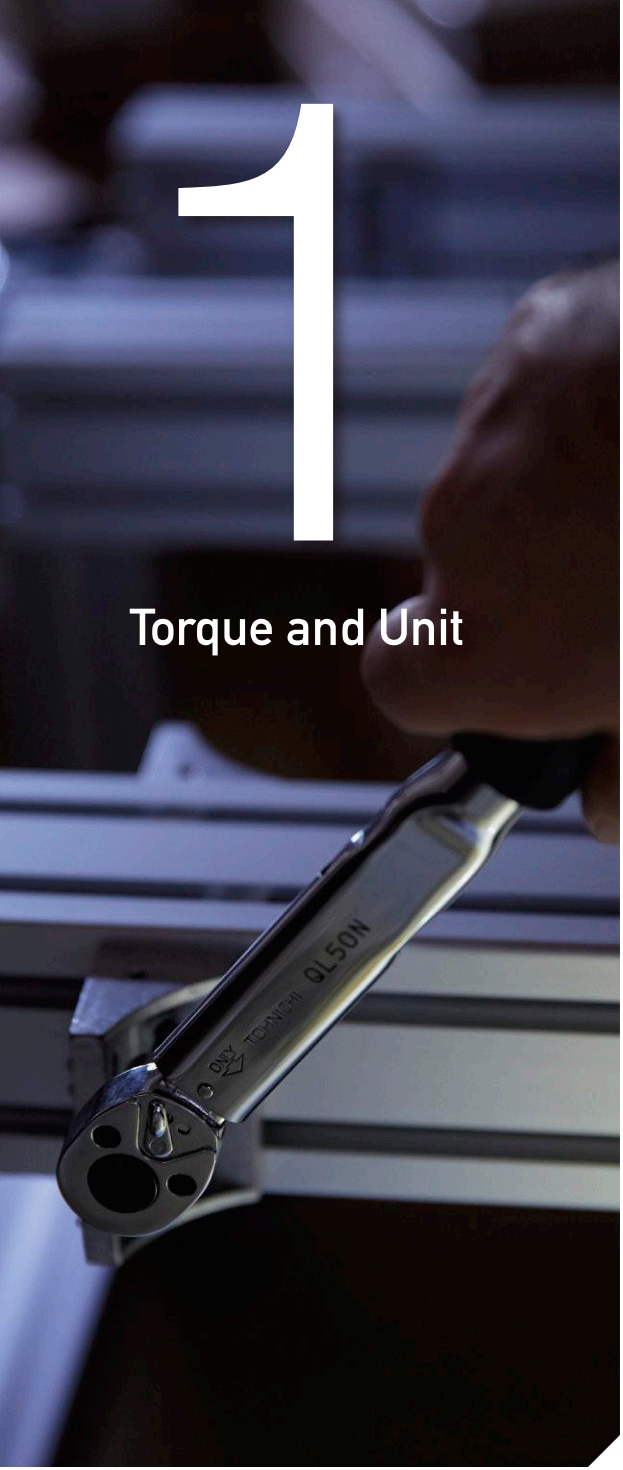
Tohnichi actively offers the various kinds of torque related information and torque solutions at overseas base too. Tohnichi Shanghai/Tohnichi America/Tohnichi Europe always exhibits Tohnichi major products at their showroom, and visitors can actually try our products. Also seminars for torque products' usage are regularly held there which contributes to enhance the quality of industrial products overseas.

东仁扭矩仪器(上海)有限公司

TOHNICHI AMERICA CORP.

TECHNICAL DATA





1 Torque and Unit

1-1 What is Torque?

1-2 Torque Units [SI Metric American]

Unstable Mass and Stable Weight

The newton, N is the international standard unit of "force". Previously, "mass" was an object of weight. "Mass" was expressed "kg", and weight as "kgf" or "kgw". "Mass" means a unchangeable amount and it is same at anywhere on the earth or at zero gravity area. However, "weight" is result by the acceleration of gravity, and "no feeling of weight" and "no weight" at zero gravity condition. There are different gravities on our earth. The state of latitude or land height above sea level make weight differences. For example, there is difference in 1g between 1kg weight at sea level and the top of high mountain, 3776m due to various centrifugal forces.

MASS

WEIGHT (Sensation of weight on your hand)

Acceleration of gravity

Place	Latitude	Altitude [m]	Acceleration of Gravity [m/s²]	Difference from International Standard [%]
International Standard	–	–	9.80665	0
Omori (Tohnichi Tokyo)	35°34'	7	9.79782	−0.090
Kofu (Tohnichi Plant)	35°36'	255	9.79785	−0.090
Sapporo, Japan	43°04'	15	9.80596	−0.007
Naha, Japan	26°12'	21	9.79095	−0.160
Nagoya , Japan	35°09'	46	9.79732	−0.095
Osaka, Japan	34°47'	15	9.79703	−0.098
Hiroshima, Japan	34°22'	1	9.79658	−0.103
Mexico City	19°20'	2269	9.77927	−0.279
Singapore	1°18'	8	9.78066	−0.265
Helsinki	60° 10'	21	9.81901	+0.126

1 Torque and Unit

1-1 What is Torque

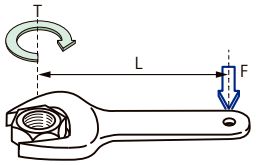
(1) Torque

Torque = Force × Length

The force required to rotate an object, the "force moment" and "rotation moment", is known as torque.

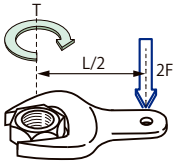
Torque (T) is shown as the product of the force (F) and the length (L).

T=F× L



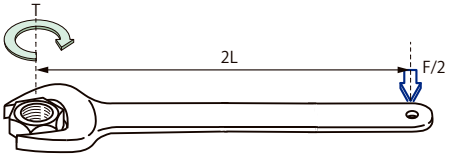
= 2F × L/2

Doubled force with a half length is same torque.



= F/2 × 2L

Halved force with double length is same torque.



(2) Weight and mass

■ Force unit

[N] (newton) SI unit

One newton [N] (≈ 0.1 [kgf]) is the force caused by accelerating a mass of 1kg at 1m/s^2.

[kgf] (kilogram·f) old JIS unit

■ Mass unit

[kg] (kilogram)

■ Length unit

[m] (meter)

1-2 Torque Units [SI Metric American]

(1) Unit

■ Sl unit [N·m]

1000[mN·m]=100[cN·m]=1[N·m]=0.001[kN·m]

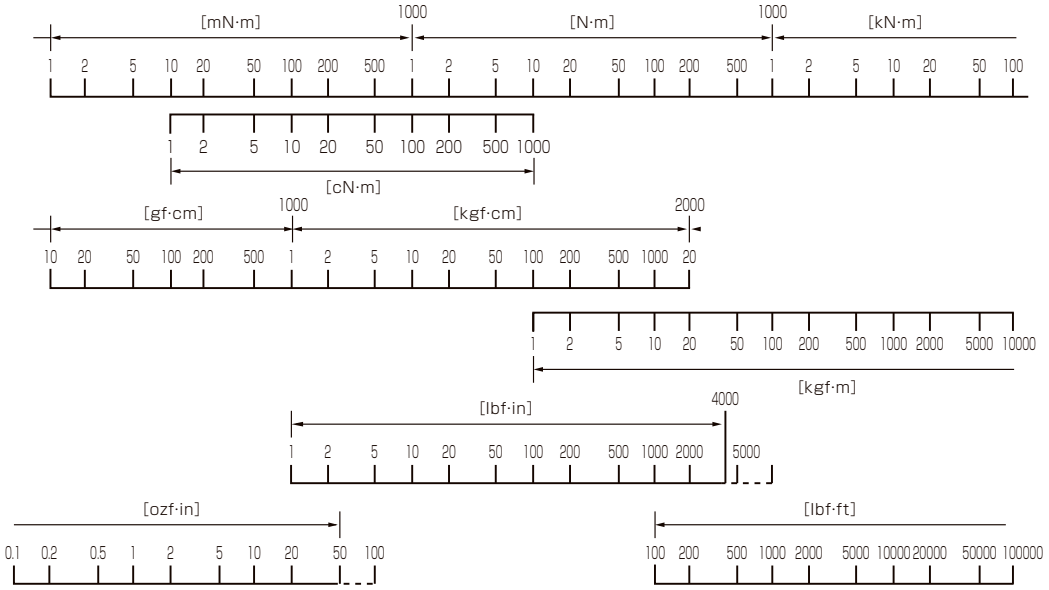
■ Metric unit [kgf·cm]

1000[gf·cm]=1[kgf·cm]=0.01[kgf·m]

■ American unit [lbf·in]

16[ozf·in]=1[lbf·in]=0.0833[lbf·ft]

■ Example of Torque Ranges



1-2 Torque Units [SI, Metric, American unit]

(2) Unit of Torque and Conversion Values

	SI unit system			Metric (Gravity) unit system			American unit system		
	mN·m	cN·m	N·m	gf·cm	kgf·cm	kgf·m	ozf·in	lbf·in	lbf·ft
1mN·m =	1	0.1	0.001	10.2	0.0102	0.000102	0.142	0.00885	0.000738
1cN·m =	10	1	0.01	102	0.102	0.00102	1.42	0.0885	0.00738
1N·m =	1000	100	1	10200	10.2	0.102	142	8.85	0.738
1gf·cm =	0.0981	0.00981	0.0000981	1	0.001	0.00001	0.0139	0.000868	0.0000723
1kgf·cm =	98.1	9.81	0.0981	1000	1	0.01	13.9	0.868	0.0723
1kgf·m =	9810	981	9.81	100000	100	1	1390	86.8	7.23
1ozf·in =	7.06	0.706	0.00706	72.0	0.072	0.00072	1	0.0625	0.00521
1lbf·in =	113	11.3	0.113	1150	1.15	0.0115	16	1	0.0833
1lbf·ft =	1360	136	1.36	13800	13.8	0.138	192	12	1
Country/Region	Japan, China, Europe			Asia			US, Aircraft industry		

1 [N·m] = 10.1972 [kgf·cm] ≈ 10.20 [kgf·cm]
1 [kgf·cm] = 0.0980665 [N·m] ≈ 0.0981 [N·m]
Note: 3 Significant Digits.

Conversion example:
T = 25.0 [kgf·cm]
= 25.0 x 0.0980665
= 2.4516625 [N·m]
≈ 2.45 [N·m]

(3) [kgf·cm] ([kgf·m]) to [N·m] Conversion Value

Conversion value 1[kgf·cm]=0.0980665[N·m]
1[kgf·m]=9.80665[N·m]

kgf·cm

	0	1	2	3	4	5	6	7	8	9
10	0.981	1.08	1.18	1.27	1.37	1.47	1.57	1.67	1.77	1.86
20	1.96	2.06	2.16	2.26	2.35	2.45	2.55	2.65	2.75	2.84
30	2.94	3.04	3.14	3.24	3.33	3.43	3.53	3.63	3.73	3.82
40	3.92	4.02	4.12	4.22	4.31	4.41	4.51	4.61	4.71	4.81
50	4.90	5.00	5.10	5.20	5.30	5.39	5.49	5.59	5.69	5.79
60	5.88	5.98	6.08	6.18	6.28	6.37	6.47	6.57	6.67	6.77
70	6.86	6.96	7.06	7.16	7.26	7.35	7.45	7.55	7.65	7.75
80	7.85	7.94	8.04	8.14	8.24	8.34	8.43	8.53	8.63	8.73
90	8.83	8.92	9.02	9.12	9.22	9.32	9.41	9.51	9.61	9.71
100	9.81	9.90	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7

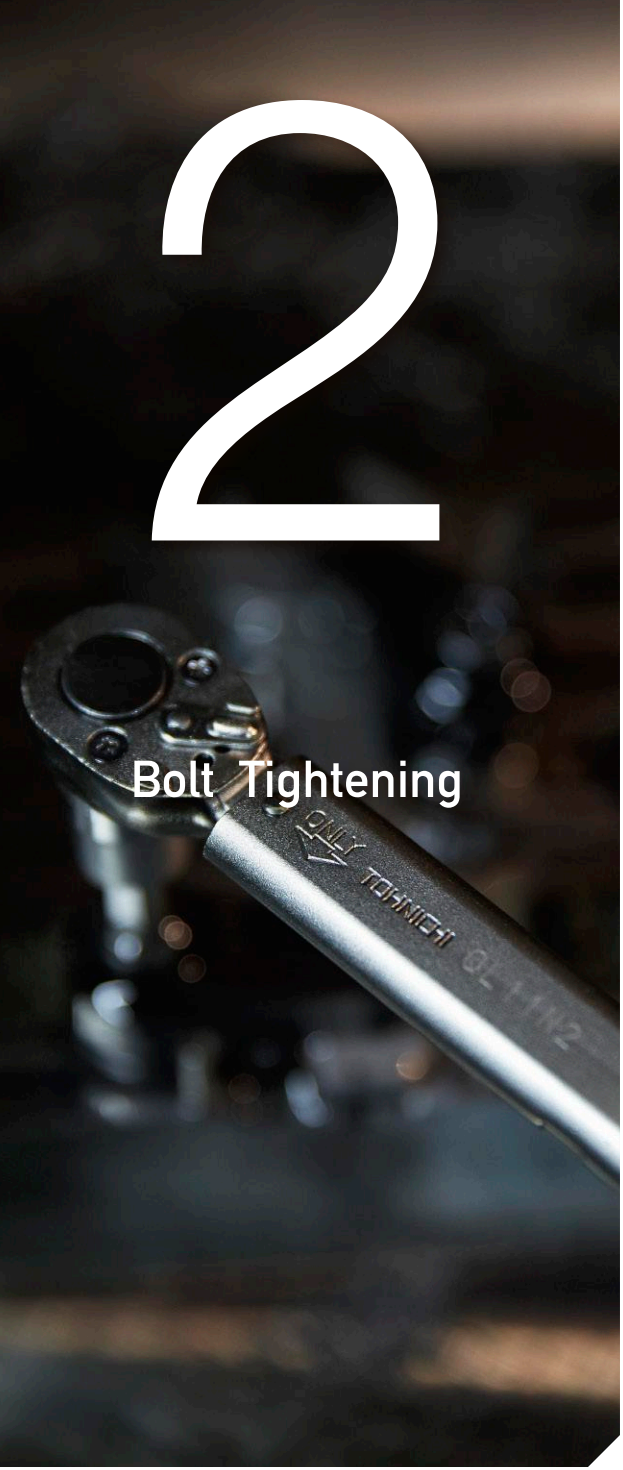
kgf·cm

	0	10	20	30	40	50	60	70	80	90
100	9.81	10.8	11.8	12.7	13.7	14.7	15.7	16.7	17.7	18.6
200	19.6	20.6	21.6	22.6	23.5	24.5	25.5	26.5	27.5	28.4
300	29.4	30.4	31.4	32.4	33.3	34.3	35.3	36.3	37.3	38.2
400	39.2	40.2	41.2	42.2	43.1	44.1	45.1	46.1	47.1	48.1
500	49.0	50.0	51.0	52.0	53.0	53.9	54.9	55.9	56.9	57.9
600	58.8	59.8	60.8	61.8	62.8	63.7	64.7	65.7	66.7	67.7
700	68.6	69.6	70.6	71.6	72.6	73.5	74.5	75.5	76.5	77.5
800	78.5	79.4	80.4	81.4	82.4	83.4	84.3	85.3	86.3	87.3
900	88.3	89.2	90.2	91.2	92.2	93.2	94.1	95.1	96.1	97.1
1000	98.1	99.0	100	101	102	103	104	105	106	107

kgf·m

	0	1	2	3	4	5	6	7	8	9
10	98.1	108	118	127	137	147	157	167	177	186
20	196	206	216	226	235	245	255	265	275	284
30	294	304	314	324	333	343	353	363	373	382
40	392	402	412	422	431	441	451	461	471	481
50	490	500	510	520	530	539	549	559	569	579
60	588	598	608	618	628	637	647	657	667	677
70	686	696	706	716	726	735	745	755	765	775
80	785	794	804	814	824	834	843	853	863	873
90	883	892	902	912	922	932	941	951	961	971
100	981	990	1000	1010	1020	1030	1040	1050	1060	1070

Note: 3 Significant Digits.



2 Bolt Tightening

Torque and Tension

Why tighten screws?

Screw tightening is carried out in order to stop objects from moving (to fix them). Followings are major objectives of the screw tightening.

1. For fixing and jointing objects
2. For transmitting driving force and braking force
3. For sealing drain bolts, gas and liquid

The fixing force at this time is called the axial tension (tightening force), and the target of screw tightening is to "apply an appropriate axial tension."

Although axial tension control should normally be carried out, because axial tension is difficult to measure, torque control is used for its substitute characteristics that allow tightening administration and operations to be carried out easily.

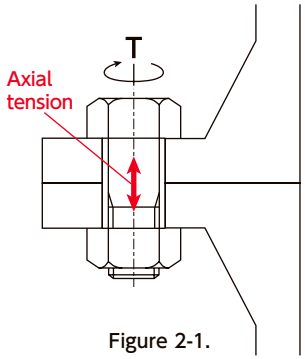


Figure 2-1.

Enhance reliability with combination of fixing, transmitting, preventing leakage and others.

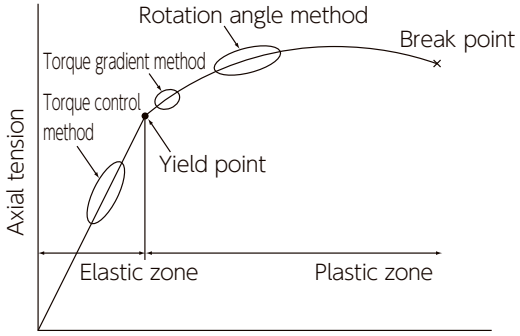
2-1 Various Tightening Methods

Various tightening methods

Table 2-1. Various tightening methods

Tightening method	Description	Advantages and disadvantages
Torque control method	Bolt tightening is controlled by specific torque value. This is the most widely used method.	It is reasonable way for tightening control and operation. Tightening torque is not influenced by the bolt length so easy to standardize. The Bolt efficiency will be low due to wide tolerance of the tension.
Rotation angle method	The tightening is managed by rotting angle which start from the seating point of the bolt head. Tightening is conducted by specific angle from the snug torque.	Tightening within plastic zone gives lower dispersion of axial tension and easy the operation. Since tightening conducts beyond the yield point, there is limitation for additive load to the joint or difficulty for re-tightening. It is difficult to define the tightening angle.
Torque gradient method	The tightening is managed by the variation of the torque gradient against rotating angle at the yield point. The variation is monitored and carried out arithmetic process by an electronic device.	Since the dispersion of the axial tension is small, it is possible to design the bolt efficiency large. Inspection for the bolt itself is possible even after tightening. Tightening is conducted beyond the yield point and the tightening device is expensive, so it is hard to adopt the same method in the service field.
Elongation measurement method	Tightening is controlled by the elongation of the bolt, generated by bolt tightening. Elongation is measured by a micrometer, ultrasonic, or an embedded gauge sensor in a bolt.	The dispersion of the bolt is very small. Tightening within the elastic zone is available. The efficiency of the bolted joint is large. Additive loading and bolt re-tightening are possible. The bolt end faces must be finished. The tightening cost is high.
Loading method	By tightening the nut while tensile load is applied to the bolt, tightening is controlled by the generated tensile force after releasing the load.	Axial tension can be directly controlled. Torsion stress of the bolt is not generated. The tightening device and bolts are specially made. High cost.
Heating method	Tightening is controlled by the variation of the elongation before and after heating the bolt.	Space and force are not required for tightening. There is no clear relation between the heat and axial tension. Temperature setting control is difficult.

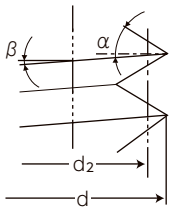
Figure 2-2. Tightening control methods



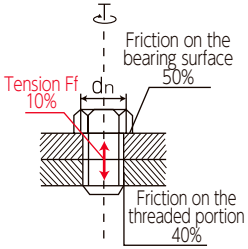
2-2 Screw and Torque

Relation formula between screw and torque

Figure 2-3.
Detail drawing



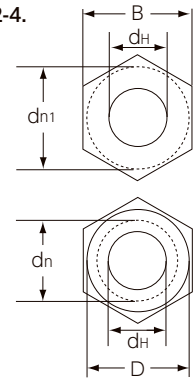
Relational drawing



T : Torque ·····[N·m]
F : Axial tension··· [N]
d_2 : Pitch diameter [mm] (See P.132 Table 8-1)
d_n : Pitch diameter of bearing surface
·····[mm] (See P.132 Table 8-1)
μ : Friction coefficient of threaded portion
····· (See P.36 Table 2-2)
μn : Friction coefficient of bearing potion
·····(See P.36 Table 2-2)
α : Half angle of screw thread · ISO Screw 30°
β : Lead angle [tan β] · (See P.132 Table 8-1)

Formula of pitch diameter of bearing surface (d_{n1}, d_n)

Figure 2-4.



Formula of screw (1)

Reference literature: "Theory and calculation of threaded fasteners" Akira Yamamoto (Yokendo Co., Ltd.)

$$T = Ff\left\{\frac{d_2}{2}\left(\underbrace{\frac{\mu}{\cos\alpha}}_{\text{Friction on the threaded portion}} + \underbrace{\tan\beta}_{\text{Tension Ff}}\right) + \underbrace{\mu_n}_{\text{Friction on the bearing surface}}\frac{d_n}{2}\right\} \div 1000$$

Example: For a M8 bolt at Ft = 8000 [N], the tightening torque is

From P.132 Table 8-1. $d_2 = 7.188$ [mm]
$dn_1 = 11.96$ [mm] (Hexagon nut style)
$\tan\beta = 0.0554$

From P.36 Table 2-2.
$\mu = \mu n = 0.15 \quad \alpha = 30°$

$$T = 8000\left\{\frac{7.188}{2}\left(\frac{0.15}{\cos 30°} + 0.0554\right) + 0.15\left(\frac{11.96}{2}\right)\right\} \div 1000$$
$$= 13.8 \text{ [N·m]}$$

a. Hexagon bearing surface (first type nut, bolt)

$$d_{n1} = \frac{0.608B^3 - 0.524d_H^3}{0.866B^2 - 0.785d_H^2}$$

B: Hexagon width across flats [mm] d_H: Bearing surface inside diameter [mm]

b. Round shape bearing surface (second, third type nut)

$$d_n = \frac{2}{3} \cdot \frac{D^3 - d_H^3}{D^2 - d_H^2}$$

D: Bearing surface outside diameter [mm] d_H: Bearing surface inside diameter [mm]

Formula of screw (2)

$$T = K \cdot d \cdot Ff \text{ or } Ff = \frac{T}{K \cdot d}$$

K: Torque coefficient (See P.36 Table 2-2)
d: Nominal size of screw [mm]

Example: Axial tension to tighten a M20 screw to T = 400 [N·m]

d =20 [mm] K = 0.2 (See P.36 Table 2-2)

$$F = \frac{400}{0.2 \times 20 \div 1000} = 100000 \text{ [N]}$$

2-3 Torque Coefficient

(1) Formula of torque coefficient

$$K=\frac{1}{2d}\left[d_2\left(\frac{\mu}{\cos\alpha}+\tan\beta\right)+\mu_n\cdot d_n\right]$$

d is the nominal screw diameter [mm]

(2) Variable Torque Coefficient

Table 2-2. Torque coefficient and friction coefficient

Lubrication	Torque coefficient Min. - Avg. - Max.	Friction coefficient Min. - Avg. - Max.
General machine oil Spindle oil Machine oil Turbine oil Cylinder oil	0.14~0.20~0.26	0.10~0.15~0.20
Low friction oil Double sulfurous molybdenum Wax based oil	0.10~0.15~0.20	0.067~0.10~0.14
Fcon Bolt tension stabilization (See P.482)	0.16~0.18~0.20	0.12~0.135~0.15

Note: The values in this table are for standard screw joints. They are not applicable for special conditions.

$K \approx 1.3\mu + 0.025$

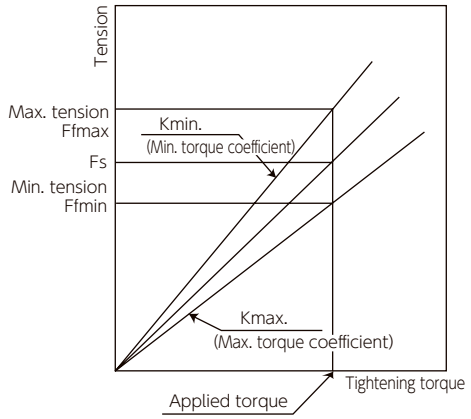
Min. and max. indicate the width of dispersion ($\pm 3\sigma$). The variation width will be smaller if the conditions are limited. (by lubrication oil, shape, etc.)

(3) Fluctuated axial tension with same applied torque

Factors of fluctuated axial tension

- **Lubrication**
- **Machine factors of the bolted Joint**
- **Environment**
- **Tightening speed**
- **Reutilization screw**

Figure 2-5. Relation between tightening torque and tightening axial tension



Example: Applying same torque value, how the axial tension varies when the torque coefficient is changed.

F = T / (K.d)

Nominal diameter: d = 10 [mm] = 0.01 [m]
Tightening torque: T = 24 [N·m]
Torque coefficient: Kmin. = 0.14, K = 0.2, Kmax. = 0.26

Kmin. = 0.14

Fmax=24 / (0.14×0.01) =17140 [N]

Kmax. = 0.26

Fmin=24 / (0.26×0.01) =9230 [N]

K = 0.2

Fs=24 / (0.2×0.01) =12000 [N]

2-4 Method for Determining Tightening Torque

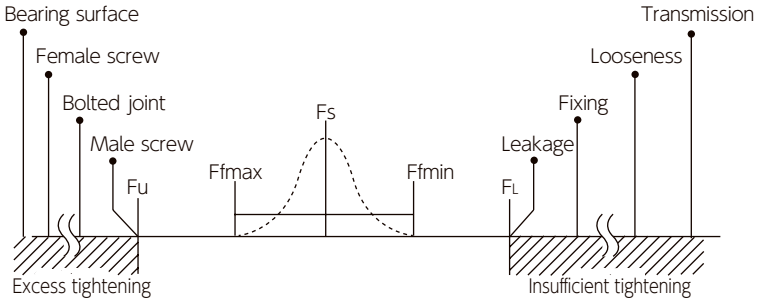
(1) Applying appropriate tightening torque

Male screw strength
Female screw strength
Strength of bolted joint
Bearing surface strength

$Fu > Fmax \sim Ffs \sim Ffmin > F_L$

Fixing
Sealing
Transmission
Looseness

Figure 2-6. Applying appropriate tightening torque



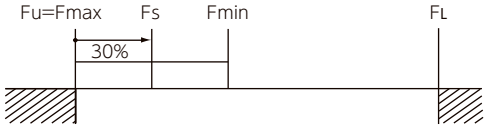
(2) Methods for determining tightening torque

Table 2-3. Methods for determining tightening torque

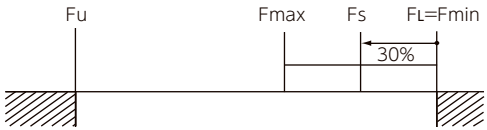
1. Standardization	To establish company standardization of tightening torque. (See P.38 Figure 2-8)
2. Confirmation of the present tightening torque	To establish the present tightening torque and confirm it.
3. Method based on breaking torque (Determination of upper limit)	To adopt 70% of the breaking torque as the tightening torque for screw joints. (Ffmax = Fu)
4. Method based on axial tension (Determination of lower limit)	To adopt 130% of the minimum required tightening torque, the level that prevents loosening, as the tightening torque. (Ffmin = F_L)
5. Method based on axial tension measurement	To specify the tightening torque as the optimal axial tension by measuring with an axial tension meter.

Figure 2-7. Various defective joints

Method based on breaking torque point



Method based on minimum required torque



2-4 Method for Determining Tightening Torque

(3) Standardization of Tightening Torque

Relation between Screw and Torque

Calculation formula

$T = K \cdot d \cdot F$ (JIS B 1083)

$As = \frac{\pi}{4}\left(\frac{d_2+d_3}{2}\right)^2$ (JIS B 1082)

$d_3 = d_1 - \frac{H}{6}$

$H = 0.866025P$

$\sigma = \frac{F}{As}$

T : Tightening torque [N·m]

K : Torque coefficient 0.2 ($\mu \approx 0.15$)

d : Nominal diameter of bolt [mm]

F : Axial tension [N]

As: Stress area of bolt [mm²] (JIS B 1082)

d_2 : Effective diameter of bolt [mm] (JIS B 0205)

d_3 : Value of 1/6 of fundamental triangle height subtracted from root diameter of bolt (d_1) [mm]

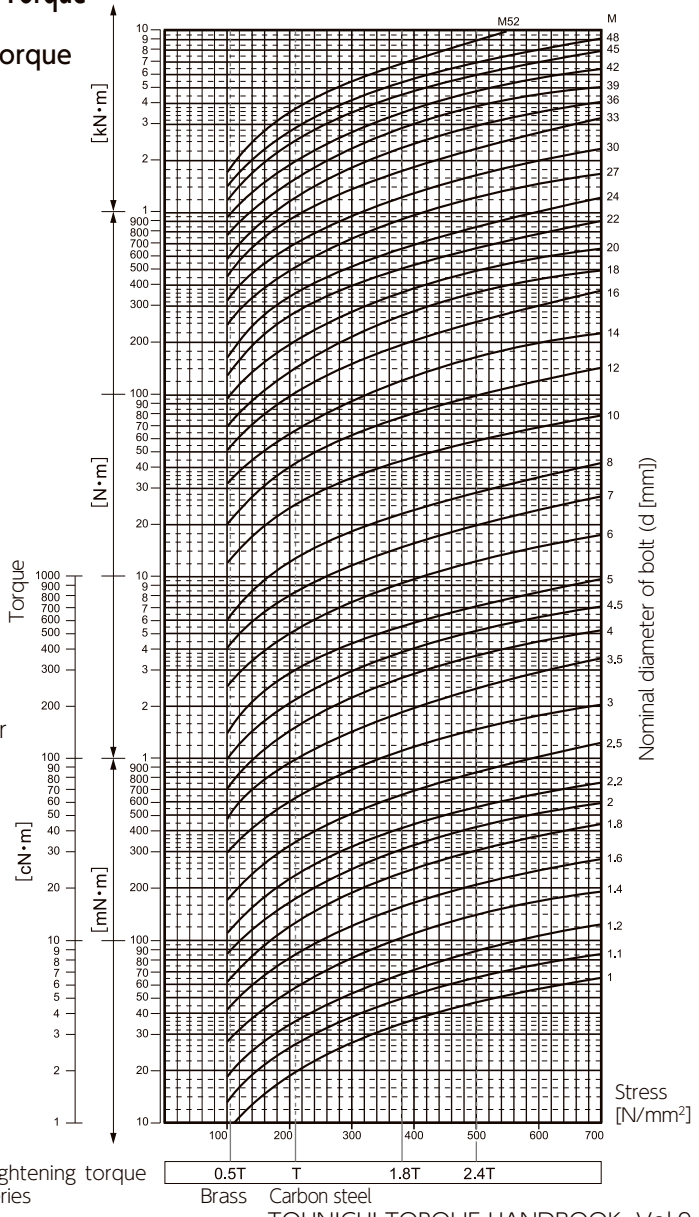
d_1 : Root diameter of bolt [mm] (JIS B 0205)

H : Fundamental triangle height [mm]

P : Pitch [mm]

σ : Tensile stress of bolt [N/mm²]

Figure 2-8. Relation between screw and torque



Standard tightening torque

Table 2-4. Standard tightening torque [N・m] (Reference value)

Nominal diameter	T [N・m]	0.5T series [N・m]	1.8T series [N・m]	2.4T series [N・m]
M1	0.0193	0.00965	0.0347	0.0463
(M1.1)	0.0272	0.0136	0.0490	0.0653
(M1.2)	0.0369	0.0185	0.0664	0.0886
(M1.4)	0.0578	0.0289	0.104	0.139
M1.6	0.0853	0.0427	0.154	0.204
(M1.8)	0.129	0.0645	0.230	0.310
M2	0.174	0.0870	0.310	0.418
(M2.2)	0.229	0.115	0.410	0.550
M2.5	0.356	0.178	0.640	0.854
M3	0.634	0.317	1.14	1.52
(M3.5)	0.997	0.499	1.79	2.39
M4	1.48	0.740	2.66	3.55
(M4.5)	2.14	1.07	3.85	5.14
M5	2.98	1.49	5.36	7.15
M6	5.07	2.55	9.18	12.2
(M7)	8.50	4.25	15.3	20.4
M8	12.3	6.15	22.1	29.5
M10	24.4	12.2	43.9	58.6
M12	42.5	21.3	76.5	102
M14	67.6	33.8	122	162
M16	106	53.0	190	254
(M18)	145	73.0	263	350
M20	206	102	367	490
(M22)	280	140	504	672
M24	356	178	641	854
(M27)	521	261	938	1250
M30	707	354	1270	1700
(M33)	962	481	1730	2310
M36	1240	620	2230	2980
(M39)	1600	800	2880	3840
M42	1980	990	3560	4750
(M45)	2480	1240	4460	5950
M48	2960	1480	5330	7100
(M52)	3840	1920	6910	9220
M56	4780	2390	8600	11500
(M60)	5950	2950	10700	14300
M64	7200	3600	13000	17300
(M68)	8740	4400	15700	21000

Standard bolt stress: 210 [N/mm²] Stress area of bolt
Round the digit to effective 3 digits.

Table 2-5. Standard tightening torque [kgf・cm] (Reference value)

Nominal diameter	T [kgf・cm]	0.5T series [kgf・cm]	1.8T series [kgf・cm]	2.4T series [kgf・cm]
M1	0.197	0.0984	0.354	0.472
(M1.1)	0.277	0.139	0.500	0.666
(M1.2)	0.376	0.187	0.677	0.903
(M1.4)	0.589	0.293	1.06	1.42
M1.6	0.870	0.435	1.57	2.08
(M1.8)	1.32	0.658	2.37	3.16
M2	1.77	0.887	3.19	4.26
(M2.2)	2.34	1.17	4.20	5.61
M2.5	3.63	1.82	6.53	8.71
M3	6.47	3.23	11.6	15.5
(M3.5)	10.2	5.09	18.3	24.4
M4	15.1	7.55	27.1	36.2
(M4.5)	21.8	10.9	39.3	52.4
M5	30.4	15.2	54.7	72.9
M6	51.7	26.0	93.6	124
(M7)	86.7	43.3	156	208
M8	125	62.7	225	301
M10	249	124	448	598
M12	433	217	780	1040
M14	689	345	1240	1650
M16	1080	540	1940	2590
(M18)	1480	744	2680	3570
M20	2100	1040	3740	5000
(M22)	2860	1430	5140	6850
M24	3630	1820	6540	8710
(M27)	5310	2660	9560	12700
M30	7210	3610	13000	17300
(M33)	9810	4900	17600	23600
M36	12600	6320	22700	30400
(M39)	16300	8160	29400	39200
M42	20200	10100	36300	48400
(M45)	25300	12600	45500	60700
M48	30200	15100	54400	72400
(M52)	39200	19600	70500	94000
M56	48700	24400	87700	117000
(M60)	60700	30100	109000	146000
M64	73400	36700	133000	176000
(M68)	89100	44900	160000	214000

Multiply the table(N・m) on the left by 10.1972 and rounded to effective 3 digits.

Screws and applicable “T” series

Table 2-6. Screws and applicable “T” series

	Standard T series	0.5T series	1.8T series	2.4T series
Applicable screws (Strengths) (Material)	4.6 ～ 6.8 SS, SC, SUS	- Brass, Copper, Aluminum	8.8 ～ 12.9 SCr, SNC, SCM	10.9 ～ 12.9 SCr, SNC, SCM, SNCM
Axial tension standard value [N/mm²] Min - Max	210 160 ～ 300	105 80 ～ 150	380 290 ～ 540	500 380 ～ 710
Application	To be applied to ordinary screws, unless otherwise specified	Male and female screws with copper, aluminum or plastic, for die-cast plastic products	Durable screw joints made of special steel including those affected by additional dynamic loads (Friction clamping)	
Applicable products	Ordinary products	Electronic products	Vehicles, Engines	Construction products

＊The maximum to the minimum of the axial stress is considered as the dispersion of the torque coefficient.
Example: σ max = 210 × (0.2 ÷ 0.14) = 300 [N/mm²]
Torque coefficient: 0.14 (minimum)～0.2 (average) ～ 0.26 (maximum)

2-4 Method for Determining Tightening Torque

(4) Standard tightening torque

Table 2-7. Standard tightening torque and bolt axial tension

Nominal diameter	Stress area of bolt [mm²]	T series				0.5T series			
		Std. tightening torque [N·m]	Std. axial tension Fs [N]	Max. axial tension Fmax [N]	Min. axial tension Fmin [N]	Std. tightening torque [N·m]	Std. axial tension Fs [N]	Max. axial tension Fmax [N]	Min. axial tension Fmin [N]
M1	0.460	0.0193	96.5	137	74.2	0.00965	48.3	68.9	37.1
(M1.1)	0.588	0.0272	124	177	95.1	0.0136	61.8	88.3	47.6
(M1.2)	0.732	0.0369	154	220	118	0.0185	77.1	110	59.3
(M1.4)	0.983	0.0578	206	295	159	0.0289	103	147	79.4
M1.6	1.27	0.0853	267	381	205	0.0427	133	191	103
(M1.8)	1.70	0.129	358	512	277	0.0645	179	256	138
M2	2.07	0.174	435	621	335	0.0870	218	311	167
(M2.2)	2.48	0.229	520	744	400	0.115	261	373	201
M2.5	3.39	0.356	712	1020	548	0.178	356	509	274
M3	5.03	0.634	1060	1510	813	0.317	528	755	406
(M3.5)	6.78	0.997	1420	2040	1100	0.499	713	1020	548
M4	8.78	1.48	1850	2640	1430	0.740	925	1320	712
(M4.5)	11.3	2.14	2380	3400	1830	1.07	1190	1700	915
M5	14.2	2.98	2980	4260	2290	1.49	1490	2130	1150
M6	20.1	5.07	4230	6040	3250	2.55	2130	3040	1640
(M7)	28.9	8.50	6070	8670	4670	4.25	3040	4340	2340
M8	36.6	12.3	7690	11000	5910	6.15	3840	5490	2960
M10	58.0	24.4	12200	17400	9390	12.2	6100	8710	4690
M12	84.3	42.5	17700	25300	13600	21.3	8880	12700	6830
M14	115	67.6	24100	34500	18600	33.8	12100	17200	9290
M16	157	106	33100	47300	25500	53.0	16600	23700	12700
(M18)	192	145	40300	57500	31000	73.0	20300	29000	15600
M20	245	206	51500	73600	39600	102	25500	36400	19600
(M22)	303	280	63600	90900	49000	140	31800	45500	24500
M24	353	356	74200	106000	57100	178	37100	53000	28500
(M27)	459	521	96500	138000	74200	261	48300	69000	37200
M30	561	707	118000	168000	90600	354	59000	84300	45400
(M33)	694	962	146000	208000	112000	481	72900	104000	56100
M36	817	1240	172000	246000	132000	620	86100	123000	66200
(M39)	976	1600	205000	293000	158000	800	103000	147000	78900
M42	1120	1980	236000	337000	181000	990	118000	168000	90700
(M45)	1310	2480	276000	394000	212000	1240	138000	197000	106000
M48	1470	2960	308000	440000	237000	1480	154000	220000	119000
(M52)	1760	3840	369000	527000	284000	1920	185000	264000	142000
M56	2030	4780	427000	610000	328000	2390	213000	305000	164000
(M60)	2360	5950	496000	708000	381000	2950	246000	351000	189000
M64	2680	7200	563000	804000	433000	3600	281000	402000	216000
(M68)	3060	8740	643000	918000	494000	4400	324000	462000	249000

Nominal diameter	Stress area of bolt [mm²]	1.8T series				2.4T series			
		Std. tightening torque [N·m]	Std. axial tension Fs [N]	Max. axial tension Fmax [N]	Min. axial tension Fmin [N]	Std. tightening torque [N·m]	Std. axial tension Fs [N]	Max. axial tension Fmax [N]	Min. axial tension Fmin [N]
M1	0.460	0.0347	174	248	134	0.0463	232	331	178
(M1.1)	0.588	0.0490	223	318	171	0.0653	297	424	228
(M1.2)	0.732	0.0664	277	395	213	0.0886	369	527	284
(M1.4)	0.983	0.104	371	531	286	0.139	496	709	382
M1.6	1.27	0.154	481	688	370	0.204	638	911	490
(M1.8)	1.70	0.230	644	921	496	0.310	861	1230	662
M2	2.07	0.310	783	1120	602	0.418	1050	1490	804
(M2.2)	2.48	0.410	936	1340	720	0.550	1250	1790	962
M2.5	3.39	0.640	1280	1830	985	0.854	1710	2440	1310
M3	5.03	1.14	1900	2710	1460	1.52	2530	3620	1950
(M3.5)	6.78	1.79	2560	3650	1970	2.39	3410	4880	2630
M4	8.78	2.66	3330	4750	2560	3.55	4440	6340	3410
(M4.5)	11.3	3.85	4280	6110	3290	5.14	5710	8160	4390
M5	14.2	5.36	5360	7660	4120	7.15	7150	10200	5500
M6	20.1	9.18	7650	10900	5890	12.2	10200	14500	7820
(M7)	28.9	15.3	10900	15600	8410	20.4	14600	20800	11200
M8	36.6	22.1	13800	19700	10600	29.5	18400	26300	14200
M10	58.0	43.9	22000	31400	16900	58.6	29300	41900	22500
M12	84.3	76.5	31900	45500	24500	102	42500	60700	32700
M14	115	122	43600	62200	33500	162	57900	82700	44500
M16	157	190	59400	84800	45700	254	79400	113000	61100
(M18)	192	263	73100	104000	56200	350	97200	139000	74800
M20	245	367	91800	131000	70600	490	123000	175000	94200
(M22)	303	504	115000	164000	88100	672	153000	218000	117000
M24	353	641	134000	191000	103000	854	178000	254000	137000
(M27)	459	938	174000	248000	134000	1250	231000	331000	178000
M30	561	1270	212000	302000	163000	1700	283000	405000	218000
(M33)	694	1730	262000	374000	202000	2310	350000	500000	269000
M36	817	2230	310000	442000	238000	2980	414000	591000	318000
(M39)	976	2880	369000	527000	284000	3840	492000	703000	379000
M42	1120	3560	424000	605000	326000	4750	565000	808000	435000
(M45)	1310	4460	496000	708000	381000	5950	661000	944000	509000
M48	1470	5330	555000	793000	427000	7100	740000	1060000	569000
(M52)	1760	6910	664000	949000	511000	9220	887000	1270000	682000
M56	2030	8600	768000	1100000	591000	11500	1030000	1470000	790000
(M60)	2360	10700	892000	1270000	686000	14300	1190000	1700000	917000
M64	2680	13000	1020000	1450000	781000	17300	1350000	1930000	1040000
(M68)	3060	15700	1150000	1650000	888000	21000	1540000	2210000	1190000

2-5 Tolerance of Tightening Torque

Tolerance of Tightening Torque

For threaded joints, sometimes more definite tightening control is necessary, while at other times relatively rough control is adequate just so that joints will not loosen. The axial tension will be influenced by the dispersion of the torque coefficient and the tolerance of the tightening torque. In order to limit the axial tension dispersion, it will be meaningless simply to limit the tightening torque tolerance without also limiting the torque coefficient dispersion.

Tolerance of tightening torque

Table 2-8.

Class	Tightening torque		Torque coefficient		Axial tension		
	Torque value	Tolerance	Coefficient	Tolerance	Dispersion		Upper/lower limit (Ratio)
Special	Measured value	±5%	Measured value	±15%	±15%	115～85%	0.75
1st class		±10%		±20%	±20%	120～80%	0.65
2nd class	Standard torque (measured value)	±20%	0.14～0.26※ (0.10～0.20)	±30%	±35%	135～65%	0.50
3rd class	Standard torque	±30%	0.12～0.28※ (0.09～0.20)	±40%	±50%	150～50%	0.35

※( ) Values in brackets are when using disulfide molybdenum or wax as lubrication.

Relation formula of standard deviation

When you require strict bolt management, the following formulas express the relationships using the standard deviation (%) of the dispersion of the tightening torque and the torque coefficient.

Dispersion in axial tension (σn), torque coefficient (σk), and tightening torque (σt) relation

$$\sigma n = \sqrt{\sigma k^2 + \sigma t^2}$$

In order to make $\sigma_n$smaller, it is necessary to make σ_k and σ_t smaller, respectively. Since it is easy to manage the tightening torque, $\sigma_k \approx \sigma_t$ will be set if $\sigma_k = 1/3\ \sigma_t$ is approximately controlled.

Example:

$K = 0.2 \pm 0.06 (3\sigma)$

$$\sigma K = \frac{0.06}{3 \times 0.2} \times 100(\%) = 10(\%)$$

$\sigma t = 3\%$

$\sigma n = \sqrt{10^2 + 3^2} = 10.4\%$

$(3\sigma n = 31.2\%)$

2-6 Tightening of Tension Stability

Tightening Procedures

Various tightening methods for stabilizing the initial axial tension have been devised.

(1) Zigzag tightening

It is recommended to tighten nuts in a diagonal sequence as shown in the drawing.

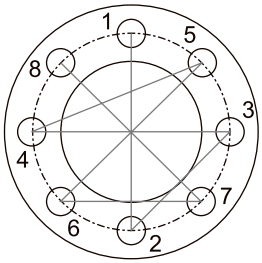


Figure 2-9.

First time…Tighten to around 50% of the specified torque in turns.
Second time…Tighten to around 75% of the specified torque in turns.
Third time…Tighten to 100% of the specified torque in turns.

It is recommended to tighten all the bolts equally, and to avoid applying torque to one or several bolts on one side.

(2) Two steps tightening

The tightening sequence will not follow this drawing if tightening will be done using multiple automatic nutrunners. In the first step the nuts should be tightened provisionally. (50% of the tightening torque)
Next the final tightening should be done with 100% torque. The method consists of tightening in two steps.

(3) Two times tightening

In the case where there will be a delay for axial tension transmission and adequate initial axial tension will not be obtained, such as due to an existing soft part such as packing or rubber in the flap tightened, this is a method of securing initial axial tension by first tightening the nuts with 100% torque and then tightening them once more with 100% torque.

(4) Stabilized tightening

When the bearing will be deformed (including burr and surface roughness) by the tightening, this is a method of preventing initial axial tension drop by tightening the nuts with 100% torque, then loosening them and tightening them once more with 100% torque.

3 Inspecting Tightening Torque

Inspection Method of Applied Torque

Inspecting Tightened Torque Value

Estimate how much torque was applied in the screw tightening, and carry out an inspection of the tightening operation with the following methods.

■ Loosening Torque ■ Retightening Torque

■ Marking ■ T-point

Table 3-1. Methods of inspecting the tightening torque

Method	Loosening Torque	Retightening Torque	Marking	T-Point
Measuring method	Loosen the bolt using a torque wrench and read the torque when the bolt starts moving.	Tighten the bolt further to determine the applied torque. Read the torque when the bolt starts moving again.	Mark the position of the tightened bolt, loosen it and read the torque when retightening it up to the marked position.	When continuing to tighten a bolt that has already been tightened with a torque wrench until the bolt begins to turn again, this torque value can be calculated by using the θ - t wave formula.
Measured torque/ Tightening torque = α	0.6 ~ 0.9 ※(0.8)	0.9 ~ 1.2 ※(1.05)	0.9 ~ 1.1 ※(1.0)	0.9 ~ 1.1 ※(1.0)
Advantages/ Disadvantages	Relatively easy to measure. It is necessary to retighten the bolt. Often used for sizes of M4 or less.	Accuracy is obtained if the point at which rotation begins is distinct. No further work is necessary after the inspection.	Takes time and labor. After the inspection, the bolt is maintained at its original torque.	Measurement will be most accurate when the test piece is secured. The bolt can be left "as it is" after the inspection is complete and no individual variations will result.

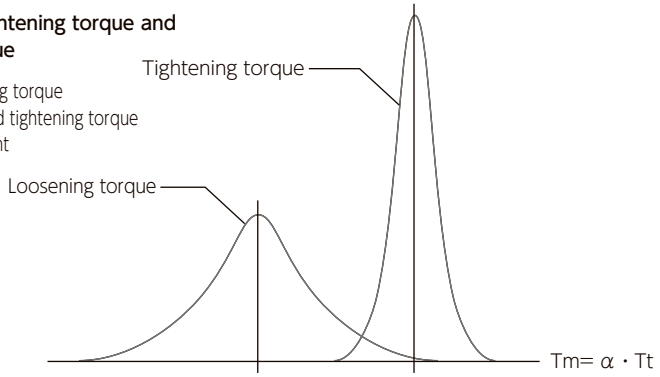
α : Ratio between measuring torque and tightening torque
※ : Approximate value obtained by experiment

Figure 3-1. Variation of tightening torque and loosening torque

$Tm = \alpha \cdot Tt$

$(Tm) \neq Tt$

Tm : Measuring torque
Tt : Estimated tightening torque
α : Coefficient



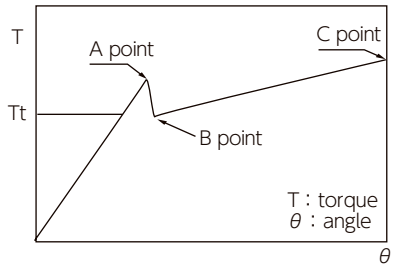
3-1 Retightening Torque Methods

Retightening torque methods

The retightening method requires that additional torque is applied to a bolt or screw which has already been tightened, and then measures the torque value when the bolt just begins to move again. In standard screws:

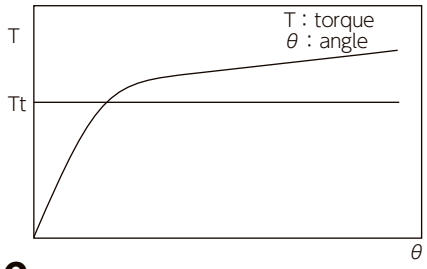
Point A: Torque when the static friction of the screw is exceeded.
Point B: Torque when screw starts to rotate continuously.
Point C: Maximum torque detected by inspection.

Figure 3-2. Typical torque change on retightening



These measuring methods are used according to the accuracy required.

Figure 3-3.



(1) A-point method

Measurment of the torque when a tightened bolt just begins to move again is relativery easy and there is no much the individual differences. But because this method measures the static friction torque, the value will be higher than the actually applied torque (Tt) and the varience is large and relation is low.

Sometimes the maximum value by static friction (A point) may not exist (Figure 3-3).

(2) B-point method

Technical experience is required to read the lowest peak on the retightening inspection and the reading accuracy is not very high, but the measuring value is close to the tightening torque (Tt). Sometimes a clear minimum torque may not exist.

(3) C-point method

Measurement is easy by checking the maximum torque using a memory pointer. But the measurement value may change considerably depending on the operator's sensation and where they stop when the screw starts turning, so individual interpretation and performance can be a large factor. Generally, tightening torque means the C point method. The C point may sometimes show the A point.

3-2 Proposal of New Retightening Method

Advanced retightening T-point method

The retightening torque first starts with the rotation of the head only, and then causes the rotation of the screw, shifting from static friction to dynamic friction, before friction whip subsides to become a stable straight line. (Figure 3-4) Basically this straight line is an extension of the torque angle line figure obtained during the tightening.

Compared with the conventional A, B, and C point methods, the new retightening method (T-point method) will have less dispersion in the measurements, and in addition its central value will almost match the tightening torque. Unlike the A, B, and C point methods, compensation using offsets will not be required. The general offsets and dispersions of the tightening torque for each method in situations where there is no loosening or galling are shown in Figure 3-5.

Figure 3-4. New retightening method

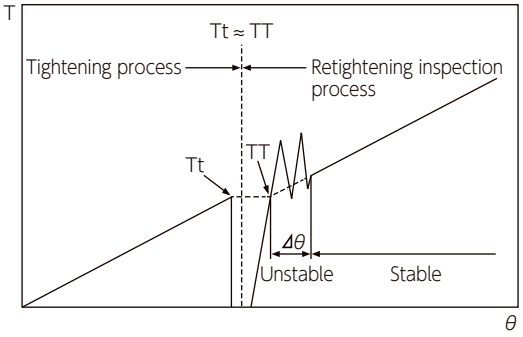
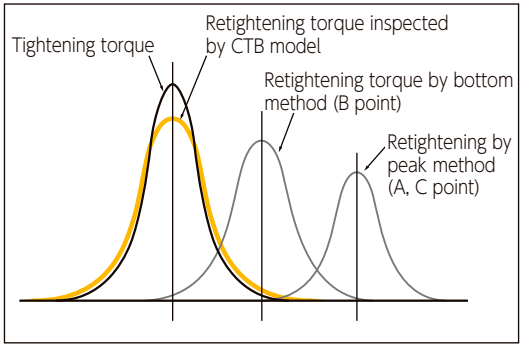
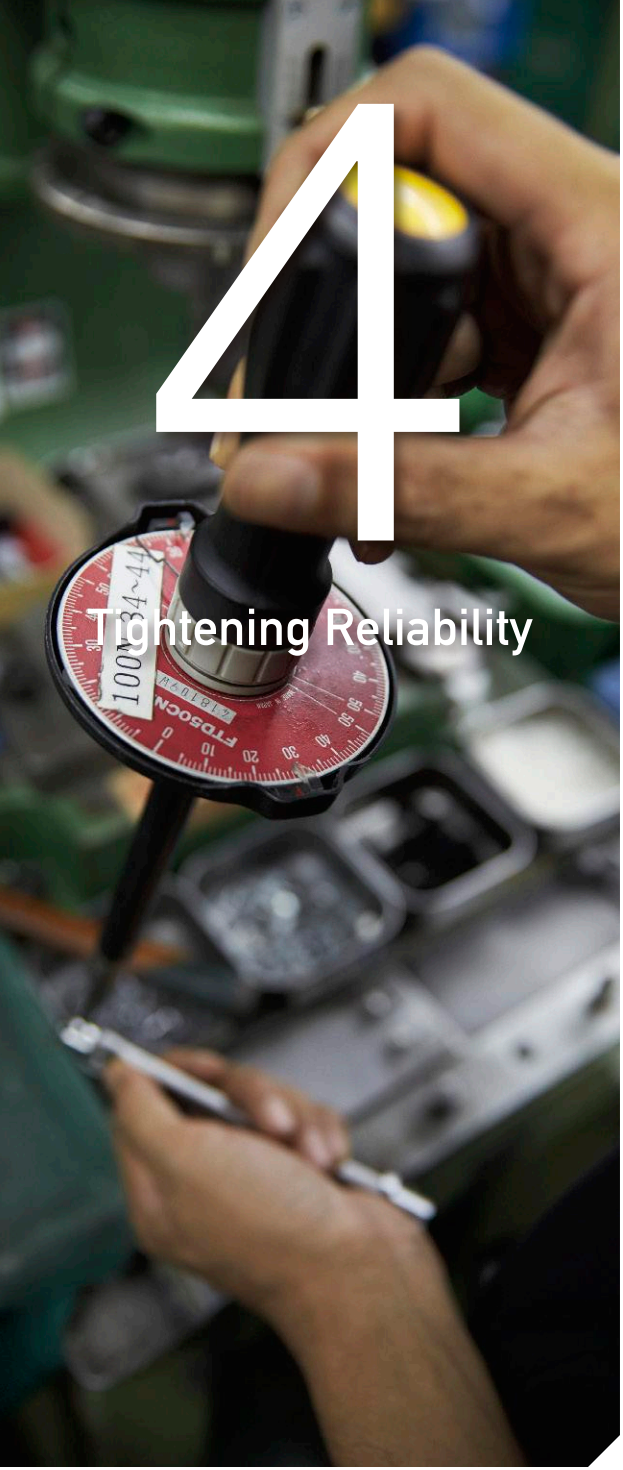


Figure 3-5. Distribution of retightening torque



Strong Points

Easy measurement operation.
Less individual differences on result.
Shorter operation time.
Less dispersion on result.



4 Tightening Reliability

What is Tightening Reliability?

Bolt tightening reliability simply means tightening bolts properly.
However, depending upon the circumstances there are the following assurance levels.

1. To pass tightening inspections (by retightening)
2. To tighten bolts to the required torque (within the tolerance) specified by the drawings
3. To tighten bolts to be the required initial tightening force (initial axial tension)
4. To tighten bolts to be the required working tightening force (axial tension)
5. To achieve the maximum performance of the bolt by using only parts or bolts that are in good condition which do not easily loosen or break and do not create leaks from bolted joints.

Even if the tightening torque is kept constant, the initial axial tension generated will greatly vary. Therefore, the target of "bolt tightening reliability" by the torque method is not to keep the axial tension fixed, but to maintain it within the given dispersion width. It is important not only to improve the reliability of the bolt tightening work, but also to link it with one of the assurance levels listed above to avoid generating any problems even if the axial tension used is varied. This is the feature of "bolt tightening reliability".

4-1 Characteristic Factors of Defects in Bolt Tightening

Four M characteristic factors of defects in bolt tightening

1. MAN (Tightening operator human error)
- Missed tightening
- Improper tightening tool usage

2. METHOD (Improper tightening specification)
- Wrong tightening value specification
- Wrong tightening procedure
- Wrong tightening tool selection

3. MACHINE (Improper tightening equipment)
- Inaccuracy
- Mechanical failure

4. MATERIAL (Improper screw joint material)
- Out of tolerance the parts
- Defection of the material
- Irrelevant lubricant on the thread.

4-2 Characteristic Cause Diagram of Defective Joints

Characteristic cause diagram of defective joints

1. Design quality failure
- ●Miscalculation for the required clamping force
- ●Shortage of the strength for screw joint part
- ●Miscalculation for the initial camping force loss.
- ●Instruction failure of tightening specification
- ●Lack of measures to prevent loosening
- ●Inapplicability of tightening tools
- ●Inapplicability of tightening inspection

2. Improper tightening work by operator
- ●Incorrect tightening procedure
- ●Improper handling of tools by operator
- ●Missed tightening by operator
- ●Instruction failure to operator

3. Improper tightening tools
- ●Usage condition change of the tightening tool
- ●Function failure of tightening tool
- ●Decrease in accuracy of tightening tool
- ●Improper selection of tightening tool

4. Defective bolt joint
- ●Change in torque coefficient
- ●Change in friction of screw thread
- ●Process failure of bolt
- ●Insufficient bolt strength
- ●Bolt size error
- ●Bearing surface right angle defection

5. Failure in the field
- ●Insufficient operator education
- ●Overlook of bolts loosening
- ●Not available any suitable tightening tool for the work
- ●Insufficient instruction for tightening spec

6. System failure
- ●Insufficient bolt tightening standardization
- ●Insufficient tightening specification instruction
- ●Insufficient tightening failure monitoring
- ●Insufficient bolt tightening system
- ●Insufficient education for bolt tightening

→ **Defective Screw Joint**
- ●Damage of joint
- ●Loose fastening
- ●Fixing failure of the bolted joint
- ●Heat or current conduction defect
- ●Leakage of oil or gas

4-3 Bolt Tightening Reliability

Bolt tightening reliability and tightening work

Bolts generate clamping force and can only show their performance after proper tightening work has been completed. However, we cannot correctly check whether a bolt has been correctly tightened or not after the bolt has been tightened. It is therefore important that the operator checks the tightening accuracy while performing the tightening work rather than by carrying out an inspection after the work has been completed. This is called "containing the quality while tightening".

The factors that obstruct the reliability of the tightening work are classified into two categories: machine error due to the tightening tool and human error caused by the operator.

In general, tightening tools are classified by tightening accuracy into three categories shown in Table 4-1. The allowable tolerance of the tightening torque should be appropriately decided and standardized based upon the relation with the allowable dispersion width. Even if tightening is carried out at a higher accuracy than required, the variation in tightening force will not have much effect.

Figure 4-1. Accuracy of tightening torque and dispersion of tightening tension

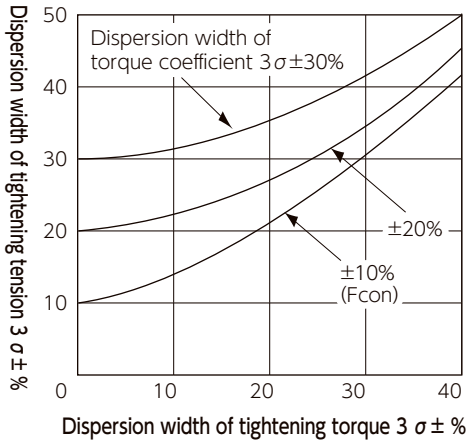


Table 4-1. Tightening method classifications

Method	Mechanism	Accuracy range (3σ)	Tightening Tool
①By guesswork	The operator judges the tightening condition according to the force or sound, and stops the tightening work.	Over ±30%	・Manual wrench ・Manual screwdriver ・Impact wrench (no torque control)
②By maximum capacity	The bolt is tightened by adjusting the pressure or current until the motor stalls or the clutch slips.	±10～30%	・Stall type ・Slip clutch type ・Impact wrench (control type)
③By torque detection	The tightening torque is measured, and when the required torque is reached the tightening is stopped.	Within ±10%	・Torque wrench ・Mechanical type torque control ・Electric type torque control

4-4 Machine Error

(1) Machine error

2 major methods of sustaining torque reliability

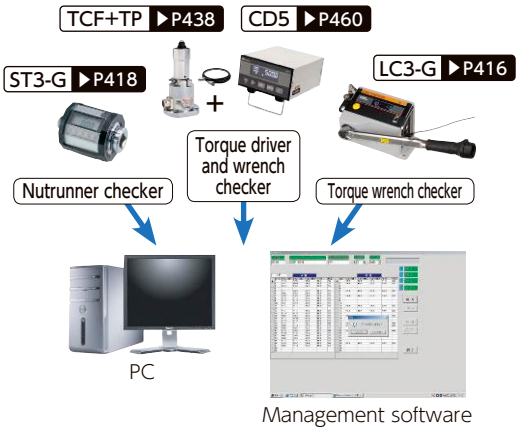
For any tightening tool, sooner or later the tightening torque will change and the accuracy will go out of tolerance due to wear of the tightening tool. In most cases, however, the operator will be unaware of the change, resulting in defects of a large quantity of products. There are two methods required to be carried out to recognize changes in the tightening torque.

The first method uses daily inspections and periodic calibrations to regularly confirm the operating torque of the tightening tool.

(1) Daily inspections

Daily inspections of torque tools before and after carrying out the work keep the occurrence of problems to a minimum. Tools for daily inspections are arranged to be easy to operate and take the minimum of time.

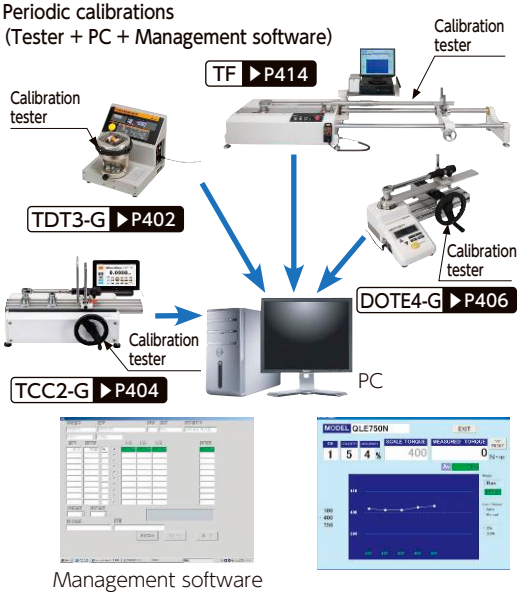
Daily inspections (Checker + PC + Management software)



(2) Periodic calibrations

Periodic calibrations are different from the daily inspection, in that it is necessary to precisely measure the accuracy of the torque tools to assure the torque tools used for the work. One common problem of power tightening tools is that the calibration results often differ from the actual tightening torque. (P.51 Figure 4-2) This difference is due primarily to the fact that the calibration procedure does not accurately replicate the joint hardness or softness (joint coefficient) and it will be important to simulate the actual bolt tightening conditions.

Periodic calibrations
(Tester + PC + Management software)



Note that the checkers and testers used for checking and calibration must themselves be calibrated regularly, and it will be necessary to establish traceability.

4-4 Machine Error

The second method is to sample the tightened bolts and check them by using the retightening torque inspection method to assume the tool tightening torque.

Inspection data management system

Through the development of electronic instruments, tightening torque value and retightening torque values can be monitored and furthermore, recorded. The recorded data can be submitted to a third party for proof in protection against product liability. However, the monitoring should use a measuring system that is independent from the control system of the tightening torque. Otherwise, trouble within the control system cannot be observed.

Using this method, the degree of wear and the tendency of the tightening tools can be predicted and as a result, preventive maintenance becomes possible. Accidental accuracy defects do not usually occur in tightening tools, but if they do, they result in defects in a large quantity of products. Therefore, it is preferable to keep the tool within a repairable range even if this would result in some possible defects relating to the frequency of the periodic calibration retightening inspection.

Digital Torque Wrench

CEM3-G-BT ▶P314 / CTB2-G-BT ▶P330

Wireless Link

Wireless Link

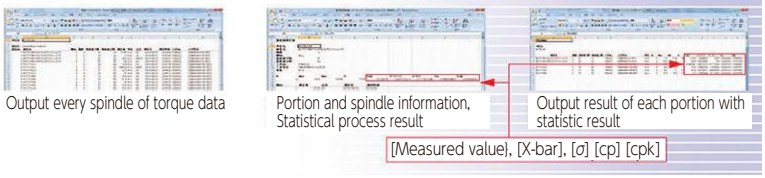
Bar code reader

Inspection Data Management System ▶P358

Wireless Link

TDMS/TDMSHT ▶P468

PC



(2) Joint coefficient

When the static characteristics of torque tools are discussed, only the tightening torque is considered and the rotation of the screw is neglected. But when dynamic characteristics (over-torque measures in nut runners) are discussed, the way the tightening torque increases with the rotation of the screws will become a problem. While this is generally known qualitatively as a "soft joint" or "hard joint", it will be necessary to express this quantitatively. The joint coefficient (e) is identified and written as follows.

[1] Definition of joint coefficient (e)

The relation between the tightening torque and rotation for a screw is shown in Figure 4-2. The joint coefficient (e)at $T = T_0$ for this joint is defined as shown in Formula (1).
Use the rotation angle (θ) in Formula (2)

$$e=\frac{1}{T_0}\left(\frac{dT}{dn}\right)_{T=T_0} \quad \cdots\cdots \text{Formula (1)}$$

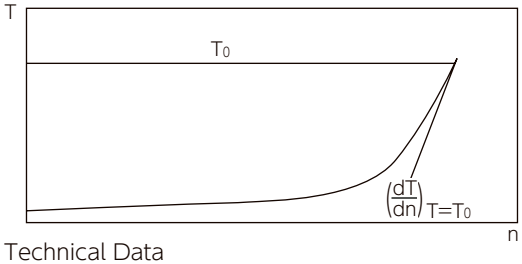
n : Number of screw turns
T_0 : Tightening torque

$$\theta=360n \quad d\theta=360dn$$

$$e=\frac{360}{T_0}\left(\frac{dT}{d\theta}\right)_{T=T_0} \quad \cdots\cdots \text{Formula (2)}$$

θ : Rotation angle of the screw (°)

Figure 4-2



[2] Meaning of the joint coefficient

① To make the explanation easier, when the relation of the torque and amount of rotation (rotation angle) is shown by a straight line, the right formula results. e = 10 means that the tightening torque is reached from snug torque at $\Delta n = \frac{1}{10}$ rotation or $\Delta\theta = 36°$

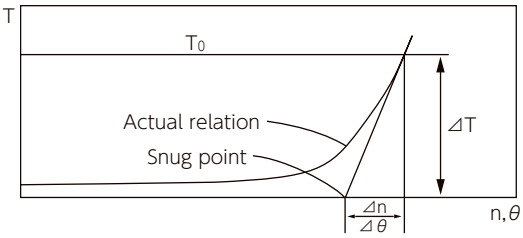
② As the joint coefficient (e) is a non-dimensional figure, it is not changed by the size of the screw.

$$e=\frac{1}{T}\cdot\frac{\Delta T}{\Delta n} \quad \Delta T=T_0$$

$$e=\frac{1}{\Delta n} \quad \text{or} \quad e=\frac{360}{\Delta\theta}$$

$$\Delta n=\frac{1}{e} \quad \Delta\theta=\frac{360}{e}$$

図 4-3



[3] Methods of obtaining the joint coefficient

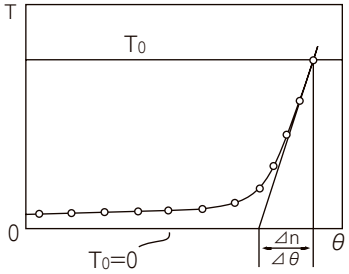
① Method by drawing

Measure the tightening torque and amount of rotation (angle) from the actual screw. (In this case, the origin of the rotation amount, the angle, can be neglected.) Plot on the drawing as shown Figure 4-4, and determine Δn or $\Delta\theta$ from the tangent of the prescribed tightening torque (To).
(e) can be calculated from formulas (3)and (4).

$$e=\frac{1}{\Delta n} \quad \cdots\cdots \text{Formula (3)}$$

$$e=\frac{360}{\Delta\theta} \quad \cdots\cdots \text{Formula (4)}$$

Figure 4-4



② Simple method

Tighten up to 80% of the tightening torque (T_0). Then, use the formula (5) to calculate (e) from the rotation angle ($\Delta\theta$)at the time of retightening up to To.

$$\theta=\frac{72}{\Delta\theta'} \quad \cdots\cdots \text{Formula (5)}$$

$$e=\frac{360}{T_0}\cdot\frac{T_0-0.8T_0}{\Delta\theta'}$$

Example of actual joint coefficient measurement.
*Using the (2) simple method above
Bolt: M8
Tightening torque (T_0): For 13.4 [N・m], 0.8T0 will be 10.7 [N・m]

① Preparation

Place a protractor on the outside of the measuring bolt. (The protractor should have a hole so that the bolt will be in the center.)
Set the line so that the index is on the outside of the socket.

② Measurement

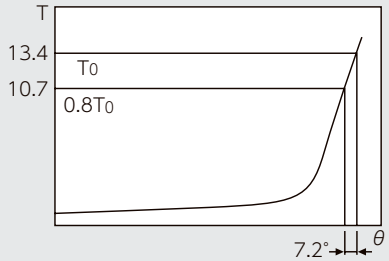
Tighten up to 0.8T_0 (10.7 [N・m]).
Next, align the index of the protractor to "0".
Then tighten to T0 (13.4 [N・m])and read the angle (7.2°).

③ Calculation

From the simple method formula $e=\frac{72}{\Delta\theta}=\frac{72}{7.2}=10$

Medium joints can be calculated from this formula

Figure 4-5



4-5 Human Error

(1) Human error

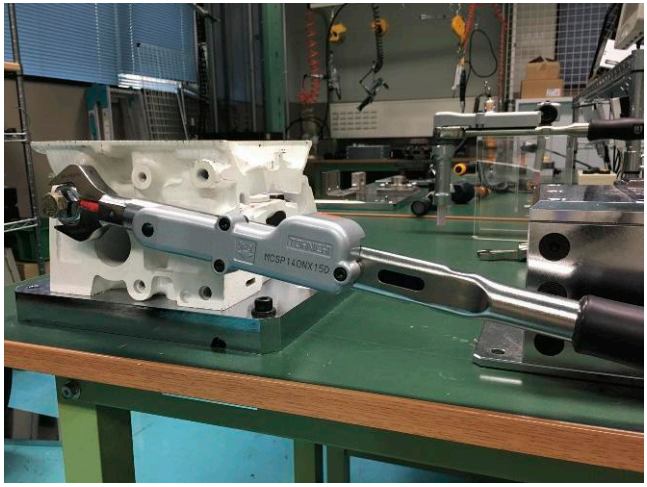
For the reliability of the tightening work, human error is the most difficult problem. We know that people make mistakes due to human nature. It is also difficult to observe any human errors by machine. We always have to take into consideration the fact that human error can be reduced through education. Tightening by a human operator means that at the same time the operator can execute a visual inspection in which they can observe bolt tightening defects, such as machine errors and galling. This visual inspection is a very effective method to improve the reliability of the bolt tightening.

Among human errors, "missed tightening" is the number one problem. In order to tighten bolts effectively and uniformly, bolts are tightened to the required torque after first carrying out provisional tightening. But in this case the provisionally tightened bolts, which are visually indistinguishable from fully tightened bolts, may be felt not fully tightened. Since this kind of human error happens accidentally, it is very difficult to find the error by doing a sampling test.

In order to eliminate "missed tightening" it is important to confirm that the bolts have been fully tightened at the same time of full tightening.
Among the confirmation methods, there is the counting method, in which a tightening completion signal is output upon reaching the set torque and counted by a counter. There is also the monitoring method where OK/NG judging is carried out based on the tightening torque value, and the marking method in which the torque wrench operation applies a mark to the head of the bolt. By selecting the method that best matches each of the work environments it will be possible to prevent missed tightening.

Among relatively frequent human errors are "erroneous operations" such as stopping pulling the torque wrench before completion of tightening and releasing the trigger of a power tool.

Counter method



Marking method

4-5 Human Error

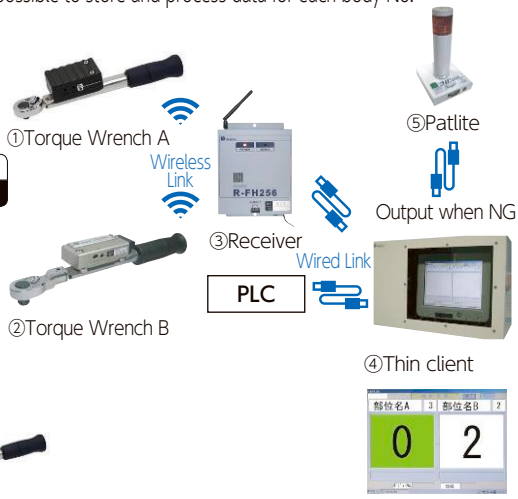
As tightening confirmation methods, there is the counter method in which a counter is used to count down the number of tightening completion signals that are output each time the set torque is attained. There is the monitoring method, where OK/NG judgment is carried out using the tightening torque values, and there is also the marking method, in which a mark is applied to the bolt head simultaneously with the operation of the torque wrench. By selecting the method according to each of the operating environments, it will be possible to prevent missed bolt tightening.

Counter method

When the set torque is attained, the tightening completion signal is output and the signal is counted down by the counter (CNA-4mk3) for confirmation of the number of items tightened. In addition to the wired counting method (QSPLS, etc.) using the signal from the limit switch, there is the wireless counting method (QSPFH, etc.)

ID recognition with FH receiver RS232 output by thin-client computer

This is a wireless error-proofing (Pokayoke)system for use when carrying out tightening of two positions on one work piece. When the body No. indication is received from the PLC(Programmable Controller), the tool will become able to conduct tightening. At part A, torque wrench A is used to tighten three bolts. When tightening has been completed, the tightening bolts at part B will be displayed, and it will be possible to conduct tightening. Using torque wrench B, the two bolts are tightened, and when the work has been completed an OK signal is output to the PLC. If torque wrench B is used for tightening at part A, an error occurs and the display will appear in red to indicate a warning as an error check to ensure that the correct torque wrench is used to tighten the bolts. An NG signal will also be output to the lamp. In addition, because the tightening at part B can not be carried out until the tightening at part A has been completed, the tightening work procedure will also be maintained. Using the thin client, it is possible to store and process data for each body No.



Monitoring method

In addition to checking the number of units tightened, the actual tightening torque is shown, judgment is made whether or not the torque is within the standards, and data is stored. It is increasing the tightening reliability. There is the wired system (CSPLD/LDC+CD5) and wireless system (FD, FDD). This is also used as a backup for power tools.

Example of ID recognition from Thin Client (PC) using FDD and double tightening prevention.

Select [Operator], [Date] and [Model] before starting operation.
Judgment the tightening whether it within Hi/Lo tolerance and shows the result with Green or Red color.

Click [Excel output] and select a model and date of operation to output inquire data.

Marking method

A tightening confirmation mark is applied when the tightening torque is achieved. Previous systems had problems, such as the method where a sponge filled with ink was input in the socket, since simply setting the wrench was enough to apply a mark and so it did not result in tightening confirmation. In addition, for the method of making a mark using a marker pen, the making of the mark itself became work and it was possible to make a mark even if tightening was not carried out, so this too did not fulfill the requirements as a marking system.
To solve this problem, there are marking torque wrenches available, where a marker is activated to simultaneously prevent missed tightening and erroneous operations only when the torque wrench is activated and unfailingly applies the tightening torque; they are MPQL model for hexagonal bolts and CMQSP model for bolts with hexagonal holes.

Tohnichi Tightening Assurance System ▶P64

(2) How to use torque tools

1.Precautions when selecting accessories

- There is a possibility that ball point hexagonal sockets, universal joints, and flexible joints may adversely affect the tightening accuracy.
- There is a possibility that extension bars and torsion bars to adversely affect the durability of the torque tools.
- Use sockets, bits and adaptors within the range of assured tolerance.
- Use sockets and bits that match the screw size.

Depending on the accessories such as sockets and extension bars, there is a possibility that the tightening accuracy and the tool durability to be lost. Be careful when selecting accessories.

2.Check prior starting work

- Confirm the usage torque.
  For adjustable type tools, confirm that the scale values are correctly set to the usage torque.
  For preset type tools, confirm that the torque values described in the main unit are correctly set.
- Check whether or not there are scratches or rust on the main unit.
- Confirm that there is no distortion of the main unit.
- Confirm that there are no parts missing. (Take particular care about damage to the ratchet part.)
- Check whether there is wear on the socket and bit.

Quickly detect degradation and damage to parts, and use tightening equipment which is able to assure the work.

3.Method of applying force in manual torque tools

- 

apply force in the direction marked “ONLY”. (See How to Use on P.356)
- Apply force at the effective length line. (See How to Use on P.356)
- Pull (or push) horizontally. (See How to Use on P.356)
- Apply force at right angles. (See How to Use on P.356)
- Do not apply force with momentum.
- Do not add your body weight when applying the force.
- As soon as you hear or feel the “click” sound or feel that, the operation has finished, quickly remove the force.
- Do not repeat the same operation one more time on the same screw.

Torque tools cannot be used correctly by an awkward position. Be sure to confirm the work environment where the force is can be applied naturally.

4.Cautions when using manual torque tools

- Take care that dirt or water does not enter into tools.
- Do not drop or allow the equipment to strike with other objects.
- Do not apply over-torque.
- Do not use for screw returning work.
- Use combination extension handle for QLE2 and CLE2 models.
- Do not use the tool by extending the handle part.
- Do not use the tool out of scale range.

5.Cautions for storage

- When storing torque tools, reduce the graduation. (Adjustable types)
- Store it in a location where has low humidity and little change in temperature.
- If the tool is not used for a long time, inspect it occasionally.

6.Cautions when using power torque tools

- Adjust the usage pressure with a regulator (pressure at hand).
- Ensure that the usage pressure does not fluctuate.
- Use the stipulated air hose diameter item.
- Do not use a longer air hose than the required length.
- Take care that dirt or water does not enter into the equipment.
- When set up a tool for the first time, blow the air hose before connect it to the torque tool.
- Apply oil (ISO VG32 (Turbine oil #90)).
- Use the three-point set (Regulator, filter, oiler).
- When the equipment will not be used for more than a week, insert oil directly into the coupler (approximately 10 drops),lightly rotate it one time, and then store it.
- Continue to pull the start lever until the tightening has been completed. (Automatic stop or automatic reversing)
- Do not repeat the same operation more than one time on the same screw.

4-6 Bolt Tightening Reliability and Bolts

Bolt tightening reliability and bolts

To ensure the "bolt tightening reliability", first the reliability of the bolts themselves must be maintained. The initial axial tension has to be controlled so that the force comes into the specified range determined by the standardization or the design when the bolt is tightened to the required torque. Since the torque coefficient changes due to the friction of the bearing surface and the threaded parts, factors such as oil on the threads, surface hardness, and surface treatment should remain constant. As with high-tension bolts for construction, the torque coefficient can be measured by a tension meter to verify that the torque coefficient is within the specified variation to further improve the bolt tightening reliability. In this case, a certain number of samples will be required to find the variation of the torque coefficient.

Bolted joints consist of bolts, nuts, and joint members. Therefore, caution should be taken when adding oil to the joint or carrying out surface treatment of the joint, especially when wax-based oil or molybdenum-based lubrication is used. The torque coefficient will become small and the initial axial tension will sharply increase.
The variations of joint face, parallelism, gaskets in between, or paint will all have an affect on the clamping force. "Galling" or "seating defects" will also prevent bolt reliability. Recently, an axial force stabilizer (Fcon) has been developed that stabilizes the torque coefficient to stabilize the axial force, which is effective in improving the above problems.

Fcon ▶P482


特許証
(CERTIFICATE OF PATENT)
特許第5308608号
(PATENT NUMBER)
発明の名称 (TITLE OF THE INVENTION) 締結体締付け力安定化剤、これを用いた締付け力安定化法、安定化剤を付着した締結体構成部品
特許権者 (PATENTEE) 東京都大田区大森北２丁目２番１２号 株式会社東日製作所
東京都江東区青海二丁目４番１０号 地方独立行政法人 東京都立産業技術研究センター
発明者 (INVENTOR) 小松 恭一 辻 洋
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(THIS IS TO CERTIFY THAT THE PATENT IS REGISTERED ON THE REGISTER OF THE JAPAN PATENT OFFICE.)
平成25年 7月 5日(July 5, 2013)
特許庁長官 (COMMISSIONER, JAPAN PATENT OFFICE) 羽藤秀雄

4-7 Construction of a Tightening Reliability System

Construction of a tightening reliability system

There are many obstructive factors for "Bolt tightening reliability" as shown in P.51. To properly eliminate these factors, it is necessary to consider the total system.

The design, tightening operation, bolts, and the reliability in the field all have to be equally improved in a balanced manner at each step; otherwise, the errors in bolt tightening will not decrease. First of all, the suitability of the design and the preconditions has to be verified. In the torque method, mutual consent is required regarding the tightening torque, tolerance, torque coefficient and dispersion width, tightening force in use and inspection methods, and must include people from design engineering, tightening operations and inspection.

It is desirable that these are systemized by standardization. In order to construct a system of "bolt tightening reliability", the elimination of "machine error" and "human error" has to be included. To maintain this reliability various methods have been designed, but their respective effects are different. (Table 4-2) More than one of these methods may be used in combination to reach the required reliability level, first seeking to eliminate all the obstructive factors with the minimum expense and time. Even if an expensive system is adopted, if it misses any of the requirements the reliability will not be maintained. Standardization of bolt tightening enables easy after-sales service. Even if the special tightening method can successfully be employed in the plant, the reliability will be lost if the same tightening cannot be achieved by the field service. The system of "bolt tightening reliability" in the broad sense must include maintenance.

Since bolts easily generate a large clamping force, many bolts are used in the assembly of products, but because there are many uncertain factors relating to bolt tightening, it influences the reliability of products and the entire system.

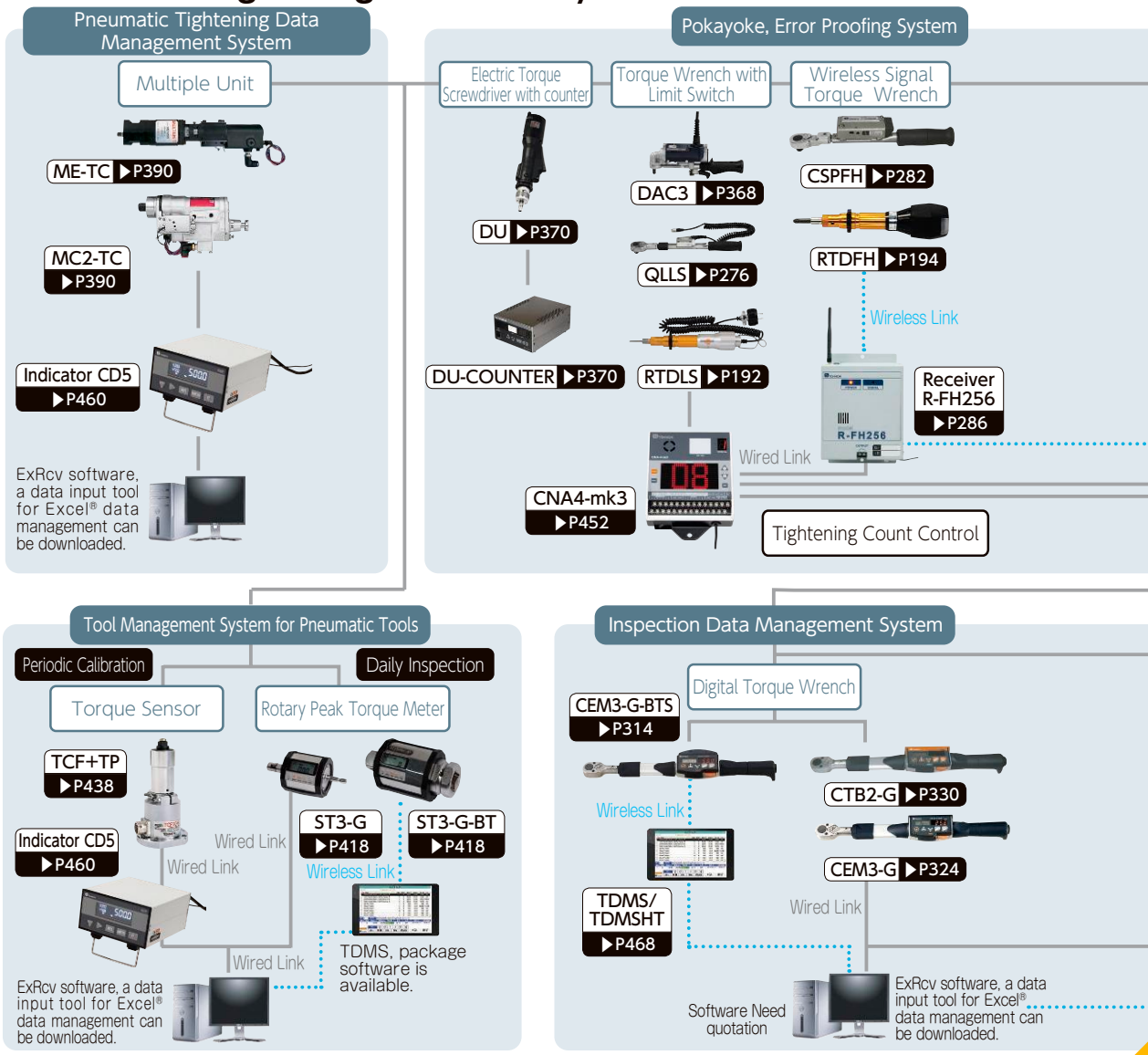
Table 4-2. Methods of confirming the reliability of tightening

Method	Machine error	Human error	Bolt Reliability	
			Visual check	Non-Visual check
1)100% retightening inspection	◎	◎	×	◎
2)Two-stage tightening (Double check)	◎	◎	×	◎
3)Sampling retightening inspection	◎	×	×	○
4)Periodical inspection of tightening tools	◎	×	×	×
5)Visual inspection by tightening operator	×	○	◎	×
6)Marking (Socket)	×	○	×	○
7)Tightening completion by marking	×	◎	×	◎
8)Tightening completion by counting	×	◎	×	
9)Tightening torque control data OK-NG judgment	○	◎	×	
10)Tightening torque control data preservation	○	◎	×	
11)Tightening torque monitoring (Independent)	◎	◎	○	
12)Tightening torque angle monitoring	○	◎	◎	
13)Clamping force measurement (Elongation, Ultrasonic)	◎	◎	◎	
14)Sampling torque coefficient testing	×	×	○	
15)Sampling product testing	◎	×	○	

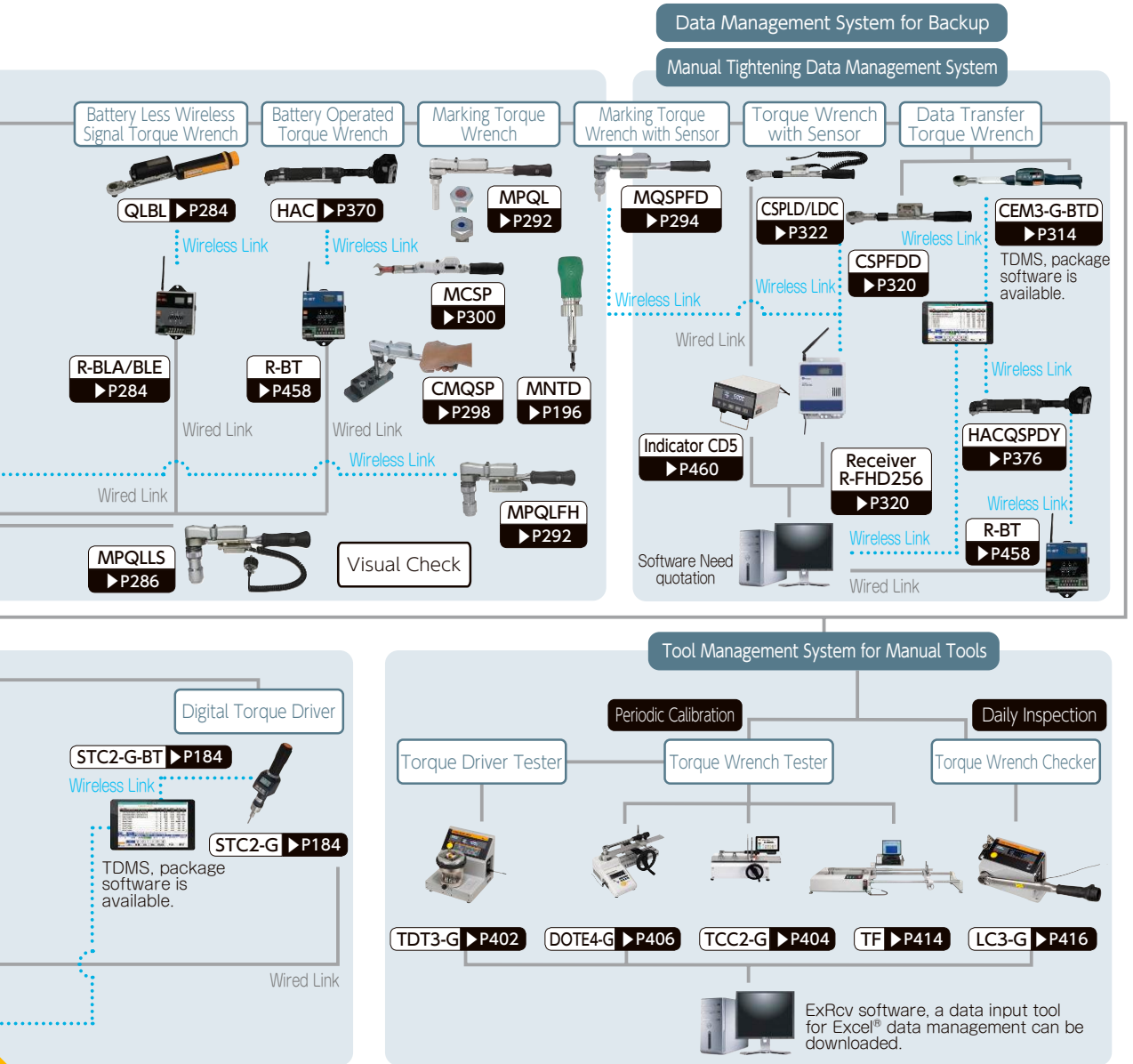
◎: Effective, ○: Slightly effective, x: Ineffective, [ ]: Visual inspection included

4-8 From Torque Control to Tightening Assurance System

(1) Tohnichi Tightening Assurance System

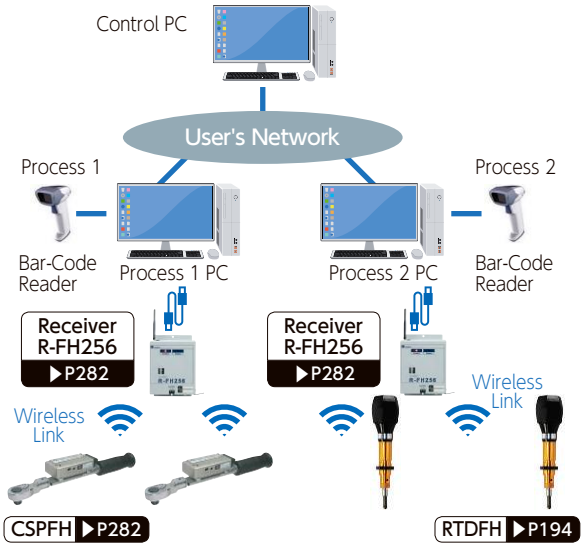


Tohnichi Tightening Assurance System advices the users how to tighten bolts properly and how to eliminate various error which occur during bolt tightening operations.



(2) System configuration examples

Pokayoke, Error-proofing System ①



Error-proofing System

FH: Click type Torque Wrench with wireless signal function.

Each tightening process is displayed on PC and this system provides operational instructions by sound to prevent missed tightening.

First, operator reads the bar-code on a tightening work and conducts operation in accordance with instructions from PC. Besides, the tightening record is saved to a server via a network as an evidence of traceability.

Pokayoke, Error-proofing System ②

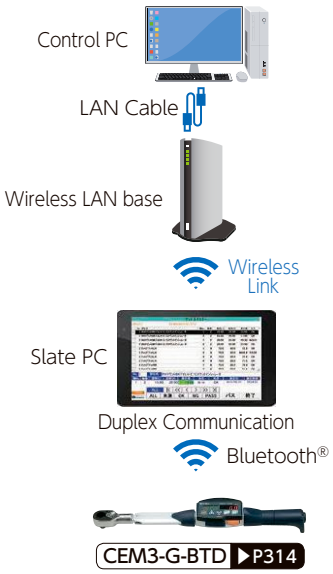
Error-proofing + Monitoring System

FDD: Click type Torque Wrench with wireless data transfer function

The system stores actually applied torque value for data management and preventing missed tightening. Operator conducts tightening work according to instructions from PC. OK/NG judging is carried out based on the tightening torque value of upper and lower limit. Judgment results are saved to a server for tightening traceability.

Pokayoke, Error-proofing System ③

Pokayoke, Error-proofing System ④



Error-proofing + Monitoring + Marking System

MQSPFHDS: Marking Torque Wrench with wireless data transfer function.

The system is capable of data management, preventing missed tightening and making on the bolt-head for higher level of tightening reliability. The marking can be identified at the visual or image processing check and it is very effective for preventing missed tightening caused by human error.

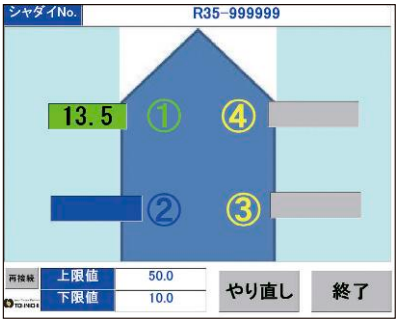
It is an advanced system to control the both counting and actual applied torque management. All the data is saved to a server for traceability.

Error-proofing + Monitoring System

Case of Digital Torque Wrench with wireless data transfer function, CEM3-G-BTD

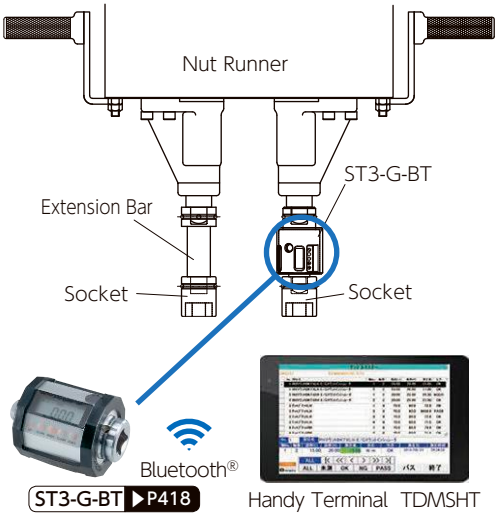
It is ideal for managing tightening data in cell-production. Upper/Lower limit can be set through PC via duplex communication.

All the data is saved to a server for traceability.

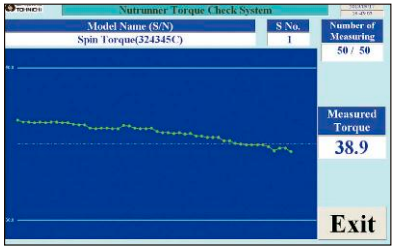


4-8 From Torque Control to Tightening Assurance System

Nut runner checking system
Case: Spintork / ST3-G-BT



Nut runner torque checking can be conducted in high accuracy and easy operation on a real-time basis by ST3-G-BT with handy terminal. Data transfer is excuted by wireless communication.
Handy terminal is excellent at compact mobility.
Early detection is possible on the basis of information complied by handy terminal.
Most errors can be avoided in adavance by statistical process of checked data. The tightening data is saved to a server via a network and traceability of tightening work is available.



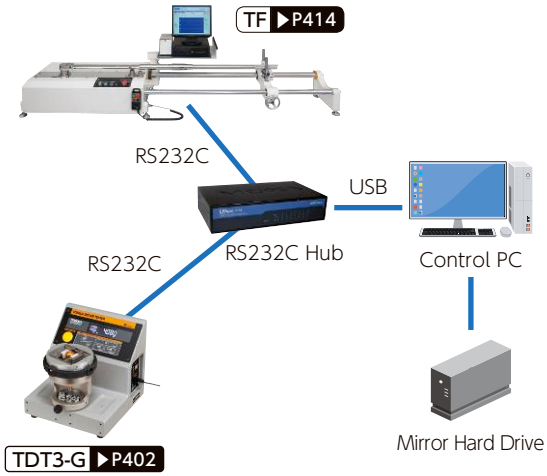
Torque•Angle measurement system
Case: Digital torque and Angle Wrench / CTA2-G-BT

In angle-controlled bolt tightening, torque and angle are stimulously measured and displayed on handy terminal. Relations between torque and angle can be graphycally-illustrated. Real-time anasysis is possible.

Torque wrench daily inspection system
Case: Torque Wrench Line Checker / LC3-G

Daily inspection of torque tools is coducted before and after carrying out the work and keeps the tool problems to a minimum. Data measured by LC3-G is saved to server and errors can be avoided in advance by statistical data. As a result, preventive maintenance can become possible.

Torque wrench periodic calibration system
Case: Torque Wrench Tester / TF



This is the system to manage periodic calibration data of torque driver and wrench by control PC. The system gererates following functions by saving all the data to a server.

- Tracking a full record from the beginning to the end
- Control of calibration cycle
- Alarm notification to announce calibration period
- Issuing caribration certificate
- Accuracy management by serial numbers and more...

5 Selection of Tightening Tools

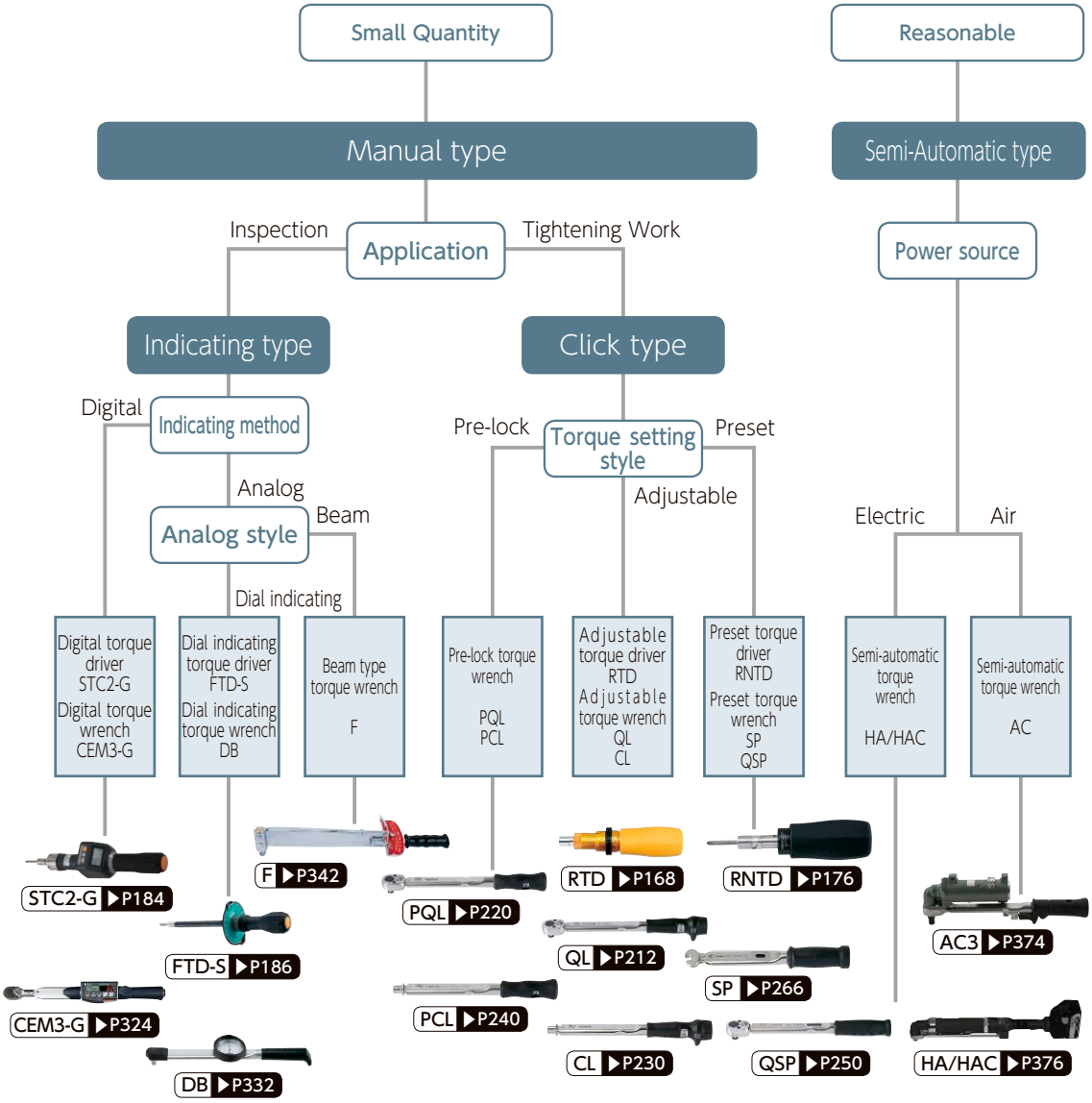
Tightening Control System

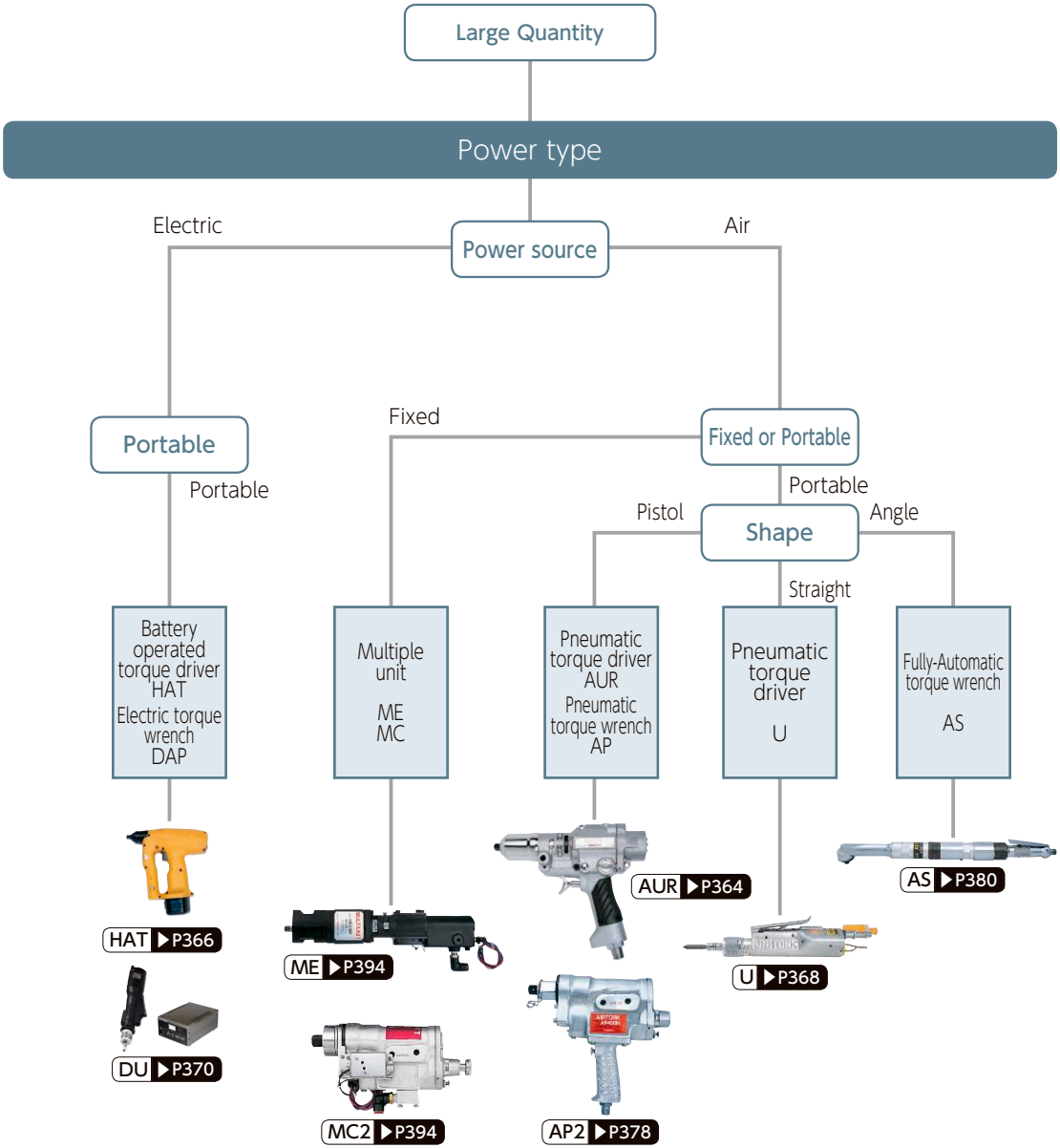
For the tightening torque, it is necessary to decide the accuracy of tightening control according to the importance of the tightening position, and to choose and to control the necessary torque tools.

Table 5-1. Bolt tightening control system

Class	Control system	Tightening tolerance	Application	Application example	Application tightening tool	Tightening tool control	Torque assurance system
A	Standard	±30%	Threaded joint for use in fixing parts subject to no external force	· Bolts tightened to static parts · Bolts fixing covers (Non air-tight)	Selection by model and capacity. (No torque control)	Periodical maximum performance measurement.	Periodical inspection by retightening method. (α=1.05)
B	Individual	±20%	Threaded joint with high safety margin in fixing, air-tightness and transfer against external force	· Bolts tightened to dynamic parts. (Bolt strength classification not specified) · Bolts for low pressure sealing.	Torque-controlled tightening device. (Indirect control device)	Periodical tightening torque measurement.	Daily inspection by retightening method. (α: measured values)
C	Individual	±10%	Threaded joint with low safety margin in fixing, air-tightness and transfer against external force	· Bolts tightened to dynamic parts. (Bolt strength classification specified) · Bolts for high pressure sealing.	Torque-controlled tightening device. (Direct control type)	Periodical tightening torque measurement. Daily tightening torque check.	Daily inspection by retightening method. Daily check of tightening device.
D	Individual	±5% (Angle method)	Threaded joint limitedly designed in fixing, air-tightness and transfer against external force	· Main bolt for connecting rod of engine. · High pressure hydraulic equipment.	Nutrunner with torque control. (with monitoring angle)	Periodical tightening torque measurement. Daily tightening torque check.	Monitoring. Daily check of tightening device.

5-1 Tool Selection Flowchart




Large Quantity
Power type
Power source
Electric
Air
Portable
Portable
Fixed
Fixed or Portable
Portable
Pistol
Shape
Angle
Straight
Battery operated torque driver HAT
Electric torque wrench DAP
Multiple unit
ME
MC
Pneumatic torque driver AUR
Pneumatic torque wrench AP
Pneumatic torque driver
U
Fully-Automatic torque wrench
AS
HAT ▶P366
DU ▶P370
ME ▶P394
MC2 ▶P394
AUR ▶P364
AP2 ▶P378
U ▶P368
AS ▶P380

5-2 Manual Torque Tools

(1) Selection process

Table 5-2. Selection of manual torque tools

Type		Structure	Main applications	Type comparison					Model		Shape of head (Reference)
				Measuring torque	Tightening for multiple purpose	Continuous tightening for a same bolt	Accuracy	Ease of work	Torque wrench	Torque driver	Page
Indicating type	Beam	Read the deflection of the beam spring directly from the graduated plate	General tightening work, testing and maintenance	○	○	×	○	△	◎F, SF, QF, FR QFR, CF		F p342 SF p342 QF p346 QFR p346 CF p348
	Dial	Read the torsion from the torsion bar, which is magnified by the dial	Precise tightening work, research and testing	◎	○	×	◎	◎	DB, DBE, T-S CDB-S	(ATG), MTD, FTD-S	DB p332 DBE p334 T-S p340 ATG p430 MTD p190 FTD-S p186
	Digital	Read the digital display for the output of the strain gauge	Precise tightening work, research and testing	◎	△	×	◎	◎	CEM3-G	STC2-G	STC2-G p184
Click type	Adjustable	When the torque reaches the preset value, a click is heard and impulse is felt	General tightening work, Tightening for mass production	×	○	○	○	◎	◎QL,QLE2, ◎CL,CLE2, PQL TiQL, TiQLE	◎LTD MLD	QL p212 QLE2 p216 CL p230 CLE2 p234 PQL p220 TiQL p246 TiEQL p246 LTD p170 MTD p190
	Preset	When the torque reaches the value set by the tester, a click is heard and impulse is felt	Particular bolt tightening, Tightening for mass production	×	×	◎	○	◎	SP2, RSP2, QSP, CSP, BQSP, BCSP	NTD	SP2 p268 RSP2 p272 QSP p250 CSP p254 BQSP p258 BCSP p260 NTD p178
Rotary slip	Adjustable	Once torque set is achieved, even if more force is applied, this model does not add additional torque and prevent over torque.	tightening work of short tact time, tightening at low torque value	×	○	○	○	◎		RTD AMRD BMRD	RTD p168 AMRD p172 BMRD p172
	Preset	Once torque set is achieved, even if more force is applied, this model does not add additional torque and prevent over torque.	tightening work of short tact time, tightening at low torque value	×	×	◎	△	◎	QASPCA		QSPCA p252 RNTD p176
				×	×	◎	○	◎		RNTD	

Tools marked with "◎" are standard torque wrenches or screwdrivers that are widely used.

(2) Selection of tools by application

Table 5-3. Selection of tools by application

Item / Application	Manual tools	
	Torque screwdriver	Torque wrench
General usage	RTD, LTD, AMLD, BMLD	QL, QLE2, CL, CLE2
Mass production	RNTDFH, RNTD, NTD	SP2, QSP, (PQL), CSP, BQSP
Error-proofing system	RTDFH, RTDLS, LTDLS	QLLS, PQLLS, QSPLS, SP2LS, MPQL
		FH256MC QSPCALS FHSLS
Insulated	RTDZ, RNTDZ	PQLZ, QSPZ
Inspection	MTD, FTD-S, STC2-G	DB, CDB-S, T, SF, F, CF, QF, CEM3-G
Semi-automatic	–	A3/AC3, DAC3
Monitoring system	STC2-G-BT	Made to order : FD, FDD, CEM3-G-BT (Wireless) Sensor type torque wrench + CD5 (Wired)

(3) Optimum capacity

Table 5-4. Optimum capacity

Tightening torque	Optimum usage range (Against max. capacity)	Note
Below 200 [N·m]	40~90%	Can be used at max. capacity if within 100 pcs. per day
Over 200 [N·m]	40~70%	

Note: The operator may feel fatigue if the wrench is used at close to the maximum capacity. Also, the weight of the wrench will be unnecessarily heavy when it is used at low ranges. The optimum capacity is to use under the target of around 70% of maximum capacity.

Example: When QL200N4 and the setting torque T = 80 [N·m], then

$$P\ (\text{Hand force}) = \frac{\text{Setting torque}}{\text{Effective length}} = \frac{80}{400 \div 1000} = 200\,[\text{N}]$$

Table 5-5. Case of tightening torque: 80 [N·m]

*Refer to effective length of QL model (P.198)

Suitability	Torque wrench to use	Mass	Hand force	Result
△	QL200N4	1.40 [kg]	200 [N]	Heavy
○	QL140N	0.78 [kg]	250 [N]	Good
△	QL100N4	0.68 [kg]	308 [N]	Large hand force required
◎	TiLQL180N	1.00 [kg]	160 [N]	Light, small hand force

5-3 Power Torque Tools

(1) Selection process

① **Power** (air, electric, hydraulic)
② **Shape** (hand-held, fixed, head shape, reaction force support)
③ **Capacity** (tightening torque value, tightening accuracy)
④ **Tightening time** (rotations)

Table 5-6. Selection of power torque tools

		Air			Electric
		Hand-held		Fixed	Hand-held
		Without reaction	With reaction		Without reaction
Structure		Auto stop by toggle mechanism Driven by pneumatic motor	With reaction arm to absorb reaction during tightening Auto stop by toggle mechanism	Built-in to automatic equipment Auto stop by toggle mechanism Tightening completion signal by LS	Auto stop by toggle mechanism Driven by electric motor
Main applications		General tightening of small screws	Tightening of medium and large screws	Auto tightening of many units, or multiple axis tightening	General tightening of small screws
Type comparison	Small screws	◎	×	○	◎
	Medium screws	△	○	◎	△
	Large screws	×	◎	◎	×
	General multi-purpose tightening	○	○	×	○
	Same screw large quantity tightening	△	△	◎	△
	Rotation(auto speed change)	◎	○	◎ (○)	○
	Weight	◎	○	○	○
	Noise	○	△	○ (△)	◎
	Accuracy	○	○	○ (◎)	○
	Operation	○	○	◎	○
	Price	◎	○	△	○
Model		U,AUR	AP2	MG,MF,ME,MC2	DU,HAT

(2) Tightening times of tools

Table 5-7. Tightening time of various tools [sec. / piece]

Screw joint			Manual		Power + Manual		
Screw, tightening torque	Number of thread ridges	Simultaneous tightening [pieces]	Indicating type (DB50N)	Click type (QL50N)	Impact wrench + click type (QL50N)	Semi automatic (Air motor + click type in a body)	
						AC50N3	AC100N3
M8 (P1.25) T=22 [N·m] (e=10)	10	1	9.6	8.0	5.4	4.0	3.5
	10	4	7.2	6.5	3.0	2.3	2.3
	16	1	14.6	12.6	7.3	6.7	5.6
	16	4	12.5	10.6	4.0	4.0	3.6

In the test conditions, the screw is inserted into the tapped hole and the tool is placed on the table.
The time interval is measured from the start of tightening until the tightening has been completed and the tool has been returned to the table. For manual tools, you may tighten the screw with your fingers.

5-4 Selection Criteria

Table 5-8. Selection Criteria Template

Ⅰ. Screw joint Name	
Number, Degree of importance	●Important screw ●General screw
Specification of screw	●Nominal ( ) Class of strength
	●Head shape ( ) ●Number of tightening threads ( ) Screw thread (P=)
Limit of strength	●Male screw ／ Female screw ●Number of bolts tightened (Tmax=)
Tightening torque	( ) N·m
Tolerance	●Class, ±( )% ●T=( )～( )
Washer	●None／ Flat washer, Spring washer (Strong, Normal)
Surface treatment	●None ／ Parkerizing ／ Plating (Zn、Cr、)
Lubrication	●None ／ machine oil ／ Wax-based oil, molybdenum disulfide
Number of bolts tightened	●( ) Pieces/day (Time limit Sec/piece, None)
Number of bolts tightened simultaneously	●( ) Pieces
Coefficient of joint	●Hard ／ Medium ／ Soft (e=)
Tightening space	●Socket Usable ／ Not usable
	●On the bolt ( ) mm ●Around the bolt ( ) mm ●Swing ( ) ●otal length ( ) mm
Direction of tightening	●From the top ／ From the side ／ From the bottom
Ⅱ. Tightening Tool Type	●Manual ／ Powered ／ Manual + Powered
Manual type Model	●Click type ／ Indicating type ／ Adjustable type, Preset type
Head type	●Square drive ／ Open end head ／ Ring head ／ Fixed ratchet ／ Interchangeable head
Capacity (Ease-of-use)	●T( ) ●weight( )kg ●Overall length( )mm ●Hand force( )N
Power Power source	●Compressed air Pressure( )Mpa or above ●Electric( )V ●Hydraulic
Type	●Portable ／ Fixed ●Single Axis ／ Multiple Axes
Number of rotations	( ) r.p.m (at)
Torque control method	●Direct control (Graduations Non／scaled) ●Indirect control ●Maximum capacity ●No control
Capacity, shape	●T( ) ● Straight ／ Pistol ／ Angle
Tightening tool Type	
Time required for tightening	●( ) sec／piece
Cost of tightening	●( ) $／piece
Accessories	●Socket(×) ●Bit
	●Hose diameter( )

6 Torque Tools as Measurement Equipment

6-4 Accuracy and Uncertainty

6-5 Tool control

6-1 Torque Tools are Measurement Equipment

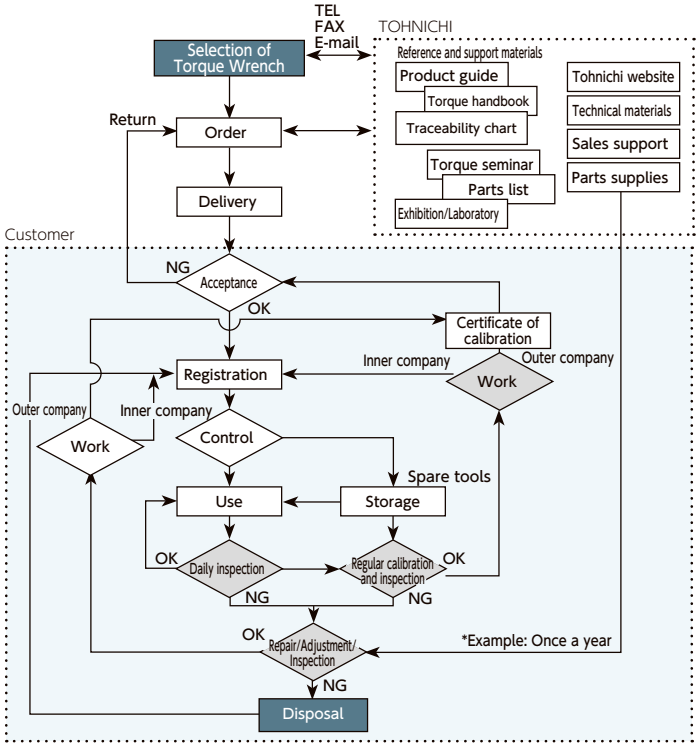
(1) Control of torque tools

The process for controlling torque tools (Figure 6-1) involves ascertaining the accuracy by adequately checking the measurement of the tools upon reception at the facility and on a daily basis. The decision of how to set up the process for the control should assess the following factors: importance, usage frequency, and usage torque capacity of the measuring instruments, by referring to the ISO standards (ISO 6789), JIS standards (JIS B 4652), and the manufacturer' s nominal accuracies.

The periodic calibration cycle depends on the same factors, but normally this is set between 3 months and a year. If possible this cycle should be readjusted as the tool ages to allow more effective control.

Due to torque tools are precision measurement equipment contrast to standard hand tools, take care for storage and management to maintain accuracy and durability.

Figure 6-1. Control system for torque tools



(2) Calibration

Calibrating a measuring device involves inspecting and verifying the extent to which the device deviates from what it should show, using as reference the upper measurement range value. Measurement range values must have a higher level of precision than the device used for measuring. The highest measurement standard applied within a company or organization is called the "reference standard."

Tools requiring calibration are calibrated periodically at a public institution. National standards and traceability must be maintained without interruption.

It is understood that calibration attests to a status only when it is performed. It does not provide Pass/Fail judgments. Therefore, adjustment and repair is not involved in calibration service. As a general rule, Tohnichi products come with a Calibration Certificate. Relevant documentation, such as an Inspection Report or Traceability System Diagram, will be issued upon request.

We keep inspection records on file for predetermined periods of time. Contact us if you need information regarding a record for a former product.

6-2 Traceability

(1) Traceability system

Generally, measurement equipment will be calibrated with more precise standard equipment and the standard equipment also calibrated by a higher level of standard devices. Eventually, it chains consecutively to National standard and when it certified, it can be described as traceable for National standard.

Torque can be resolved into length by the force. As the units of length and force are approved by official calibration laboratory respectively these units, or in part of country, torque itself chains directory to the National standard.

Tohnichi is inspecting a wide variety of torque tools based on the traceability system (Figure 6-2). Services, such as calibration and repair, are very important and necessary factors in the control process. All of these services required for internal company controls of torque tools, such as calibration certificates, inspection sheets, and traceability charts (Figure 6-3), are available upon request. Use the Traceability Issue Request forms from Tohnichi agents and included with the general product information for such traceability requests.

Figure 6-2. Traceability of Tohnichi products

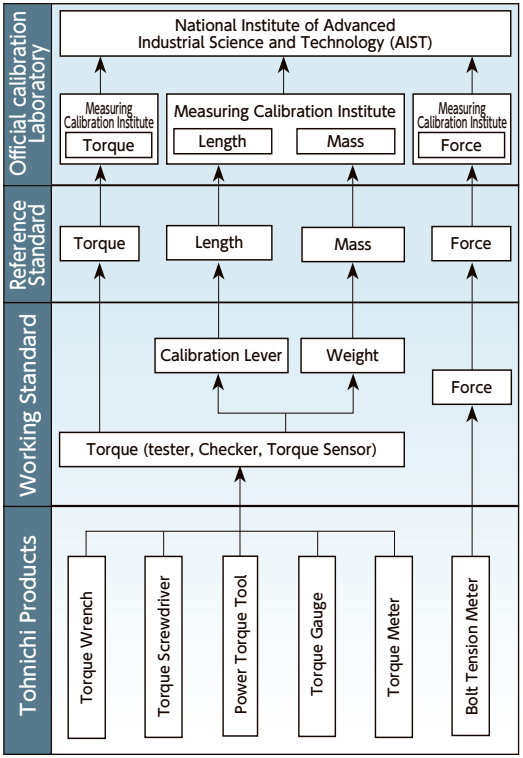
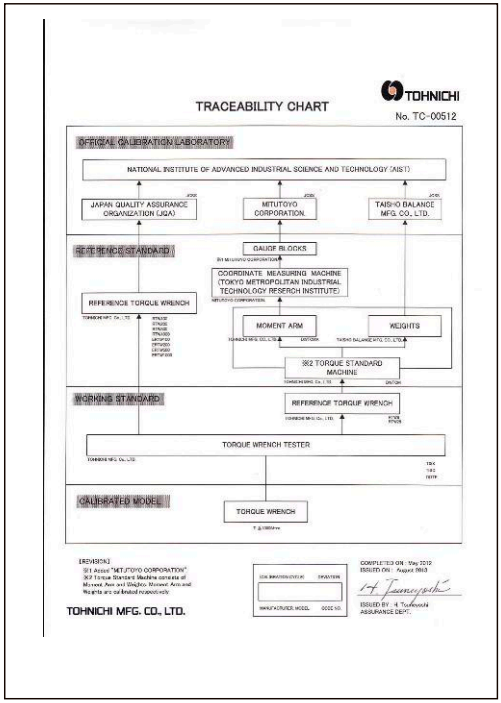


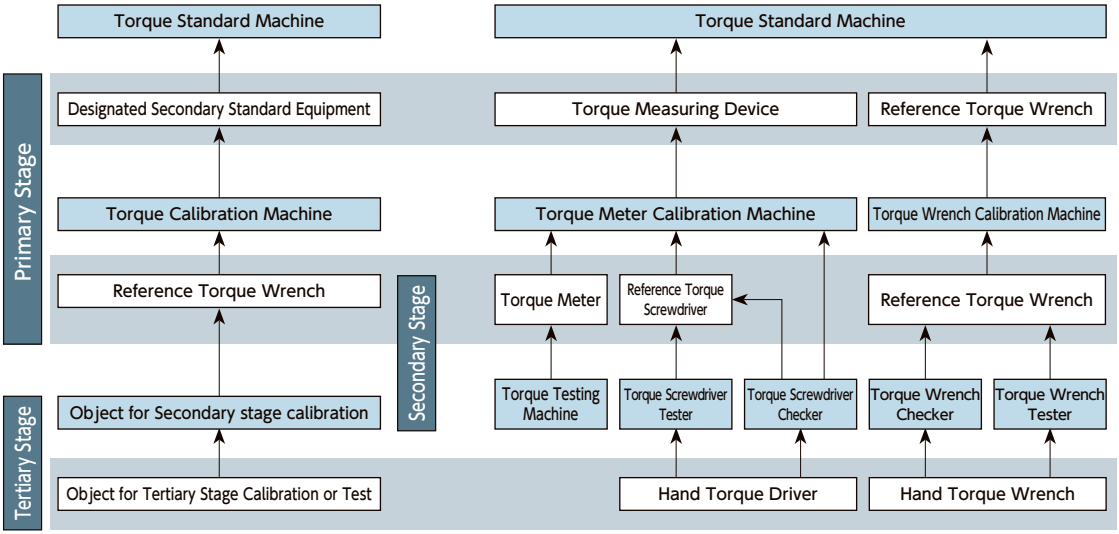
Figure 6-3. Traceability chart



(2) Diagram of torque traceability and National standard

In order to secure traceability system using torque SI units, the establishment of calibration methods using national torque standards is progressing worldwide. In Japan, a supply system using national torque standards has been prepared, in which “torque meters” that measure pure torsion are already being supplied in a range of 10 N·m to 20 kN·m, and “reference torque wrenches” that occupy the top standard of torque wrench testers are being provided in a range of 0.1 N·m to 5 kN·m (As of July 2018).
Items from the technical requirement application principles to the torque level structure for torque testing machines and torque wrenches measurement equipment disclosed by National Institute of Technology and Evaluation (NITE) shows in the figure 6-4. The layer composed of torque wrench and torque screwdriver and chains to torque tester and checker is "Tertiary Stage", the layer chains to reference torque wrench and reference torque screwdriver is "Secondary stage", and the layer chains from torque calibration
machine to designated secondary standard equipment is "Primary stage".

Figure 6-4. Traceability System Diagram



Explanation of terms in JCSS (Hierarchy of torque wrench: from NITE issue technical requirements application guidelines)

■Designated standard equipment (Torque standard Machine) ····· Equipment designated as the national standard that realizes the torque units.

■Designated secondary standard equipment (Reference torque wrench) ····· A Reference torque wrench which is calibrated by designated standard equipment. It is a reference standard for the torque of the calibration laboratory and is used for maintenance of the calibration equipment.

■Working standard (Torque wrench calibration Machine) ····· An actual load type, load cell type or build-up type torque wrench calibration machine. It is used for direct comparison calibration with a designated secondary standard equipment of a calibration service laboratory.

■Regular reference standard (Reference torque wrench) ····· The most significant reference torque wrench in a calibration service laboratory. It has a torque wrench shaped sensor part (torque converter) provided with a lever and calibrated by linking to a designated secondary standard equipment. It is a reference standard of torque wrench testers and calibration target of the primal stage.

■Torque wrench tester ····· A torque testing tool with a loading device to be given torque for calibrating hand torque wrenches. It is calibrated by a regular reference standard as the higher standard. It is a calibration target of the secondary stage.

■Hand torque tool ····· The torque wrenches, those that apply load manually and also have function as screw tightening tools. The instruments can be calibrated by a torque wrench tester or torque wrench checker under JIS B 4652. It is the calibration target of the third stage of JCSS system.

Using these, through the establishing of a torque supply system by JCSS (refer to 6-3.), a traceability system for torque will be established similar to that for other units. However, depending on the torque range, it will performed conventional local calibration.

(3) Hand torque tool standards

Requirements of ISO, International Organization for Standardization and JIS, Japanese Industrial Standards for manual torque wrenches and screwdrivers.

① ISO 6789:2017: Standards for assembly tools for screws and nuts -- Hand torque tools

Before adoption of these standards, standards in effect were listed under ISO 6789:2003 (Assembly tools for screws and nuts -- Hand torque tools -- Requirements and test methods for design conformance testing, quality conformance testing and recalibration procedure).
The standards underwent a number of changes, and are divided into Part 1 and Part 2, in response to the different needs of different users.The JIS version does not yet reflect these changes.

Part1

Part 1 specifies requirements for design and manufacture requirements, including the content of a declaration of conformity for hand torque tools.

- The classification of hand torque tools specified by the former standards (2003 version) was not changed.
- For scales and dials, maximums between graduation mark intervals were established. For electronic displays and indicators, resolution minimum requirements were established. In addition, applicable torque range must be specified.
- For high-order standard torque measurement devices, maximum measurement tolerances were established.
- Torque tool calibration procedures were made stricter than under the former standards.
- The calculation method for relative deviation (accuracy) was changed from that specified in the former standards (method returned to 1992 version).
- Some terminology and names were changed. (Reference to certificates was changed to declarations of conformity, inspection reports, etc., and their content is specified.)
- No reference is made to torque tool measurement uncertainty.

Part2

The following were established: Calibration and measurement specifications for hand torque tools; and requirements for traceable certificates of calibration. Calculation methods for uncertainty are included.

- Parameters were set for ratios between relative measurement uncertainty intervals for torque measurement devices and relative measurement uncertainty intervals for torque tools.
- The calculation method for relative measurement deviation (accuracy) is the same as that specified in the former standards (2003 version). Names are different from those in Part 1.
- Parameters were set for methods used to measure analog/dial graduation resolution.
- Stipulation of the need to evaluate variations caused by the reproducibility of a torque tool or the effect of an interface (e.g., interchangeable heads), or the output drive of a torque tool.
- Stipulation of the need to use actual torque tool calibration data when calculating reproducibility uncertainty.
- The above-mentioned data is to be used when calculating a torque tool's relative expansion uncertainty and relative measurement uncertainty intervals.
- A calibration certificate attests to the accreditation, and its content is described.

Tohnichi Manufacturing plans to introduce application of the above-mentioned standards in an orderly fashion.

② JIS B 4652:2008: Requirements and testing methods for hand torque tools

These JIS standards were compiled on the basis of the older ISO version (2003), which was later replaced by ISO 6789:2017 mentioned above. Applicable sections of the international standards were translated, to form Japanese Industrial Standards issued in 2008 without change in the technical content.
Translated JIS, so content same as ISO: 6789:2003. Content is provided for torque tool types, tests and calibrations, and an explanation is given regarding calculation methods (including for uncertainty evaluations).

These standards are valid in Japan, so there is no problem with their application in this country. However, some sections differ from the content of the two-part ISO 6789:2017, making it urgent that new standards be drawn up.

Reference data: Terms and definitions of hand torque tool in JIS / ISO

Type Ⅰ: Indicating torque wrench Tool that indicates the applied torque by a mechanical scale, dial or electronic display		Permissive Deviation	
		Maximum torque Below 10N・m	Maximum torque Above 10N・m
Class A	Twisting or deflection beam type wrench	±6%	
Class B	High rigidity housing type wrench with scale, dial, or display unit	±6%	±4%
Class C	High rigidity housing type wrench with electronic indicator		
Class D	Screwdriver with scale, dial, or display unit	±6%	
Class E	Screwdriver with electronic indicator	±6%	±4%

Type Ⅱ: Setting torque tool Tool that is set on a preset torque before use and it emits audibly,visibly or perceptibly signal when the torque reaches preset value.		Permissive Deviation	
		Maximum torque Below 10N・m	Maximum torque Above 10N・m
Class A	Variable torque type wrench with graduations or display unit	±6%	±4%
Class B	Fixed torque type wrench		
Class C	Variable torque type wrench with no graduations		
Class D	Variable torque type screwdriver with graduations or display unit	±6%	
Class E	Fixed torque type screwdriver		
Class F	Variable torque type screwdriver with no graduations		
Class G	Deflection beam / variable torque type wrench with graduations		

Special report

Torque Measurement Traceability Systems

National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology
Force and Torque Standards Group,
Hiroshi Ogushi, Research Group Director,

1. Introduction

Since the end of the last century, awareness has been growing of the importance of torque measurement traceability. This is reflected in the ISO 9000 series, ISO/IEC 17025, ISO/TS 16949, the Fastener Quality Act (USA), and directives regarding American aircraft maintenance. In Japan, R&D for the further development of torque standards and traceability systems was begun 1997 by the National Institute of Advanced Industrial Science and Technology (AIST) and the National Metrology Institute of Japan (NMIJ, known at the time as the National Research Laboratory of Metrology, under the Agency of Industrial Science and Technology). This report compares current torque measurement traceability systems in two countries: Germany and the U.S.A.

2. Torque measurement traceability systems

Figure 1 shows the outline of tractability system of Germany. It is classified "pure torsion torque calibration" and "Loading torque calibration"

Pure torsion torque measurement device calibrations are conducted under EU guidelines EURAMET/cg-14 and DIN 51309, or German industrial standards. On the other hand, for torque wrench load calibrations, domestic authorization system guideline DKD-R 3-7 is relevant for reference calibrations of torque wrenches, domestic guideline DKD-R 3-8 is relevant for torque wrench tester calibrations, and ISO 6789 is relevant for hand torque tool calibrations. The German authorization system promoted by DAkkS is used, and the SI traceability system for torque units has been established through the involvement of the national metrology institute (PTB), Germany's National Measurement Institute (NMI).

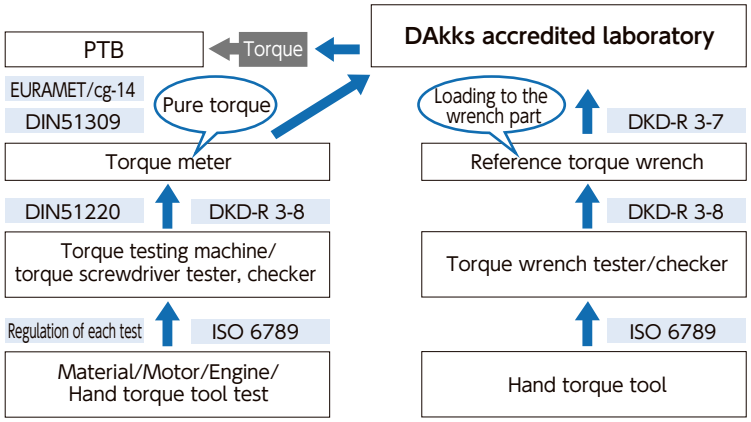


Figure 1. Germany torque traceability system and related standards

Figure 2 shows the outline of traceability system of USA. In the United States, there are many public service such as National Voluntary Laboratory Accreditation Program called NVLAP, A2LA organization and others. Both mass of weights and standard length for torque calibration services must be traceable to US national science laboratory, called the National Institute of Standard and Technology, NIST. Calibration performance of test equipment is referred to ASTM international, American Society for Testing and Materials. ASTM E2428 is standard practice for the calibration and verification of static torque measuring instruments, and ASTM E2624 is for torque calibration of testing machines. American Society of Mechanical Engineers, called ASME provides guidelines for manually operated torque instruments.

Figure 3 shows the outline of Japan. Public traceability system for Torque will be established soon with JCSS, Japan Calibration Service System. Japan Measuring Instruments Federation, JMIF provides guidelines JMIF015 for calibration service of torque meter and guidelines JMIF019 for torque wrench testers. For calibration of reference torque wrench and torque wrench tester/checker, JMIF016 and JMIF019 are referred. To calibrate manual torque instruments, JIS B 4652 by Japanese Industrial Standards Committee covers the requirement and procedure according to ISO 6789 2003. ISO 6789, however was significantly revised in 2017, it's categorized into two parts. The Part 1 is for examination and the another Part 2 for calibration.

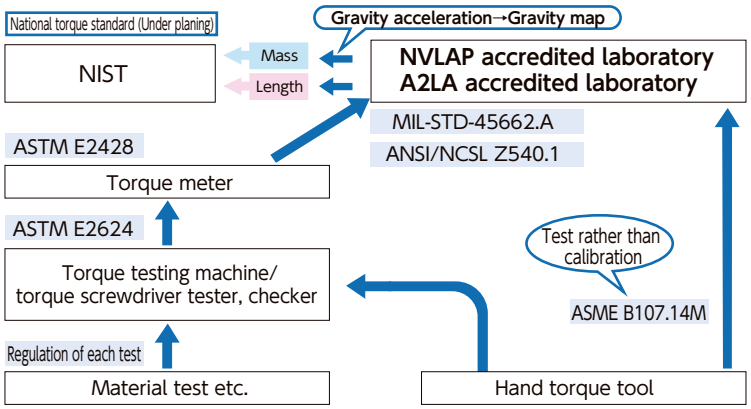


Figure 2. American torque traceability system and related standards

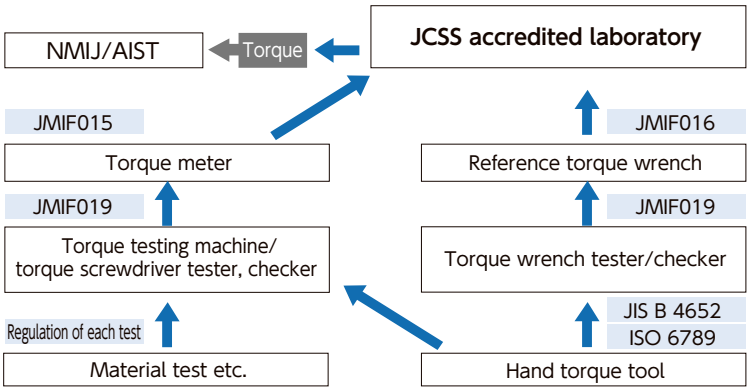


Figure 3. Japanese torque traceability system and related standards

3. Traceability stages

Here follows an explanation of traceability stages for a sample calibration, using JCSS terminology. For the first stage, using torque standard machines (TSM), which are classified as Specified Standard Instruments by the National Metrology Institute of Japan (NMIJ), calibrate a Specified Secondary Standard Instrument (either a torque measuring device [TMD] or a high precision reference torque wrench [HGRTW]). Next, using the TMD or HGRTW, calibrate the practical standards torque calibration machine (TCM) which is in the possession of the technician who performed the 1st stage calibration. Then, using the TCM, calibrate the working standard torque meter (TM), the reference torque screwdriver (RTS), and the reference torque wrench (RTW), which are in the possession of the technician who performed the 2nd stage calibration. And then, use the TM, RTS or RTW to calibrate the torque testing machine (TTM), the torque screwdriver tester (TST) / torque screwdriver checker (TSC), and the torque wrench tester (TWT) / torque wrench tester (TWC, which are in the possession of the technician who performed the 3rd stage calibration. Use the TTM, TST, TSC, TWT or TWC to test various materials or to calibrate (or test) hand torque tools. This will ensure traceability up to the end user.

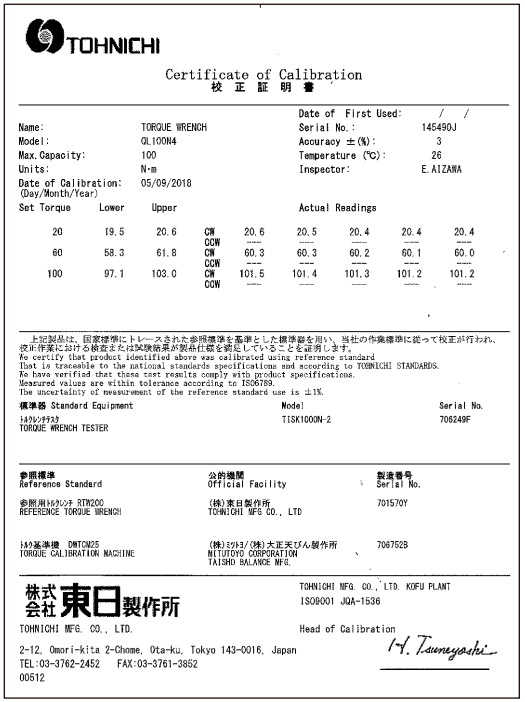
4. Conclusion

My report has briefly examined torque standards and torque measurement traceability systems in Japan. Under government directive, accreditation programs ensure measurement traceability. Such practices have become a corporate responsibility, even a business strategy, and they are now considered common sense worldwide. It is to be hoped that this report will encourage industries in Japan to use the Japan Calibration Service System (JCSS), and strengthen their torque measurement traceability systems.

(4) ISO 9000-related documents

Torque equipment is also required to be controlled, calibrated and have traceability with national standards as a measurement instrument according to ISO 9000. Tohnichi provides certificate of calibration shown in Figure 6-5. Alternatively, upon the customer's request, we also issue an inspection certificate, traceability chart shown in Figure 6-3. Tohnichi stores the histories of these issued documents for a certain period and it helps maintain your torque management system base on ISO 9000.

Figure 6-5. Certificate of calibration supplied with torque wrenches



TOHNICHI

Certificate of Calibration
校 正 証 明 書

Name: TORQUE WRENCH
Model: QL100N4
Max. Capacity: 100
Units: N·m
Date of Calibration: 05/09/2018 (Day/Month/Year)

Date of First Used: / /
Serial No.: 145490J
Accuracy ±(%): 3
Temperature (℃): 26
Inspector: E.AIZAWA

Set Torque	Lower	Upper		Actual Readings				
20	19.5	20.6	CW	20.6	20.5	20.4	20.4	20.4
			CCW	----	----	----	----	----
60	58.3	61.8	CW	60.3	60.3	60.2	60.1	60.0
			CCW	----	----	----	----	----
100	97.1	103.0	CW	101.5	101.4	101.3	101.2	101.2
			CCW	----	----	----	----	----

上記製品は、国家標準にトレースされた当社標準器を基準とした標準器を用い、当社の作業標準に従って校正が行われ、
校正作業における検査または試験結果が製品仕様を満足していることを証明します。
We certify that product identified above was calibrated using reference standard
that is traceable to the national standards specifications and according to TOHNICHI STANDARDS.
We have verified that these test results comply with product specifications.
Measured values are within tolerance according to ISO6789.
The uncertainty of measurement of the reference standard use is ±1%.

標準器 Standard Equipment	Model	Serial No.
トルクレンチテスタ TORQUE WRENCH TESTER	TTISK1000N-2	706249F

参照標準 Reference Standard	公的機関 Official Facility	製造番号 Serial No.
参照用トルクレンチ RTW200 REFERENCE TORQUE WRENCH	(株)東日製作所 TOHNICHI MFG CO., LTD	70157OY
トルク基準機 DWTCM25 TORQUE CALIBRATION MACHINE	(株)ミツトヨ/(株)大正天びん製作所 MITUTOYO CORPORATION TAISHO BALANCE MFG.	706752B

株式会社 東日製作所
TOHNICHI MFG. CO., LTD.
2-12, Omori-kita 2-Chome, Ota-ku, Tokyo 143-0016, Japan
TEL:03-3762-2452 FAX:03-3761-3852
00512

TOHNICHI MFG. CO., LTD. KOFU PLANT
ISO9001 JQA-1536
Head of Calibration
H. Tsuneyoshi

ISO Related document

1. Calibration Certificate
   (Combined with inspection certificate)

2. Inspection Certificate

3. Traceability Chart

6-3 Engagement wit JCSS and development of services

The Torque Standards Calibration Laboratory of Tohnichi Manufacturing was awarded JCSS Second Grade (Torque Wrench Testers) accreditation in November 2011. By March 2018 the Laboratory had also been granted First Grade (Reference Torque Wrenches) and Third Grade (Hand Torque Tools) registration. This makes Tohnichi the first torque device calibration service provider in Japan to complete accreditation in all JCSS grades. (10N•m ~ 1000N•m)

(1) JCSS overview

JCSS (Japan Calibration Service System) covers measurement traceability systems under Japan's Measurement Law.

Its focus is twofold: the National Measurement Standards Provision System and the Calibration Laboratory Registration System. The latter system has been administered since November 1993 as the Calibration Laboratory Accreditation System by the National Institute of Technology and Evaluation (NITE: initially called the International Trade and Industry Inspection Institute). Then due to system changes introduced on 1 July 2005, JCSS has since been administered as a calibration service provider registration system.

Participation in the registration system is voluntary. Acceptance depends on whether the entity satisfies the requirements of the Measurement Law, relevant regulations and ISO/IEC 17025. Registration is offered for each of the 24 registration categories currently published. Audits are conducted by NITE. Upon an entity's application, NITE examines such factors as whether the entity's quality assurance system is administered appropriately, whether its calibration methods and uncertainty evaluations are appropriate, and whether its equipment, etc. are suitable for calibration performance. Audited entities deemed by the audit to be eligible for JCSS registration can be issued a calibration certificate that includes a special accreditation symbol (see Figure 6-6).

In December 1999 JCSS entered into a Mutual Recognition Arrangement (MRA) with Asia Pacific Laboratory Accreditation Cooperation (APLAC), and then in November 2000 it signed another MRA with International Laboratory Accreditation Cooperation (ILAC). Participation in these international MRAs brings JCSS another step closer to worldwide acceptance of calibrations conducted under its umbrella (One-Stop-Testing).

Figure 6-6. JCSS symbol

JCSS
0281

Figure 6-7. JCSS symbol with MRA compliant

ilac-MRA IAJapan JCSS 0281 JCSS

When JCSS-registered calibration service providers wish to be covered by the international MRAs, they sign a separate voluntary agreement and may then be issued a calibration certificate imprinted with JCSS accreditation symbols and ILAC MRA attestation (see Figure 6-7). International MRA-accredited entities are subjected to periodic inspections to verify international MRA compliance. The JCSS emblem, and calibration certificate with JCSS accreditation symbol, offer traceability assurance under Japan's national measurement standards, and provide the advantage of immediate recognition of the technical expertise of the calibration service provider.

Extract from National Institute of Technology and Evaluation (NITE)

(2) JCSS calibration service

Tohnichi has been registered to JCSS as "torque" part, figure 6-9. and it is accredited to issue a calibration certification with the JCSS and MRA (Mutual Recognition Arrangement) symbol which certified the torque to be traced directly to National standard with "torque" and the contents of conformity assessment are guaranteed internationally.

Figure 6-8 Traceability chart from the view point of calibration service

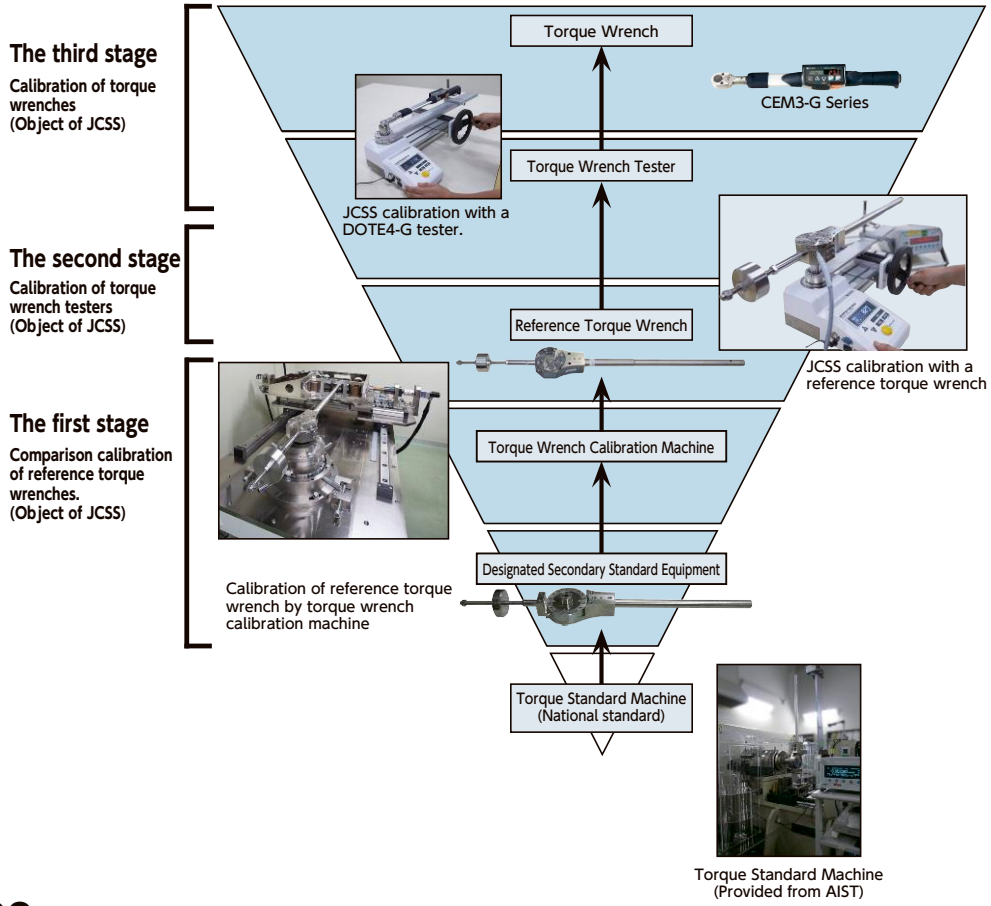
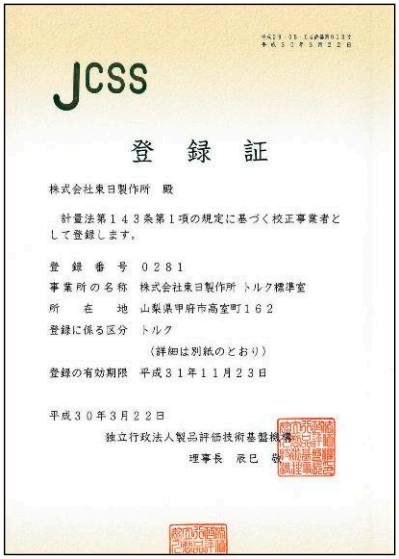


Figure 6-9 JCSS certification of registry and MRA attestation certification
(Registration the torque range from 10 N・m to 1000 N・m)



JCSS

登　録　証

株式会社東日製作所　殿

計量法第１４３条第１項の規定に基づく校正事業者として登録します。

登　録　番　号　０２８１
事業所の名称　株式会社東日製作所 トルク標準室
所　在　地　山梨県甲府市高室町１６２
登録に係る区分　トルク
（詳細は別紙のとおり）
登録の有効期限　平成３１年１１月２３日

平成３０年３月２２日
独立行政法人製品評価技術基盤機構
理事長　辰巳　敬

(English Translation)

ilac-MRA　IAJapan

Certificate of Accreditation

To　Tohnichi Mfg. Co., Ltd.

IAJapan hereby accredits the following laboratory as a calibration laboratory based on the Measurement Law as it meets the requirements of relevant international standards. This laboratory also meets the requirements for Mutual Recognition Arrangements (MRA) of ILAC and APLAC.

Accreditation No.　JCSS 0281

Name of Laboratory
Torque Standard Room, Tohnichi Mfg. Co., Ltd.

Address of Laboratory
162, Takamuro-Cho, Kofu, Yamanashi 400-0057, Japan

Accreditation Scope　Torque

Accreditation Criterion　ISO/IEC 17025:2005

Date of Issue; 2011-11-24
Dr. Koichi Nara
Chief Executive, IAJapan
National Institute of Technology and Evaluation

Figure 6-10. Example of JCSS calibration certificate (Initial page only)

TOHNICHI

JCSS

校正証明書

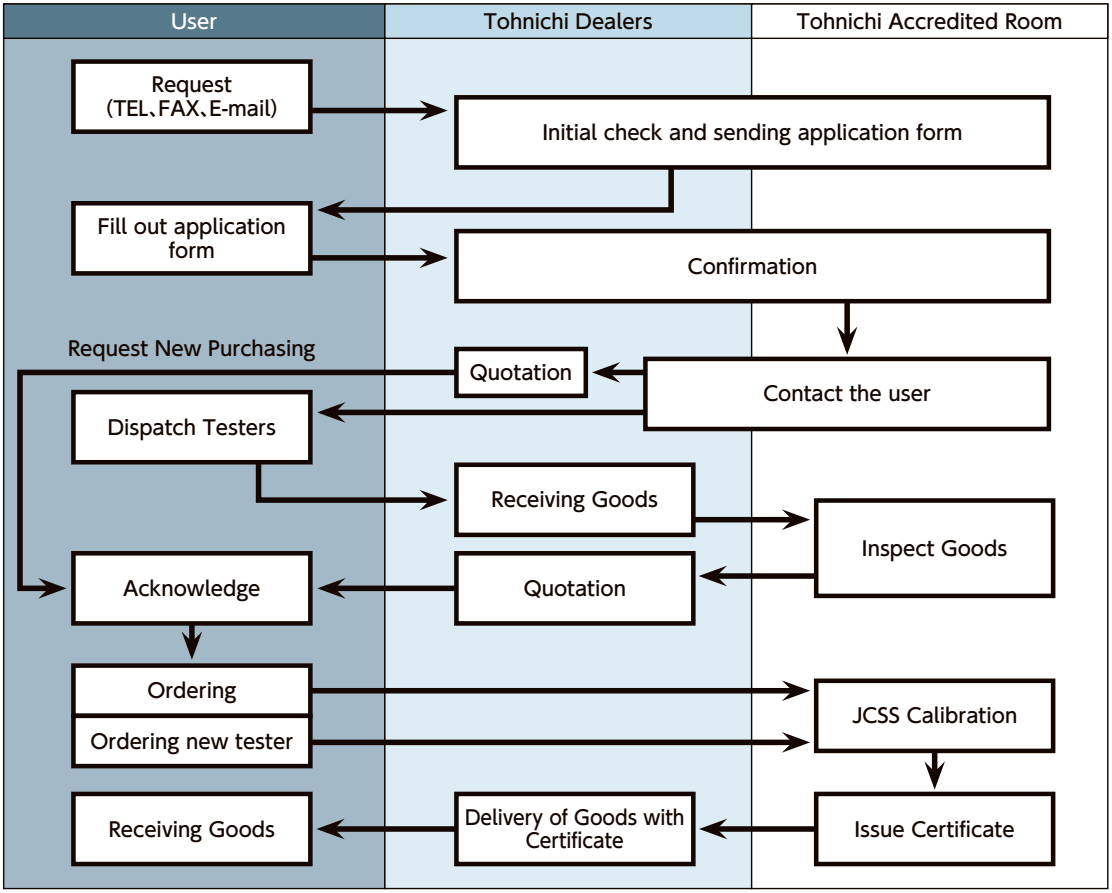
株式会社東日製作所

(3) Flow of JCSS calibration

Figure 6-11 shows a flowchart of JCSS calibration system. Application form is sent in advance to confirm requirements. "Tohnichi Accredited Room" performs calibration.

Under JCSS calibration system, not only newly purchasing Tohnichi torque equipment, also being used items can be calibrated. Contact Tohnichi for further information.

Figure 6-11 Flow of JCSS calibration



6-4 Accuracy and Uncertainty

(1) Accuracy

Accuracy is the overall favorable condition including the correctness and precision of values shown by measuring equipment or measurement results. Further, correctness is the condition where there is little deviation, while precision is the condition where there is little dispersion.

Accuracy = Deviation + Dispersion

Deviation: In graduated torque measuring devices, this is the difference between the graduated values and the measured values. In torque measuring devices without graduation (preset type), this is the difference between the set torque value and the measured torque value.
Dispersion: The standard for the dispersion is taken as 2σ or 3σ.

Figure 6-12. Relation between deviation and dispersion

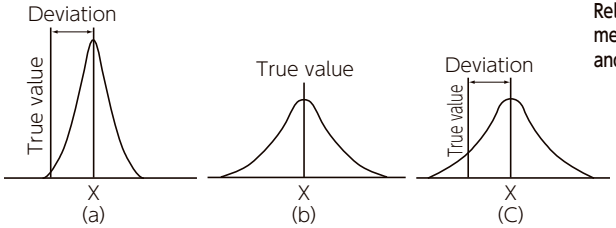


Figure 6-13. Relation of measured value and true value

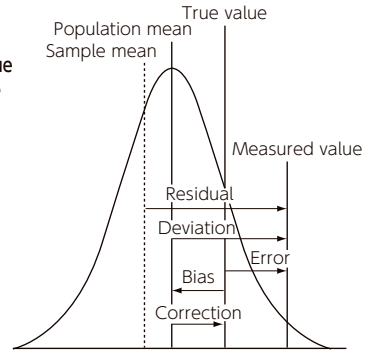


Table 6-1. Glossary of terms used in measurement(Extracted from JIS Z 8103, Glossary of terms used in measurement)

Term	Definition
True value	Value consistent with the definition of a given particular quantity. (refer to Figure 6-13) Remarks: Excluding particular cases, this is an ideal value it is unattainable practically.
Measured value	That value which has been obtained by a measurement. (refer to Figure 6-13)
Error	That value subtracted by the true value from a measured value. (refer to Figure 6-13) Remarks: The ratio of an error to the true value is called the relative error. However, in the case where it is not liable to be confused, it may also be called simply an error.
Bias	A subtracted value of population mean of measured value by a true value. (refer to Figure 6-13)
Deviation	A subtracted value by population mean from a measured value. (refer to Figure 6-13)
Residual	A subtracted value by sample mean from a measured value. (refer to Figure 6-13)
Correction	Value added algebraically to the uncorrected result of a measurement to compensate for systematic error. (refer to Figure 6-13) Remarks : 1. The correction is equal to the negative of the estimated systematic error. 2. The ratio of the correction to the read out value or calculated value is called the correction rate, and the value of correction rate expressed in percentage is called the percentage correction. 3. For the purpose of compensating the presumable systematic error, the factor to be multiplied to the measured result before correction is called the correction factor.
Dispersion	Unevenness of the magnitudes of measured values or the degree of irregularity.

(2) Uncertainty

Without assuming the conventional concept of the true value (which is generally unknown), the uncertainty is obtained from the data dispersion (already known) in the data range, using the measured results themselves. (Figure 6-12) The methods of evaluating uncertainty are classified under the following two types:

① **Evaluation method by statistical analysis from a series of measured values. (Uncertainty type A)**
② **Evaluation method by a means other than statistical analysis from a series of measured values. (Uncertainty type B)**

Further, for both of type A and type B, the standard uncertainties and the standard deviations (or similar values) are estimated from the normal distribution, rectangular distribution and trapezoid distribution. Finally, these are combined by the propagation rule of errors. (The combined standard uncertainty) Under these procedures, the overall uncertainty is indicated as the Extended Uncertainty.

Table 6-14. Factors for uncertainty in general measurements

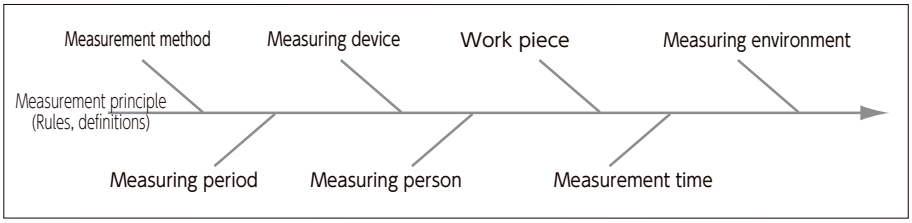
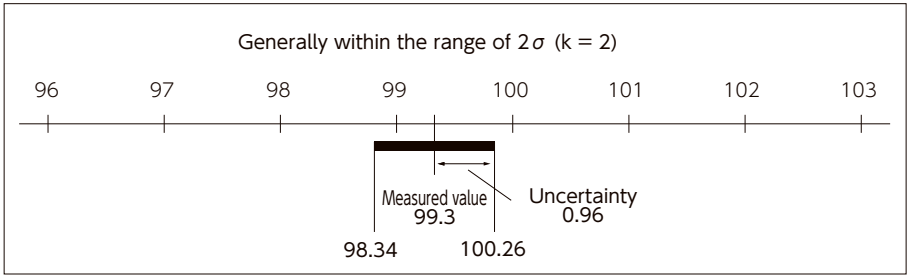
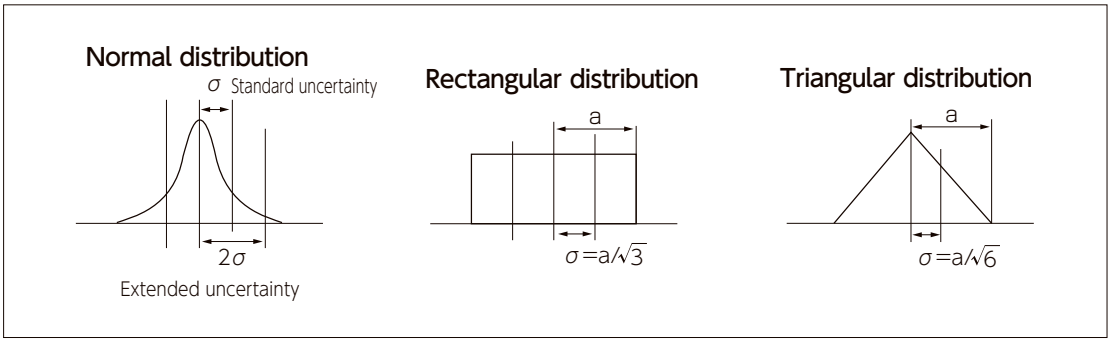


Table 6-15. Uncertainty



In normal distribution, σ (standard error) equals the standard uncertainty and generally, 2σ equals the extended uncertainty. In rectangular distribution, dividing the half width of distribution (a) by $\sqrt{3}$ equals the extended uncertainty ($a/\sqrt{3}$). In triangular distribution, dividing the half width of distribution by $\sqrt{6}$ equals the standard uncertainty ($a/\sqrt{6}$).

Table 6-16. How to estimate the uncertainty



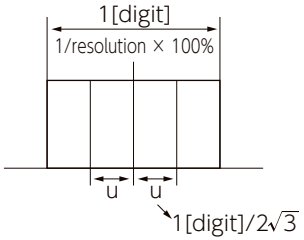
To obtain the resolution of a digital display for the uncertainty of 1 [digit], dividing 0.5 [digit] (half the width of 1 [digit]) by $\sqrt{3}$ equals the standard uncertainty (1 [digit]/$2\sqrt{3}$). For example, if the resolution (Nmin) using the minimum torque capacity (Tmin) is taken as 100, 1 [digit] equals 1% and the uncertainty of its resolution (Udigit) equals 0.29%.

Table 6-17. Example of estimating the uncertainty from the rectangular distribution

Resolution of digital display

Uncertainty for 1 [digit] (Udigit)
Resolution Nmin at Tmin
Udigit = 1/(Nmin × $2\sqrt{3}$) ×100%
1/resolution × 100%

Nmin	Udigit
100	0.29%
200	0.14%
400	0.07%



(3) Analysis procedure for uncertainty in measurements

① Setting the method of measurement and calibration. (Describe the procedure concisely.) Describe the principles and measuring methods, measuring devices and instruments concisely.

② Construction of the mathematical model (Write the formulas or state the principal factors.)
a) Describe the formulas if they can express the uncertainty.
b) If the uncertainty cannot be expressed by numerical formulas, indicate the factors of the uncertainties and combine them by adding.
c) Execute the test of significance through experiments based upon the design of experiments and factor analysis. Then estimate the uncertainties of each factor.

③ Correction of values (Describe the correction items and the methods, if any.) If corrections are made, the estimation of uncertainties should be carried out after the data correction.

④ Analysis and estimation of uncertainty elements (Including type A and type B classification) point out and classify the uncertainty elements, and estimate the standard deviation (or similar values) per element as follows:
a) Uncertainty of standard. (Described as the standard uncertainty.)
b) The uncertainty compared to the standard. Uncertainty resulting from factors such as the calibration equipment, calibration environment, calibration period, work piece, etc.(Described in the standard uncertainty; show the basis of the method of determination).

⑤ Calculation of combined standard uncertainty (Square root of sum of squares)

$$uc = \left(\sum_{i=1}^{n} ui^2\right)^{1/2} = \sqrt{u1^2+u2^2+\cdots un^2}$$

(The apparent differences between type A and type B will disappear.)

⑥ Calculation of extended uncertainty

$$U = k \cdot uc$$

k: Coverage factor
(Generally, k = 2 is taken. If not, describe the reason for this.)

(4) Example of uncertainty

① Theoretical formula
Torque [N·m] = Mass of dead weight [kg] x Gravitational acceleration [m/s²] x Effective length of calibration lever L [mm]

② Hypothetical models
・Torque calibration kit DOTCL100N
・Torque wrench tester DOTE100N4-G

③ Uncertainty of calibration of torque wrench tester
Extended uncertainty of torque calibration kit: UIA
Extended uncertainty of torque calibration work: UIB
Extended uncertainty of measured torque: UIT ($UIT^2 = UIA^2 + UIB^2$)
Extended uncertainty of torque wrench tester: UC
Extended uncertainty of calibration of torque wrench tester: UT ($UT^2 = UIT^2 + UC^2$)

④ Uncertainty of torque calibration kit

Factors	Standard uncertainty
・Mass (standard dead weight)	0.0004%
・Mass for measurement	0.01%
・Gravitational acceleration	0.005%
＊(Refer to P. 27, "Acceleration of gravity")	
・Corrections of specific gravity	0.015%
・Vertical/horizontal conversion	0.014%

Combined standard uncertainty for force

$$uf = \sqrt{0.0004^2+0.01^2+0.005^2+0.015^2+0.014^2} = 0.023\%$$

・Scale (calibration)	0.006%
・Length of lever (process tolerance)	0.02%
・Diameter of wire	0.02%
・Elongation of lever	0.014%

Combined standard uncertainty of length of lever

$$ul = \sqrt{0.006^2+0.02^2+0.02^2+0.014^2} = 0.032\%$$

Combined standard uncertainty of torque calibration kit

$$ua = \sqrt{uf^2+ul^2} = \sqrt{0.023^2+0.032^2} = 0.04\%$$

Extended standard uncertainty of torque calibration kit (k = 2)

$$UIA = 2 \times ua = 0.08\%$$

6-4 Accuracy and Uncertainty

⑤ Uncertainty of torque calibration

Factors	Standard uncertainty
・Horizontality of wire	0.06%
・Inclination of lever (horizontality)	0.06%
・Length of lever (angle of drive)	0.03%
・Newton conversion	0.03%
・Repeated uncertainty	0.1%

Combined standard uncertainty of torque calibration work:

$$ub = \sqrt{0.06^2+0.06^2+0.03^2+0.03^2+0.1^2} = 0.14\%$$

Extended uncertainty of torque calibration work:

$$UIB = 2 \times ub = 0.28\%$$

Extended uncertainty of calibration torque:

$$UIT = \sqrt{UIA^2+UIB^2} = 0.29\%$$

⑥ Uncertainty of calibration of torque wrench tester

Factors	Standard uncertainty
・Resolution of torque wrench tester (zero point)	0.06%
・Resolution of torque wrench tester (display)	0.06%
・Friction of axis bearing area	0.005%
・Uncertainty of gauge	0.14%
・Uncertainty of display	0.14%

Combined standard uncertainty of torque wrench tester:

$$uc = \sqrt{0.06^2+0.06^2+0.005^2+0.14^2+0.14^2} = 0.22\%$$

Extended uncertainty of torque wrench tester:

$$UC = 2 \times uc = 0.44\%$$

Extended uncertainty of calibration of torque wrench tester:

$$UT = \sqrt{UIT^2+UC^2} = 0.52\%$$

⑦ Traceability of torque tools

The extended uncertainty of the torque wrench tester is required to be below ±1% (k = 2).
The extended uncertainty of the torque of the torque calibration kit should be below ±0.3% (k = 2).
Therefore, the standard uncertainty of the calibration kit is expected to be below 0.15%.
Each standard uncertainty of inferior characteristics that is below 0.015% can be ignored.

(5) Accuracy of Torque Tools (JIS B 4652 : 2008)

Situation where calibration of a torque wrench or torque screwdriver is being carried out using a measuring instrument, match the indicated value on the index of the graduated scale of the measuring instrument being calibrated with the measuring point, and read the numbers on the measuring instrument.

$$As(\%) = \frac{(Xa - Xr)}{Xr} \times 100$$

As(%) : Deviation of the torque tool
Xa : Indicated value of torque tool
Reference value of Calibration Equipment
Xr : Reference value of Calibration Equipment

$$\text{Deviation of the torque tool} = \frac{\text{Indicating value of torque tool} - \text{Measuring value of calibration equipment}}{\text{Measuring Value of Calibration Equipment}} \times 100$$

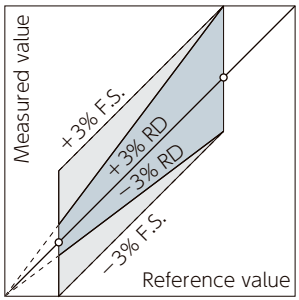
Indicated value of torque tool

Reference value of Calibration equipment

Calculation example As(%) $\chi a = 50$ $\chi r = 52$

$$As = \frac{(50-52)\times 100}{52} = -3.85\%$$

Figure 6-18. Difference in accuracy between RD and FS



Tohnichi adopts RD (Reading) for accuracy of torque products, not F.S (Full Scale).
Figure 6-18 shows the concept of difference of Reading and Full Scale accuracy.
For Full Scale +/-3% accuracy, the +/-3% error at the maximum range is applied on all measuring point. In contrast, Reading +/-3% error will be applied against each indicating points, so the more lower the measuring point, error will be larger in Full Scale.

6-4 Accuracy and Uncertainty

Torque Tools as Measurement Equipment

Table 6-2. List of Torque Equipment Accuracy

Description	Model Name	Accuracy
Digital Torque Wrench Tester	TF, TCC2-G, DOTE4-G	± 1%+ digit
Digital Torque Meter	TME2	
Digital Torque Screwdriver Tester	TDT3-G	
Digital Torque Wrench Checker	LC3-G	
Digital Rotary Torque Checker	ST3-G	
Digital Torque Screwdriver	STC2-G	± 1%
Digital Torque Wrench	CEM3-G, CTA2-G, CTB2-G	
Digital Torque Gauge	ATGE-G, BTGE-G	± 2% +1digit
Torque Meter	TM	± 2%
Torque Gauge	ATG, BTG	
Torque Wrench Tester	DOT	
Digital Torque Wrench	CPT-G	± 3%
Torque Screwdriver	RTD, LTD, NTD, FTD, MTD, RNTD, A/BMRD, A/BMLD etc.	
Torque Wrench	QL (E2), CL (E2), DQL (E2), TW2, SP2, QSP, PQL, MPQL etc.	
Semi-automatic Torque Wrench	A3、AC3	
Torque Wrench	QSPCA12N ~ 70N	± 4%
Power Torque Tool	U, UR, AUR, DU, AP2 ME, MC2, etc.	± 5%
Torque Wrench	QSPCA6N	± 6%

(6) Durability Accuracy of Tohnichi Standard

■Manual Torque Tools

Guaranteed accuracy and durability on 100,000 cycle operations at maximum torque set or one year from the first use. With proper maintenance, calibration, adjustment and parts replacement every 100,000 cycles, Tohnichi torque wrenches, upto 420N・m models can be used 1,000,000 times. Upto 1000N・m models 500,000 times, and more than 1000N・m 250,000 times.

■Power Torque Tools

Guaranteed 500,000 cycle operations or one year from the first use under proper operation.
Required periodical calibration and overhauling.

6-5 Tool Control

(1) Tool Control

Any torque equipments break down and cause malfunction as they are used for a long time. To prevent it, periodical check and calibration are required.
Daily inspection serves as a basis for the validity to use, and periodic calibration is effective for external report by securing traceability. By combining these, corresponds to measurement equipment management requirements of various standards including ISO.

Table 6-3. Daily Check and Periodic Calibration

	Daily check	Periodic calibration
Inspector	Operators	QC section, Calibration providers
Time	Before or after the operation	Periodic sequence
Testing equipment	Torque wrench checker	Torque wrench testers, Calibration equipment
Anomaly detection	Possible to detect an error at an early stage	Evaluable the uncertainty and long term variation
Failure and trouble	Possible to find abnormal trends at early stage	Difficult to find an error at early, need a report from line side for repairing

(2) Select Testers

Checker for Daily Check ···
Prevents numerous defective products beforehand

- Required to zero adjust since weight of torque wrench itself is add to vertical loading direction.
- Direct manual loading doesn't provide stable Loading speed, force position and direction.

Tester for Calibration ·····
Quality control and securing traceability of torque equipment

- Horizontal loading direction is not affected by the acceleration of gravity.
- Loading device can keep stable operation speed, force position and loading direction.

Table 6-4. Select Testers

Type / Article	Checker		Tester			
	LC3-G	ST3-G	TDT3-G	DOT	DOTE4-G	TF, TCC2-G
Object	Torque Wrench	Power Tool, Torque Wrench	Torque Screwdriver	Torque Wrench	Torque Wrench	Torque Wrench
Accuracy	± 1%+1digit	± 1%+1digit	± 1%+1digit	± 2%	± 1%+1digit	± 1%+1digit
Torque Range	Small-Medium-Large	Small-Medium-Large	Small	Small-Medium	Small-Medium-Large	Small-Medium-Large
Analog	×	×	×	○	×	×
Digital	○	○	○	×	○	○
Manual	○	○	○	○	○	○ (TCC2-G)
Power	×	×	×	○ (DOT-MD)	○ (DITE4-G-MD2)	○ (TF)
Direction	Right	Right/Left	Right/Left	Right	Right/Left	Right/Left

(3) Testers for torque tools

Table 6-5. Example of Torque tools and Testers/Checkers

Torque tools	Representative Model	Tester / Checker
Pneumatic torque screwdriver	U、UR、AUR	TCF＋TP＋Display
Semi-automatic airtork	A3, AC3	DOT・DOTE4-G・LC3-G・TF・TCC2-G Torque wrench tester
Fully automatic airtork	HAT, AP2	TCF＋TP＋Display、ST
Multiple unit	ME, MC2, MG	TCF＋TP＋Display、ST
Manual torque screwdriver	RTD、LTD、AMRD、BMRD	TDT、ATGE、TCF＋Display
Manual torque wrench	QL、SP、QSP、TW、QSPCA	DOT・DOTE4-G・LC3-G・TF・TCC2-G Torque wrench tester
Tester, Checker, Torque meter	DOTE4-G, LC3-G, TF, TDT3-G, TME2	Calibration kit (weight + calibration lever/pulley)

(4) Standards of Tohnichi, ISO, JIS (ISO 6789:2003, JIS B 4652:2008)

Table 6-6. Permissible deviation of torque value

A. Dial indicating type	Tohnichi standard	Wrench、Screwdriver	± 3%	
	ISO、JIS standard	Wrench	Below 10 N·m ± 6%	Above 10 N·m ± 4%
		Screwdriver	± 6%	
B. Adjustable type	Tohnichi standard	Wrench、Screwdriver	± 3%	
	ISO、JIS standard	Wrench	Below 10 N·m ± 6%	Above 10 N·m ± 4%
		Screwdriver	± 6%	
C. Preset type	Tohnichi standard	Wrench、Screwdriver	± 3%※	
	ISO、JIS standard	Wrench	Below 10 N·m ± 6%	Above 10 N·m ± 4%
		Screwdriver	± 6%	

Permissible deviation of JIS, ISO sectionalize by the maximum torque range of torque tools. ※QSPCA is based on ISO and JIS standard

Table 6-7. Measurement procedure

A. Dial indicating type	1. Tohnichi standard 2. ISO standard 3. JIS standard	Preliminary loading at maximum capacity → Release loading → Zero adjustment → Measure 5 times at each measuring point
B. Adjustable type	1. Tohnichi standard 2. ISO standard 3. JIS standard	5 times preliminary loading at maximum capacity → Measure 5 times at each measuring point
C. Preset type	1. Tohnichi standard	5 times preliminary loading at torque set value → Measure 5 times
	2. ISO standard 3. JIS standard	5 times preliminary loading at torque set value → Measure 10 times

Table 6-8. Measurement point

A. Dial indicating type	Tohnichi standard	20% 60% 100% ※ of maximum torque value
	ISO、JIS standard	
B. Adjustable type	Tohnichi standard	
	ISO、JIS standard	
C. Preset type	Tohnichi standard	Torque set value
	ISO、JIS standard	

Adjustable Minimum value, 60% and 100% of the maximum torque range.
There are case to calibrate at 20% of the maximum range even if it is not the minimum scale value.

(5) Naming of hand torque tools

Table 6-9. Naming of torque tools

Type I Indicating type torque tool (ISO, JIS)		Tohnichi equivalent model
Class A	Twisting or deflection beam type wrench	F、CF
Class B	High rigidity housing type wrench with scale, dial, or display unit	DB、CDB、T-S
Class C	High rigidity housing type wrench with electronic indicator	CEM3-G
Class D	Screwdriver with scale, dial, or display unit	FTD
Class E	Screwdriver with electronic indicator	STC2-G

Type II Adjustable type torque tool (ISO, JIS)		Tohnichi equivalent model
Class A	Variable torque type wrench with graduations or display unit	QL、CL、PQL
Class B	Fixed torque type wrench	–
Class C	Variable torque type wrench with no graduations	QSP、CSP、QSPCA
Class D	Variable torque type screwdriver with graduations or display unit	LTD、RTD
Class E	Fixed torque type screwdriver	NTD、RNTD
Class F	Variable torque type screwdriver with no graduations	–
Class G	Deflection beam / variable torque type wrench with graduations	–

(6) Cautions for calibration of hand torque tools (ISO 6789 : 2003、JIS B 4652 : 2008)

Common items	Calibration Device	The maximum permissible uncertainty of the calibration equipment: measurement should be ±1% of the indicated value. (including coefficient k = 2)
	Calibration Temperature	Should be in the range of 18 to 28°C and should have a temperature variation of less than ±1°C. (The maximum relative humidity should be 90%)
Type I Indicating type torque tools	Installation	Torque wrench: incline within ±3° and loading incidence angle within ±10°. torque screwdriver: tilt within ±5°.
	Preliminary Loading	Carry out preliminary loading one time up to the maximum value in the working direction, and set to zero after releasing the load.
	Loading Method	Load gradually with increasing force until the indicated torque value is reached.
Type II Adjustable type torque tools	Installation	Torque wrench: incline within ±3° and loading incidence angle within ±10°, torque screwdriver: tilt within ±5°.
	Preliminary Loading	Carry out loading five times to the maximum capacity (torque tool nominal capacity) in the working direction, and carry out averaging.
	Loading Method	After loading gradually with increasing force up to 80% of the target torque value, slowly apply a final loading evenly over 0.5 to 4 seconds to reach the target torque value.

7 Maintenance for Torque Tools

Tohnichi Adjusting Tools

Maintenance of torque tools needs in-depth understanding about their structure and methods of torque adjustment and repair, and also Tohnichi adjusting tools are required.
For learning adjustment or repair methods, consult Tohnichi or nearest distributors.

Adjusting tool for LTD/RTD models:
Used for torque adjustment (zero point) of LTD / RTD models

Thrustring tool for SP models:
Used for torque adjustment or disassembly of preset type torque wrenches

Adjusting Tool for QSP3, SP2 models:
Used for torque adjustment of QSP3, QSP4, SP2, RSP2 and QSPCA.

Adjusting tool for DB models:
Used for torque adjustment of dial indicating type torque wrenches as well as T-s and DOT models

7-1 Daily Check

Torque tool daily check can help to find any damaged or missed parts on the early stage, and this prevents users from serious accidents.
Unlike the periodical calibrations, the evaluation standards of the daily check are determined based on the comparison between the result of this time and the last time.

Table 7-1.Daily Check List

Check list		How to check	Evaluation standard	Repairable/Unrepairable
Torque value	Torque value	Visually	Whether it can definitely confirmed.	Repairable
	Tendency	Operation test with tester	When the value vary a lot from previous time's, or over the regulated tolerance.	
Scale	Dirt/stain	Visually	Vague	Repairable
	Scratch	Visually	Vague	
	Aberration of scale line	Visually	Scale and standard line is not aligned	
Outside appearance	Crack	Visually	Yes・No	Unrepairable
	Peeling metal coating	Visually	Yes・No	
	Rust	Visually	Yes・No	
	Bend of tube	Visually	Yes・No	
	Deformation of tube	Visually	Yes・No	
	Serial number	Visually	Whether it can definitely confirmed.	
Ratchet	Abnormal ratchet rotation	Turn ratchet right & left or shake while holding	Unstable or unusual rotation sounds.	Repairable if parts replaced
	Ball plunger missing/ wearning	Visually Insert and remove a socket/bit.	Ball plunder missing Socket/bit easily fallen out	
	Ratchet lever missing	Visually		
	Screw missing/loosening	Visually		
Parts	Unable to lock sub-scale	Tighten locker	Locker hits the spring pin	Repairable
	Head pin rattling	Visually		
	Sub-scale missing	Visually		Repairable if parts replaced
	Locker missing	Visually		
	Extension handle missing/loosening	Visually		

When you find something wrong other than shown on the above list, repair it or ask your nearest Tohnichi distributor for repairing immediately.

7-2 Adjustment method

(1) Adjustment methods for torque tools

For a graduated torque measuring tool, coordinate the scale torque value with the measured torque value by repeating the zero point correction and the gain adjustment several times. (Figure 7-1)

Zero point correction

For the zero point correction (Figure 7-1), the scale values are increased or reduced by the same quantity (C) against the measured torque values.

Gain adjustment

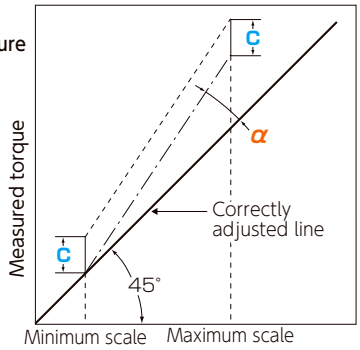
For the gain adjustment (Figure 7-1), the scale values are magnified or reduced almost proportionally to the measured torque values at a certain rate (α).

Central point

If the error at the central point of the full-scale span is too large, carry out the above zero-point correction and gain adjustment.

If the error is still too large even after the procedure, the torque tool must be disassembled and repaired.

Figure 7-1.
Adjustment figure



Adjusting procedures for adjustable type torque tools

① Set the torque tool to the minimum scale value.
② Correct the value to the minimum scale value with the torque tester zero point correction, parallel shift (C).
③ Set the value of the torque tool to the maximum scale value.
④ Adjust the value to the maximum scale value with a torque tester gain adjustment, multiplying shift (α).
⑤ Confirm the value adjustment by repeating procedures ①~④.

Adjusting procedures for indicating type torque tools

① Correct the value of the torque tool to the zero point. zero point correction, parallel shift (C).
② Load the torque tool with the maximum torque value using the torque tester and read the scale value.
③ Release the load and correct the value by adjustment gain adjustment, multiplying shift (α).
④ Confirm the adjusted value by repeating procedures ①~③.
* Torque wrenches that do not have adjusting devices are not adjustable.

Table 7-2. Torque tool zero-point correction and gain adjustment locations

Type	Model Name	Zero Point Correction	Gain Adjustment
Beam type torque wrench	SF, F, QF, CF	Needle bending	Scale plate replacement
Dial indicating torque wrench	DB, DBE,T	Dial rotation	Dial lever
Adjustable torque wrench	QL, PQL, QLE2, CL, CLE2	Sup. graduation replacement	Correcting screw
Dial indicating torque screwdriver	FTD	Needle or spring bracket rotation	Vertical movement of spring seat
	FTD-S, FTD2-S	Scale rotation	
Adjustable torque screwdriver	LTD, RTD, AMLD, BMLD, AMRD, BMRD	Zero adjusting screw or shim	Correcting screw
Power torque tool	U, ME, AP2, AUR	Scale ring	Torque adjusting screw

(2) Adjustable type torque screwdrivers

Table 7-3.Rate of torque change for adjustable type torque screwdrivers (LTD, RTD)

Model	Gain adjustment	Zero point adjustment		Adjusting tool	Fixing screw tightening torque value [cN·m]
	Rate of torque change (V) [cN·m/rev]	Rate of torque change (l) [cN·m/rev]	Remarks	Catalog No.	
RTD15CN/LTD	− 9	0.8	Zero adjusting screw 1 rev	51	60
RTD30CN/LTD	− 17.8	1.6			
RTD60CN/LTD	− 42	4.2		46	90
RTD120CN/LTD	− 70	10		47	190
RTD260CN/LTD	− 154	10		48	220
RTD500CN/LTD	− 322	33.3		49	
LTD1000CN	− 654	66.6		50	
LTD2000CN	− 1120	67.0 (t=0.1 [mm])	Shim adjustment t = 0.1 , t = 0.2 , t = 0.5	—	

※ The rate of torque change is reference use only

Adjustment of adjustable type torque screwdrivers

① Loosen the set screw.
② Match the scale to the minimum scale value, set the tool on a tester, and measure the operating torque.
③ Turn the zero adjusting screw to match the scale value with the actual measured value.
CW : Torque value increase
CCW: Torque value decrease
Note: The zero adjusting screw should be turned while the gain correcting screw is in the tightened condition.
④ Match the scale to the maximum scale value, set the tool on the tester, and measure the operating torque.
⑤ Turn the gain correcting screw to match the scale value with the actual measured value.
CW : Torque value decrease
CCW: Torque value increase
Note: The gain correcting screw should be turned while the zero adjusting screw is in the tightened condition.
⑥ Repeat procedures ③ to ⑤ until min./max. value are within the accuracy range.
⑦ Tighten the set screw, and reconfirm the operating torque at each measurement point.

$$\text{Number of turns of the zero adjusting screw} = \frac{T - To}{l \text{ (Amount of torque change)}}$$

Set torque T = 60 [cN·m]
Measured torque To = 55 [cN·m]

$$\frac{60 - 55}{10} = 0.5$$

Since 360° × 0.5 = 180°, you are required to turn the zero adjusting screw 0.5 turn (180°) clockwise.

$$\text{Number of counterclockwise turns of the gain correcting screw} = \frac{T - To}{V \text{ (Amount of torque change)}}$$

Set torque T = 260 [cN·m]
Measured torque To = 280 [cN·m]

$$\frac{260 - 280}{-154} = 0.13$$

Since 360° × 0.13 = 47°, you are required to turn the gain correcting screw 0.13 turn (47°) counterclockwise.

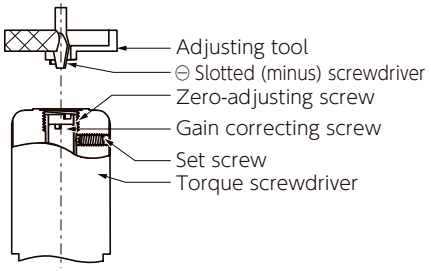


Figure 7-2. Detailed illustration of parts during adjustment

(3) Pre-set type torque screwdrivers

① Insert the adjusting tool into the hole of adjusting screw (bottom of the driver). Turn right: torque increases
② Set a driver on the loading device of the torque driver tester (TDT3-G).
③ Turn CW the loading device and measure the torque value.
④ Repeat the procedure ①～③, and adjust accuracy.

Figure7-3.Names of parts for pre-set type torque driver

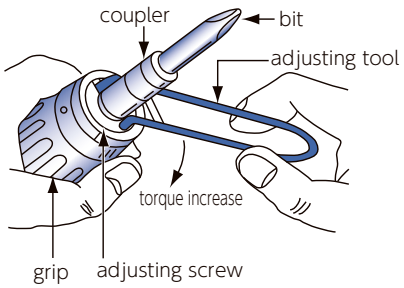


Table 7-4. Rate of torque change for pre-set type torque driver (NTD, RNTD)

model	Rate of torque change per a revolution [cN·m / rev]	Adjusting tool Catalog No.
RNTD15CN NTD15CN	7.7	42
RNTD30CN NTD30CN	9.8	
RNTD60CN NTD60CN	21.1	
RNTD120CN NTD120CN	32	
RNTD260CN NTD260CN	62.7	43
RNTD500CN NTD500CN	160.7	44
NTD1000CN	272.7	

※ The rate of torque change is reference use only

Torque screw driver tester with torque screw driver fixed

(4) Adjustable torque wrenches

1) Adjustment of adjustable torque wrench below 420N

(Except for the following models: QL2N. 5N. 10N. 15N. QL25N5. CL2N. 5N. 10N. 15N. CL25N5)

① Loosen the locker, and turn the supplemental graduation to set it to the minimum scale value.

② Set the torque wrench on a tester, apply loading and confirm the operating torque. Turn the supplemental graduation to match the actual measured value as the minimum scale value.

③ Remove the spring pin using nippers.

④ Rotate the locker counterclockwise to remove it.

⑤ Replace the supplemental graduation so that the "0" of the scale is shown in the scale window.

Supplemental graduation

⑥ Attach the locker.

⑦ Rotate the supplemental graduation clockwise to match the maximum scale value. Set the torque wrench on the tester, apply loading and confirm the operating torque.

- In the case where the actual measured value is lower than the scale value, turn the correcting screw counterclockwise (CCW).
- In the case where the actual measured value is higher than the scale value, turn the correcting screw clockwise (CW).

Note: The correcting screw should be turned while the torque wrench is in the operating condition.

⑧ Repeat procedures ① to ⑦ to repeat the adjustment until both the minimum value and maximum value are within the accuracy range.

⑨ When both the minimum value and maximum value are within the accuracy range, tap in the spring pin. The position for tapping in the spring pin should be where the supplemental graduation is free to rotate when the locker is loosened, but allowing the supplemental graduation to be fixed when the locker is tightened.

Figure7-4. Locker and spring pin correct position

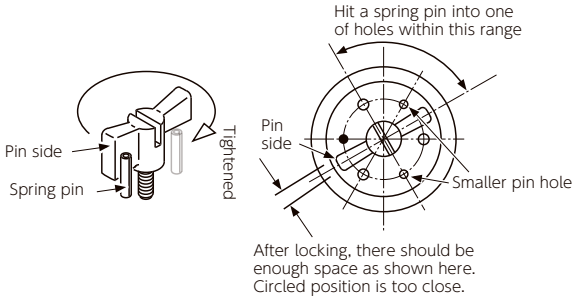
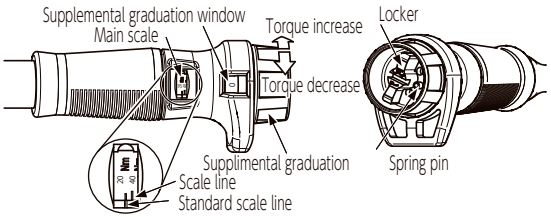


Figure 7-5. Torque setting details

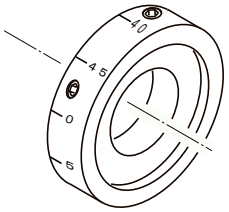


2) Adjustment of QLE2, CLE2

① Set the torque wrench on a tester, apply loading and confirm the operating torque. Turn the supplemental graduation to match the actual measured value as the minimum scale value.

② Loosen the fixing screw of the subsidiary scale ring. Keeping the subsidiary ring fixed, match the measured value with the minumum scale value by turning the adjusting screw with adjusting box, and then tighten the fixing screw of the subsidiary scale ring (tighten at 138N.m).

Figure 7-6. Supplimental graduation adjustment



③ Make sure the "0" of the scale can be shown from the scale window correctly.

④ Set the torque wrench to its maximum torque, and set on the tester.

- If the measered value is lower than the scale value, turn the adjusting screw CCW.
- If the measered value is higher than the scale value, turn the adjusting screw CW.

Note: Adjusting screw must be turned when the wrench operated.

⑤ Repeat procedure ① ~ ④ until the accracy reaches within the accuracy range.

Table 7-5. Rate of torque change for adjusting screw

Model	Rate of torque change by adjusting screw per a revolution (Max. scale, CW)	Flat to flat distance of the adjusting wrench
QL1.5N4	0.4	1.27
QL3N4	0.9	
QL6N4	1.7	
QL12N4	3.5	
QL2N	0.4	
QL5N	1.4	
QL10N	2.9	
QL15N	4.3	
QL25N5	6.4	1.5
QL50N	14	2
QL100N4	23	
QL140N	33	
QL200N4	45	2.5
QL280N	63	
QL420N	83	
QLE550N	96	
QLE550N2		
QLE750N	130	3
QLE750N2		
QLE1000N	190	
QLE1000N2	180	
QLE1400N	340	
QLE1400N2	230	
QLE2100N	380	4
QLE2100N2	300	
QLE2800N2	440	

※ Torque ⊿ is for reference use only.

3) Settle main graduation scale position below adjustable 420N models, except for QL2/5/10/15N, QL25N5, CL2/5/10/15N, CL25N5

① Confirm the value of both Min. and Max. are within accracy range, and check the deviation of scale.
② Remove the spring pin using nippers.
③ Remove Locker.
④ Remove graduation. Sup and seat.
⑤ Measure the depth from end surface to thrust ring.
⑥ Loosen thrust ring screw by using hex key.
⑦ Remove thrust ring.
⑧ Remove adjusting screw and scale piece assembly.
⑨ Remove stop plate.
⑩ Remove main spring and seat.
⑪ Apply Ever Torque (P.491) inside tube.
⑫ Insert a shim (for adjusting scale) between seat and main spring, and insert it inside tube.
⑬ set stop plate inside tube.
⑭ Insert scale piece.
⑮ Reassemble the thrust ring and put it in until it reaches to the depth measured in procedure ⑤. Decide the scale position so that the value on the sub scale is going to be the center of the scale window.
⑯ Tighten the thrust ring screw at the required torque value (see P.117 table7-7).
⑰ Combine sub scale seat and sub scale.
⑱ Put a washer on locker, and lightly tighten locker (pin will be fixed after adjustment).
⑲ Adjust torque value (see P.112).
⑳ Hit a pin into locker (see P.112).

Figure 7-7. Scale adjustment for adjusting type torque wrench (sectional)

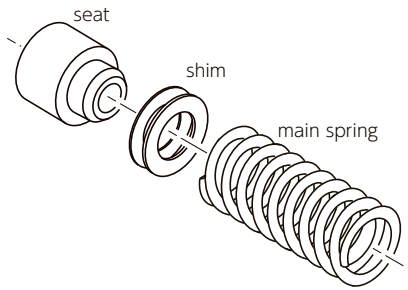
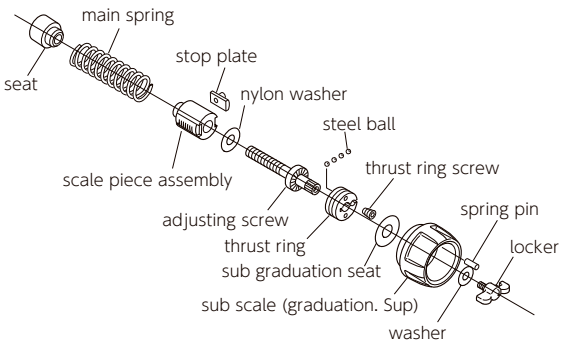


Figure 7-8. Scale adjustment for adjusting type torque wrench (whole)



4) Settle main graduation scale position above adjustable 550N models

① Confirm the value of both Min. and Max. are within accracy range, and check the deviation of scale.

② Adjust the scale line.
if the line deviates to the head side from standard line: adjust scale to the Max. value.
if the line deviates to the sub scale side from standard line: adjust scale to the Min. value.

③ Slide the scale by a chisel and small hammer to adjust the scale line and standard line position.

④ Confirm the positions of scale line and standard scale line are align. Punch the three positions of the scale piece to fix the memory.

⑤ Check if scale is not moved pushing it with chisel.

Figure 7-9. QL scale adjustment

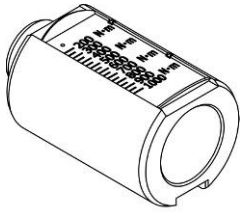


Figure 7-10. Scale line deviation

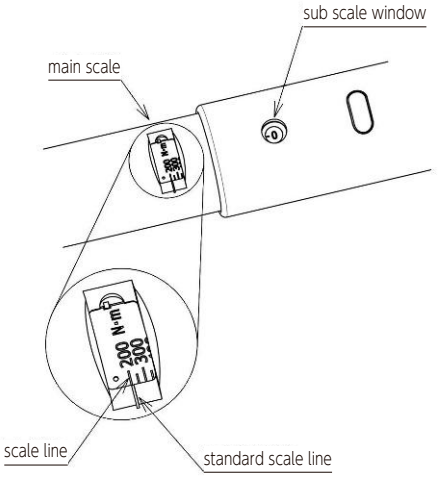


Figure of installation of a torque wrench on a torque wrench tester.

(5) Pre-set torque wrenches

Adjusting method for pre-set type wench varies depending on models. Please check the model name of your torque wrench.

1) QSP (1.5N4 ～ 280N3), QSPCA, SP2 (2N2 ～ 310N2), RSP2 (8N2 ～ 310N2)

① Insert the adjusting tool (Table 7-6) into the hexagonal hole with pin at the end of the wrench main unit

② Set the torque wrench on a tester, apply loading, and read the torque when the toggle operates. Adjust the setting torque by turning the adjusting screw, and repeat several times until the value comes close to the torque setting that you want to achieve.
CW: Torque value increase
CCW: Torque value decrease

③ Then inspect the set torque value with the tester five times or more to confirm that the torque value has become stable.

Torque adjustment for QSP (1.5N4 ～ 280N3), QSPCA, SP2 (2N2 ～ 310N2), RSP2 (8N2 ～ 310N2)

QSP4

SP2

QSPCA

Table7-6. Adjusting tool for QSP3, SP2, RSP2, QSPCA

Torque wrench model name	Adjusting tool	
	Catalog No.	Tip shape [mm] Hex x Bore x Depth
QSP1.5N4 ～ QSP25N3/CSP	931	2.5 × 1.5 × 6
QSP50N3 ～ 280N3/CSP	930	4 × 2.5 × 8
SP2N2 ～ 19N2,RSP8N2 ～ RSP19N2	931	2.5 × 1.5 × 6
SP38N2 ～ SP310N2/RSP2	930	4 × 2.5 × 8
QSPCA6N, 12N	931	2.5 × 1.5 × 6
QSPCA30N, 70N	930	4 × 2.5 × 8

2) SP (420N、560N)，QSP (420N)

① Set the wrench on a torque wrench tester, apply loading, and read the torque when the toggle operates. Adjust the setting torque by turning the thrustring with the thrustring tool, and repeat several times until the value comes close to the torque setting you want to achieve.

② Then inspect the set torque value with the tester three times or more to confirm that the torque value has become stable, and tighten the thrustring screw with the specified torque. (Table7-7)

③ Tighten the cap by turning it clockwise using the thrustring tool.
CW: Torque value increase
CCW: Torque value decrease

④ Inspect the set torque value with the tester five times or more to confirm that the torque value has become stable. And tighten thrustring screw with set torque (Table7-7).

⑤ Tighten cap by thrustring tool.

Figure 7-11 QSP torque adjustment

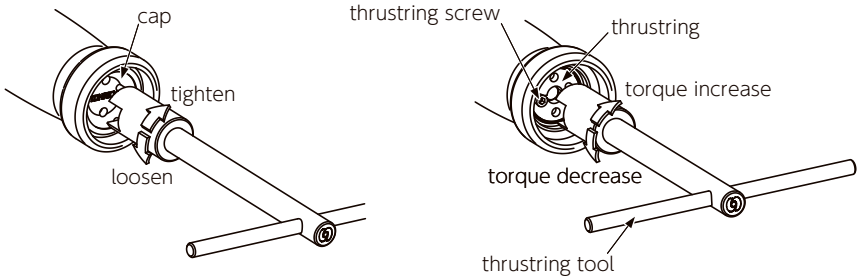


Table 7-7. Torque adjustment for SP and QSP models

Torque wrench model name		Thrustring tool		Thrustring screw		Thrustring	Cap
SP	QSP	No.	Catalog No.	Width across flats B[mm]	Tightening torque T[N·m]	a_1/d_1 [mm]	a_2/d_2 [mm]
—	QSP1.5N~QSP6N/CSP	A-1	310	1.5	0.5	6.8/2	6.8/2.2
SP2N ~ SP19N	QSP12N/CSP	A-2	311			9/2.5	9/3.2
SP38N, 67N	—	A-3	312	2	2.0	12/3	12/3.2
SP120N ~ 220N	—	A-4	313	3	3.0	16/3	16/3.2
SP310N	—	A-5	314			18/3	18/3.2
SP420N, 560N	QSP420N/CSP	A-6	315			20/3	20/3.2

(6) Dial indicating torque wrenches

① Remove the back cover using the thrus tring tool. (P.107 table 7-7)
② Set the torque wrench in the tester so that a counterclockwise torque will be applied, and apply preloading. (Tester should carry this out in RUN mode.)
③ Release the preloading, and carry out zero adjustment both of the tester and torque wrench.
④ Again, set the torque wrench in the tester so that a counterclockwise torque will be applied, and apply loading up to the torque wrench maximum specified value. Read the value on the tester. (Tester should carry this out in RUN mode.)
⑤ In the case where there is a discrepancy between the tester value and the torque wrench indicated value: When the tester value is lower than the torque wrench indicated value, the sector should be widened. When the tester value is higher than the torque wrench indicated value, the sector should be compressed.
⑥ Repeat procedures (4) and (5) until the values are within the accuracy range.
⑦ Set the torque wrench in the tester so that a clockwise torque will be applied, and apply preloading. (Tester should carry this out in RUN mode.)
⑧ Release the preloading, and carry out zero adjustment both of the tester and torque wrench.
⑨ Again, set the torque wrench in the tester so that a clockwise torque will be applied, and apply loading up to the torque wrench maximum specified value. Read the value on the tester. (Tester should carry this out in RUN mode.)
⑩ In the case where there is a discrepancy between the tester value and the torque wrench indicated value: When the tester value is lower than the torque wrench indicated value, the sector should be widened. When the tester value is higher than the torque wrench indicated value, the sector should be compressed.
⑪ Repeat procedures (9) and (10) until the values are within the accuracy range.
⑫ Install the back cover to the main unit rear window.

Figure 7-12

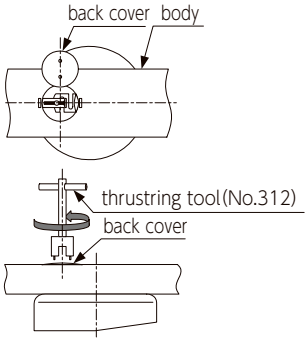
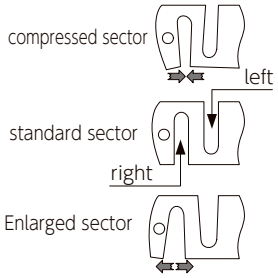


Figure 7-13



7-3 Parts Replacement

(1) Replace ratchet part

1) Disassembling the ratchet

① Remove the flat head screw (Phillips or hexagonal) using a screwdriver or hexagon key.
② Remove the head cover from the head and ratchet.
③ Remove the ratchet assembly.
④ Take out the ratchet springs. (Be careful that the ratchet springs do not spring out.)
⑤ Remove the head saws.

2) Reassembling the ratchet

① Insert the head saw axis part back into the hole of the head of the head.
② Install the ratchet springs between the ratchet and the head saws so that the springs' small diameters are touching the head saws. (Be careful that the ratchet springs do not spring out.)
③ Insert the ratchet assembly while pressing down on the head saw.
④ Install the head cover, centering the hole over the ratchet.
⑤ Place some screw adhesive on a small plate and apply a small quantity into the hole of the head cover. (Be careful not to get the adhesive on the inside parts.)
⑥ Tighten the flat head screw (Phillips or hexagonal), using a torque screwdriver or torque wrench.

Figure 7-14. Ratchet spring position

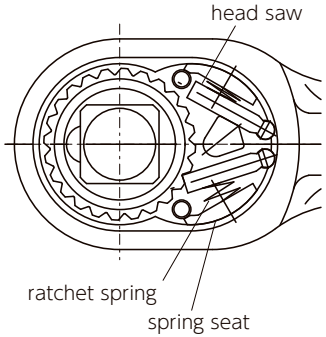


Table 7-8. Tightening torque for head screw

Model	Tightening torque (N•m)
QL2N ~ QL25N5/QSP	0.78
QL50N ~ QL140N/QSP	1.42
QL200N ~ QL420N/QSP	3.30
QLE550N2 ~ QLE1000N2	7
QLE1400N2 ~ QLE2800N2	11.6

(2) How to fix locker of adjustable torque screwdriver

① Set the main scale and sub scale.
② Apply grease into the holes of roller, and put roller on each hole.
＊Be careful of rollers for RTD260CN, sharp side should be upward.
③ Insert locker (white dot of the locker should be the next to LOCK mark), and turn it counter clockwisely.
Make sure the ▼ marks and white dot can match up.
④ From coupler side, insert locker pieces until hear snap sound.
＊Watch the direction of locker piece, the flat side should be with the RTD case side.
⑤ Confirm the locker works correctly.

Figure 7-16. Direction to set the roller

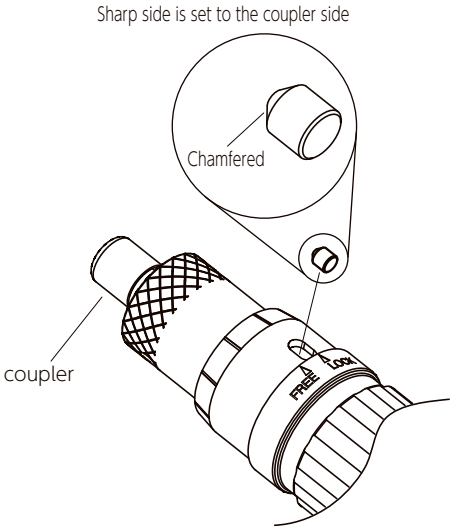
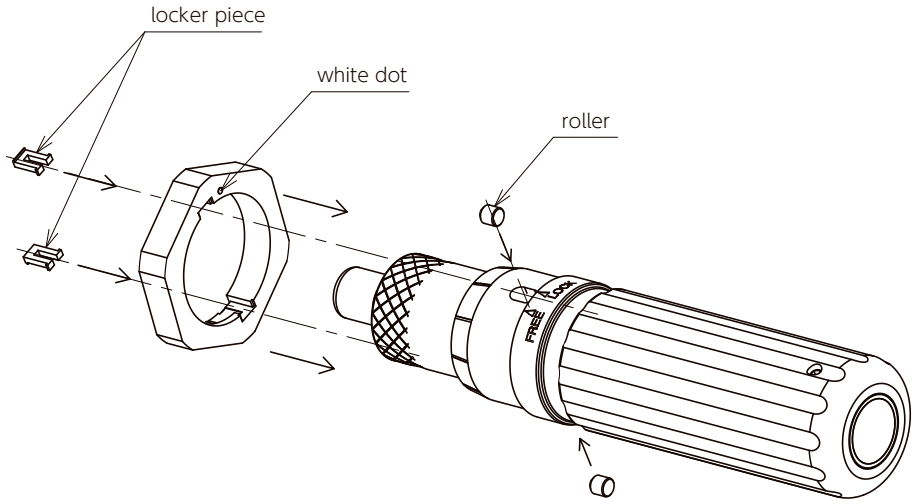


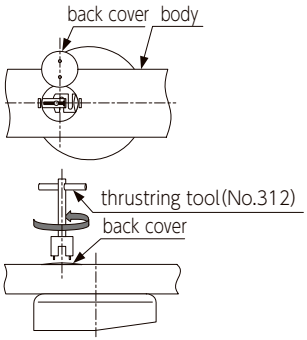
Figure 7-15 Assembling RTD locker



(3) Dial indicating torque wrench

A : Disassembling the dial gauge

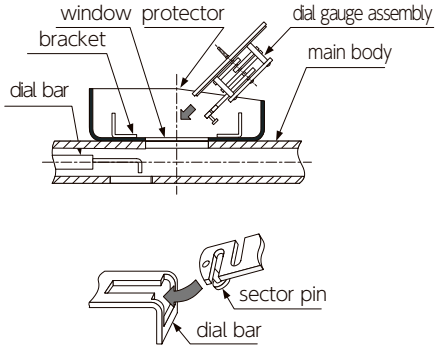
Figure 7-17



① Rotate and remove the back cover with the thrustring tool (P.99 Table 7-5)
② Remove the protector cover. (DB1.5N4 to DB280N)
③ Set the notched part of the glass plate so that it is parallel with the tube.
④ Hold the body in a vice, insert the special tool (P.491) between the protector and the dial gauge assembly and pry off the glass plate.
⑤ Pull off the needle using the special tool.
⑥ Take off the scale plate.
⑦ Take off the spring plate.
⑧ Loosen the two M3 screws with a Phillips screwdriver.
⑨ Lift up the dial gauge assembly and take off the sector pin of the dial gauge assembly from the groove of the dial bar while confirming using the rear window of the main unit.
⑩ Remove the bracket from the protector.

B : Reassembling the dial gauge

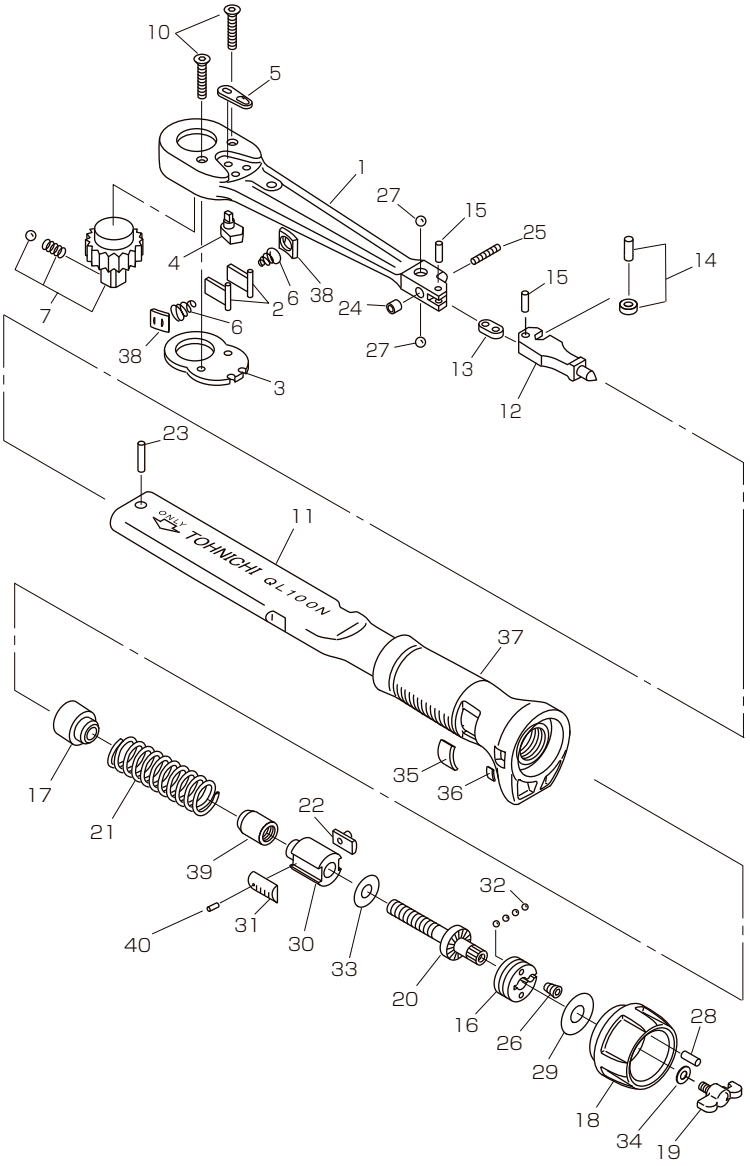
Figure 7-18



① Place the bracket back in the center of the main unit protector.
② Insert the dial gauge assembly into the main unit window from above the bracket. Insert the sector pin into the groove of the dial bar. (confirm using the round window on the rear side.)
③ Apply screw adhesive to the screws of the protector.
④ Match the positions of the dial gauge assembly and the protector and tighten using the two M3 screws. (tightening torque 0.6 [N·m])At this time, check the smooth rotation of the bracket.
⑤ Attach the spring plate.
⑥ Match the center hole of the scale plate with the dial gauge assembly axis, and assemble while aligning the bracket projections with the groove on the outside circumference of the scale plate.
⑦ Positioning the square drive of the main unit to the left and keeping it facing up, install the needle.
⑧ Insert the plate glass, matching it with the center of the bracket.

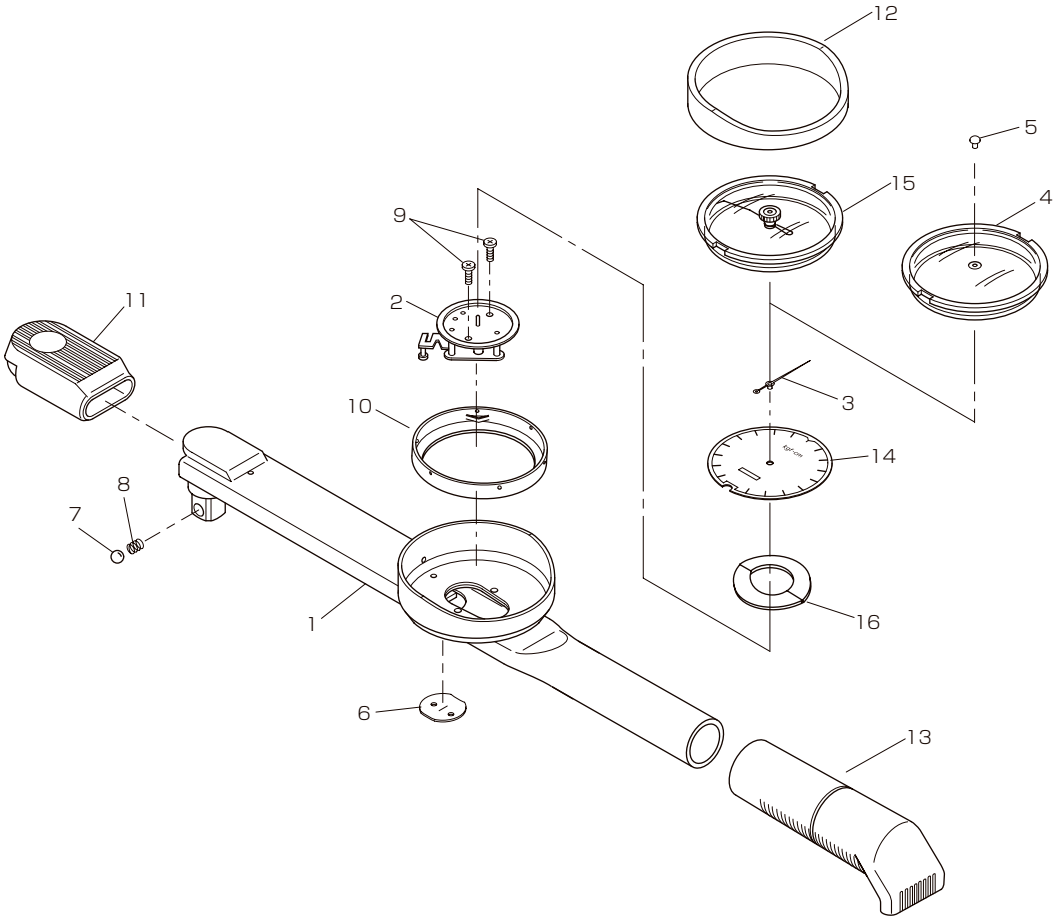
7-4 Parts List

(1) QL



No.	Part Name	pcs/unit	Part NO.					
			QL25N	QL50N	QL100N4	QL140N	QL200N4	QL280N
1	Head	1	—	—	—	—	—	—
2	Head saw	2	02T26243	03T26243	01T48017	05T50449	02T48017	07T50449
3	Head cover	1	02T03360	03T03360	01T48013	05T50448	02T48013	07T50448
4	Cam	1	02T03361	03T03361	01T48020	04T03361		05T50694
5	Ratchet lever	1	02T04762	03T04762	03T04762	04T04762		05T04762
6	Ratchet spring	2	06T03405	05T03405	01T03405	11T03405	06T50450	12T03405
7	Ratchet assembly	1	00T16061B	00T16061C	00T48012A	00T16061W	00T48012B	00T50507B
10	Flat head screw	2	02T10312	03T50410	15T50410	05T50410	07T50410	07T50410
11	Tube	1	—	—	—	—	—	—
12	Thruster	1	06T12843	05T12843	08T06731		03T12843	02T37240
13	Toggle	1	06T50099	05T50099	08T50099		03T50099	
14	Roller	1	00T35308B	00T35308C	00T35308E		00T35308F	
15	Toggle pin	2	02T37432	03T37432	04T37432		05T37432	
16	Thrust ring	1	05T10339	01T10339	03T10339		03T05034	
17	Seat	1	06T05035	05T05035	04T50122		03T05035	
18	Sub graduation	1	02T50100	00T50102B	00T50104B		00T50106B	
19	Locker	1	04T50121	03T50121	03T50121		03T50121	
20	Adjusting screw	1	05T05031	01T05030	01T12405		01T50659	01T37556
21	Main spring	1	03T03924	04T03924	01T48019	09T03924	02T48019	05T37346
22	Stop plate	1	09T48019	05T04995	04T04995		03T04995	
23	Head pin	1	06T04995	05T05077	04T05077		03T05077	
24	Nylon tube	1	06T05077	02T03420	02T03420		03T03420	
25	Socket head screw	1	01003012607	01004015607	01004015607		01005020607	
26	Thrust ring screw	1	04T05188		02T05188		01T05188	
27	Steel ball	2	0703/321		07001/81			
28	Spring pin	1	050020074	050030084				
29	Sub scale seat	1	06T09483	05T09483	04T09483		03T09483	
30	Scale piece	1	01T09904	01T09905	01T09906	01T12404	01T50548	01T37555
31	Scale plate	1	01T50365	01T50366	01T50126	01T50368	01T50663	01T50370
32	Steel ball	4	0703/321		07000031		07001/81	
33	Nylon washer	1	02T50320	03T50320	04T50320		05T50320	
34	Washer	1	01T50539		02T50539		03T50539	
35	Scale cover	1	01T50538	02T50538	03T50538		04T50538	
36	Sub scale cover	1	01T50267	02T50267	03T50267		04T50267	
37	Handle	1	01T46004	02T46004	03T46004		04T46004	05T46004
38	Spring seat	2	—	—	01T48014	01T45879	01T48015	01T45984
39	Graduation stopper	1	—	—	—	06T50493	08T50493	—
40	Scale pin	1	01T50575	051.2004				

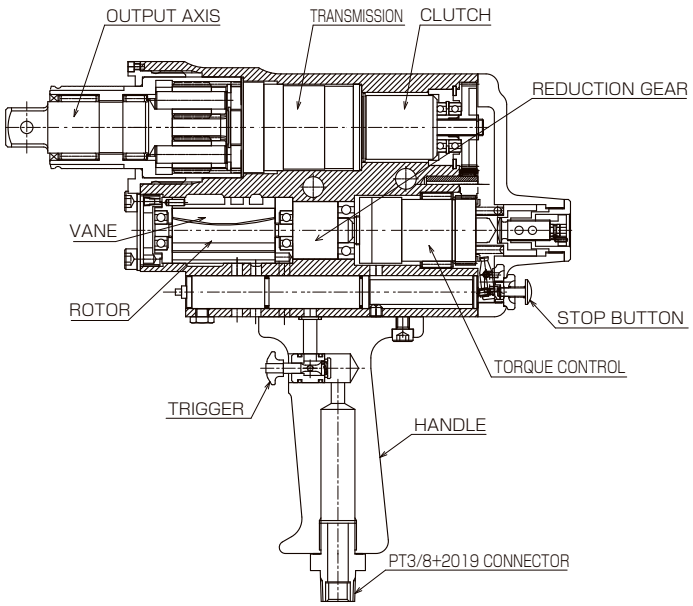
(2) DB



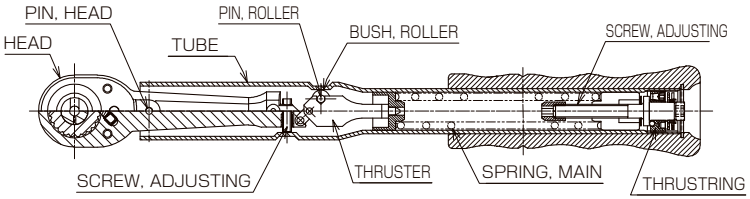
No.	PART NAME	OTY	PART No.					※ Note
			DB25N	DB50N	DB100N	DB200N	DB280N	
1	TUBE ASSEMBLY	1	—	—	—	—	—	
2	DIAL GAUGE ASSEMBLY	1	00T38056A				00T07741A	
3	NEEDLE	1	00T12088A					
4	PLATE, GLASS	1	01T28398					
5	RIVET	1	06002004014					Used for "non memory-pointer" model only.
6	COVER, BACK	1	01T08491					
7	BALL, STEEL	1	07000051		07000061		07000071	
8	SPRING, BALL	1	02T06494		03T06494		04T06494	
9	SCREW, FLAT HEAD	2	01003006202					
10	BRACKET	1	01T12087					
11	COVER, HEAD	1	01T28421	01T50383	01T50384	01T28423	01T28424	
12	COVER, PROTECTOR	1	01T50174					
13	GRIP	1	01T28410	01T28409	01T28406	01T28407	01T28408	
14	PLATE, SCALE	1	01T50193	02T50193	03T50193	04T50193	04T28663	
16	SPRING, PLATE	1	03T08172					
			-S					
15	S-S. IND. ASSEMBLY	1	00T16065F					

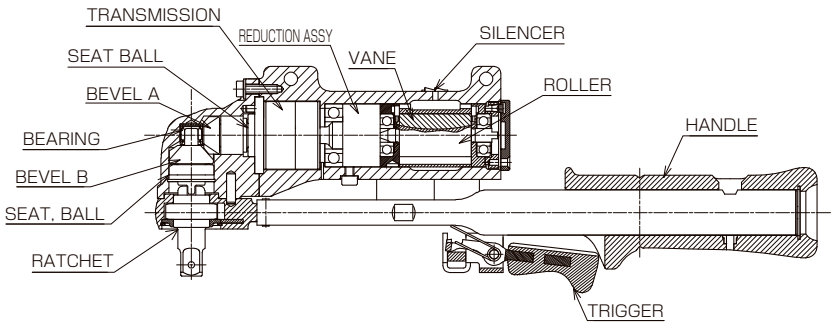
7-5 Cross-Section-Drawings

AP2

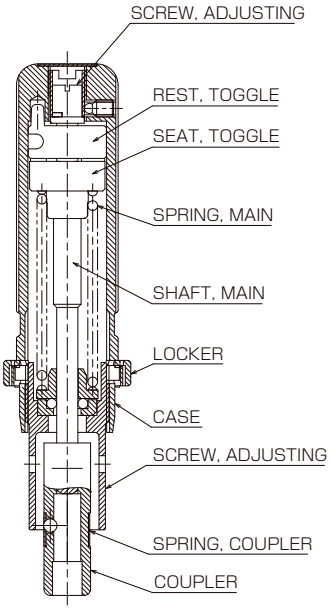


AC3

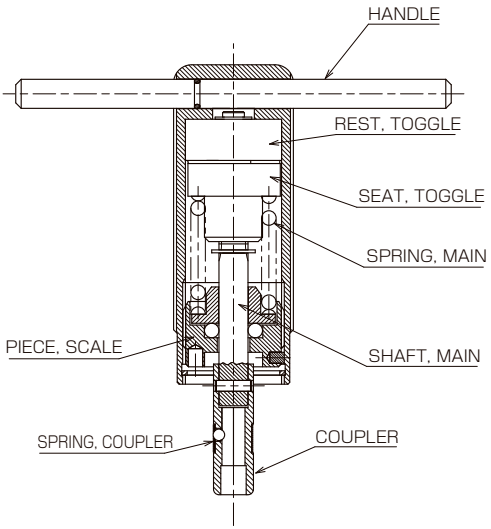




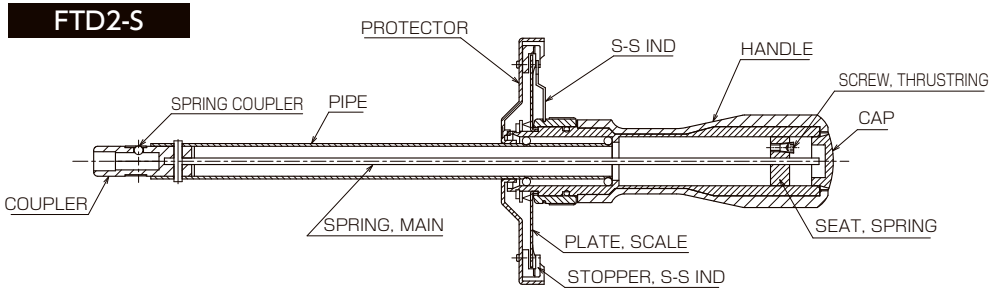
RTD (LTD)



RNTD (NTD)

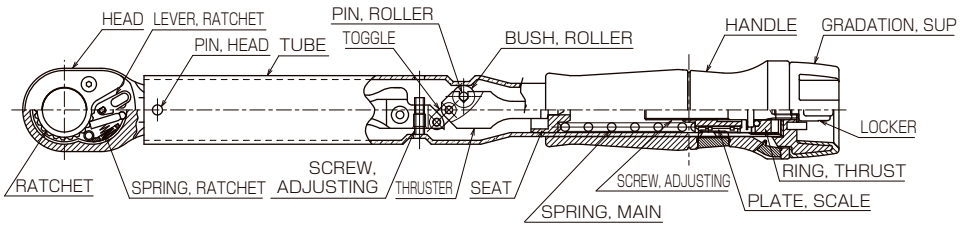


FTD2-S

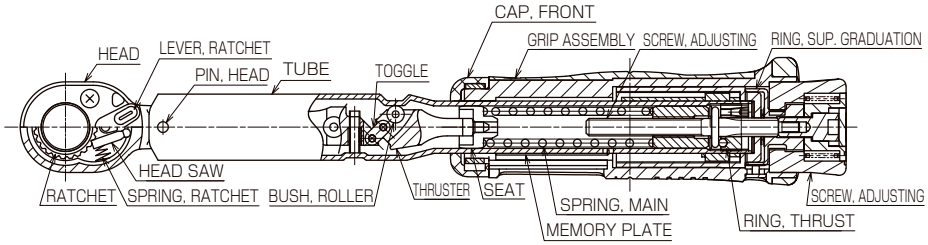


7-5 Cross-section Drawings

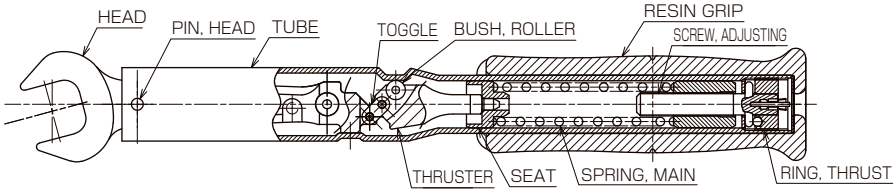
QL4



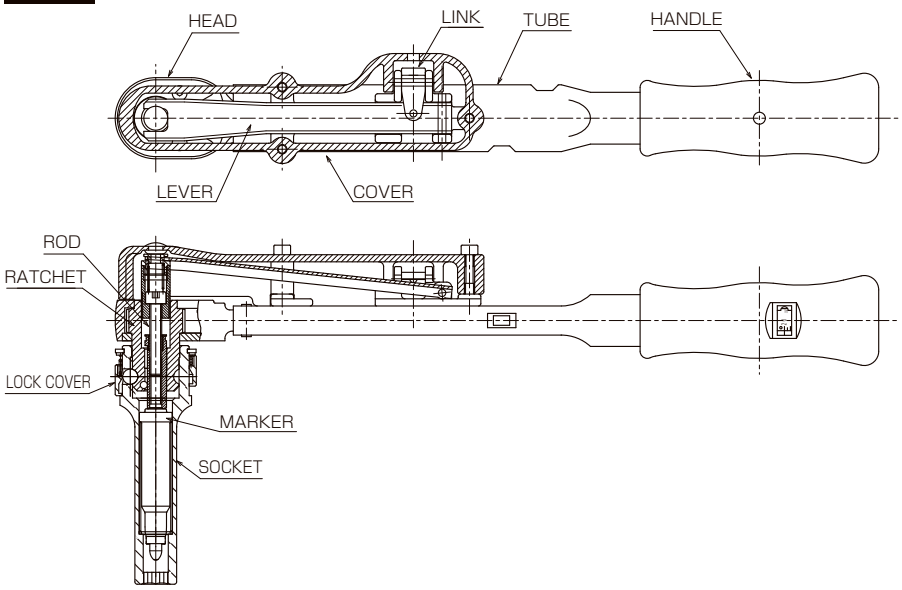
QL5



SP2



MPQL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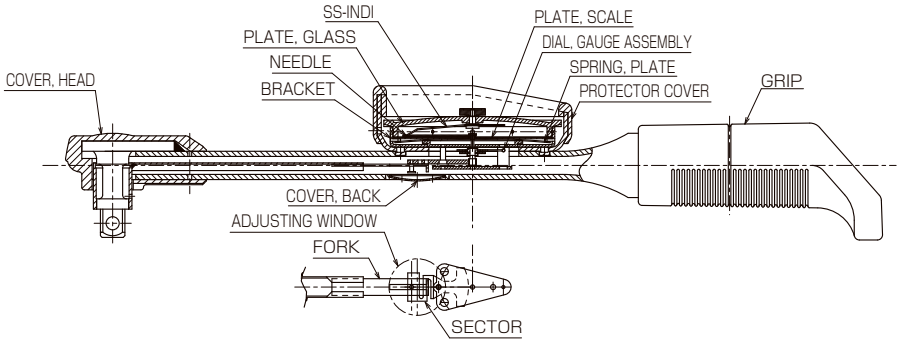
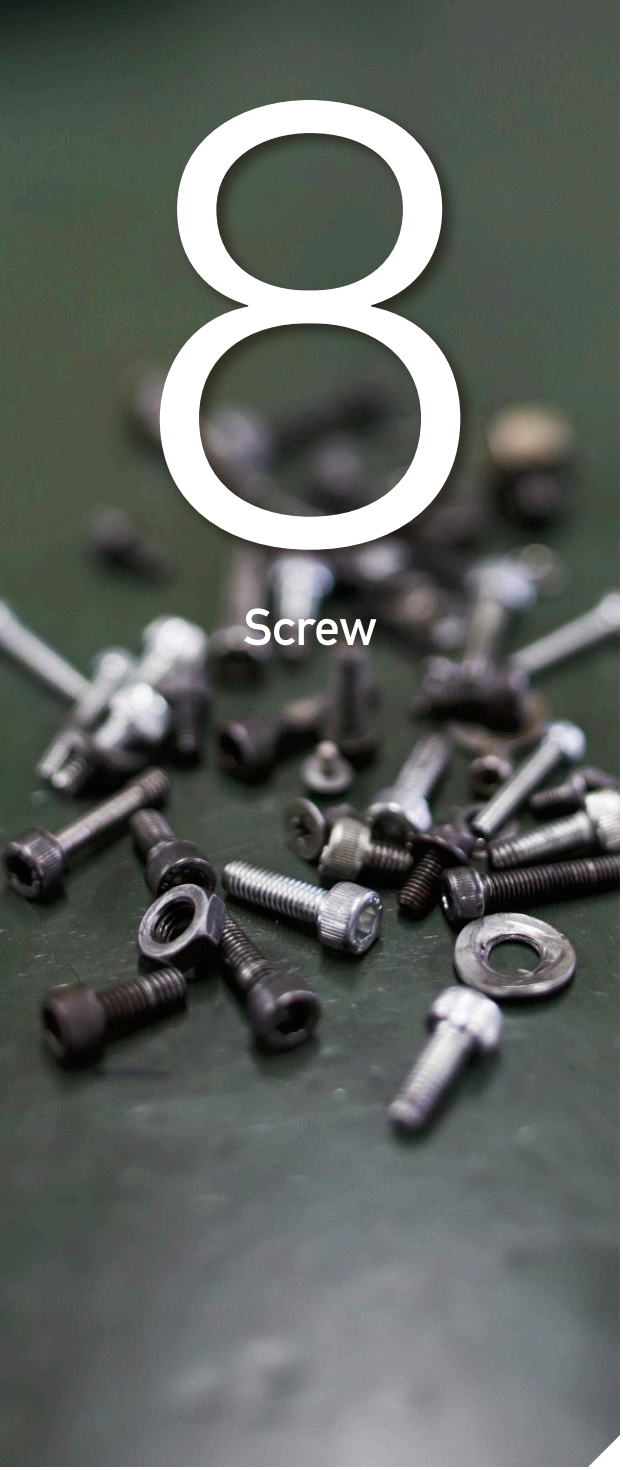
LINK
TUBE
HANDLE
LEVER
COVER
ROD
RATCHET
LOCK COVER
MARKER
SOCKET

DB

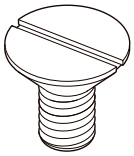

SS-INDI
PLATE, GLASS
NEEDLE
BRACKET
PLATE, SCALE
DIAL, GAUGE ASSEMBLY
SPRING, PLATE
PROTECTOR COVER
GRIP
COVER, HEAD
COVER, BACK
ADJUSTING WINDOW
FORK
SECTOR



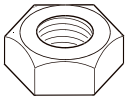
8 Screw

Names of Screws

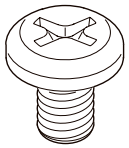
Small screws with slits



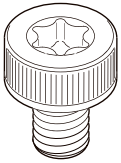
Nuts



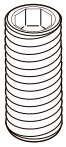
Cross-recessed pan screws



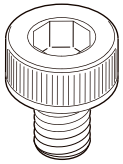
Hexalobular screws



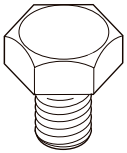
Hexagon set screws



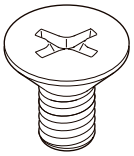
Hexagon socket head bolts



Hexagon bolts



Cross-recessed countersunk screws



8 Screw

8-1 Dimensions of Screws

(1) Bolts

Nominal size of bolt

	d	[mm]	M1	M1.2	M1.4	M1.6	M2	M2.5	M3	M3.5	M4	M5	M6	M8	M10
Pitch	p	[mm]	0.25	0.25	0.3	0.35	0.4	0.45	0.5	0.6	0.7	0.8	1	1.25	1.5
Pitch diameter	d_2	[mm]	0.838	1.038	1.205	1.373	1.740	2.208	2.675	3.110	3.545	4.480	5.350	7.188	9.026
Effective area	As	[mm^2]	0.460	0.732	0.983	1.27	2.07	3.39	5.03	6.78	8.78	14.2	20.1	36.6	58.0
Minor diameter	d_1	[mm]	0.729	0.929	1.075	1.221	1.567	2.013	2.459	2.850	3.242	4.134	4.917	6.647	8.376
Lead angle	$\tan\beta$		0.0950	0.0767	0.0792	0.0811	0.0732	0.0649	0.0595	0.0614	0.0629	0.0568	0.0595	0.0554	0.0529
3rd class bolt dia.	dh	[mm]	1.3	1.5	1.8	2.0	2.6	3.1	3.6	4.2	4.8	5.8	7.0	10.0	12.0

Hexagon bolts, nuts

		d	[mm]	M1	M1.2	M1.4	M1.6	M2	M2.5	M3	M3.5	M4	M5	M6	M8	M10
		s	[mm]	—	—	—	3.2	4	5	5.5	6	7	8	10	13	16
Part class	A (M1.6～M24)	e	[mm]	—	—	—	3.41	4.32	5.45	6.01	6.58	7.66	8.79	11.05	14.38	17.77
	B (M1.6～M64)			—	—	—	3.28	4.18	5.31	5.88	6.44	7.50	8.63	10.89	14.20	17.59
	C (M5～M64)			—	—	—	—	—	—	—	—	—	8.63	10.89	14.20	17.59
		k	[mm]	—	—	—	1.1	1.4	1.7	2	2.4	2.8	3.5	4	5.3	6.4
Style 1 (Hexagon nut)		$m_{(MAX)}$	[mm]	—	—	—	1.3	1.6	2	2.4	2.8	3.2	4.7	5.2	6.8	8.4
		$m_{(Min)}$		—	—	—	1.05	1.35	1.75	2.15	2.55	2.9	4.4	4.9	6.44	8.04
Style 2 (Hexagon nut)		$m_{(MAX)}$	[mm]	—	—	—	—	—	—	—	—	—	5.1	5.7	7.5	9.3
		$m_{(Min)}$		—	—	—	—	—	—	—	—	—	4.8	5.4	7.14	8.94
Pitch diameter of bearing surface	Hexagon	dn_1		—	—	—	2.75	3.47	4.28	4.79	5.34	6.19	7.20	8.90	11.96	14.59
	Round A	dn		—	—	—	2.14	2.84	3.61	4.10	4.65	5.36	6.36	7.98	10.84	13.36
	Round B			—	—	—	2.15	2.78	3.54	4.04	4.59	5.28	6.28	7.40	10.75	13.27
	Round C			—	—	—	—	—	—	—	—	—	6.282	7.902	10.75	13.27

Hexagon socket head bolts

	d	[mm]	M1	M1.2	M1.4	M1.6	M2	M2.5	M3	M3.5	M4	M5	M6	M8	M10
	s	[mm]	—	—	—	1.5	1.5	2	2.5	—	3	4	5	6	8
	e	[mm]	—	—	—	1.73	1.73	2.3	2.87	—	3.44	4.58	5.72	6.86	9.15
	k	[mm]	—	—	—	1.60	2.00	2.50	3.00	—	4.00	5.00	6.00	8	10
	dw		—	—	—	2.72	3.48	4.18	5.07	—	6.53	8.03	9.38	12.33	15.33
Pitch diameter of bearing surface	dn		—	—	—	2.533	3.238	3.843	4.616	—	5.968	7.235	8.588	11.57	14.1
	dk	[mm]	—	—	—	3.00	3.80	4.50	5.50	—	7.00	8.50	10.00	13	16
Pitch diameter of bearing surface	dn'		—	—	—	2.378	3.061	3.667	4.377	—	5.709	6.975	8.248	11.21	13.73

Set screws

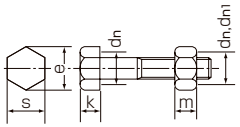
	d	[mm]	M1	M1.2	M1.4	M1.6	M2	M2.5	M3	M3.5	M4	M5	M6	M8	M10
	n	[mm]	0.2	0.2	0.25	0.25	0.25	0.4	0.4	0.5	0.6	0.8	1	1.2	1.6
	s	[mm]	—	—	—	0.7	0.9	1.3	1.5	—	2	2.5	3	4	5
	e	[mm]	—	—	—	0.809	1.011	1.454	1.73	—	2.3	2.87	3.44	4.58	5.72

Hexalobular screws

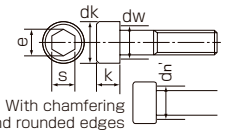
	b	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20
	Hole number	6.00	8.00	10.00	20.00	25.00	30.00	45.00	50.00	55.00	60.00	70.00	80.00	90.00
	k	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00
	dw	3.48	4.18	5.07	6.53	8.03	9.38	12.33	15.33	17.23	20.17	23.17	25.87	28.87
no knurling	dk	3.80	4.50	5.50	7.00	8.50	10.00	13.00	16.00	18.00	21.00	24.00	27.00	30.00
knurling		3.98	4.68	5.68	7.22	8.72	10.22	13.27	16.27	18.27	21.33	24.33	27.33	30.33
Pitch diameter of bearing surface	dn	3.061	3.667	4.377	5.709	6.975	8.248	11.21	13.73	15.90	18.40	20.92	23.52	26.51

Refer to JIS B1136

Hexagon bolts, nuts

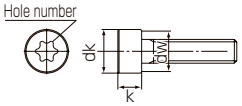


Hexagon socket head bolts



Set screws

Hexalobular screws



Various dimensions of bolts

M12	M14	M16	M18	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56
1.75	2	2	2.5	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5.5
10.863	12.701	14.701	16.376	18.376	20.376	22.051	25.051	27.727	30.727	33.402	36.402	39.077	42.077	44.752	48.752	52.428
84.3	115	157	192	245	303	353	459	561	694	817	976	1120	1310	1470	1760	2030
10.106	11.835	13.835	15.294	17.294	19.294	20.752	23.752	26.211	29.211	31.670	34.670	37.129	40.129	42.587	46.587	50.046
0.0513	0.0501	0.0433	0.0486	0.0433	0.0391	0.0433	0.0381	0.0402	0.0363	0.0381	0.0350	0.0367	0.0340	0.0356	0.0326	0.0334
14.5	16.5	18.5	21.0	24.0	26.0	28.0	32.0	35.0	38.0	42.0	45.0	48.0	52.0	56.0	62.0	66.0

Refer to B0205, B1082, B1001

M12	M14	M16	M18	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56
18	21	24	27	30	34	36	41	46	50	55	60	65	70	75	80	85
20.03	23.36	26.75	30.14	33.53	37.72	39.98	—	—	—	—	—	—	—	—	—	—
19.85	22.78	26.17	29.56	32.95	37.29	39.55	45.2	50.85	55.37	60.79	66.44	71.3	76.95	82.6	88.25	93.56
19.85	22.78	26.17	29.56	32.95	37.29	39.55	45.2	50.85	55.37	60.79	66.44	71.3	76.95	82.6	88.25	93.56
7.5	8.8	10	11.5	12.5	14	15	17	18.7	21	22.5	25	26	28	30	33	35
10.8	12.8	14.8	15.8	18	19.4	21.5	23.8	25.6	28.7	31	33.4	34	36	38	42	45
10.37	12.1	14.1	15.1	16.9	18.1	20.2	22.5	24.3	27.4	29.4	31.8	32.4	34.4	36.4	40.4	43.4
12	14.1	16.4	17.6	20.3	21.8	23.9	26.7	28.6	32.5	34.7	—	—	—	—	—	—
11.57	13.4	15.7	16.9	19	20.5	22.6	25.4	27.3	30.9	33.1	—	—	—	—	—	—
16.86	19.48	22.10	24.95	28.03	31.22	33.27	37.94	42.16	45.81	50.48	54.70	58.92	63.59	68.26	73.83	78.50
15.59	18.12	20.56	23.24	26.15	28.95	30.89	—	—	—	—	—	—	—	—	—	—
15.51	17.86	20.30	22.98	25.89	28.76	30.70	35.09	39.00	42.42	46.70	50.62	54.20	58.58	62.97	68.28	72.51
15.51	17.86	20.30	22.98	25.89	28.76	30.70	35.09	39.00	42.42	46.70	50.62	54.20	58.58	62.97	68.28	72.51

Refer to JIS B1180, B1181

M12	M14	M16	M18	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56
10	12	14	—	17	—	19	—	22	—	27	—	32	—	36	—	41
11.43	13.72	16	—	19.44	—	21.73	—	25.15	—	30.85	—	36.57	—	41.13	—	45.83
12	14	16	—	20	—	24	—	30	—	36	—	42	—	48	—	56
17.23	20.17	23.17	—	28.87	—	34.81	—	43.61	—	52.54	—	61.34	—	70.34	—	82.26
16.31	18.84	21.37	—	27.11	—	32.17	—	40.21	—	48.25	—	55.84	—	64.33	—	75.36
18	21	24	—	30	—	36	—	45	—	54	—	63	—	72	—	84
15.90	18.40	20.92	—	26.51	—	31.53	—	39.46	—	47.47	—	54.94	—	63.44	—	74.43

Refer to JIS B1176

M12	M14	M16	M18	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56
2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6	—	8	—	10	—	12	—	—	—	—	—	—	—	—	—	—
6.86	—	9.15	—	11.43	—	13.72	—	—	—	—	—	—	—	—	—	—

Refer to JIS B1117, B1177

※d_2: JIS B 0205, p: JIS B 0205, β : $\tan\beta = p/\pi d^2$ See P.35 for more details

8-1 Screw
Dimensions of Screws

(2) Small Bolts/Nuts, non ISO standards

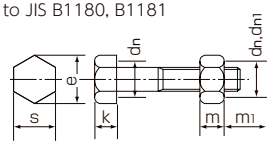
Small hexagon nuts, bolts

Table 8-2. Dimensions of small bolts and nuts

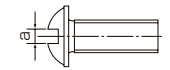
	d	[mm]	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30	(M33)	M36
	s	[mm]	12	14	17	19	22	24	27	30	32	36	41	46	50
	e	[mm]	13.9	16.2	19.6	21.9	25.4	27.7	31.2	34.6	37	41.6	47.3	53.1	57.7
	k	[mm]	5.5	7	8	9	10	12	13	14	15	17	19	21	23
	m	[mm]	6.5	8	10	11	13	15	16	18	19	22	24	26	29
	m_1		5	6	7	8	10	11	12	13	14	16	18	20	21
Hexagon	dn_1		10.70	12.79	15.64	17.70	20.3	22.40	25.0	27.6	29.7	33.3	37.6	41.8	45.5
Round	dn		10.03	12.06	14.82	16.55	19.07	21.1	23.6	26.1	28.1	31.1	35.2	39.2	42.7

Refer to JIS B1180, B1181

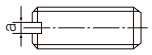
※ (See P.35 for more details of hexagon and round bearing surface)



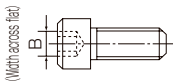
(3) Fine Screws



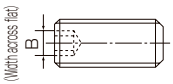
Small screws with slits



Set screws with slits



Hexagon socket head bolts



Hexagon set screws

Table 8-3. Dimensions of fine screws

	d	M1	(M1.1)	M1.2	(M1.4)	M1.6	M1.8
Small screws with slits	d_2	0.838	0.938	1.038	1.205	1.373	1.573
	p	0.25	0.25	0.25	0.3	0.35	0.35
	tanβ	0.0950	0.0848	0.0767	0.0792	0.0811	0.0708
	d_1	0.729	0.829	0.929	1.075	1.221	1.421
	As	0.460	0.588	0.732	0.983	1.27	1.70
	a	0.32	—	0.32	0.32	0.4	—
Set screws with slits	a	0.2	—	0.2	0.25	0.25	—
Socket head bolts	B	—	—	—	(1.3)	(1.5)	—
Set screws	B	—	—	—	(0.7)	(0.7)	—

※ d1min: Root diameter, A1min: Area of section of root diameter Unit: [mm]

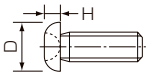
(4) Small Screws

Table 8-4. Dimensions of small screws

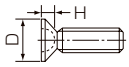
		M1.6	M2	M2.5	M3	(M3.5)	M4	M5	M6	M8	M10
⊕#	⊕	0	0	1	1	2	2	2	3	4	4
⊖ Slit width	⊖= a	0.4	0.5	0.6	0.8	1	1.2	1.2	1.6	2	2.5
Pan screws	D	3.2	4.0	5.0	5.6	7.00	8.00	9.50	12.00	16.00	20.00
	H	1.30	1.60	2.10	2.40	2.60	3.10	3.70	4.6	6.0	7.5
Countersunk screws	D	3.0	3.8	4.7	5.5	7.30	8.40	9.30	11.30	15.80	18.30
	H	1	1.2	1.5	1.65	2.35	2.7	2.7	3.3	4.65	5

Refer to JIS B1111

Unit: [mm]



Pan screws



Countersunk screws

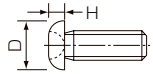
(5) Small Screws, non ISO standards

Table 8-5. Dimensions of small screws ⊕⊖

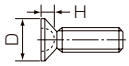
		M2	(M2.2)	M2.5	M3	(M3.5)	M4	(M4.5)	M5	M6	M8
⊕#	⊕	1 (0)	1	1	2 (1)	2	2	2	2	3	3
		( ) Supports ISO			( ) Truss head						
⊖ Slit width	⊖= a	0.6	0.6	0.8	0.8	1	1	1	1.2	1.2	1.6
Pan screws	D	3.5	4	4.5	5.5	6	7	8	9	10.5	14
	H	1.3	1.5	1.7	2	2.3	2.6	2.9	3.3	3.9	5.2
Countersunk screws (Spherical countersunk screws)	D	4	4.4	5	6	7	8	9	10	12	16
	H	1.2	1.3	1.45	1.75	2	2.3	2.55	2.8	3.4	4.4
Truss screws	D	4.5	5	5.7	6.9	8.1	9.4	10.6	11.8	14	17.8
	H	1.2	1.3	1.5	1.9	2.2	2.5	2.8	3.1	3.7	4.8
Bind screws	D	4.3	4.7	5.3	6.3	7.3	8.3	9.3	10.3	12.4	16.4
	H	1.2	1.3	1.5	1.9	2.2	2.5	2.8	3.1	3.7	4.8
Spherical screws	D	3.5	4	4.5	5.5	6	7	8	9	10.5	14
	H	1.3	1.5	1.7	2	2.3	2.6	3	3.4	4	5.4

Refer to JIS B1111

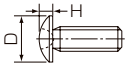
Unit: [mm]



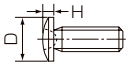
Pan screws



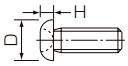
Countersunk screws
(Spherical countersunk screws)



Truss screws



Bind screws



Spherical screws

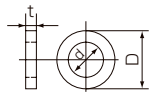
(6) Washers

Table 8-6. Dimensions of washers

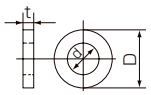
			M2	(M2.2)	M2.5	M3	(M3.5)	M4	(M4.5)	M5	M6	(M7)	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24
Plain washers, small, round	d		2.2	2.4	2.7	3.2	3.7	4.3	4.8	5.3	6.4	—	8.4	10.5	13	15	17	19	21	23	25
	D		4.5	4.5	5	6	7	8	9	9	11	—	15	18	20	24	28	30	34	37	39
	t		0.3	0.3	0.5	0.5	0.5	0.5	0.8	1	1.6	—	1.6	1.6	2	2.5	2.5	3	3	3	4
Plain washers, polished, round	d		2.2	2.4	2.7	3.2	3.7	4.3	4.8	5.3	6.4	—	8.4	10.5	13	15	17	19	21	23	25
	D		5	6	6	7	8	9	10	10	12	—	16	20	24	28	30	34	37	39	44
	t		0.3	0.5	0.5	0.5	0.5	0.8	0.8	1	1.6	—	1.6	2	2.5	2.5	3	3	3	3	4
Spring washers	d		2.1	—	2.6	3.1	3.6	4.1	4.6	5.1	6.1	7.1	8.2	10.2	12.2	14.2	16.2	18.2	20.2	22.5	24.5
	2号	t	0.5	—	0.6	0.7	0.8	1	1.2	1.3	1.5	1.6	2	2.5	3	3.5	4	4.6	5.1	5.6	5.9
		D	4.4	—	5.2	5.9	6.6	7.6	8.3	9.2	12.2	13.4	15.4	18.4	21.5	24.5	28	31	33.8	37.7	40.3
	3号	t	—	—	—	—	—	—	—	—	1.9	2.0	2.5	3.0	3.6	4.2	4.8	5.4	6.0	6.8	7.2
		D	—	—	—	—	—	—	—	—	12.2	13.4	15.6	18.8	21.9	24.7	28.2	31.4	34.4	38.3	41.3

※ d: Plain washer inner dia. Refer to JIS B1251, B1256

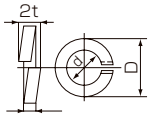
Unit: [mm]



Plain washers, small, round



Plain washers, polished, round



Spring washers

8 Screw

8-2 Screw Relevant Information

(1) Screw Threaded Hole and Countersink Hole

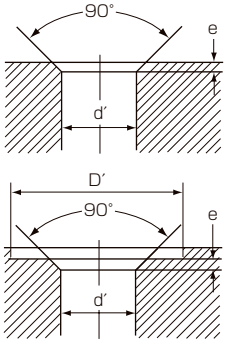


Table 8-7. Diameters

Nominal size of screw	Bolt hole diameter d'				Chamfering e	Facing diameter D'
	1st class	2nd class	3rd class	4th class (1)		
M1	1.1	1.2	1.3	—	0.2	3
M1.2	1.3	1.4	1.5	—	0.2	4
M1.4	1.5	1.6	1.8	—	0.2	4
M1.6	1.7	1.8	2	—	0.2	5
※ M1.7	**1.8**	**2**	**2.1**	—	0.2	5
M1.8	2.0	2.1	2.2	—	0.2	5
M2	2.2	2.4	2.6	—	0.3	7
M2.2	**2.4**	**2.6**	**2.8**	—	0.3	8
※ M2.3	**2.5**	**2.7**	**2.9**	—	0.3	8
M2.5	2.7	2.9	3.1	—	0.3	8
※ M2.6	**2.8**	**3**	**3.2**	—	0.3	8
M3	3.2	3.4	3.6	—	0.3	9
M3.5	3.7	3.9	4.2	—	0.3	10
M4	4.3	4.5	4.8	**5.5**	0.4	11
M4.5	4.8	5	5.3	**6**	0.4	13
M5	5.3	5.5	5.8	**6.5**	0.4	13
M6	6.4	6.6	7	**7.8**	0.4	15
M7	7.4	7.6	8	**—**	0.4	18
M8	8.4	9	10	**10**	0.6	20
M10	10.5	11	12	**13**	0.6	24
M12	13	13.5	14.5	**15**	1.1	28
M14	15	15.5	16.5	**17**	1.1	32
M16	17	17.5	18.5	**20**	1.1	35
M18	19	20	21	**22**	1.1	39
M20	21	22	24	**25**	1.2	43
M22	23	24	26	**27**	1.2	46
M24	25	26	28	**29**	1.2	50
M27	28	30	32	**33**	1.7	55
M30	31	33	35	**36**	1.7	62
M33	34	36	38	**40**	1.7	66
M36	37	39	42	**43**	1.7	72
M39	40	42	45	**46**	1.7	76
M42	43	45	48	—	1.8	82
M45	46	48	52	—	1.8	87
M48	50	52	56	—	2.3	93
M52	54	56	62	—	2.3	100
M56	58	62	66	—	3.5	110
M60	62	66	70	—	3.5	115
M64	66	70	74	—	3.5	122
M68	70	74	78	—	3.5	127

Note: 1. 4th class is appropriate mainly for cast extracting holes.
2. Figures in bold are not prescribed in ISO 273.
3. The nominal sizes of ※ screws are not included in ISO meter screws of ISO 261.

Unit: [mm]

(2) Screw Threaded Hole Depth

Table 8-8. Diameters

Screw				Facing hole diameter (2)					Ref.: Female screw inner diameter (3)			
				System						Max. permissible dimension		
Nominal size of screw	Outside diameter d	Pitch P	(1) Standard catching height H1	90	85	80	75	70	Minimum permissible dimension	4H (Below M1.4) 5H (Over M1.6) 1st class	5H (Below M1.4) 6H (Over M1.6) 2nd class	7H 3rd class
M1	1.0	0.25	0.135	**0.76**	**0.77**	**0.78**	0.80	0.81	0.729	0.774	0.785	—
M1.1	1.1	0.25	0.135	**0.86**	**0.87**	**0.88**	0.90	0.91	0.829	0.874	0.885	—
M1.2	1.2	0.25	0.135	**0.96**	**0.97**	**0.98**	1.00	1.01	0.929	0.974	0.985	—
M1.4	1.4	0.3	0.162	**1.11**	**1.12**	**1.14**	1.16	1.17	1.075	1.128	1.142	—
M1.6	1.6	0.35	0.189	**1.26**	**1.28**	**1.30**	**1.32**	1.33	1.221	1.301	1.321	—
M1.8	1.8	0.35	0.189	**1.46**	**1.48**	**1.50**	**1.52**	1.53	1.421	1.501	1.521	—
M2	2.0	0.4	0.217	**1.61**	**1.63**	**1.65**	1.68	1.70	1.567	1.657	1.679	—
M2.2	2.2	0.45	0.244	**1.76**	**1.79**	**1.81**	**1.83**	1.86	1.713	1.813	1.838	—
M2.5	2.5	0.45	0.244	**2.06**	**2.09**	**2.11**	**2.13**	2.16	2.013	2.113	2.138	—
M3	3.0	0.5	0.271	**2.51**	**2.54**	**2.57**	**2.59**	**2.62**	2.459	2.571	2.599	2.639
M3.5	3.5	0.6	0.325	**2.92**	**2.95**	**2.98**	**3.01**	**3.05**	2.850	2.975	3.010	3.050
M4	4.0	0.7	0.379	**3.32**	**3.36**	**3.39**	**3.43**	3.47	3.242	3.382	3.422	3.466
M4.5	4.5	0.75	0.406	**3.77**	**3.81**	**3.85**	**3.89**	3.93	3.688	3.838	3.878	3.924
M5	5.0	0.8	0.433	**4.22**	**4.26**	**4.31**	**4.35**	4.39	4.134	4.294	4.334	4.384
M6	6.0	1	0.541	**5.03**	**5.08**	**5.13**	**5.19**	5.24	4.917	5.107	5.153	5.217
M7	7.0	1	0.541	**6.03**	**6.08**	**6.13**	**6.19**	6.24	5.917	6.107	6.153	6.217
M8	8.0	1.25	0.677	**6.78**	**6.85**	**6.92**	6.99	7.05	6.647	6.859	6.912	6.982
M9	9.0	1.25	0.677	**7.78**	**7.85**	**7.92**	7.99	8.05	7.647	7.859	7.912	7.982
M10	10.0	1.5	0.812	**8.54**	**8.62**	**8.70**	8.78	8.86	8.376	8.612	8.676	8.751
M11	11.0	1.5	0.812	**9.54**	**9.62**	**9.70**	9.78	9.86	9.376	9.612	9.676	9.751
M12	12.0	1.75	0.947	**10.3**	**10.4**	**10.5**	10.6	10.7	10.106	10.371	10.441	10.531
M14	14.0	2	1.083	**12.1**	**12.2**	**12.3**	12.4	12.5	11.835	12.135	12.210	12.310
M16	16.0	2	1.083	**14.1**	**14.2**	**14.3**	14.4	14.5	13.835	14.135	14.210	14.310
M18	18.0	2.5	1.353	**15.6**	**15.7**	**15.8**	16.0	16.1	15.294	15.649	15.774	15.854
M20	20.0	2.5	1.353	**17.6**	**17.7**	**17.8**	18.0	18.1	17.294	17.649	17.744	17.854
M22	22.0	2.5	1.353	**19.6**	**19.7**	**19.8**	20.0	20.1	19.294	19.649	19.744	19.854
M24	24.0	3	1.624	**21.1**	**21.2**	21.4	21.6	21.7	20.752	21.152	21.252	21.382
M27	27.0	3	1.624	**24.1**	**24.2**	24.4	24.6	24.7	23.752	24.152	24.252	24.382
M30	30.0	3.5	1.894	**26.6**	**26.8**	27.0	27.2	27.3	26.211	26.661	26.771	26.921
M33	33.0	3.5	1.894	**29.6**	**29.8**	30.0	30.2	30.3	29.211	29.661	29.771	29.921
M36	36.0	4	2.165	**32.1**	**32.3**	32.5	32.8	33.0	31.670	32.145	32.270	32.420
M39	39.0	4	2.165	**35.1**	**35.3**	35.5	35.8	36.0	34.670	35.145	35.270	35.420
M42	42.0	4.5	2.436	**37.6**	**37.9**	38.1	38.3	38.6	37.129	37.659	37.799	37.979
M45	45.0	4.5	2.436	**40.6**	**40.9**	41.1	41.3	41.6	40.129	40.659	40.799	40.979
M48	48.0	5	2.706	**43.1**	**43.4**	43.7	43.9	44.2	42.587	43.147	43.297	43.487
M52	52.0	5	2.706	**47.1**	**47.4**	47.7	47.9	48.2	46.587	47.147	47.297	47.487
M56	56.0	5.5	2.977	**50.6**	**50.9**	51.2	51.5	51.8	50.046	50.646	50.796	50.996
M60	60.0	5.5	2.977	**54.6**	**54.9**	55.2	55.5	55.8	54.046	54.646	54.796	54.996
M64	64.0	6	3.248	**58.2**	**58.5**	58.8	59.1	59.5	57.505	58.135	58.305	58.505
M68	68.0	6	3.248	**62.2**	**62.5**	62.8	63.1	63.5	61.505	62.135	62.305	62.505

Remarks: Figures in bold on the left side of the – – line, ····line, and —line are prescribed in each JIS B 0209. 4H (below M1.4), 5H (above M1.6) or first class, 5H (below M1.4), 6H (above M1.6) or second- class and 7H or third class show they are within the permissible dimension of the female inner diameter. Unit: [mm]

Note: (1) $H_1 = 0.541266P$ (2) Screw prepared hole = d - 2 x H1 (Catching rate/100)

8-3 Bolt Looseness

(1) Classification and causes of looseness

In bolt looseness, there are the following two causes:

①Looseness generated by bolt return without turning, and

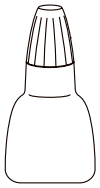
②Looseness generated by bolt return with turning.

Depending on the cause of the looseness, it will be necessary to select appropriate looseness prevention measures.

Table 8-9. Classification and causes of looseness

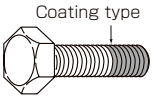
	Classification	Causes
Looseness generated by bolt return without turning	1. Initial looseness	Contact part becoming flattened from being uneven
	2. Subsidence	Plastic deformation of bearing surface
	3. Looseness by fretting corrosion	Friction by lateral displacement of contact part
	4. Looseness by permanent deformation of sealant	Permanent fatigue of gasket
	5. Looseness by over-tightening	Advance of bolt plastic deformation
	6. Looseness resulted from heat	Internal stress change over recrystallizing temperature or different thermal expansion in jointed parts
Looseness generated by bolt return with turning	7.Looseness by vibration force axis angle (Parallel, around axis of thread)	Relative displacement of bearing surface and threaded parts
	8. Looseness by axis vibration from external force	
	9. Looseness by impact of external force on axis right angle	
	10. Looseness by impact of external force in axis direction	Dissipation and lowering of threaded and bearing surface parts by restitution and shock wave on impact

(2) Chemical loosening prevention



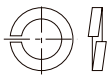
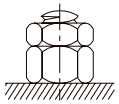
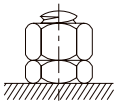
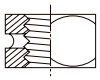
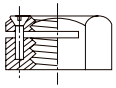
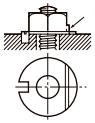
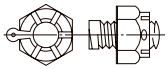
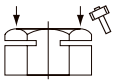
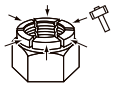
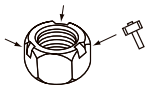
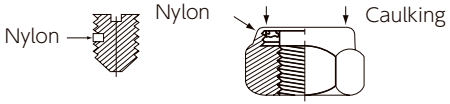
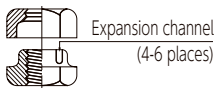
Liquid adhesive for screws

Stick adhesive for screws



(3) Mechanical loosening prevention

Table 8-10. Preventing loose joints

<table>
<tr><th colspan="6">Methods of using elastic washers</th></tr>
<tr><td>Belleville spring washer</td><td colspan="2">Spring washer</td><td>Claw spring washer</td><td colspan="2">Toothed washer</td></tr>
<tr><td colspan="2">  </td><td colspan="2">  </td><td colspan="2">  </td></tr>
<tr><td colspan="2">Method of using check nut</td><td colspan="4" rowspan="2">First tighten the lower nut to about 80% of the specified torque. Then, tighten the upper nut to 100% of the specified torque. This generates a reactive force between the two nuts and prevents them from becoming loose. If the load capacity of the nuts is likely to cause a problem, use the thicker one on top as shown in figure (b).</td></tr>
<tr><td>(a)
  </td><td>(b)
  </td></tr>
<tr><td colspan="3">Method of using small screw</td><td colspan="3">Method of using a claw or wire</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td><td colspan="2">Caulking  </td></tr>
<tr><th colspan="6">Methods to bend or calk part of the washer Calking</th></tr>
<tr><td colspan="2">Claw washer</td><td colspan="4">Tongued washer</td></tr>
<tr><td colspan="2">Bending  </td><td colspan="2">Bending  </td><td colspan="2">Key channel  Caulking</td></tr>
<tr><td colspan="3">Method to apply part of the material to the side of the nut</td><td colspan="3">Method of using split cotter</td></tr>
<tr><td colspan="3">  </td><td colspan="3">  </td></tr>
<tr><td colspan="6">Method to use power applied to the bearing surface</td></tr>
<tr><td colspan="2">  </td><td colspan="2">  </td><td colspan="2">  </td></tr>
<tr><td colspan="6">Method of deforming</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td colspan="3">  </td></tr>
<tr><td colspan="3">Method of filling nylon</td><td colspan="3">Method to use force-loosening check nut</td></tr>
<tr><td colspan="3">Nylon  Nylon Caulking</td><td colspan="3">Expansion channel (4-6 places)  </td></tr>
</table>

9 Standards and Regulations

9-1 Standards and Regulations

9-1 Standards and Regulations

Approach of Tohnichi to Global Standards

With higher awareness of quality control, a variety of regulations have been enacted in different countries from a viewpoint of environment protection.
Tohnichi has been making daily efforts to manufacture the products compliant with those regulations.

9-1 Regulations

(1) ISO 6789

(Assembly tools for screws and nuts - Hand torque tools - Requirements and test methods for design conformance testing, quality conformance testing and recalibration procedure)

These standards stipulate the various measurement permissible difference ratios, measurement points, and measurement methods relating to the required items, testing methods, and displays of manual torque tools used for tightening control of screw tightening units.

(2) ISO / IEC 17025

(General requirements for the competence of testing and calibration laboratories)

Technical requirements for laboratories and calibration site that is standardized based on ISO 9001. The accreditation bodies use it as a standard to certify the abilities of test sites or certification laboratories. ISO/IEC 17025 accredited site or laboratory is allowed to use the symbol mark on their inspection or calibration certifications, thereby the certifications will be accepted internationally and ensured reliability.

(3) ISO 9001

(Quality Management System)

ISO 9001 is a global quality management standard. Use it to establish and to update your organization's quality management system (QMS). It applies to all types of organizations. It doesn't matter what size they are or what they do. It can help both product and service organizations achieve standards of quality that are recognized and respected throughout the world. Revisions have been added several times so that consistency with other management systems can be ensured.

(4) ISO 14001

(Environmental Management System)

An international standard on the environment established for the purpose of minimizing the impact of corporate activities on the environment.
It is based on PDCA (plan-do-check-act) management to achieve the results in line with the management policy by set up necessary targets, implement, operate, verify and re-planning for improving the management system continually.

(5) ISO/TS 16949

(Quality Management System for Automotive-related Industries)

Technical standards for automotive and the suppliers that is standardized based on ISO 9001 with adding the industry-specific requirements. Especially, the it's arranged specific requirement for emphasizing defect prevention, deduction of variation and waste in automotive parts and materials suppliers.

(6) Overseas Wireless Standards

Table 9-1. Conditions of wireless equipment certification acquisition

Country	Authority	Acquisition condition
Japan	TELEC	FH256MC, FHSLS, RTDFH, FHP, FMA, BL, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
United States	FCC	FH256MC, FHSLS, RTDFH, FHP, FMA, BLA, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
Thailand	IC	FH256MC, FHSLS, RTDFH, FHP, FMA, BLA, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
Canada	CE	FH256MC, FHSLS, RTDFH, FHP, BLE, FD, CEM3-BT, ST3-BT, STC2-BT
EU	SRRC	FH256MC, FHSLS, RTDFH, FHP, BLE, FD, CEM3-BT, ST3-BT
Russia	NTC	FH256MC, FHSLS, RTDFH, FHP, FMA, BLA, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
China	SIRIM	FH256MC, FHSLS, RTDFH, FHP, FD
Malaysia	SDPPI	FH256MC, FHSLS, RTDFH, FHP, FD
South Korea	KC	FH256MC, FHSLS, RTDFH, FHP, FD
Taiwan	NCC	FH256MC, FHSLS, RTDFH, FHP, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
Indonesia	FSB	FH256MC, FHSLS, RTDFH, BLE, FD, CEM3-BT, ST3-BT, STC2-BT, HAC
India	WPC	FH256MC, FHSLS, FD
South Africa	ICASA	FH256MC
Singapore	IDA	FH256MC, FHSLS, CEM3-BT,ST3-BT, STC2-BT
Brazil	ANATEL/OCD	FD, CEM3-BT, ST3-BT, STC2-BT, HAC

Certification (reference) As of May 2018

FHSLS
(P.286)

FD
(P.320)

CEM3-G-BT
(P.314)

Japan (TELEC)

United States (FCC)

Canada (IC)

China (SRRC)

South Korea (KC)

Indonesia (SDPPI)

(7) CE Marking

CE Marking is a mark which indicates that the specified product conforms to the safety standards, and only products that show CE Marking can be assured of unrestricted distribution inside the EU zone. In the case where products are to be exported to the EU region, it will be necessary to certify that the product conforms to the required standards, and CE Marking must be affixed. Among Tohnichi products, electric and electronic devices have CE Marking affixed and certification attached, and the conformity is assured. Note that mechanical torque wrenches are not applicable to these standards, and do not have CE Marking certification.

(8) RoHS Directive
Restriction of Hazardous Substances

This EU legislation restricts the use of toxic substances in electric and electronic devices. It was enacted to facilitate device recycling, and to protect human health and the environment when they are disposed of.
When application of the RoHS (Restriction of Hazardous Substances) directive came into effect in 2006, six substances were restricted: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ether. Then on 31 March 2015 four types of phthalate esters were added, making a total of 10 substances. Tohnichi' s machine products are exempt from these restrictions. In the case of our electronic and electric devices, we verify whether RoHS directives apply or not.

(9) REACH
Registration, Evaluation, Authorization and Restriction of Chemicals

This EU directive amalgamates more than 40 EU chemical substance control regulations. It was enacted to protect human health and the environment, and to maintain and improve the scientific and industrial competitiveness of the EU. After the directive came into effect on 1 June 2007, substances of very high concern (SVHC), such as substances that are carcinogenic, bioaccumulative or toxic, were added sequentially, so that by the 19th amendment in July 2018, the list had 191 substances. An entity that violates this directive can no longer produce, market or use chemicals in the EU.

(10) IEC61340-5-1
Protection of Electronic Devices from Electrostatic Phenomena – General Requirements

The general requirements for protection electro Static Discharge (ESD).
ESD causes the problems such as damage or malfunction of electronic equipment and it may degrade the performance of electric devices. Our some products that ESD protection mark (⚠) is described fulfill this requirement.

(11) EU Battery Directive
2006/66/EC

The new Battery Directive is to regulate batteries and accumulators containing hazardous chemicals (secondary battery). Regulated is if you want to export to the EU in equipment with built-in batteries and accumulators that contain cadmium. However, the equipment that is designed to be sent into space and equipment related to national security are not eligible.

Prohibition of Ingredients

- Batteries shall not contain more than 0.002% (20 ppm) cadmium by weight. Batteries intended for use in the following applications are exempt from the cadmium requirement:
  - Emergency and alarm systems
  - Emergency lighting
  - Medical equipment
  - Cordless power tools

(12) Chinese Version RoHS Directive
Administrative Measures on the Control of Pollution caused by Electronic Information Products

In March 2007 the Administrative Measure on the Control of Pollution Caused by Electronic Information Products was enacted in China to restrict the use of designated hazardous substances in electrical and electronic products. It is thus known as the "China RoHS." The amended version of this legislation promulgated in July 2016 strengthened the restrictions. It includes the six old EU RoHS substances, and the chemical compounds subsequently added. The legislation clearly specifies the restricted substances, and identifies two procedural steps: management of an inventory that lists usage restrictions, and eligibility assessments.

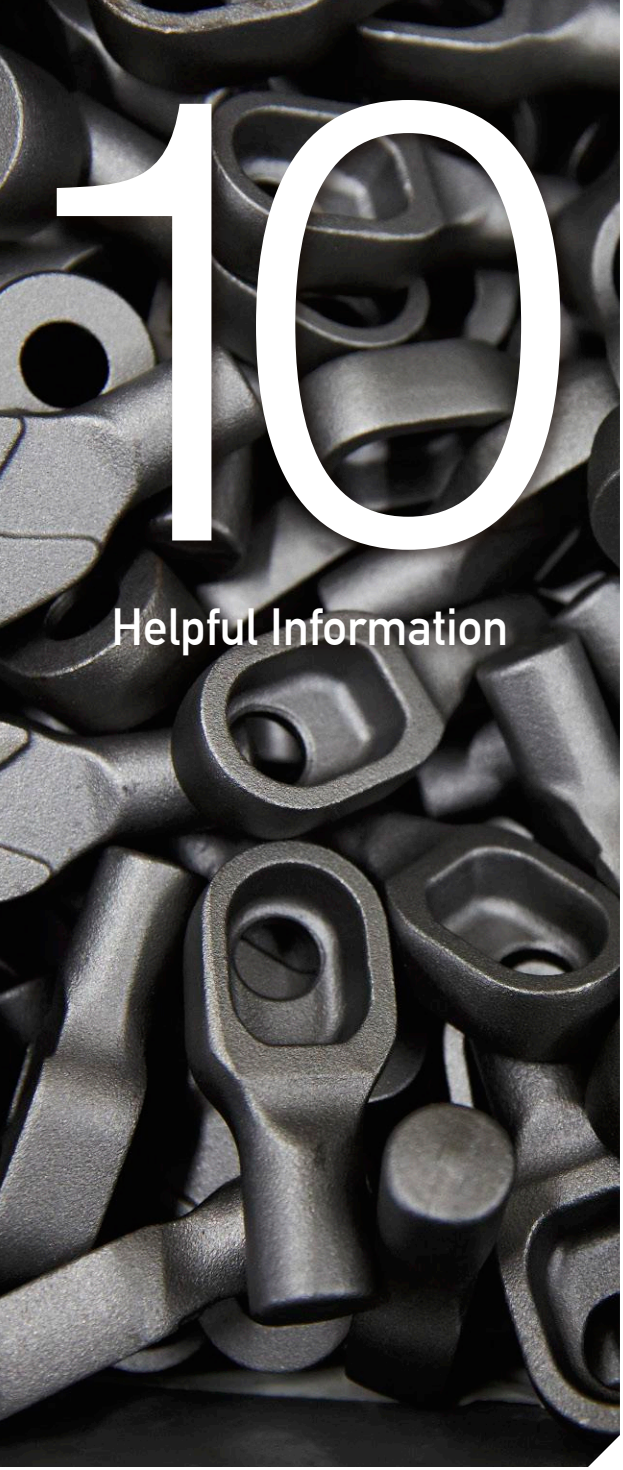
(13) GOST R
Russian National Standards The Government Standard of Russia

GOST-R (The Government Standard of Russia) is the general name for all the Russian standards, and industrial products will require explosion-proofing, fire-resistance, hygiene certification, and measurement instrument certification. GOST-R certification is required for all the specified products, and it will be necessary to submit certificates in order to import and distribute these products in Russia. In advance of other companies, Tohnichi has already acquired the GOST-R certification for its main products.

(14) CCC
China Compulsory Certification

China Compulsory Certification (CCC) is a certificate system on the safety of products sold in China and it was implemented on May 1, 2002. As for the product which does not acquire the certification, the commercial activities such as imports and sales to China are prohibited.

At the global level, the most influential organizations determining engineering-related standards are **IEC, the International Electrotechnical Commission** and **ISO, the international Organization for Standardization**. The IEC is primarily concerned with electrical and electronic engineering issues, while the ISO' s field is mechanical engineering. Each organization currently has more than 100 member countries. The standards they have developed are recognized as holding much weight.



10 Helpful Information

10 Helpful Information

10-1 SI Unit

(1) SI base units

The international system of units is based on the seven base units listed table on the right.

SI base units

Base quantity	SI base units	
	Name	Symbol
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric current	Ampere	A
Thermodynamic temperature	Kelvin	K
Amount of substance	Mole	mol
Luminous intensity	Candela	cd

10-1 SI Unit

(2) SI derived unit

SI derived units are expressed algebraically in terms of base units. These symbols are obtained by means of the mathematical signs of multiplication and division.

Named units derived from SI units.

Derived quantity	SI derived unit	
	Name	Symbol
Area	Square meter	m^2
Volume	Cubic meter	m^3
Velocity	Meter per second	m/s
Acceleration	Meter per square second	m/s^2
Wave number	Per meter	m^{-1}
Mass density	Kilogram per cubic meter	kg/m^3
Specific volume	Cubic meter per kilogram	m^3/kg

(3) SI prefixes

The multiple can usually be chosen so that the numerical values will be between 0.1 and 1000.

SI prefixes

Factor	Prefix	Symbol
$10^9 = (10^3)^3$	Giga	G
$10^6 = (10^3)^2$	Mega	M
$10^3 = (10^3)^1$	Kilo	k
10^2	Hecto	h
10^1	Deca	da
10^{-1}	Deci	d
10^{-2}	Centi	c
$10^{-3} = (10^3)^{-1}$	Milli	m
$10^{-6} = (10^3)^{-2}$	Micro	μ
$10^{-9} = (10^3)^{-3}$	Nano	n
$10^{-12} = (10^3)^{-4}$	Pico	p

Example of SI derived unit which has

Derived quantity	SI derived unit			
	Special name	Symbol	Expressed in terms of other SI units	Expressed in terms of other SI base units and SI derived unit
Plane angle	radian	rad	–	$m \cdot m^{-1} = 1$
Solid angle	steradian	sr	–	$m^2 \cdot m^{-2} = 1$
Frequency	hertz	Hz	–	s^{-1}
Force	newton	N	–	$m \cdot kg \cdot s^{-2}$
Pressure, stress	pascal	Pa	N/m^2	$m^{-1} \cdot kg \cdot s^{-2}$
Energy, work, quantity of heat	joule	J	N•m	$m^2 \cdot kg \cdot s^{-2}$
Power, radiant flux	watt	W	J/s	$m^2 \cdot kg \cdot s^{-3}$
Electric charge, quantity of electric	coulomb	C	–	A•s
Electric potential, potential difference, tension electromotive force	volt	V	W/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-1}$
Capacitance	farad	F	C/V	$m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$
Electric resistance	ohm	Ω	V/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$
Magnetic flux	weber	Wb	V•s	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$
Magnetic flux density	tesla	T	Wb/m^2	$kg \cdot s^{-2} \cdot A^{-1}$

(4) Non-SI units which may be used with SI units and their multiples

Units used with the SI

Name	Symbol	Definition
Minute	min	1 [min] = 60 [s]
Hour	h	1 [h] = 60 [min] = 3600 [s]
Day	d	1 [d] = 24 [h] = 86400 [s]
Degree	°	$1° = (\pi/180)$ [rad]
Minute	′	$1′ = (1/60)° = (\pi/10800)$ [rad]
Second	″	$1″ = (1/60)′ = (\pi/648000)$ [rad]
Liter	ℓ, L (1)	1 [L] = 1 [dm^3] = 10^{-3} [m^3]
Tonne (2)	t	1 [t] = 10^3 [kg]

Note: 1. The two symbols for the liter are on an equal footing. The CIPM (International Committee of Weights and Measures) will, however, make a survey on the development of the use of the two symbols in order to see if one of the two may be suppressed.
2. Also it is called the metric ton in the English language.

10 Helpful Information

10-2 Characteristic of Material

(1) Physical characteristic of metal material

Element	Symbol	Specific gravity	Fusing point [C]	Longitudinal elastic coefficient E [N/mm²]
Zinc	Zn	7.113 (25°)	419.5	–
Argon	Ar	0.00178	−189.4	–
Aluminum	AL	2.699	660	61782
Sulfur	S	2.07	119	77473
Uranium	U	19.07	1132.3	166713
Chlorine	CL	0.00321	−101	–
Cadmium	Cd	8.65	320.9	54917
Potassium	K	0.86	63.7	–
Gallium	Ga	5.907	29.78	–
Calcium	Ca	1.55	838	21575~26478
Gold	Au	19.32	1063	80415
Silver	Ag	10.49	960.8	70608~77473
Chromium	Cr	7.19	1875	–
Silicon	SI	2.33 (25°)	1410	10787
Germanium	Ge	5.323 (25°)	937	–
Cobalt	Co	8.85	1495	205940
Samarium	Sm	7.49	1072	54917
Zirconium	Zr	6.489	1852	94144
Mercury	Hg	13.546	−38.36	–
Tin	Sn	7.29	231.9	41188~45111
Tungsten	W	19.3	3410	34323
Carbon	C	2.25	3727	4903
Titanium	TI	4.507	1668	115718
Nitrogen	N	0.00125	−209	
Iron	Fe	7.87		
Copper	Cu	8.96	1083	107873
Sodium	Na	0.9712	97.82	–
Lead	Pb	11.36	327.4	13729
Nickel	NI	8.902 (25°)	1453	205940
Neodymium	Nd	7	1019	–
Platinum	Pt	21.45	1769	147100
Vanadium	V	6.1	1900	127486~137293
Barium	Ba	3.5	714	–
Fluorine	F	0.001696	−219.6	–
Plutonium	Pu	19~19.72	640	98067
Beryllium	Be	1.848	1277	27459~30401
Magnesium	Mg	1.74	650	44130
Manganese	Mn	7.43	1245	156906
Molybdenum	Mo	10.22	2610	411879
Lithium	LI	0.534	180.5	–
Phoshorus	P	1.83	44.25	–

Alloy name	Specific gravity	Fusing point [C]	Longitudinal elastic coefficient E [N/mm²]	Transuerse elastic coefficient G [N/mm²]
Duralumin	2.79	Approx. 650	Approx. 68647	26478
Super mild steel	7.856~7.861	1500	205940	79434
Hard steel	7.836~7.846	1390~1420	204959	81984
High carbon steel	7.81	1335~1450	196133~202017	80415~81395
Cast steel	7.84	1410~1470	205940	76982
Alminum bronze	7.6	1040	109834	–
Phosphorus bronze	8.78	1000	109834	–
German silver	8.3~8.7	950~1180	107873	39227
Berylium copper	8.2	864~ 955	1108151	–
Chrome steel	Approx. 7.84	–	201036~210843	–
Chrome-Stainless steel	7.6~7.75	1510~1532	202998~207901	–
Silicon steel	7.6~7.8	1430~1530	216727~220650	–
Nickel-Chrome steel	7.8	1450~1510	203978	–
White metal	7.38	240~ 355	52171	–

10-2 Helpful Information Characteristic of Material

(2) Strength characteristic of plastic

Model	Code	Specific gravity	Elongation [%]	Longitudinal elastic coefficient E [N/mm²]	Tensile strength [N/mm²]	Bending strength [N/mm²]
Thermoplasticity						
Polyethylene	PE					
Low density (LD)		0.91～0.925	90～ 800	96.1～ 260.9	3.9～ 15.7	–
Medium density (MD)		0.926～0.94	50～ 600	171.6～ 377.6	7.8～ 24.5	33.3～ 48.1
High density (HD)		0.941～0.965	20～1300	411.9～ 1235.6	20.6～ 38.2	–
Polypropylene	PP	0.90～0.91	200～ 700	1098.3～ 1549.5	29.4～ 38.2	41.2～ 54.9
Vinyl chloride resin (Hard)	PVC	1.30～1.58	40～ 80	2402.6～ 4118.8	41.2～ 52.0	68.6～109.8
Tetrafluoride ethylene	PTFE	2.14～2.20	200～ 400	398.1	13.7～ 34.3	–
ABS resin	ABS					
Shock resistance (H1)		1.03～1.06	5.0～ 25	2059.4～ 3089.1	45.1～ 52.0	75.5～ 89.2
With fiberglass		1.23～1.36	2.5～ 3.0	4050.1～ 7219.8	58.8～130.4	109.8 ～185.3
Polycarbonate	PC					
No packing		1.2	100 ～130	2059.4～ 3383.3	54.9～ 65.7	93.2
With fiberglass		1.24～1.52	0.9～ 5.0	3432.3～11909.8	82.4～171.6	116.7～219.7
Polyacetal	POM					
Homopolymerization		1.42	25～ 75	3569.6	68.6	97.1
With homopolymerization fiberglass		1.56	2～ 7	6864.7	54.9～ 75.5	–
Copolymerization		1.41	40～ 75	2814.5	60.8	89.2
With copolymerization fiberglass		1.61	3	8580.8	127.5	192.2
Nylon 6		1.12～1.14	200dry～300	–	68.6～ 81.4	–
Nylon 6 with fiberglass		1.35～1.42	3	5491.7～ 9953.7	171.6 ～ 89.2	164.8 dry
Nylon 6,6		1.13～1.15	60dry～300	–	82.4～ 75.5	116.7～42.2
Nylon 6,6 with fiberglass		1.38	4dry～5	–	164.8 ～185.3	281.5 dry
Nylon 12		1.01～1.02	300	1235.6	54.9～ 63.7	–
Polymide with fiberglass	PI	1.9	1 or less	19564.3	185.3	340.3
Plastic of cellulose						
Cellulose acetate	CA	1.22～1.34	6.0～ 7.0	451.1～ 2745.9	12.7～ 61.8	13.7～109.8
Cellulose acetate butylete	CAB	1.15～1.22	50～100	1372.9～ 1716.2	17.7～ 47.1	27.5～ 61.8

Model	Code	Specific gravity	Elongation [%]	Longitudinal elastic coefficient E [N/mm²]	Tensile strength [N/mm²]	Bending strength [N/mm²]
Thermosetting						
Phenol resin	PF					
Molding with organism		1.34～1.45	0.4～0.8	5491.7～11669.9	34.3～ 61.8	48.1～ 96.1
Molding mineral		1.45～2.00	0.2～0.5	6864.7～20594.0	31.4～ 52.0	48.1～ 96.1
Molding with fiberglass		1.69～1.95	0.2	13042.8～22653.4	34.3～127.5	68.6～411.9
Urea resin	UF					
Molding with α-cellulose		1.47～1.52	0.5～1.0	6864.7～10297.0	38.2～ 89.2	68.6～123.6
Epoxy resin	EP					
No molding		1.11～1.40	3～6	2402.6	27.5～ 89.2	91.2～144.2
Molding with fiberglass		1.6～2.0	4	20868.6	68.6～137.3	68.6～411.9
Unsaturation polyester resin	UP					
No molding		1.11～1.46	5 or less	2059.4～ 4393.4	41.2～ 89.2	58.8～157.9
Brimix molding	(BMC)	1.65～2.30	0.5	6864.7～17161.6	20.6～68.6	48.1～137.3
Melanin resin	MF					
Molding with α-cellulose		1.47～1.52	0.6～0.9	8237.6～ 9610.5	48.1～89.2	68.6～109.8
Silicon resin	SI					
Molding with fiberglass		1.80～1.90	–	–	27.5～45.1	68.6～ 96.1
Polyurethane	PUR					
Molding		1.10～1.50	100～1000	686.5～ 6864.7	1.0～68.6	4.9～ 31.4
Thermoplasticity		1.05～1.25	100～650	686.5～ 2402.6	31.4～57.9	4.9～ 61.8

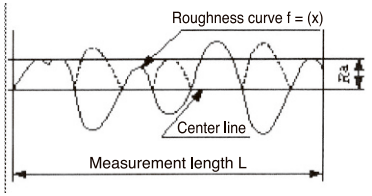
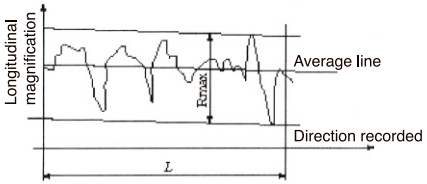
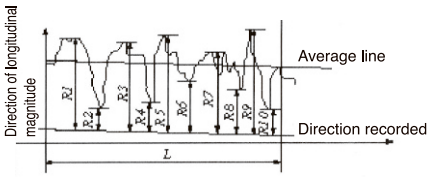
1N=0.101972kgf
1kgf=9.80665N

(3) Characteristic of special steel

Classification	Symbol	Heat treatment [°C]	Yielding point or bearing force [N/mm²]	Tensile strength [N/mm²]	Elongation [%]	Contraction [%]	Hardness [HB]	Hardness [HRC]
General structural steel (JIS G3101)	SS400	–	More than 215	400~510	More than 21	–	–	–
Machine structural carbon steel (JIS 4051)	S25C	Annealing	–	–	–	–	121~156	–
	S30C	Hardening / Annealing	More than 355	More than 540	More than 23	More than 57	152~212	–
	S35C	Normalizing	More than 305	More than 510	More than 23	–	149~207	–
		Annealing	–	–	–	–	126~163	–
		Hardening / Tempering	More than 390	More than 570	More than 22	More than 55	167~235	–
	S45C	Normalizing	More than 345	More than 570	More than 20	–	167~229	–
		Annealing	–	–	–	–	137~170	–
		Hardening / Tempering	More than 490	More than 690	More than 17	More than 45	201~269	–
	S50C	Normalizing	More than 365	More than 610	More than 18	–	179~235	–
		Annealing	–	–	–	–	143~187	–
		Hardening / Tempering	More than 540	More than 740	More than 15	More than 40	212~277	–
	S55C	Normalizing	More than 390	More than 650	More than 15	–	183~255	–
		Annealing	–	–	–	–	149~192	–
		Hardening / Tempering	More than 590	More than 780	More than 14	More than 35	229~285	–
Carbon tool steel (JIS 4401)	SK3	Hardening / Tempering	–	More than 850	–	–	–	More than 63
	SK4	Hardening / Tempering	–	More than 770	–	–	–	More than 61
	SK5	Hardening / Tempering	–	–	–	–	–	More than 59
Chrome steel (JIS 4104)	SCr415	Hardening / Tempering	–	More than 780	More than 15	More than 40	217~302	–
	SCr420	Hardening / Tempering	–	More than 830	More than 14	More than 35	235~321	–
	SCr440	Hardening / Tempering	More than 785	More than 930	More than 13	More than 45	269~331	–
Chromium-molybdenum steel (JIS 4105)	SCM415	Hardening / Tempering	–	More than 830	More than 16	More than 40	235~321	–
	SCM420	Hardening / Tempering	–	More than 930	More than 14	More than 40	262~352	–
	SCM435	Hardening / Tempering	–	More than 930	More than 15	More than 50	269~331	–
	SCM440	Hardening / Tempering	–	More than 980	More than 12	More than 45	285~352	–
	SCM455	Hardening / Tempering	–	More than 1030	More than 12	More than 40	302~363	–

10 Helpful Information

10-3 Roughness of Surface

Type symbol	Symbol	How to determine	Explanation
Center line average roughness	Ra	Turn back roughness curve from center line, and express the value by [μm] of area got from roughness curve and center line, divided by length L. Generally to read directly average line roughness measurement.	
Max. height	Rmax	Sectional curve, to get max. height of part extracted standard length L and to express by [μm]. To extract just standard length from part without extraordinary high mountain and deep valley recognized as scar.	 L: Standard length Rmax: Max. height of the part to
Ten points average height	Rz	For the part just extracted standard length from sectional curve to express the difference between average of height of mountaintop from max. to the fifth and average of height of bottom from most deep to the fifth by [μm]	 R1, R3, R5, R7, R9 : height of mountain top from Max. to the fifth R2, R4, R6, R8, R10 : height of bottom from most deep to the fifth $Rz = \frac{(R1 + R3 + R5 + R7 + R9) - (R2 + R4 + R6 + R8 + R10)}{5}$

10 Helpful Information

10-4 Material Mechanics

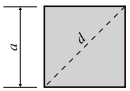
(1) Area of plane figure

a. Square

$A = a^2$

$a = \sqrt{A}$

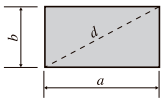
$d = a\sqrt{2}$



b. Rectangle

$A = ab$

$d = \sqrt{a^2+b^2}$

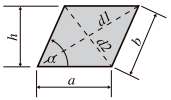


c. Parallelogram

$A = ah = ab\sin\alpha$

$d1 = \sqrt{(a+h\cot\alpha)^2+h^2}$

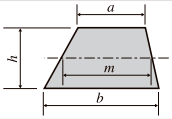
$d2 = \sqrt{(a-h\cot\alpha)^2+h^2}$



d. Trapezoid

$A = \frac{a+b}{2}h = mh$

$m = \frac{a+b}{2}$

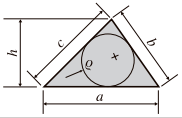


e. Triangle

$A = \frac{ah}{2} = \varrho s$

$= \sqrt{s(s-a)(s-b)(s-c)}$

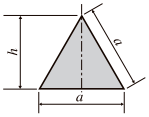
$s = \frac{a+b+c}{2}$



f. Equilateral triangle

$A = \frac{a^2}{4}\sqrt{3}$

$h = \frac{a}{2}\sqrt{3}$



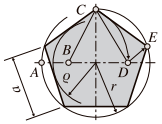
g. Equilateral pentagon

$A = \frac{5}{8}r^2\sqrt{10+2\sqrt{5}}$

$a = \frac{1}{2}r\sqrt{10-2\sqrt{5}}$

$\varrho = \frac{1}{4}r\sqrt{6+2\sqrt{5}}$

Drawing: $\overline{AB} = 0.5r, \overline{BC} = \overline{BD}, \overline{CD} = \overline{CE}$



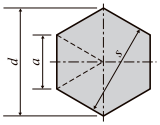
h. Equilateral hexagon

$A = \frac{3}{2}a^2\sqrt{3}$

$d = 2a$

$= \frac{2}{\sqrt{3}}s \approx 1.155s$

$s = \frac{\sqrt{3}}{2}d \approx 0.866d$



i. Equilateral octagon

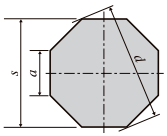
$A = 2as \approx 0.83s^2$

$= 2s\sqrt{d^2+s^2}$

$a = s\times\tan 22.5^\circ \approx 0.415s$

$s = d\times\cos 22.5^\circ \approx 0.924d$

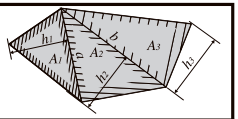
$d = \frac{s}{\cos 22.5^\circ} \approx 1.083s$



j. Polygon

$A = A_1+A_2+A_3$

$= \frac{ah_1+bh_2+bh_3}{2}$

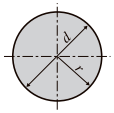


k. Circle

$A = \frac{\pi}{4}d^2 = \pi r^2$

$\approx 0.785d^2$

$U = 2\pi r = \pi d$

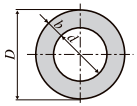


l. Annulus ring

$A = \frac{\pi}{4}(D^2-d^2)$

$= \pi(d+b)b$

$b = \frac{D-d}{2}$



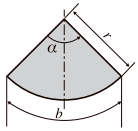
m. Sector

$A = \frac{\pi}{360^\circ}r^2\alpha = \frac{\widehat{\alpha}}{2}r$

$= \frac{br}{2}$

$b = \frac{\pi}{180^\circ}r\alpha$

Formula1 —— $\widehat{\alpha} = \frac{\pi}{180^\circ}\alpha$ α = Circular measure ofα (rad)



n. Arch shape

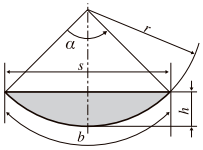
$s = 2r\sin\frac{\alpha}{2}$

$A = \frac{h}{6s}(3h^2+4s^2) = \frac{r^2}{2}(\widehat{\alpha}-\sin\alpha)$

$r = \frac{h}{2}+\frac{s^2}{8h}$

$h = r(1-\cos\frac{\alpha}{2}) = \frac{s}{2}\tan\frac{\alpha}{4}$

Segment For$\widehat{\alpha}$see formula1 of sector.

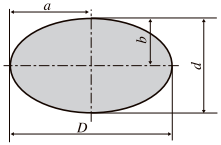


o. Ellipse

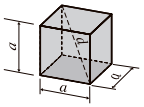
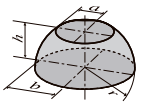
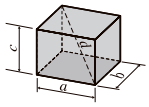
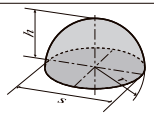
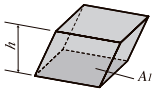
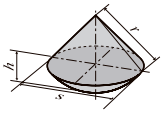
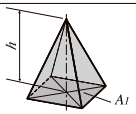
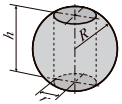
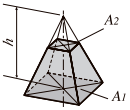
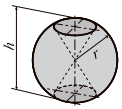
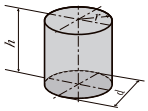
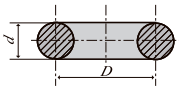
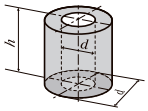
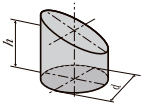
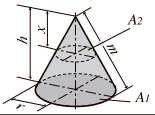
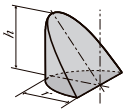
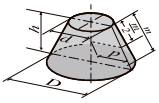
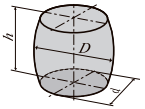
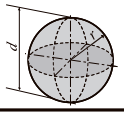
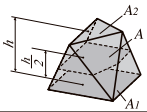
$A = \frac{\pi}{4}Dd = \pi ab$

$U \approx \pi\frac{D+d}{2}$

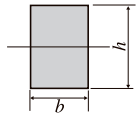
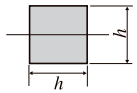
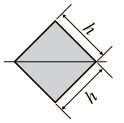
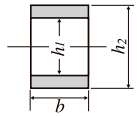
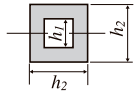
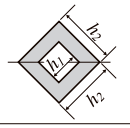
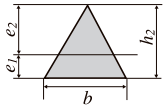
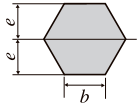
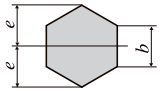
$= \pi(a+b)\left[1+\frac{1}{4}\lambda^2+\frac{1}{64}\lambda^4+\frac{1}{256}\lambda^6+\frac{25}{16384}\lambda^8+\cdots\cdots\right]$, here$\lambda = \frac{a-b}{a+b}$



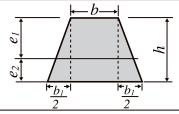
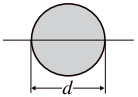
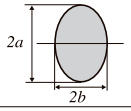
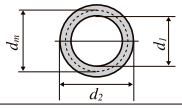
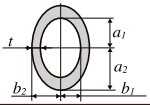
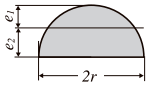
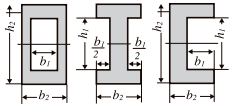
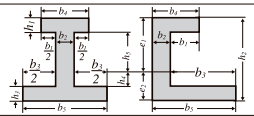
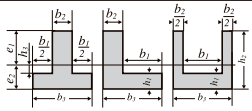
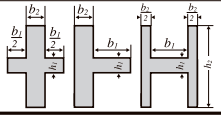
(2) Volume of solid figure

a. Cube	$V = a^3$ $A_0 = 6a^2$ $d = \sqrt{3}a$		k. Spherical zone	$V = \frac{\pi}{6}h(3a^2+3b^2+h^2)$ $A_m = 2\pi rh$ $A_0 = \pi(2rh+a^2+b^2)$	
b. Rectangular parallelepiped	$V = abc$ $A_0 = 2(ab+ac+bc)$ $d = \sqrt{a^2+b^2+c^2}$		l. Spherical crown	$V = \frac{\pi}{6}h(\frac{3}{4}s^2+h^2)$ $= \pi h^2(r-\frac{h}{3})$ $A_m = 2\pi rh$ $= \frac{\pi}{4}(s^2+4h^2)$	
c. Parallelepiped	$V = A_1 h$		m. Cube part of it cut	$V = \frac{2}{3}\pi r^2 h$ $A_0 = \frac{\pi}{2}r(4h+s)$	
d. Pyramid	$V = \frac{A_1 h}{3}$		n. Globe with hollow cylinder	$V = \frac{\pi}{6}h^3$ $A_0 = 2\pi h(R+r)$	
e. Pyramid of head cut	$V = \frac{h}{3}(A_1+A_2+\sqrt{A_1A_2})$ $\approx h+\frac{A_1+A_2}{2}$		o. Globe with hollow circular cone	$V = \frac{2}{3}\pi r^2 h$ $A_0 = 2\pi(h+\sqrt{r^2-\frac{h^2}{4}})$	
f. Circular cylinder	$V = \frac{\pi}{4}d^2h$ $A_m = 2\pi rh$ $A_0 = 2\pi r(r+h)$		p. Torus	$V = \frac{\pi^2}{4}Dd^2$ $A_0 = \pi^2 Dd$	
g. Hollow cylinder	$V = \frac{\pi}{4}h(D^2-d^2)$		q. Circular cylinder cut diagonally	$V = \frac{\pi}{4}d^2h$	
h. Circular cone	$V = \frac{\pi}{3}r^2h$ $A_m = \pi rm$ $A_0 = \pi r(r+m)$ $m = \sqrt{h^2+r^2}$ $A_2 : A_1 = x^2 : h^2$		r. Hoof shape	$V = \frac{2}{3}r^2h$ $A_m = 2rh$ $A_0 = A_m + \frac{\pi}{2}r^2 + \frac{\pi}{2}r\sqrt{r^2+h^2}$	
i. Circular cylinder of head cut	$V = \frac{\pi}{12}h(D^2+Dd+d^2)$ $A_m = \frac{\pi}{2}m(D+d) = 2\pi pm$ $m = \sqrt{(\frac{D-d}{2})^2+h^2}$		s. Barrel shape	$V \approx \frac{\pi}{12}h(2D^2+d^2)$	
j. Globe	$V = \frac{4}{3}\pi r^3 = \frac{1}{6}\pi d^3$ $\approx 4.189r^3$ $A_0 = 4\pi r^2 = \pi d^2$		t. Angular base	$V = \frac{h}{6}(A_1+A_2+4A)$ *This formula can be used for volume calculation of globe and part of globe.*	

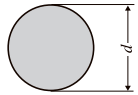
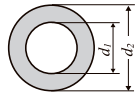
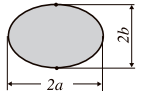
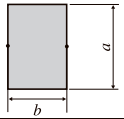
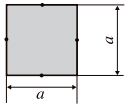
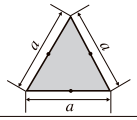
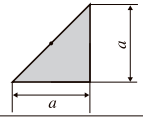
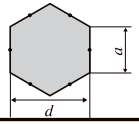
(3) Principal moment of inertia and modulus of section-1

Cross section shape	Area of cross section shape $A[cm^2]$	Principal moment of inertia $Ix[cm^4]$	Modulus of section $Z[cm^3]$	Radius of gyration: k $k^2[cm^2]$
a. 	bh	$\frac{1}{12}bh^3$	$\frac{1}{6}bh^2$	$\frac{1}{12}h^2$
b. 	h^2	$\frac{1}{12}h^4$	$\frac{1}{6}h^3$	$\frac{1}{12}h^2$
c. 	h^2	$\frac{1}{12}h^4$	$\frac{\sqrt{2}}{12}h^3$	$\frac{1}{12}h^2$
d. 	$b(h_2-h_1)$	$\frac{1}{12}b(h_2^3-h_1^3)$	$\frac{1}{6}\frac{b(h_2^3-h_1^3)}{h_2}$	$\frac{1}{12}\frac{h_2^3-h_1^3}{h_2-h_1}$
e. 	$h_2^2-h_1^2$	$\frac{1}{12}(h_2^4-h_1^4)$	$\frac{1}{6}\frac{h_2^4-h_1^4}{h_2}$	$\frac{1}{12}(h_2^2+h_1^2)$
f. 	$h_2^2-h_1^2$	$\frac{1}{12}(h_2^4-h_1^4)$	$\frac{\sqrt{2}}{12}\frac{h_2^4-h_1^4}{h_2}$	$\frac{1}{12}(h_2^2+h_1^2)$
g. 	$\frac{1}{2}bh$	$\frac{1}{36}bh^3$	$Z_1=\frac{1}{24}bh^2$ $Z_2=\frac{1}{12}bh^2$ $e_1=\frac{2}{3}h,\quad e_2=\frac{1}{3}h$	$\frac{1}{18}h^2$
h. 	$\frac{3\sqrt{3}}{2}b^2=2.60b^2$	$\frac{5\sqrt{3}}{16}b^4=0.5413b^4$	$Z=\frac{5}{8}b^3=0.625b^3$ $e=\frac{\sqrt{3}}{2}b=0.866b$	$\frac{5}{24}b^2$
i. 	$\frac{3\sqrt{3}}{2}b^2=2.60b^2$	$\frac{5\sqrt{3}}{16}b^4=0.5413b^4$	$\frac{5\sqrt{3}}{16}b^3=0.5413b^3$ $e=b$	$\frac{5}{24}b^2$

(3) Principal moment of inertia and modulus of section-2

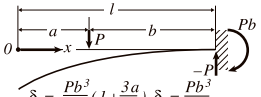
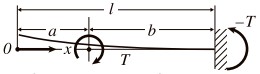
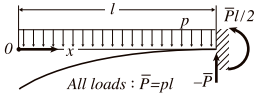
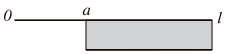
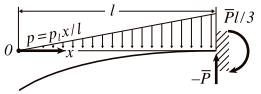
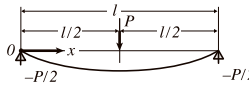
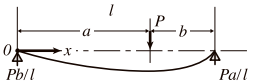
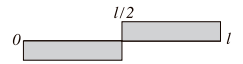
Cross section shape	Area of cross section shape $A[cm^2]$	Principal moment of inertia $Ix[cm^4]$	Modulus of section $Z[cm^3]$	Radius of gyration: k $k2[cm^2]$
j. 	$h\left(b+\frac{b_1}{2}\right)$	$\frac{6b^2+6bb_1+b_1^2}{36(2b+b_1)}h^3$	$Z=\frac{6b^2+6bb_1+b_1^2}{12(3b+2b_1)}h^2$ $e=\frac{1}{3}\frac{3b+2b_1}{2b+b_1}h$ $e=h-e_1$	$\frac{6b^2+6bb_1+b_1^2}{18(2b+b_1)^2}h^2$
k. 	$\frac{\pi}{4}d^2$	$\frac{\pi}{64}d^4$	$\frac{\pi}{32}d^3$	$\frac{\pi}{16}d^2$
l. 	πab	$\frac{\pi}{4}a^3b$	$\frac{\pi}{4}a^2b$	$\frac{1}{4}a^2$
m. 	$\frac{\pi}{4}(d_2^2-d_1^2)$	$\frac{\pi}{64}(d_2^4-d_1^4)$	$\frac{\pi}{32}\frac{d_2^4-d_1^4}{d_2}$ $\fallingdotseq 0.8d_m^2t$ $\left(When\ \frac{t}{d_m}\ is\ very\ small\right)$	$\frac{1}{16}(d_2^2+d_1^2)$
n. 	$\pi(a_2b_2-a_1b_1)$	$\frac{\pi}{4}(a_2^3b_2-a_1^3b_1)$	$\frac{\pi}{4a^2}(a_2^3b_2-a_1^3b_1)$ $\fallingdotseq\frac{\pi}{4}a_2(a_2+3b_2)t$	$\frac{1}{4}\frac{a_2^3b_2-a_1^3b_1}{a_2b_2-a_1b_1}$
o. 	$\frac{\pi}{2}r^2$	$\left(\frac{\pi}{8}-\frac{8}{9\pi}\right)r^4$ $=0.1098r^4$	$Z_1=0.1908r^3$ $Z_2=0.2587r^3$ $e_1=0.5756r$ $e_2=0.4244r$	$\frac{9\pi^2-64}{36\pi^2}r^2$ $=0.0697r^2$
p. 	$b_2h_2-b_1h_1$	$\frac{1}{12}(b_2h_2^3-b_1h_1^3)$	$\frac{1}{6}\frac{b_2h_2^3-b_1h_1^3}{h_2}$	$\frac{1}{12}\frac{b_2h_2^3-b_1h_1^3}{b_2h_2-b_1h_1}$
q. 	$b_1h_1+b_2h_2+b_3h_3$	$\frac{1}{3}(b_4e_1^3-b_1h_5^3+b_5e_2^3-b_3h_4^3)$	$e_2=\frac{b_2h_2^2+b_3h_3^2+b_1h_1(2h_2-h_1)}{2(b_1h_1+b_2h_2+b_3h_3)}$	
r. 	$b_1h_1+b_2h_2$	$\frac{1}{3}(b_3e_2^3-b_1h_3^3+b_2e_1^3)$	$e_2=\frac{b_1h_1^2+b_2h_2^2}{2(b_1h_1+b_2h_2)}$ $e_1=h_2-e_2$	$\frac{1}{3}\frac{b_3e_2^3-b_1h_3^3+b_2e_1^3}{b_1h_1+b_2h_2}$
s. 	$b_1h_1+b_2h_2$	$\frac{1}{12}(b_1h_1^3+b_2h_2^3)$	$\frac{1}{6}\frac{b_1h_1^3+b_2h_2^3}{h_2}$	$\frac{1}{12}\frac{b_1h_1^3+b_2h_2^3}{b_1h_1+b_2h_2}$

(4) Twist of shaft of cross section shape

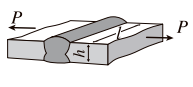
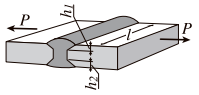
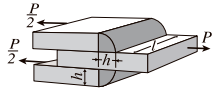
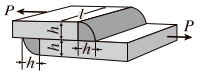
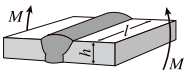
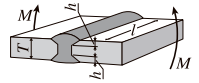
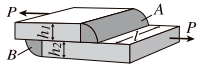
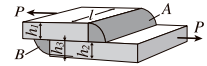
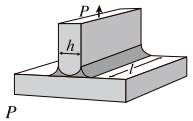
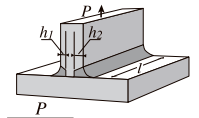
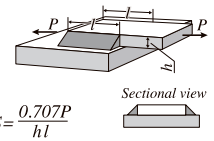
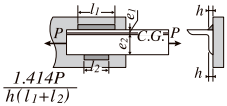
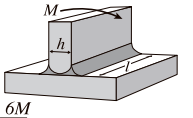
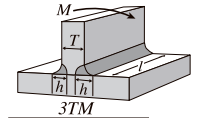
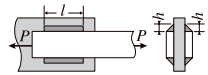
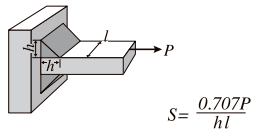
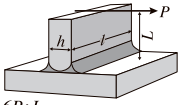
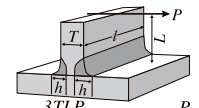
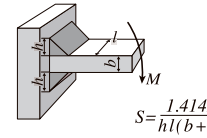
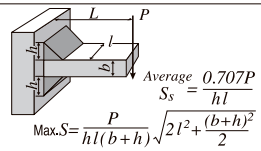
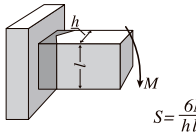
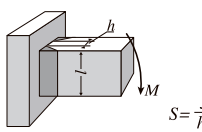
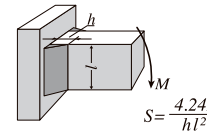
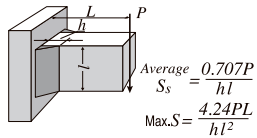
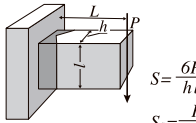
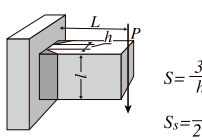
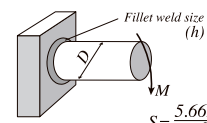
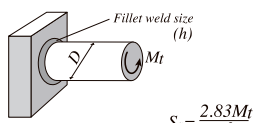
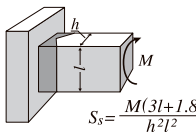
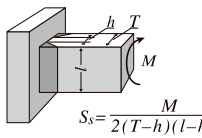
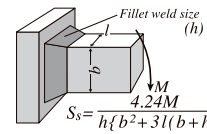
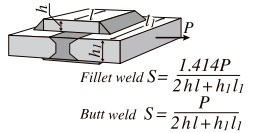
Cross section shape	Polar moment of inertia $Ip[cm^4]$	Max sharing stress $\tau\ max\ [kg/cm^2]$	Twisting angleθ against length l $\theta[rad]$
a. 	$\frac{\pi d^4}{32}$	$\frac{16T}{\pi d^3}$ (Outer corner)	$\frac{32}{\pi d^4}\ \frac{Tl}{G}$
b. 	$\frac{\pi (d_2^4-d_1^4)}{32}$	* $\frac{16d_2T}{\pi(d_2^4-d_1^4)}$ (Outer corner)	$\frac{32}{\pi(d_2^4-d_1^4)}\ \frac{Tl}{G}$
c. 	$\frac{\pi a^3b^3}{a^2+b^2}$	$\frac{T}{\pi ab^2}$	$\frac{a^2+b^2}{\pi a^3b^3}\ \frac{Tl}{G}$
d. 	k_3ab^3 k_3 Following table	$\frac{1}{k_1}\ \frac{T}{ab^2}$ k_1 Following table	$\frac{1}{k_3}\ \frac{Tl}{ab^3G}$ k_3 Following table
e. 	$0.1041a^4$	$\frac{T}{0.208a^3}$	$\frac{7.114}{a^4}\ \frac{Tl}{G}$
f. 	$\frac{a^4}{46.2}$	$\frac{20T}{a^3}$	$\frac{80}{\sqrt{3}\ a^4}\ \frac{Tl}{G}$
g. 	$\frac{a^4}{38.3}$	$\frac{17.58T}{a^3}$	$\frac{38.3}{a^4}\ \frac{Tl}{G}$
h. 	$1.04a^4$	$\frac{4.61T}{Ad}=5.32\frac{T}{d^3}$ $d=\sqrt{3}a$ $A=\frac{3}{2\sqrt{3}}d^2=0.866d^2$	$\frac{7.52}{Ad^2}\ \frac{Tl}{G}$ A=Cross section

a / b	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	∞
k1	0.208	0.231	0.246	0.258	0.267	0.282	0.292	0.298	0.307	0.312	0.333
k2	1.000	0.859	0.759	0.766	—	0.745	0.743	—	0.743	0.743	0.743
k3	0.141	0.196	0.229	0.249	0.263	0.281	0.291	0.298	0.307	0.312	0.333

(5) Beam

Beam (elastic curve)	 $\delta_0=\frac{Pb^3}{3EI}\left(1+\frac{3a}{2b}\right),\ \delta_a=\frac{Pb^3}{3EI}$ $\phi_0=\phi_a=-\frac{Pb^2}{2EI}$	 $\delta_0=\frac{-Tb^2}{2EI}\left(1+\frac{2a}{b}\right),\ \delta_a=\frac{-Tb^2}{2EI}$ $\phi_0=\phi_a=\frac{Tb}{EI}$	 All loads : $\bar{P}=pl$ $\delta_0=\frac{\bar{P}l^3}{8EI},\ \phi_0=\frac{-\bar{P}l^2}{6EI}$
M (bending moment)	 $M_0=0,\ M_a=0,\ M_l=Pb$	 $M_0=0,\ M_{a+}=M_l=-T$	 $M_0=0,\ M_l=\frac{\bar{P}l}{2}$
F (shearing force)	 $F_0=0$ $\quad F_l=P$	 $F=0(\text{const.})$	 $F_0=0$ $\quad F_l=P$
Some formula	$0\sim a$: $\delta=\frac{Pb^3}{3EI}\left[1+\frac{3(a-x)}{2b}\right]$ $M=0,\ F=0$ $a\sim l$: $\delta=\frac{Pb^3}{3EI}\left[1-\frac{3(a-x)}{2b}+\frac{(x-a)^3}{2b^3}\right]$ $M=Pb(x-a)/l$ $F=P$	$0\sim a$: $\delta=\frac{-Tb^2}{2EI}\left[1+\frac{2(a-x)}{b}\right]$ $M=0,\ F=0$ $a\sim b$: $\delta=\frac{-T}{2EI}(l-x)^2$ $M=-T$ $F=0$	$0\sim l$: $\delta=\frac{\bar{P}l^3}{8EI}\left(1-\frac{4x}{3l}+\frac{x^4}{3l^4}\right)$ $\phi=\frac{-\bar{P}l^2}{6EI}\left(1-\frac{x^3}{l^3}\right)$ $M=\frac{\bar{P}x^2}{2l}$ $F=\frac{\bar{P}x}{l}$
Beam (elastic curve)	 All loads : $\bar{P}=p_l l/2$ $\delta_0=\frac{\bar{P}l^3}{15EI},\ \phi_0=\frac{-\bar{P}l^2}{12EI}$	 $\phi_0=\frac{Pl^2}{16EI},\ \phi_l=-\frac{Pl^2}{16EI}$ $\delta_{max}=\frac{Pl^3}{48EI}\ ;x=\frac{l}{2}$	 $\phi_0=\frac{Pb}{6EIl}\left(l^2-b^2\right),\phi_l=\frac{-Pa}{6EI}\left(l^2-a^2\right)$ $\delta_a=\frac{Pa^2b^2}{3EIl},\ \phi_a=\frac{-Pab(a-b)}{3EIl}$ $\delta_{max}=\frac{Pb(l^2-b^2)^{3/2}}{9\sqrt{3}EIl}\ x=\left[(l^2-b^2)/3\right]^{1/2}$
M (bending moment)	 $M_0=0$ $\quad M_l=Pl/3$	 $M_0=0$ $\quad M_l=0$ $M_{max}=M_{l/2}=Pl/4$	 $M_0=0$ $\quad M_l=0$ $M_a=-Pab/l$
F (shearing force)	 $F_0=0$ $\quad F_l=P$	 $F_0=-P/2$ $\quad F_l=P/2$	 $F_0=-Pb/l$ $\quad F_l=Pa/l$
Various formula	$0\sim l$: $\delta=\frac{\bar{P}l^3}{15EI}\left(1-\frac{5x}{4l}+\frac{x^5}{4l^5}\right)$ $\phi=\frac{-\bar{P}l^2}{12EI}\left(1-\frac{x^4}{l^4}\right)$ $M=\frac{\bar{P}x^3}{3l^2}$ $F=\frac{\bar{P}x^2}{l^2}$	$0\sim l/2$: $\delta=\frac{Pl^3}{48EI}\left(\frac{3x}{l}-\frac{4x^3}{l^3}\right)$ $\phi=\frac{Pl^2}{16EI}\left(1-\frac{4x^2}{l^2}\right)$ $M=-Px/2$ $F=-P/2$	$0\sim a$: $\delta=\frac{Pbx}{6EIl}\left[2l(l-x)-b^2-(l-x)^2\right]$ $M=-Pbx/l$ $F=-Pb/l$ $a\sim l$: $\delta=\frac{Pa(l-x)}{6EIl}\left[2lb-b^2-(l-x)^2\right]$ $M=-Pa(l-x)/l$ $F=Pa/l$

(6) Welding strength

 $S=\frac{P}{hl}$	 $S=\frac{P}{(h_1+h_2)l}$	 $S=\frac{0.707P}{hl}$	 $S=\frac{0.707P}{hl}$
 $S=\frac{6M}{lh^2}$	 $S=\frac{3TM}{lh(3T^2-6Th+4h^2)}$	 The stress of A and B is equal $S=\frac{1.414P}{(h_1+h_2)l}$	 $A: S=\frac{1.414P}{(h_1+h_2)l}$ $B: S=\frac{1.414Ph_2}{h_3l(h_1+h_2)}$
 $S=\frac{P}{hl}$	 $S=\frac{P}{(h_1+h_2)l}$	 $S=\frac{0.707P}{hl}$	 $S=\frac{1.414P}{h(l_1+l_2)}$ $l_1=\frac{1.414Pe_2}{Shb}$; $l_2=\frac{1.414Pe_1}{Shb}$
 $S=\frac{6M}{lh^2}$	 $S=\frac{3TM}{lh(3T^2-6Th+4h^2)}$	 $S=\frac{0.354P}{hl}$	 $S=\frac{0.707P}{hl}$
 $S=\frac{6P\cdot L}{lh^2}$ $S_s=\frac{P}{lh}$	 $S=\frac{3TLP}{lh(3T^2-6Th+4h^2)}$, $S_s=\frac{P}{2lh}$	 $S=\frac{1.414M}{hl(b+h)}$	 Average $S_s=\frac{0.707P}{hl}$ Max.$S=\frac{P}{hl(b+h)}\sqrt{2l^2+\frac{(b+h)^2}{2}}$
 $S=\frac{6M}{hl^2}$	 $S=\frac{3M}{hl^2}$	 $S=\frac{4.24M}{hl^2}$	 Average $S_s=\frac{0.707P}{hl}$ Max.$S=\frac{4.24PL}{hl^2}$
 $S=\frac{6PL}{hl^2}$ $S_s=\frac{P}{hl}$	 $S=\frac{3PL}{hl^2}$ $S_s=\frac{P}{2hl}$	 Fillet weld size (h) $S=\frac{5.66M}{hD^2\pi}$	 Fillet weld size (h) $S_s=\frac{2.83M_t}{hD^2\pi}$
 $S_s=\frac{M(3l+1.8h)}{h^2l^2}$	 $S_s=\frac{M}{2(T-h)(l-h)h}$	 Fillet weld size (h) $S_s=\frac{4.24M}{h\{b^2+3l(b+h)\}}$	 Fillet weld $S=\frac{1.414P}{2hl+h_1l_1}$ Butt weld $S=\frac{P}{2hl+h_1l_1}$

10-5 Formula of Electricity

Formula of Electricity-1

Relation between frequency and cycle	$f = \frac{1}{T}\ [Hz]$
Relation between instantaneous magnitude and effective value of electric current	$I = \sqrt{i^2\ Average}\ \ [A]$
Relation of effective value of sine wave current	$I = \frac{1}{\sqrt{2}}\ Im\ [A]$
Ohm's law	$I = \frac{E}{R}\ [A]$
Relation of magnitude between voltage and current of inductive circuit	$I = \frac{E}{\omega L} = \frac{E}{X_L}\ [A]$
Relation of magnitude between voltage and current of capacitance circuit	$I = \frac{E}{\frac{1}{\omega C}} = \frac{E}{X_C}\ [A]$
Impedance of LR straight circuit	$Z = \sqrt{R^2 + \omega^2 L^2}\ [\Omega]$
Impedance of RC straight circuit	$Z = \sqrt{R^2 + \frac{1}{\omega^2 C^2}}\ [\Omega]$
Composite reactance of LC straight circuit	$X = \omega L - \frac{1}{\omega C} = (X_L - X_C)\ \ [\Omega]$
Impedance of LRC straight circuit	$Z = \sqrt{R^2 + (\omega L - \frac{1}{\omega C})^2}\ \ [\Omega]$
Resonance frequency	$f_0 = \frac{1}{2\pi\sqrt{LC}}\ [Hz]$
Voltage expansion of series resonance	$\frac{E_L}{E} = \frac{\omega_0 L}{R} \qquad \frac{E_C}{E} = \frac{1}{\omega_0 CR}$
Voltage expansion of parallel resonance	$\frac{I_L}{I_0} = \frac{I_C}{I_0} = \frac{\omega L}{R} = \frac{1}{\omega CR}$
Inductive reactance expressed by symbolic method	$\dot{I} = \frac{\dot{E}}{j\omega l} = -j\frac{\dot{E}}{\omega L}\ [A]$
Capacitive reactance expressed by symbolic method	$\dot{I} = \frac{\dot{E}}{-j\frac{1}{\omega C}} = j\frac{\dot{E}}{\frac{1}{\omega C}}\ [A]$
LRC impedance expressed by symbolic method	$\dot{Z} = R + j(\omega L - \frac{1}{\omega C})\ [\Omega]$
Admittance	$\dot{Y} = \frac{1}{Z} = g + jb = (\frac{R}{R^2+X^2} - j\frac{X}{R^2+X^2})\ [\Omega]$
Resonance frequency in case coil with resistance	$f_0 = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}\ [Hz]$

Formula of Electricity-2

Parallel condition of impedance bridge	$\dot{Z}_1\dot{Z}_4 = \dot{Z}_2\dot{Z}_3$
Electricity of AC circuit	$P = EI\cos\phi \ [W]$
Power factor	$\cos\phi = \frac{P}{EI} = \frac{EI\cos\phi}{EI} = \frac{R}{Z}$
Relation of volt-ampere, effective power and reactive power	$EI = \sqrt{(EI\cos\phi)^2 + (EI\sin\phi)^2} \ [VA]$
Calculation of AC electric power by symbolic method	$\dot{E}\dot{I}' = (E_1 + jE_2)(I_1 - jI_2)$ $= (P_a + jP_r) \ [W, Var]$ $\dot{E}'\dot{I} = (E_1 - jE_2)(I_1 + jI_2)$ $= (P_a - jP_r) \ [W, Var]$
Balanced three phase AC voltage	$e_a = \sqrt{2}E\sin\omega t \ [V]$ $e_b = \sqrt{2}E\sin(\omega t - \frac{2\pi}{3}) \ [V]$ $e_c = \sqrt{2}E\sin(\omega t - \frac{4\pi}{3}) \ [V]$
Symbolic method expression of balanced three phase AC	$\dot{E}_a = E \ [V]$ $\dot{E}_b = E(-\frac{1}{2} - j\frac{\sqrt{3}}{2}) \ [V]$ $\dot{E}_c = E(-\frac{1}{2} + j\frac{\sqrt{3}}{2}) \ [V]$
Relation between phase voltage and line voltage of balanced three phrases Y- connection	$E_l = \sqrt{3}E_s \ [V]$
Relation between line circuit and phase current of balanced three Δ-connection	$I_l = \sqrt{3}I_s \ [A]$
Effective electric power of balanced three phase AC current	$P_a = \sqrt{3}E_lI_l\cos\phi = 3E_sI_s\cos\phi \ [W]$
Reactive electric power of balanced three phase AC current	$P_r = \sqrt{3}E_lI_l\sin\phi \ [Var]$
Apparent power of balanced three phase AC current	$VA = \sqrt{3}E_lI_l \ [VA]$

TORQUE SCREWDRIVER

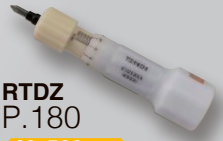
Click/Direct Reading type Torque Screwdriver

SERIES INDEX

Rotary Slip Adjustable

RTD
P.168
2~500 [cN·m]
Rotary Slip Adjustable Torque Screwdriver

AMRD / BMRD
P.172
0.3~30 [cN·m]
For small screws(M1-M2), rotary slip adjustable torque screwdriver.



RTDZ
P.180
60~500 [cN·m]
Insulated adjustable torque screwdriver

Preset

RNTD
P.176
5~500 [cN·m]
Rotary slip preset torque screwdriver

NTD
P.178
5~1000 [cN·m]
Click type preset torque screwdriver

RNTDZ
P.182
100~500 [cN·m]
Insulated preset torque screwdriver

Indicating

STC2-G
P.184
10~400 [cN·m]
Digital torque screwdriver with multiple data processing functions.

FTD-S / FTD
P.186·188
0.3~1600 [cN·m]
Dial indicating type torque screwdriver

MTD
P.190
0.1~10 [mN·m]
For small screws, dial indicating torque screwdriver

Pokayoke Marking

MNTD
P.196
40~500 [cN·m]
Preset marking torque screwdriver

Adjustable

LTD
P.170
2~2000 [cN·m]
Adjustable torque screwdriver

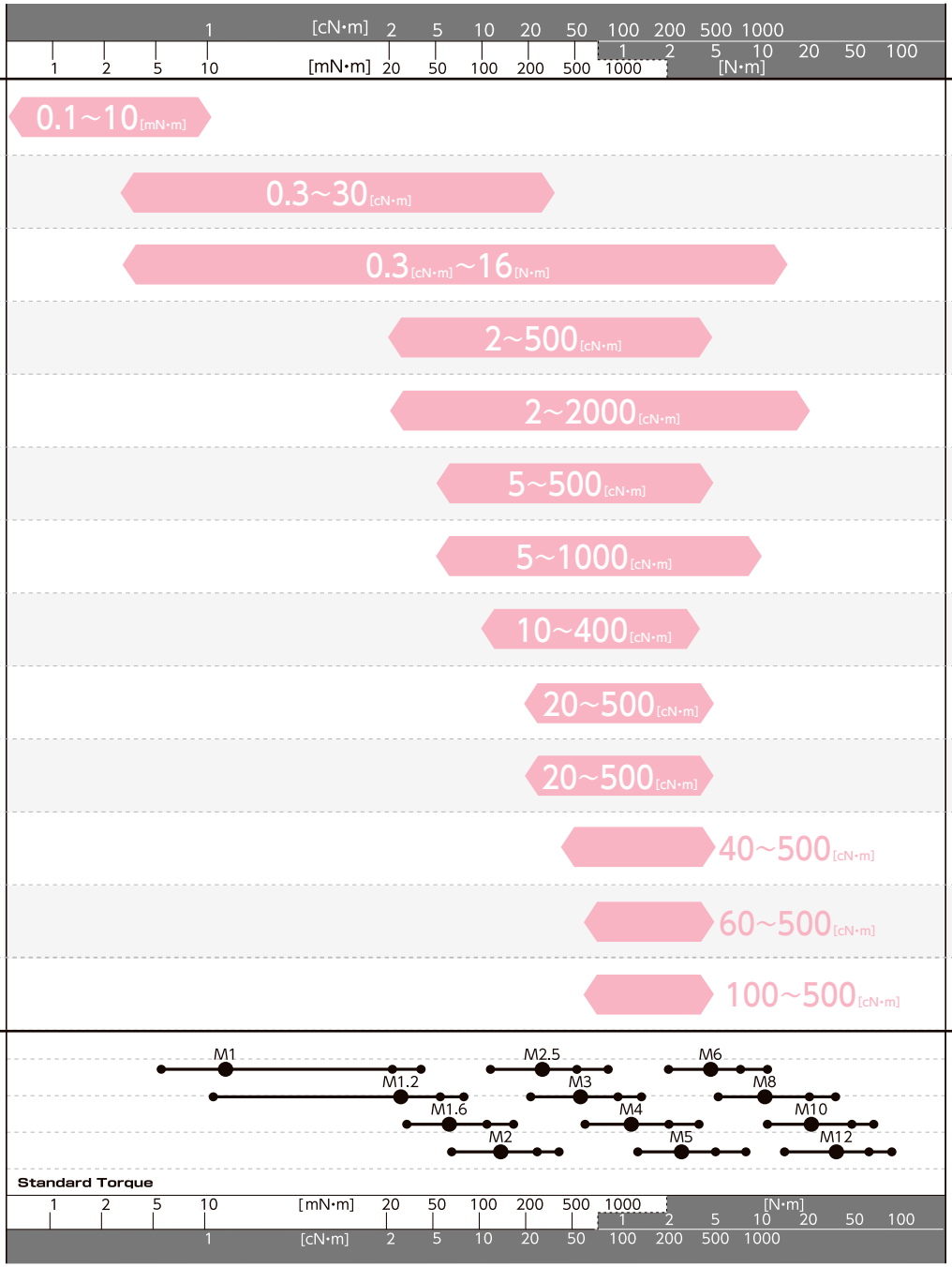
AMLD / BMLD
P.174
0.3~30 [cN·m]
For small screws(M1-M2), adjustable torque screwdriver

Pokayoke Rotary Slip

RTDLS / RNTDLS
P.192
20~500 [cN·m]
Error-proofing torque screwdriver with limited switch output

RTDFH / RNTDFH
P.194
20~500 [cN·m]
Wireless error-proofing torque screwdriver with limited switch output

TORQUE RANGE INDEX



MODEL・TYPE				PAGE
 **MTD**	Indicating	Dial Type		190
 **AMRD/BMRD**	Assembly	Rotary Slip / Adjustable	 **AMLD/BMLD** Assembly Adjustable	172・174
 **FTD-S/FTD**	Indicating	Dial Type		186・188
 **RTD**	Assembly	Rotary Slip / Adjustable		168
 **LTD**	Assembly	Adjustable		170
 **RNTD**	Assembly	Rotary Slip / Preset		176
 **NTD**	Assembly	Preset		178
 **STC2-G**	Indicating	Digital		184
 **RTDLS/RNTDLS**	Assembly	Rotary Slip		192
 **RTDFH/RNTDFH**	Assembly	Rotary Slip / Wireless		194
 **MNTD**	Click type	Preset		196
 **RTDZ**	Assembly	Rotary Slip / Adjustable		180
 **RNTDZ**	Assembly	Rotary Slip / Preset		182

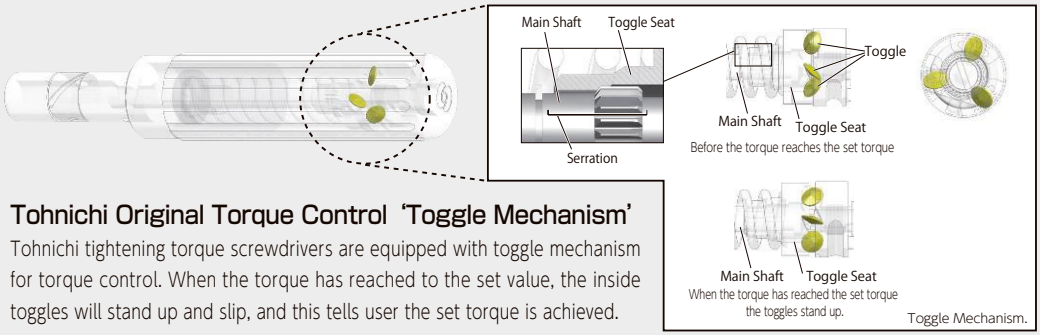
T = Standard Tightening Torque

Refer to page 38, "Relation between Screw and Torque" for more details.

Features of TOHNICHI Torque Driver

① High Accuracy

Exceeding the ISO6789 standard, digital type Torque screwdrivers STC2-G maintain the accuracy ±1% and Indicating Torque screwdrivers and Tightening torque screwdrivers hold ±3 % . (Refer to technical date P.104) Tightening torque screwdrivers such as RTD, LTD are equipped with our original torque control (toggle mechanism), which enhances high accuracy and high durability.



Tohnichi Original Torque Control 'Toggle Mechanism'

Tohnichi tightening torque screwdrivers are equipped with toggle mechanism for torque control. When the torque has reached to the set value, the inside toggles will stand up and slip, and this tells user the set torque is achieved.

② High Durability

Guaranteed accuracy and durability on 100,000 cycle operations at maximum torque set or one year from the first use. With proper maintenance, calibration, adjustment and parts replacement every 100,000 cycles, Tohnichi click type screwdrivers can be used 1,000,000 times

Durability test to ensure high durability

Tohnichi conducts durability testing when developing new products. Before manufacturing new products, we test durability as type certification test Also when mass production, we conduct sampling test regularly to maintain our high level of durability.

③ Easy maintenance

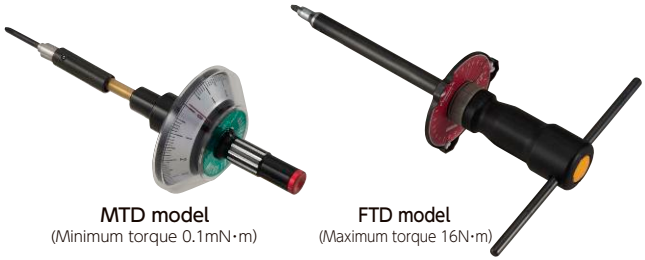
Tohnichi original 'toggle mechanism' enables gain-adjusting. Adjusting is possible without large scale disassembling such as replacing main spring of the screw driver, and that helps to cut the maintenance time and cost (refer to technical data P109-110).

④ 'Hexagonal locker' to prevent rolling

Tohnichi has changed the locker design from the old circled shape to the new hexagonal shape and this could prevent the torque screw driver from rolling and unexpected dropping. Lockers are the important parts that maintain alignment of readings. This re-designed hexagonal lockers prevent such accidents. Along with this development, locker can be easily repaired. (Refer to technical date P.120)

⑤A large collection of series and product line

From the smallest torque (0.1mN·m) to large torque(16N·m), Tohnichi torque screwdrivers have a wide range of products.



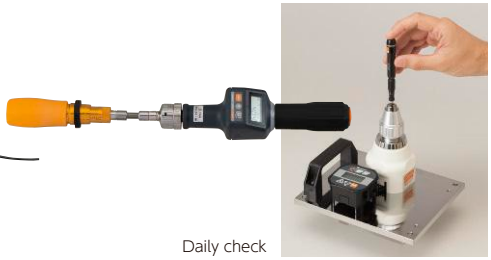
MTD model
(Minimum torque 0.1mN·m)

FTD model
(Maximum torque 16N·m)

⑥Calibration devices

TDT3-G series for calibration and LC3-G/ATGE-G/BTGE-G models for daily check.

Calibration

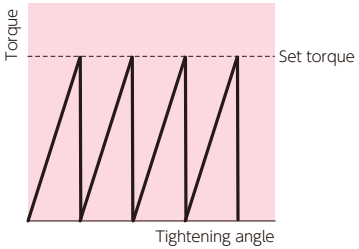


Daily check

Tohnichi 2 types of torque screwdrivers (for your ideal work)

— Signal type torque screw driver —

Rotary Slip model

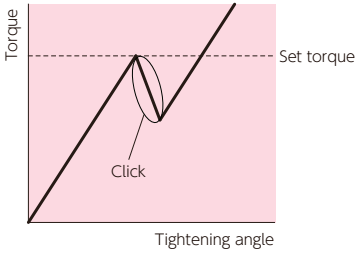


A clear 'Rotary-slip' shake signals tightening completion upon reaching the set torque. The shock repeats if tightening after reaching the set torque continues. Because users can tighten no further than the set torque, over-torque is completely prevented.

A sample product of rotary-slip type torque screwdrivers

RTD [P.168]

Click type (non-rotary slip)



A clear 'click' sound signals tightening completion upon reaching the set torque. Once recognizing the click sound, loosen and finish tightening to avoid over-torque. Compared with rotary slip type, click type screwdrivers are low impact; they are suitable for tightening precision devices.

A sample product of click type torque wrench

LTD [P.170]

RTD Rotary Slip Adjustable Torque Screwdriver

Torque screwdriver with over-torque prevention rotary-slip mechanism for various applications from mass production to maintenance work.

RTD120CN [L'=132mm]

Locker shape for rolling prevention

RTD60CN [L'=109mm]

RTD500CN with an auxiliary tightening tool(separately sold)

※Bit is optional

Application

- For various kinds of tightening operation from mass production to maintenance work.

Features

Features of torque screwdriver ▶P.166

- Rotary slip style.
- RTD is designed to ratchet freely after reaching the set torque to prevent over-torque.
- Toggle clutch torque detection mechanism is adopted to enhance durability.
- Easy torque adjustment with scale.
- All models include the locking mechanism which prevents changing of torque during use.
- Hexagonal locker prevents driver from rolling and locker can be replaced with new one.
- Counterclockwise tightening model available upon request.

Optional Accessories

·Interchangeable bit [p.502]

·Adjusting tool [p.490]

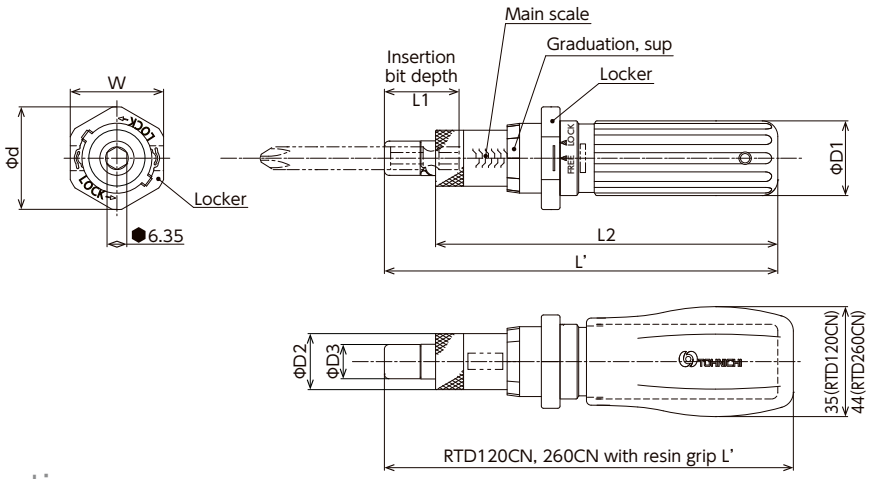
·Preset hook spanner [p.490]

·Auxiliary tool [p.490]

·Resin grip [p.490]

Dimensions

■ RTD



Specifications

Accuracy ± 3%

S.I. MODEL			RTD15CN	RTD30CN	RTD60CN	RTD120CN	RTD260CN	RTD500CN
TORQUE RANGE [cN•m]	MIN.~MAX.		2~15	4~30	10~60	20~120	60~260	100~500
	GRAD.		0.1	0.2	0.5	1	2	5
METRIC MODEL			1.5RTD	3RTD	6RTD	12RTD	26RTD	50RTD
TORQUE RANGE [kgf•cm]	MIN.~MAX		0.2~1.5	0.4~3	1~6	2~12	6~26	10~50
	GRAD.		0.01	0.02	0.05	0.1	0.2	0.5
AMERICAN MODEL			RTD20Z / RTD1.3I	RTD40Z / RTD2.6I	RTD80Z / RTD5I	RTD150Z / RTD10I	RTD22I	RTD40I
TORQUE RANGE [ozf•in/lbf•in]	MIN.~MAX		ozf•in 6~20 / lbf•in 0.2~1.3	ozf•in 15~40 / lbf•in 0.4~2.6	ozf•in 20~80 / lbf•in 1~5	ozf•in 30~150 / lbf•in 2~10	lbf•in 6~22	10~40
	GRAD.		ozf•in 0.2 / lbf•in 0.01	ozf•in 0.5 / lbf•in 0.02	ozf•in 1 / lbf•in 0.05	ozf•in 2 / lbf•in 0.1	lbf•in 0.2	0.5
APPLICABLE SCREW	SMALL SCREW		(M1.8)	M2 (M2.2)	M2.5,M3	(M3.5)	M4 (M4.5)	M5,M6
	TAPPING SCREW		(M1.4) M1.6	(M1.8) M2	(M2.2) M2.5	M3 (M3.5)	M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	101		109	132	149	155
	GRIP	D1	16		19.5	24	30.5	33
	BODY	D2	10.7		14.8	18	23	26
		D3	11					
		L1	18		24			
		L2	76.5~84.3		81.1~90.1	105~115	113.8~123.8	129~141
	LOCKER	d	23.5		29	33	41	45
		W	21.5		26.5	30	37.5	41
WEIGHT [kg]			0.05		0.08	0.16	0.27	0.32

Note Auxiliary tightening tool for RTD500CN is available (separately sold).
Standard Accessories 1. Resin grip (for RTD120CN and RTD260CN only).
2. Preset hook spanner (for RTD260CN and RTD500CN only).

Alternative model
LTD ····· p.170
AMRD/BMRD ····· p.172
AMLD/BMLD ····· p.174
RNTD ····· p.176
NTD ····· p.178

Tester/Checker
TDT3-G ····· p.402

How to use
How to set torque
····· p.198

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] RTD120CN
Note
• Standard bit on the market can be used.
• Counterclockwise tightening model available upon request.

LTD Adjustable Torque Screwdriver

Standard torque screwdriver for tightening small fasteners.

LTD120CN [L'=132mm]

Locker shape for rolling prevention (LTD15CN~LTD500CN)

LTD60CN [L'=109mm]

LTD2000CN2 with an auxiliary tightening tool (separately sold)

※Bit is optional

Application

- For various kinds of small fastener tightening from mass production to maintenance work.

Features

Features of torque screwdriver ▶P.166

- LTD is non rotary type. See RTD version for rotary slip feature which prevents over-torque.
- Toggle clutch torque detection mechanism is adopted to enhance durability.
- Upon reaching the set torque, it clicks to signal tightening is complete.
- Easy torque adjustment with scale.
- Models LTD15CN ~LTD500CN include a locking mechanism which prevents changing of torque during use.
- Hexagonal locker prevents driver from rolling and locker can be replaced with new one.
- Counterclockwise tightening model and Limit-switch version are available upon request.

Optional Accessories

·Interchangeable bit [p.502]

·Adjusting tool [p.490]

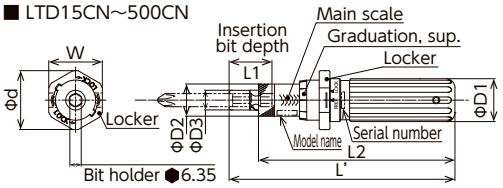
·Preset hook spanner [p.490]

·Auxiliary Tool [p.490]

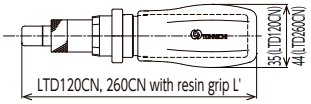
·Resin grip [p.490]

Dimensions

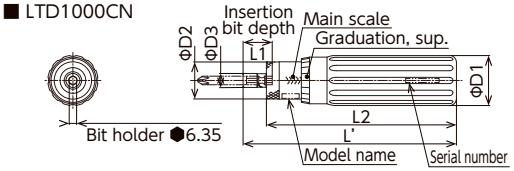
■ LTD15CN~500CN



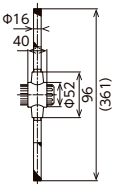
■ LTD120CN, 260CN with resin grip



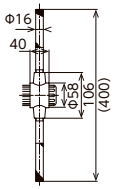
■ LTD1000CN



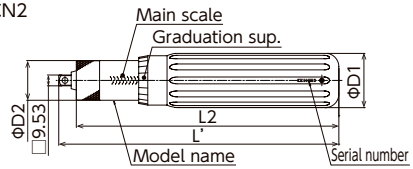
■ LTD1000CN with an auxiliary tightening tool.



■ LTD2000CN2 with an auxiliary tightening tool.



■ LTD2000CN2



Specifications

Accuracy ± 3%

S.I. MODEL		LTD15CN	LTD30CN	LTD60CN	LTD120CN	LTD260CN	LTD500CN	LTD1000CN	LTD2000CN2
TORQUE RANGE [cN·m]	MIN.~MAX.	2~15	4~30	10~60	20~120	60~260	100~500	200~1000	400~2000
	GRAD.	0.1	0.2	0.5	1	2	5		
METRIC MODEL		1.5LTD	3LTD	6LTD	12LTD	26LTD	50LTD	100LTD	LTD200M2
TORQUE RANGE [kgf·cm]	MIN.~MAX.	0.2~1.5	0.4~3	1~6	2~12	6~26	10~50	20~100	40~200
	GRAD.	0.01	0.02	0.05	0.1	0.2	0.5		

AMERICAN MODEL		LTD20Z	LTD1.3I	LTD40Z	LTD2.6I	LTD80Z	LTD5I	LTD150Z	LTD10I	LTD22I	LTD40I	LTD90I	LTD180I2
TORQUE RANGE [ozf·in/lbf·in]	MIN.~MAX.	ozf·in 6~20	lbf·in 0.2~1.3	ozf·in 15~40	lbf·in 0.4~2.6	ozf·in 20~80	lbf·in 1~5	ozf·in 30~150	lbf·in 2~10	lbf·in 6~22	10~40	20~90	40~180
	GRAD.	ozf·in 0.2	lbf·in 0.01	ozf·in 0.5	lbf·in 0.02	ozf·in 1	lbf·in 0.05	ozf·in 2	lbf·in 0.1	lbf·in 0.2	0.5		
APPLICABLE SCREW	SMALL SCREW	(M1.8)		M2 (M2.2)		M2.5, M3		(M3.5)		M4 (M4.5)	M5, M6	(M7)	M8
	TAPPING SCREW	(M1.4) M1.6		(M1.8) M2		(M2.2) M2.5		M3 (M3.5)		M4	(M4.5)	M6	(M7)

DIMENSION [mm]			LTD15CN	LTD30CN	LTD60CN	LTD120CN	LTD260CN	LTD500CN	LTD1000CN	LTD2000CN2
	OVERALL LENGTH	L'	101		109	132	149	155	183	247
	GRIP	D1	16		19.5	24	30.5	33	43	48
	BODY	D2	10.7		14.8	18	23	26	32	35
		D3	11						12	–
		L1	18		24				25	–
		L2	76.5~84.3		81.1~90.1	105~115	122.8~132.8	129~141	151~163	209.5~236
	LOCKER	d	23.5		29	33	41	45		
		W	21.5		26.5	30	37.5	41		
WEIGHT [kg]			0.05		0.08	0.13	0.22	0.33	0.58	1.15

Note 1. Auxiliary tightening tool for LTD500CN, 1000CN is available (separately sold).
2. LTD2000CN2 has 9.53mm square drive.

Standard Accessories 1. Resin grip (for LTD120CN and LTD260CN only).
2. Preset hook spanner (for LTD260 ~ LTD2000CN2 only).
3. LTD2000CN2 comes with a tightening tool.

Alternative model

RTD ····· p.168
AMRD/BMRD ····· p.172
AMLD/BMLD ····· p.174
RNTD ····· p.176
NTD ····· p.178

Tester/Checker

TDT3-G ····· p.402

How to use

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Technical data

Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ···p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.] LTD120CN

Note

- Standard bit on the market can be used.
- Counterclockwise tightening model available upon request.

Loading Direction | Adjustable | Rotary Slip | Graduation | 6.35 | φ2 | RoHS

AMRD/BMRD Rotary Slip Adjustable Torque Screwdriver for Small Screws

Rotary slip style torque screwdriver for tightening small screws (M1 – M2).

AMRD4CN [L'=93mm]
※AMRD bits are included as standard accessory.

BMRD30CN2 [L'=116mm]
※BMRD bits are sold separately.

Application

- For watches, precision electronic equipment, computer, etc.

Features

Features of torque screwdriver ▶P.166

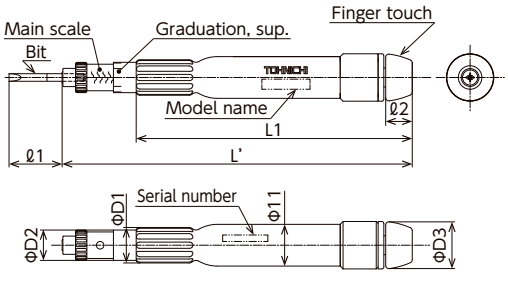
- Same features with RTD except designed for tightening small screws.
- Enhanced reliability and durability by adopting toggle clutch torque mechanism.
- AMRD / BMRD is designed to ratchet freely upon reaching the set torque to prevent over-torque.
- Upon reaching the set torque, it clicks to signal tightening is complete.
- Easy torque adjustment with scale.
- Index finger holding feature allows the operator to tighten with precise movements.
- Counterclockwise tightening model available upon request.

Optional Accessories

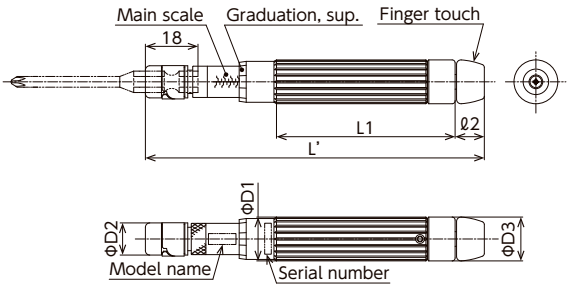
·Interchangeable bit
[p.502]

Dimensions

■ AMRD1CN~8CN



■ BMRD15CN2,30CN2



Specifications

Accuracy ± 3%

S.I. MODEL			AMRD1CN	AMRD2CN	AMRD4CN	AMRD8CN	BMRD15CN2	BMRD30CN2
TORQUE RANGE [cN·m]	MIN.~MAX.		0.3~1	0.5~2	1~4	2~8	2~15	4~30
	GRAD.		0.01	0.025	0.05	0.1		0.2
METRIC MODEL			100AMRD	200AMRD	400AMRD	800AMRD	1.5BMRD2	3BMRD2
TORQUE RANGE [gf·cm/kgf·cm]	MIN.~MAX.		gf·cm 30~100	50~200	100~400	200~800	kgf·cm 0.2~1.5	0.4~3
	GRAD.		gf·cm 1	2.5	5	10	kgf·cm 0.01	0.02
AMERICAN MODEL			—	AMRD3Z	AMRD6Z	AMRD12Z	1.5BMRD2-A	3BMRD2-A
TORQUE RANGE [ozf·in/lbf·in]	MIN.~MAX.		—	ozf·in 1~3	2~6	3~12	lbf·in 0.2~1.5	0.4~3
	GRAD.		—	ozf·in 0.05	0.1	0.2	lbf·in 0.005	0.01
APPLICABLE SCREW	SMALL SCREW		—	M1	(M1.1) M1.2	(M1.4) M1.6	(M1.8)	M2 (M2.2)
	TAPPING SCREW		—	—	M1	(M1.1) M1.2	(M1.4) M1.6	(M1.8) M2
DIMENSION [mm]	OVERALL LENGTH	L'	93				116	
	GRIP	D1	10				15	
	BODY	D2	8				11	
		D3	13				15	
		L1	72				62	
		ℓ1	14					
		ℓ2	8				10	
WEIGHT [kg]			0.03				0.05	
ACCESSORY BIT	+		#0					
	-thickness X width		0.15×1, 0.2×1.5, 0.3×2					

Note 1. AMRD bits are included as standard accessory.
2. Bits for BMRD are sold separately. Refer to P.502

Alternative model
RTD ····· p.168
LTD ····· p.170
RNTD ····· p.176
NTD ····· p.178
AMLD/BMLD ····· p.174

Tester/Checker
ATGE-G ····· p.426
BTGE-G ····· p.428

How to use
How to set torque ····· p.198

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ···p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.1] AMRD1CN
[EX.2] BMRD15CN2

Note
・Bits for AMRD are TOHNICHI original bits.
・Standard bit on the market can be used for BMRD(6.35 HEX).

Loading Direction | Adjustable | Graduation | 6.35 | φ2 | RoHS

AMLD/BMLD Adjustable Torque Screwdriver for Small Screws

Torque screwdriver for tightening small screws (M1 – M2).

AMLD4CN [L'=83mm]
※AMLD bits are included as standard accessory.

BMLD30CN2 [L'=116mm]
※BMLD bits are sold separately.

Application

- For watches, precision electronic equipment, computer, etc.

Features

Features of torque screwdriver ▶P.166

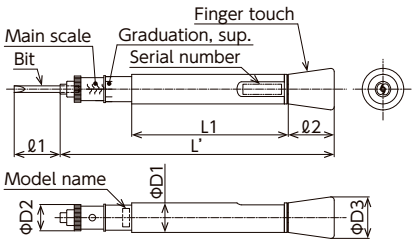
- Same features as LTD except designed for tightening small screws.
- Enhanced reliability and durability by adopting toggle clutch torque mechanism.
- Non-rotary adjustable (click) style.
- Easy torque adjustment with scale.
- Index finger holding feature allows the operator to tighten with precise movements.
- Counterclockwise tightening model available upon request.

Optional Accessories

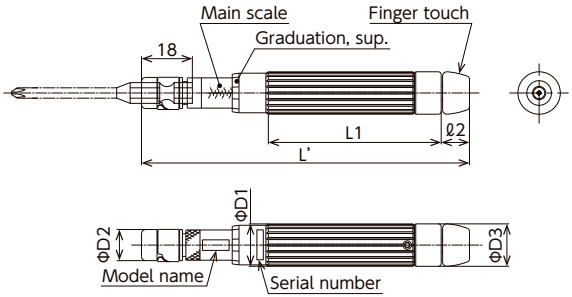
·Interchangeable bit
[p.502]

Dimensions

■ AMLD1CN~8CN



■ BMLD15CN2,30CN2



Specifications

Accuracy ± 3%

S.I. MODEL			AMLD1CN	AMLD2CN	AMLD4CN	AMLD8CN	BMLD15CN2	BMLD30CN2
TORQUE RANGE [cN·m]	MIN.~MAX.		0.3~1	0.5~2	1~4	2~8	2~15	4~30
	GRAD.		0.01	0.025	0.05	0.1		0.2
METRIC MODEL			100AMLD	200AMLD	400AMLD	800AMLD	1.5BMLD2	3BMLD2
TORQUE RANGE [gf·cm/kgf·cm]	MIN.~MAX.		gf·cm 30~100	50~200	100~400	200~800	kgf·cm 0.2~1.5	0.4~3
	GRAD.		gf·cm 1	2.5	5	10	kgf·cm 0.01	0.02
AMERICAN MODEL			—	AMLD3Z	AMLD6Z	AMLD12Z	1.5BMLD2-A	3BMLD2-A
TORQUE RANGE [ozf·in/lbf·in]	MIN.~MAX.		—	ozf·in 1~3	2~6	3~12	lbf·in 0.2~1.5	0.4~3
	GRAD.		—	ozf·in 0.05	0.1	0.2	lbf·in 0.005	0.01
APPLICABLE SCREW	SMALL SCREW		—	M1	(M1.1) M1.2	(M1.4) M1.6	(M1.8)	M2 (M2.2)
	TAPPING SCREW		—	—	M1	(M1.1) M1.2	(M1.4) M1.6	(M1.8) M2
DIMENSION [mm]	OVERALL LENGTH	L'	83				116	
	GRIP	D1	9				15	
	BODY	D2	8				11	
		D3	13				15	
		L1	48				62	
		ø1	14					
		ø2	14				10	
WEIGHT [kg]			0.026				0.05	
ACCESSORY	+		#0					
BIT	-thickness X width		0.15×1, 0.2×1.5, 0.3×2					

Note 1. AMLD bits are included as standard accessory.
2. Bits for BMLD are sold separately. Refer to P.502

Alternative model
RTD ····· p.168
LTD ····· p.170
RNTD ····· p.176
NTD ····· p.178
AMRD/BMRD ····· p.172

Tester/Checker
ATGE-G ····· p.426
BTGE-G ····· p.428

How to use
How to set torque ····· p.198

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.1] AMLD1CN

[EX.2] BMLD15CN2

Note

- Bits for AMLD are TOHNICHI original bits.
- Standard bit on the market can be used for BMLD(6.35 HEX).

Loading Direction Preset Rotary Slip 6.35 RoHS

RNTD Rotary Slip Preset Torque Screwdriver

Preset style over torque prevention rotary slip torque screwdriver.

RNTD120CN [L'=109mm]

RNTD60CN [L'=94mm]

RNTD500CN
with an auxiliary tightening tool

※The bit on the picture is optional.

Application

- Used for mass production and maintenance services.

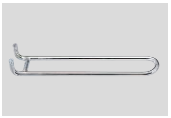
Features

Features of torque screwdriver ▶P.166

- Rotary slip style.
- Preset version of RTD model.
- Toggle clutch torque detection mechanism for enhanced reliability and durability.
- RNTD is designed to ratchet freely after reaching the set torque to prevent over-torque.
- Preset style is ideal for applications which requires the same torque value on the line.
- RNTD500CN comes with an auxiliary tightening tool.
- Counterclockwise tightening model available upon request.

Optional Accessories

·Interchangeable bit [p.502]



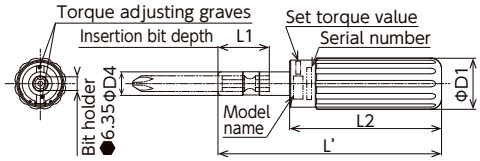
·Torque adjusting bar [p.490]

·Auxiliary Tool [p.490]

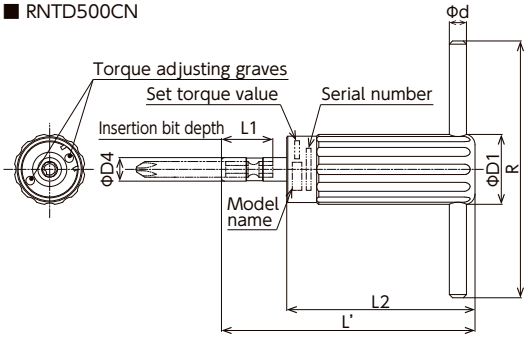
·Resin grip [p.490]

Dimensions

■ RNTD15CN～260CN



■ RNTD500CN



■ RNTD120CN, 260CN with a resin grip

Specifications

Accuracy ± 3%

MODEL			RNTD15CN	RNTD30CN	RNTD60CN	RNTD120CN	RNTD260CN	RNTD500CN
TORQUE RANGE [cN·m]	MIN.～MAX.		5～15	10～30	20～60	40～120	100～260	200～500
TORQUERANGE [kgf·cm]	MIN.～MAX.		0.5～1.5	1～3	2～6	4～12	10～26	20～50
TORQUE RANGE [lbf·in]	MIN.～MAX.		0.5～1.3	1～2.5	2～5	4～10	10～22	20～40
APPLICABLE SCREW	SMALL SCREW		(M1.8)	M2 (M2.2)	M2.5, M3	(M3.5)	M4 (M4.5)	M5, M6
	TAPPING SCREW		(M1.4) M1.6	(M1.8) M2	(M2.2) M2.5	M3 (M3.5)	M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	94			109	110	119
	GRIP	D1	19.5			24	30.5	33
	BODY COLOR		Black					
	BODY	D4	11					
		L1	24					
		L2	59			76	79	88
	HANDLE	d						8
		R						120
WEIGHT [kg]			0.07			0.11	0.18	0.27

Note 1. Resin grip (for RNTD120CN and RNTD260CN only).
2. RNTD500CN comes with an auxiliary tightening tool.

Alternative model
RTD ····· p.168
LTD ····· p.170
AMRD/BMRD ····· p.172
AMLD/BMLD ····· p.174
NTD ····· p.178

Tester/Checker
TDT3-G ····· p.402

How to use
How to set torque
····· p.198

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify Model name **X** Torque value
[EX.1] RNTD120CN X Torque Free
[EX.2] RNTD120CNX90cN·m

Note
- RNTD is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order. Torque setting before delivery is free of charge.
- Standard bit on the market can be used.

NTD Preset Torque Screwdriver

Preset torque screwdriver (Non-rotary slip)

NTD120CN [L'=109mm]

NTD60CN [L'=94mm]

NTD500CN with an auxiliary tightening tool

※ The bit on the picture is optional.

Application

- Used for mass production and maintenance services.

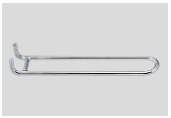
Features

Features of torque screwdriver ▶P.166

- Preset type has no external scale; requires adjusting key and torque tester to set torque.
- Toggle clutch torque detection mechanism for enhanced reliability and durability.
- Upon reaching the set torque, it clicks to signal tightening is complete.
- Preset style is ideal for applications which requires the same torque value on the line.
- NNTD500CN and 1000CN comes with an auxiliary tightening tool.
- Counterclockwise tightening model available upon request.
- LS (Limit Switch)-version driver (available upon request), can be used to make error-proofing (Pokayoke) system.

Optional Accessories

·Interchangeable bit [p.502]



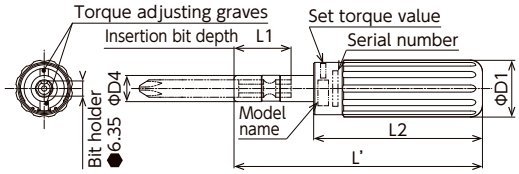
·Torque adjusting bar [p.490]

·Auxiliary Tool [p.490]

·Resin grip [p.490]

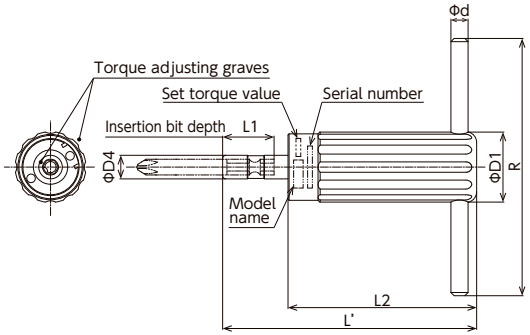
Dimensions

■ NTD15CN~NTD260CN



■ NTD120CN, NTD260CN with a resin grip

■ NTD500CN, NTD1000CN



Specifications

Accuracy ± 3%

MODEL			NTD15CN	NTD30CN	NTD60CN	NTD120CN	NTD260CN	NTD500CN	NTD1000CN
TORQUE RANGE [cN·m]	MIN.~MAX.		5~15	10~30	20~60	40~120	100~260	200~500	400~1000
TORQUE RANGE [kgf·cm]	MIN.~MAX.		0.5~1.5	1~3	2~6	4~12	10~26	20~50	40~100
TORQUE RANGE [lbf·in]	MIN.~MAX.		0.5~1.3	1~2.5	2~5	4~10	10~22	20~40	40~90
APPLICABLE SCREW	SMALL SCREW		(M1.8)	M2 (M2.2)	M2.5,M3	(M3.5)	M4 (M4.5)	M5, M6	(M7)
	TAPPING SCREW		(M1.4) M1.6	(M1.8) M2	(M2.2) M2.5	M3 (M3.5)	M4	(M4.5)	M6
DIMENSION [mm]	OVERALL LENGTH	L'	94			109	110	119	155
	GRIP	D1	19.5			24	30.5	33	43
	BODY COLOR		Green						
	BODY	D4	11						12
		L1	24						25
		L2	59			76	79	88	113
	HANDLE	d						8	10
		R						120	160
WEIGHT [kg]			0.07			0.11	0.18	0.27	0.55

Note 1. Resin grip (for NTD120CN and NTD260CN only).
2. NTD500CN and NTD1000CN comes with an auxiliary tightening tool.

Alternative model
RTD ····· p.168
LTD ····· p.170
AMRD/BMRD ····· p.172
AMLD/BMLD ····· p.174
RNTD ····· p.176

Tester/Checker
TDT3-G ····· p.402

How to use
How to set torque
····· p.198

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.
Specify Model name **X** Torque value
[EX.1] NTD120CN X Torque free
[EX.2] NTD120CNX90cN·m

Note
·NTD is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order.
·Standard bit on the market can be used.

Loading Direction | Adjustable | Rotary Slip | Graduation | Resin Body | 6.35 | RoHS

RTDZ Rotary Slip Adjustable Insulated Torque Screwdriver

Insulated design suited for use in electric shock hazard conditions.

RTDZ260CN [L'=150mm]

RTDZ500CN [L'=183mm]

Body shape for rolling prevention

※The bit on the picture is optional

Application

- Electric car assembly, batteries, etc.

Features

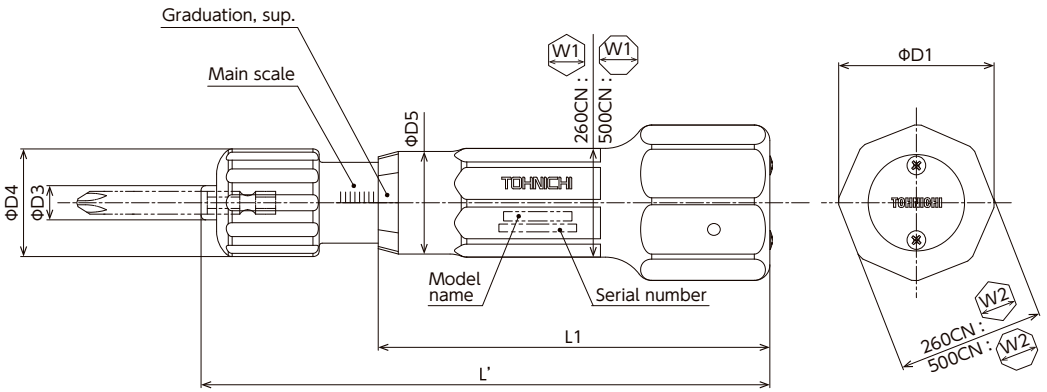
Features of torque screwdriver ▶P.166

- Withstands voltage: Max AC1000V.
- Prevents electric shock accidents.
- Rotary slip style.
- Ideal for electric car assembly, connection of battery terminal, and wiring work.
- Easy torque adjustment with scale.
- Counterclockwise tightening model available upon request.

Optional Accessories

·Interchangeable bit [p.502]

Dimensions



Specifications

Accuracy ± 3%

S.I. MODEL			RTDZ260CN	RTDZ500CN
TORQUE RANGE [cN•m]	MIN.~MAX.		60~260	100~500
	GRAD.		2	5
METRIC MODEL			26RTDZ	50RTDZ
TORQUE RANGE [kgf•cm]	MIN.~MAX.		6~26	10~50
	GRAD.		0.2	0.5
APPLICABLE SCREW	SMALL SCREW		M4 (M4.5)	M5,M6
	TAPPING SCREW		M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	150	183
	GRIP	L1	110	126
		W1	32	33.2
		W2	39	47
		SHAPE	HEXAGON	OCTAGON
		D1	42	50
		D3	12	
		D4	30	35
		D5	30.5	33
WEIGHT [kg]			0.22	0.38

Optional equipment
RNTDZ ····· p.182
PQLZ ····· p.248
QSPZ ····· p.262

Tester/Checker
TDT3-G ····· p.402

How to use
How to set torque ····· p.198

Technical data
Torque unit ····· p.29
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] RTDZ500CN

Note
- Other insulated torque drivers are supplied upon request.
- Bits are not insulated.

RNTDZ Rotary Slip Preset Insulated Torque Screwdriver

Insulated design suited for use in electric shock hazard conditions.

RNTDZ260CN [L'=126mm]

RNTDZ500CN [L'=140mm]

Body shape for rolling prevention

※The bit on the picture is optional

Application

- Electric car assembly, batteries, etc.

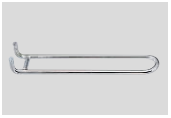
Features

Features of torque screwdriver ▶P.166

- Withstands voltage: Max AC1000V.
- Prevents electric shock accidents.
- Ideal for electric car assembly, connection of battery terminal, and wiring work.
- Preset version of RTDZ and ideal for single purpose tightening application.
- Rotary slip style.
- Octagon-shaped body prevents driver from rolling.

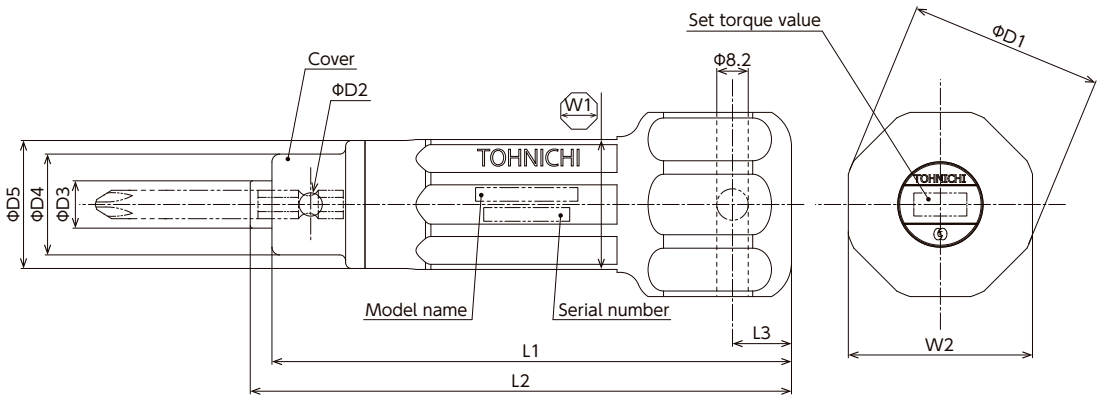
Optional Accessories

·Interchangeable bit [p.502]



·Torque adjusting bar [p.490]

Dimensions



Specifications

Accuracy ± 3%

MODEL			RNTDZ260CN	RNTDZ500CN
RANGE [cN·m]	MIN.~MAX.		100~260	200~500
RANGE [kgf·cm]	MIN.~MAX.		10~26	20~50
RANGE [lbf·in]	MIN.~MAX.		10~22	20~40
APPLICABLE SCREW	SMALL SCREW		M4 (M4.5)	M4
	TAPPING SCREW		M5,M6	(M4.5)
Dimension [mm]	OVERALL LENGTH	L2	126	140
	BODY	L1	120	134
	BODY	L3	10	15
	GRIP	W1	32	33.5
		W2	40	47.5
	BODY	D1	42	50
		D2	5	6
		D3	12	
		D4	23	26
		D5	30.5	33
WEIGHT [Kg]			0.24	0.34

Alternative model

RTDZ ····· p.180
PQLZ ····· p.248
QSPZ ····· p.262

Tester/Checker

TDT3-G ····· p.402

Technical data

Torque unit ····· p.29
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify Model name **X** Torque value

[EX.1] RNTDZ260CN X Torque free

[EX.2] RNTDZ260CN X 200cN·m

Note

- Other insulated torque drivers are supplied upon request.
- Bits are not insulated.
- RNTDZ is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order. Torque setting before delivery is free of charge.
- Standard bit on the market can be used.

TUD TOHNICHI UNIFIED DESIGN

IEC 61340-5-1:2007

Loading Direction

Digital | Ratchet Head | Battery | Direct Reading | Light indicator/buzzer | 36 Gear | 6.35 | RoHS

STC2-G (-BT) Digital Torque Screwdriver

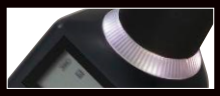
Operator can visibly and audibly check the torque status and judgment.

STC2-G

STC2-G-BT:

STC200CN2-G [L'=230mm]

Check torque drivers to confirm torque setting



White LED light
Approaching 80% of target torque

Blue LED light
Achieved target torque

Yellow & Red flashing LED light
Over torque warning

※The bit on the picture is optional.

Application

- For precise tightening and inspection.
- For research and development electronic device.
- For daily check of torque screw drivers.
- The STC2-G-BT is ideal for cell production and the assembly of small lot orders.

Features

- Multifunctional LED loading. Operator can visibly and audibly check the torque status and judgment.
- Display can be turned upside down with keypad operation.
- The date management is available in the PC via USB connection.
- 1000 date memory storage, accuracy ±1%.
- Bi-directional ratcheting mechanism.
- Saved tightening data in STC2-G can be output into a Excel receiver which is free to download from Tohnichi website.
- Using the "TDMS / TDMSHT" (P.468), the STC2-G-BT with Bluetooth® can build a system for managing tightening data.

Optional Accessories

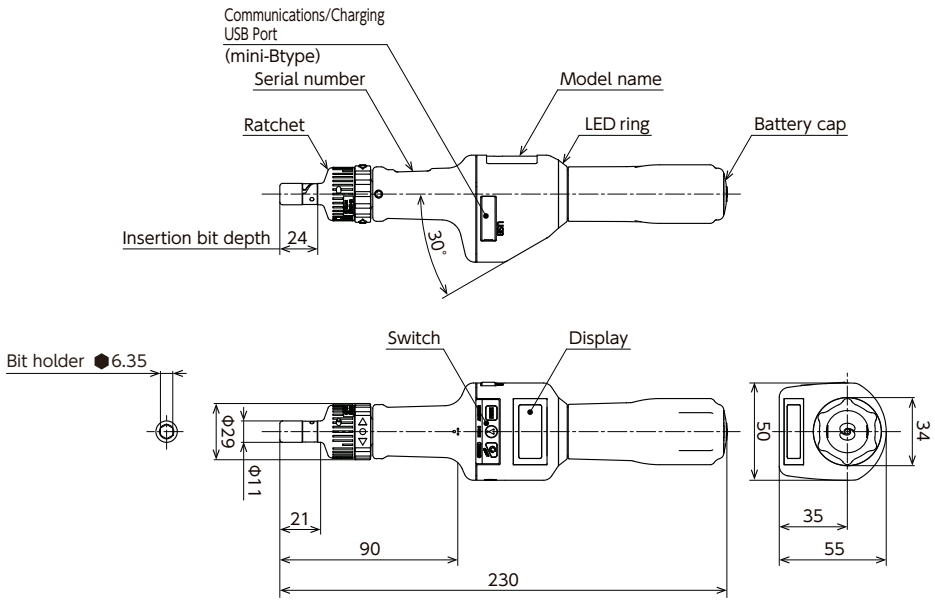
·Interchangeable bit [p.502]

·AC adapter [p.507]

·Battery pack [p.507]

※Bluetooth® is registered trademark of Bluetooth SIG, Inc.
※Excel® is a registered trademark of the Microsoft Corporation.

Dimensions



Specifications

Accuracy ±1%

MODEL		STC50CN2-G	STC200CN2-G	STC400CN2-G
	with Bluetooth®	STC50CN2-G-BT	STC200CN2-G-BT	STC400CN2-G-BT
TORQUE RANGE [cN•m]	MIN.~MAX.	10～50	40～200	80～400
	1 DIGIT	0.05	0.2	0.5
TORQUE RANGE [kgf•cm]	MIN.~MAX.	1～5	4～20	8～40
	1 DIGIT	0.005	0.02	0.05
TORQUE RANGE [lbf•in]	MIN.~MAX.	1～4.4	4～17	8～35
	1 DIGIT	0.005	0.02	0.05
OVERALL LENGTH [mm]		230		
WEIGHT [g]		325		

Standard Accessories 1.AC adapter 2.USB cable 3.Battery pack

Bluetooth® Specifications

Bluetooth® VERSION	V3.0
COMMUNICATION METHOD	AFH
MODULATION METHOD	GFSK
RADIO OUTPUT	4dBm
TRANSMISSION POWER CLASS	Class2
PROFILE	SPP
COMMUNICATION DISTANCE	Approx 10m
COONTINUOUS USE	Approx. 15hrs

Common Specifications

MEASUREMENT MODE	Tightening mode/Inspection mode
DATA MEMORY	1000
REMAINING BATTERY	4 steps
OK/NG JUDGMENT	Buzzer and LED when the upper and lower limits have been set
OTHER FUNCTIONS	Auto power off, Auto memory/reset, Auto zero

POWER SOURCE	Lithium ion battery
DATA OUTPUT	USB
CONTINUOUS USE	Approx. 30 hours
BATTERY CHARGE	AC adapter: Approx. 5 hours, PC(via USB): Approx. 10hours
OPERATING TEMPERATURE RANGE	0～40℃ below 85%RH (no condensation)

Alternative model

FTD-S ····· p.186
FTD ····· p.188

Optional equipment

TDMS/TDMSHT ····· p.468

Tester/Checker

TDT3-G ····· p.402

Technical data

Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Overseas Wireless Standards ··· p.143

How to order.

Specify Model name

[EX.]STC50CN2-G

Note

・Standard bit on the market can be used.

FTD-S Dial Indicating Torque Screwdriver with Memory Pointer

Direct-reading style torque screwdriver for inspection with memory pointer.

FTD200CN2-S
[L'=272mm]

FTD8N2-S
[L'=338mm]
with an auxiliary tightening tool

Scale part

※The bit on the picture is optional.

Application

- For inspection and tightening.

Features

- Basic model direct-reading style torque driver.
- Suitable for inspecting tightened screws.
- With bi-directional scale plate, it can be used for both retightening and loosening torque testing methods.
- Memory pointer captures peak torque (refer to the attached picture).
- FTD8N2-S and FTD16N2-S comes with Auxiliary tightening tool as standard accessory.

Optional Accessories

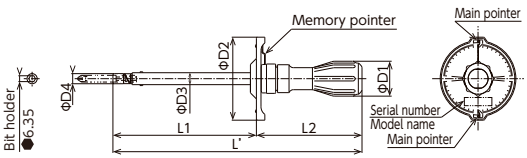
·Interchangeable bit [p.502]

·Auxiliary tool [p.490]

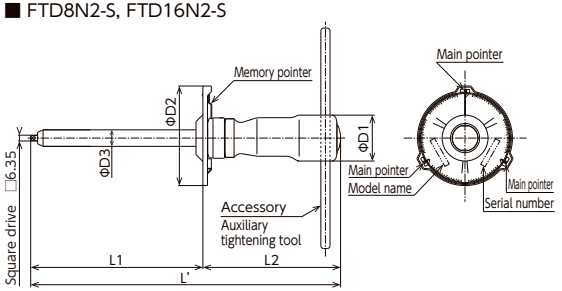
·Interchangeable socket [p.504]

Dimensions

■ FTD2CN-S～400CN2-S



■ FTD8N2-S, FTD16N2-S



Specifications

Accuracy ±3%

S.I. MODEL			FTD2CN-S	FTD5CN-S	FTD10CN-S	FTD20CN-S	FTD50CN2-S	—	FTD100CN2-S	FTD200CN2-S	FTD400CN2-S	FTD8N2-S	FTD16N2-S
TORQUE RANGE [cN·m]	MIN.～MAX.		cN·m 0.3～2	0.5～5	1～10	3～20	5～50	—	10～100	30～200	50～400	N·m 1～8	3～16
	GRAD.		cN·m 0.05	0.1	0.2	0.5	1	—	2	5	10	N·m 0.2	0.5
METRIC MODEL			02FTD2-S	05FTD2-S	1FTD2-S	2FTD2-S	5FTD2-S	—	10FTD2-S	20FTD2-S	40FTD2-S	80FTD2-S	160FTD2-S
TORQUE RANGE [gf·cm/kgf·cm]	MIN.～MAX.		gf·cm 30～200	50～500	kgf·cm 0.1～1	0.3～2	0.5～5	—	1～10	3～20	5～40	10～80	30～160
	GRAD.		gf·cm 5	10	kgf·cm 0.02	0.05	0.1	—	0.2	0.5	1	2	5
AMERICAN MODEL			FTD3Z2-S	FTD7Z2-S	FTD15Z2-S	FTD30Z2-S	FTD70Z2-S	5FTD2-A-S	10FTD2-A-S	20FTD2-A-S	40FTD2-A-S	80FTD2-A-S	160FTD2-A-S
TORQUE RANGE [ozf·in/lbf·in]	MIN.～MAX.		ozf·in 0.5～3	1～7	2～15	5～30	10～70	lbf·in 0.5～5	lbf·in 1～10	3～20	5～40	10～70	20～140
	GRAD.		ozf·in 0.1	0.2	0.5	1	2	lbf·in 0.1	lbf·in 0.2	0.5	1	2	5
APPLICABLE SCREW	SMALL SCREW		M1	M1.2	M1.6	M2	M2.5		M3 (M3.5)	M4	M5	M6	M8
	TAPPING SCREW		M1	(M1.1) M1.2	(M1.4) M1.6	(M1.8) M2	(M2.2)		M2.5, M3	(M3.5)	M4	(M4.5)	M6 (M7)
DIMENSION [mm]	OVERALL LENGTH	L'	151				272					338	
	GRIP	D1	20				38					50	
	BODY	D2	90									112	
		D3	6				13					18	
		D4	9				11						
		L1	85				157					188	
		L2	67				115					150	
WEIGHT [kg]			0.14				0.37					0.9	0.93
SCALE PLATE COLOR			RED (VERMILLION)	BLUE	GREEN	PURPLE	RED (VERMILLION)		BLUE	GREEN	PURPLE	RED (VERMILLION)	BLUE
ACCESSORY BIT	+											#3	
	-thickness X width											1.2×8	

Note FTD8N2-S, FTD16N2-S; Square drive type (6.35mm)
Standard accessories Bit and Auxiliary tightening tool

Alternative model

STC2-G ····· p.184
FTD ····· p.188

Tester/Checker

TDT3-G ····· p.402

How to use

Setting FTD-S indicator and memory pointer ····· p.199

Technical data

Torque unit ····· p.29
Method of inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.] FTD100CN2-S

Note

- Standard bit on the market can be used
- FTD8N2-S and FTD16N2-S has 6.35 mm square drive.

FTD Dial Indicating Torque Screwdriver with Preload Mechanism

Direct-reading style torque screwdriver for inspection with pre-load knob.

FTD100CN [L'=216mm]

Scale part

※The bit on the picture is optional.

Application

- For inspection and tightening.

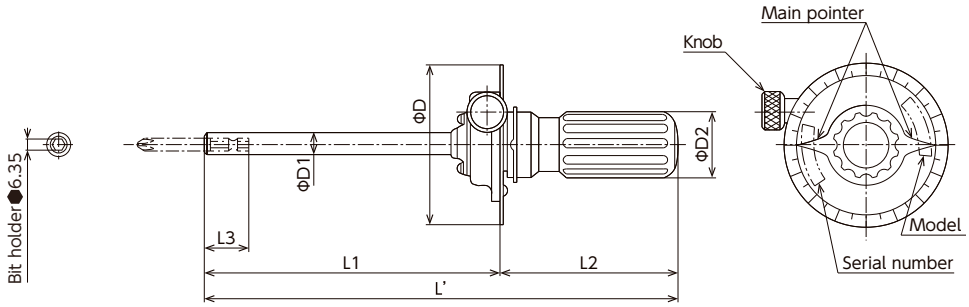
Features

- Pre-load knob function.
- Pre-load knob is designed to apply preliminary torque, which helps to reduce amount of turning and strain on the wrist.
- Suitable for inspecting tightened screws.
- With bi-directional scale plate, it can be used for both retightening and loosening torque testing methods.

Optional Accessories

·Interchangeable bit [p.502]

Dimensions



Specifications

Accuracy ±3%

S.I. MODEL			FTD50CN	FTD100CN	FTD200CN	FTD400CN
TORQUE RANGE [cN·m]	MIN.~MAX.		10~50	20~100	40~200	80~400
	GRAD.		1	2	5	10
METRIC MODEL			5FTD	10FTD	20FTD	40FTD
TORQUE RANGE [kgf·cm]	MIN.~MAX.		1~5	2~10	4~20	8~40
	GRAD.		0.1	0.2	0.5	1.0
AMERICAN MODEL			5FTD-A	10FTD-A	20FTD-A	40FTD-A
TORQUE RANGE [lbf·in]	MIN.~MAX.		1~5	1~10	3~20	5~40
	GRAD.		0.1	0.2	0.5	1.0
APPLICABLE SCREW	SMALL SCREW		M2.5	M3(M3.5)	M4	M5
	TAPPING SCREW		(M2.2)	M2.5, M3	(M3.5)	M4
DIMENSION [mm]	OVERALL LENGTH	L'	216		264	
	SCALE PLATE OUTSIDE DIA.	D	75		78	
	TUBE DIA.	D1	11		13	
	BODY	D2	30		33	
		L1	130.5		158.5	
		L2	85		105	
		L3	24			
WEIGHT [kg]			0.3		0.5	
ACCESSORY BIT	+		#1	#2		
	-thickness X width		0.7×7		0.9×7	

Alternative model
STC2-G ····· p.184
FTD-S ····· p.186

Tester/Checker
TDT3-G ····· p.402

How to use
Method of preloading FTD ····· p.199

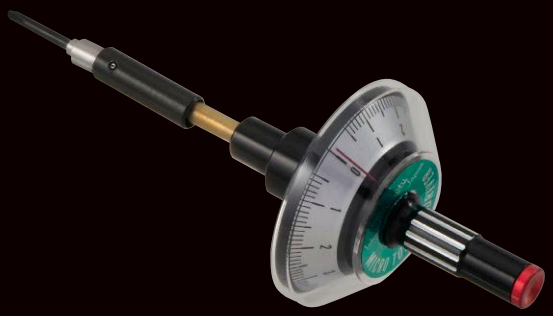
Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Method of inspection for tightening torque ···· p.45
Tool control ····· p.103

How to order.
Specify Model name
[EX.] FTD100CN
Note
·Standard bit on the market can be used.

Loading Direction Dial Indicating Direct Reading φ2 RoHS

MTD Dial Indicating Torque Screwdriver for Small Screws

Direct-reading style torque screwdriver for very small torque inspection.



MTD5MN [L'=110mm]

Scale part

※MTD bits are included as standard accessory.

Application

- For inspection and tightening of very small screws.

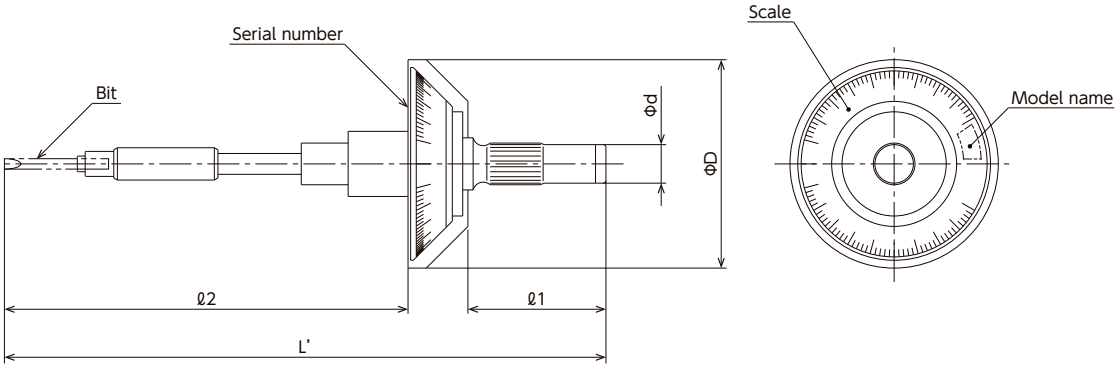
Features

- Inspection for very low torque values.
- For inspection and measuring of small torque motor shafts.
- Torsion bar mechanism makes accurate measurement possible.
- With bi-directional scale plate, it can be used for both retightening and loosening torque testing methods.

Optional Accessories

・Interchangeable bit [p.502]

Dimensions



Specifications

Accuracy ±3%

S.I. MODEL			MTD1MN	MTD2MN	MTD5MN	MTD10MN
TORQUE RANGE [mN•m]	MIN.~MAX.		0.1~1	0.3~2	0.5~5	1~10
	GRAD.		0.02	0.05	0.1	0.2
METRIC MODEL			10MTD	20MTD	50MTD	100MTD
TORQUE RANGE [gf•cm]	MIN.~MAX.		1~10	3~20	5~50	10~100
	GRAD.		0.2	0.5	1	2
AMERICAN MODEL			—	—	MTD07Z	MTD1.4Z
TORQUE RANGE [ozf•in]	MIN.~MAX.		—	—	0.1~0.7	0.2~1.4
	GRAD.		—	—	0.02	
DIMENSION [mm]	OVERALL LENGTH	L'	110	100	110	132
	OUTSIDE DIAMETER	D	40			
	BODY	ℓ1	26.5			
		d	8			
		ℓ2	71.5	61.5	71.5	94
WEIGHT [g]			22	21		23
ACCESSORY BIT	+		#0			
	-thickness x width		0.15×1, 0.2×1.5, 0.3×2			

Standard Accessories TOHNICHI original Bit for MTD is included as standard.

Technical data

Torque unit ····· p.29
Method of inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.]MTD10MN

Note

- MTD is designed for very small torque use. Therefore, make sure to check the required torque for the application before use.

RTDLS/RNTDLS Rotary Slip Torque Driver with Limit Switch

Error-proofing (Pokayoke) torque driver with limit switch output to eliminate missed tightening.

RTDLS120CN [L'=184mm]

RNTDLS500CN [L'=175mm]

RTDLS500CN with an auxiliary tightening tool (separately sold)

※The bit on the picture is optional.

Application

- Ideal for torque verification assembly processes.

Features

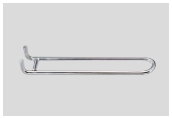
- Toque screwdriver with wired limit switch output.
- Upon reaching the set torque, the torque screwdriver “click” to complete tightening while the limit switch simultaneously sends out a contact signal.
- Limit switch can be connected to CNA-4mk3 to create tightening count management system.
- Establish interlock system at assembly line by connecting the signals from limit switch to external devices such as PLC (Programmable logic controller).
- LS wrenches are supplied with a durable curl cord.

Optional Accessories

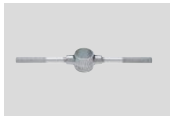
·Interchangeable bit [p.502]

·Adjusting tool [p.490]

·Preset hook spanner [p.490]



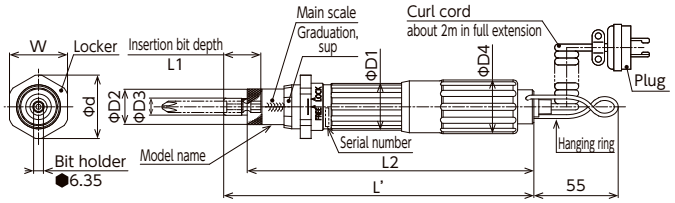
·Torque adjusting bar [p.490]



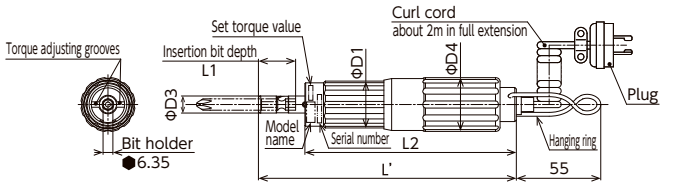
·Auxiliary tool [p.490]

Dimensions

■ RTDLS



■ RNTDLS



■Limit Switch: AC/DC30V, 1A or less

Specifications

Accuracy ± 3%

S.I. MODEL			RTDLS120CN	RTDLS260CN	RTDLS500CN	RNTDLS120CN	RNTDLS260CN	RNTDLS500CN
TORQUE RANGE [cN•m]	MIN.~MAX.		20~120	60~260	100~500	40~120	100~260	200~500
	GRAD.		1	2	5	—	—	—
METRIC MODEL			12RTDLS	26RTDLS	50RTDLS	RNTDLS120CN	RNTDLS260CN	RNTDLS500CN
TORQUE RANGE [kgf•cm]	MIN.~MAX.		2~12	6~26	10~50	4~12	10~26	20~50
	GRAD.		0.1	0.2	0.5	—	—	—
AMERICAN MODEL			RTDLS10I	RTDLS22I	RTDLS40I	RNTDLS120CN	RNTDLS260CN	RNTDLS500CN
TORQUE RANGE [lbf•in]	MIN.~MAX.		2~10	6~22	10~40	4~10	10~22	20~40
	GRAD.		0.1	0.2	0.5	—	—	—
APPLICABLE SCREW	SMALL SCREW		(M3.5)	M4(M4.5)	M5, M6	(M3.5)	M4 (M4.5)	M5.M6
	TAPPING SCREW		M3 (M3.5)	M4	(M4.5)	M3 (M3.5)	M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	184	201	212	166	167	175
	GRIP	D 1	24	30.5	33	24	30.5	33
	BODY	D 2	18	23	25.5	—	—	—
		D 3	11					
		D 4	35		40	35		40
		L 1	24					
		L 2	157.5~167.5	175.3~185.3	186.5~198.5	133.5	136.5	144.8
	LOCKER	d	33	41	45	—	—	—
		W	30	37.5	41	—	—	—
WEIGHT [Kg]			0.34	0.45	0.54	0.32	0.39	0.48

Note 1. Auxiliary tightening tool (separately sold) is available for RTD/RNTDLS500CN). 2. Curl cord can be extended to about 2m in full extension. AC/DC30V 1A or less.
Standard Accessory PRESET HOOK SPANNER (for RTDLS260, 500CN only)

Alternative model

RTDFH/RNTDFH ····· p.194

Tester/Checker

TDT3-G ····· p.402

Technical data

Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

Optional equipment

CNA-4mk3 ····· p.452

How to order.

Specify Model name **X** Torque value

[EX.1] RTDLS120CN

[EX.2] RNTDLS120CNX90cN•m

Specify model number and torque value when you order RNTDLS model.

Note

- Standard bit on the market can be used.
- RNTDLS is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order. Torque setting before delivery is free of charge.

TUD TOHNICHI UNIFIED DESIGN
IEC 61340-5-1:2007
Loading Direction
Rotary Slip
Wireless
6.35
RoHS

RTDFH/RNTDFH Remote Signal Rotary Slip Torque Screwdriver

Wireless error-proofing (Pokayoke) torque screwdriver.

RTDFH120CN [L'=191mm]

RNTDFH500CN [L'=181mm]

Answer back communication status judgment LED shows if signal is received.
(OK: Blue, NG: Red)

Application

- Ideal for torque verification assembly processes.

Features

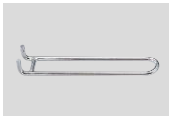
- Upon reaching the set torque, a completion signal is transmitted by radio wave.
- Wireless screwdriver eliminate space limitations, contributes to work efficiency.
- Answer-back system allows user to check the communication status.
- Connect to I/O-FH256 and CNA-4mk3 to establish error-proofing (pokayoke) system.
- Frequency hopping system enhances transmission reliability.

Optional Accessories

·Interchangeable bit [p.502]

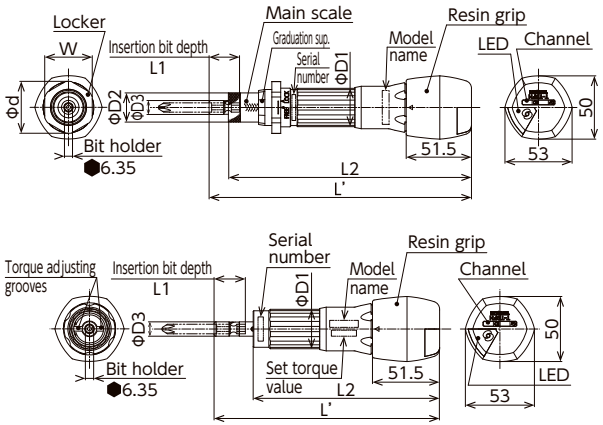
·Adjusting tool [p.490]

·Preset hook spanner [p.490]



·Torque adjusting bar [p.490]

Dimensions



	BODY	RECEIVER	SETTING BOX
MODEL	RTDFH RNTDFH	R-FH256	SB-FH256
FREQUENCY	2.4GHz band, 2.402~2.479GHz, 1MHz interval, 78 kinds		
COMMUNICATION METHOD	Spread spectrum, Frequency hopping system		
MODULATION METHOD	GFSK		
MODULATION SPEED	1Mbps		
FREQUENCY GROUP	Gr000~255		
ID	3-digit, 000 to 999, 7-digit alphanumeric		
INPUT/OUTPUT		No voltage contact output 1A, RS232C output	RS232C input
POWER	DC3V (CR2032 coin battery)	AC100V~240V power consumption 5W or less	DC9V (alkaline battery)
ANTENNA	Tip antenna	Dipole antenna	
DISPLAY	Communication status LED	Power LED, Receiving LED	Power LED, LCD
USAGE ENVIRONMENT	0~45℃, less than 85%RH, No condensation		
COMMUNICATION DISTANCE	10~20m ＊Note 1		

Note 1 Communication distance varies by surrounding radio environment. Communication errors may be caused by noise or obstruction objects. Radio waves reflected by metal, concrete, etc. may interfere with radio waves directly sent to the antenna of the receiver and a dead point occurs, resulting in communication error.

Note 2 For RTDFH/RNTDFH, with a brand-new alkaline battery, about 300,000 tightening operations can be conducted.

Specifications

Accuracy ± 3%

S.I. MODEL			RTDFH120CN	RTDFH260CN	RTDFH500CN	RNTDFH120CN	RNTDFH260CN	RNTDFH500CN
TORQUE RANGE [cN•m]	MIN.~MAX.		20~120	60~260	100~500	40~120	100~260	200~500
	GRAD.		1	2	5	—	—	—
METRIC MODEL			12RTDFH	26RTDFH	50RTDFH	—	—	—
TORQUE RANGE [kgf•cm]	MIN.~MAX.		2~12	6~26	10~50	4~12	10~26	20~50
	GRAD.		0.1	0.2	0.5	—	—	—
AMERICAN MODEL			RTDFH10I	RTDFH22I	RTDFH40I	—	—	—
TORQUE RANGE [lbf•in]	MIN.~MAX.		2~10	6~22	10~40	4~10	10~22	20~40
	GRAD.		0.1	0.2	0.5	—	—	—
APPLICABLE SCREW	SMALL SCREW		(M3.5)	M4(M4.5)	M5, M6	(M3.5)	M4(M4.5)	M5, M6
	TAPPING SCREW		M3(M3.5)	M4	(M4.5)	M3(M3.5)	M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	191	208	219	173	173	181
	GRIP	D 1	24	30.5	33	24	30.5	33
	BODY	D 2	18	23	26	—	—	—
		D 3	11					
		L 1	24					
		L 2	164~174	181.8~191.8	193~205	140	143	151.3
	LOCKER	d	33	41	45	—	—	—
		W	30	37.5	41	—	—	—
WEIGHT [Kg]			0.28	0.38	0.49	0.26	0.32	0.43

Note Auxiliary tightening tool (separately sold) is available for RTDFH500N, RNTDFH500CN.
Standard Accessory Preset Hook Spanner for RTDFH260CN, 500CN

Alternative model
RTDLS/RNTDLS ····· p.192

Optional equipment
CNA-4mk3 ····· p.452

Tester/Checker
TDT3-G ····· p.402

Technical data
Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify Model name X Torque value
[EX.1] RTDFH120CN
[EX.2] RNTDFH120CNX90cN•m
Specify model number and torque value when you order RNTDFH model.

Note
- Standard bit on the market can be used.
- RNTDFH is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order. Torque setting before delivery is free of charge.

MNTD Preset type Marking Torque Screwdriver

PAT.PEND.

Marking torque screwdriver for small screws

MNTD120CN

MNTD260CN

MNTD500CN with an auxiliary tightening tool (separately sold)
The bit and maker on the picture is optional.

Application

- Ideal for tightening verification assembly processes.

Features

Features of torque screwdriver ▶P.166

- The marker is designed to stamp on the screw head part only when the torque reaches the set torque.
- Prest style is ideal for application which requires the same torque value on the line.
- One disposal marker is capable of approximately 1,000 times of stamping.
- Height of the stamp is adjustable.
- Oversight preventable by quick visual check on the screws.

Optional Accessories

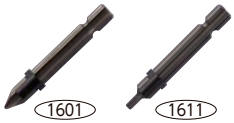
MNTD Plus Bit

Model	Applicable screw/Ref.	PART #
MNTD #1 Bit	M2.5, (M3)	1601
MNTD #2 Bit	M3, M4, M5	1602
MNTD #3 Bit	M6	1603

MNTD Hex Bit

Model	Applicable screw/Ref.	PART #
MNTD W2.5 Bit	M3	1611
MNTD W3 Bit	M4	1612
MNTD W4 Bit	M5	1613
MNTD W5 Bit	M6	1614

Note 1. Tohnichi special designed bit is required for MNTD.
2. Applicable for screws that the head diameter is over Φ 5.5mm.
3. In M3 screw, only binding head screw is applicable.



1601 1611

MNTD Bit

MNTD Marker

Model	PART #
Red Marker, 10pcs/pack	1621
Red Marker, 100pcs/pack	1622
Blue Marker, 10pcs/pack	1623
Blue Marker, 100pcs/pack	1624

Note Maker is disposable, cannot refill ink.

MNTD Marker Blue

Preset Hook Spanner

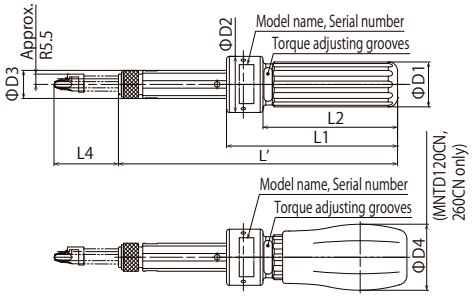
PART #	Applicable Model
52	MNTD120CN
53	MNTD260CN
54	MNTD500CN

Note To set/change torque value.

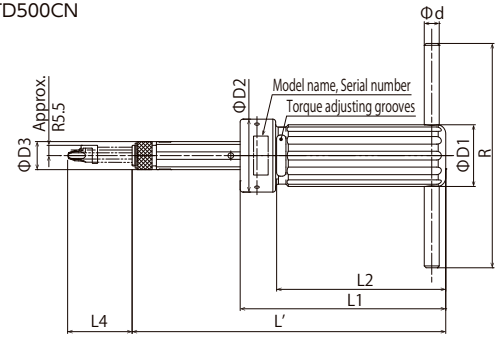
52

Dimensions

■ MNTD120CN, 260CN



■ MNTD500CN



Specifications

Accuracy ± 3%

S.I. MODEL			MNTD120CN	MNTD260CN	MNTD500CN
TORQUE RANGE[cN•m]	MIN.~MAX.		40~120	100~260	200~500
TORQUE RANGE[kgf•cm]	MIN.~MAX.		4~12	10~26	20~50
TORQUE RANGE[lbf•in]	MIN.~MAX.		4~10	10~22	20~40
APPRICABLE SCREW (REFERENCE)	SMALL SCREW		(M3.5)	M4 (M4.5)	M5, M6
	TAPPING SCREW		M3 (M3.5)	M4	(M4.5)
DIMENSION [mm]	OVERALL LENGTH	L'	150	152	168
	GRIP	D1	24	30.5	33
	BODY	D2	30	36.5	39
		D3	15		
		D4	35	44	
		L1	91.5	94	110
		L2	72	74.5	91
		L4	34.5		
	HANNDLE	d			8
		R			120
WEIGHT [g]			220	320	425

Optional equipment

RNTD ····· p.176
NTD ····· p.178

Tester/Checker

TDT3-G ····· p.402

How to use

How to set torque ····· p.198

Technical data

Torque unit ····· p.29
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.]MNTD120CN×Torque Free

Note

- MNTD is preset style. If you prefer torque setting prior to delivery, indicate torque value when you place the order. Torque setting before delivery is free of charge.
- MNTD models need Tohnichi original bit and marker.

LTD, RTD, A/BMLD, A/BMRD

Adjustable type

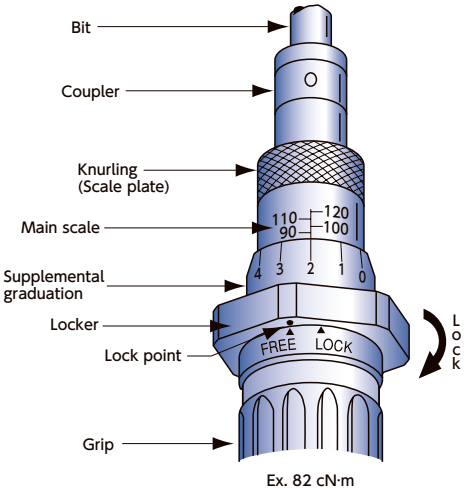
1. Turn the locker of the main unit to release the lock (LTD/RTD).
2. Holding the main scale knurling part with the fingers of your right hand, turn the grip with the fingers of your left hand to set the torque value.

*Setting the torque set values:

(1) Turn the grip to match the top end of the supplemental graduation with the main scale.

(2) Match the supplemental graduation line with the main scale vertical line (See the figure on the right).

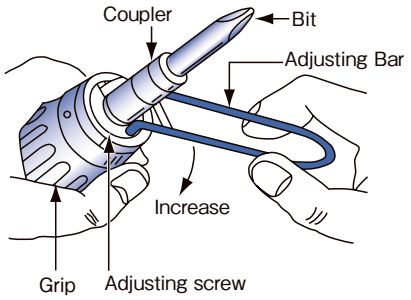
3. After setting the torque, turn the main unit locker to lock it.



NTD, RNTD, RNTDZ

Preset Type

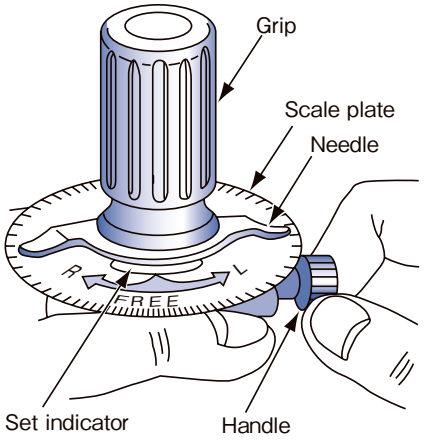
1. Holding the grip with your left hand, insert the adjusting tool bar into the grooves of the adjustment screw and turn to adjust. Turn clockwise to increase the torque value.
2. Insert with the exclusive bit into the loading device of the Torque Driver Tester (TDT3-G) and fix it.
3. Turn the loading device clockwise to measure the torque value.
4. Continue to repeat procedures #1-3 until the torque is matched.



FTD50~400CN

Preloading method of FTD

The preload function is a function that uses the handle to apply a preloading torque close to that of the measuring point to minimize the twisting angle during measurement.
In the FTD torque screwdrivers, a preload function is provided to prevent your wrist from becoming strained and the torque scale from becoming difficult to read when operating close to the maximum torque.



1. Holding the FTD screwdriver with your left hand,turn the preload handle in the counterclockwise direction using the fingers of your right hand (in case of clockwise measuring).

2. After some slipping turns, the needle will begin to move, and it will be easy to set an optional torque value.

3. If you do not wish to use the preload function, turn the preload handle until there is no tension and the central set indicator (red mark) points to the FREE mark.

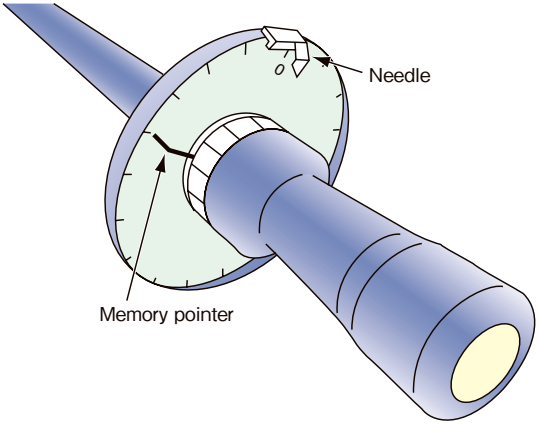
FTD-S

Setting FTD-S' indicator and memory pointer

1. Make sure the indicator is pointing to zero by matching the scale. If not, adjust to zero by lightly pushing down on the scale and rotating it.

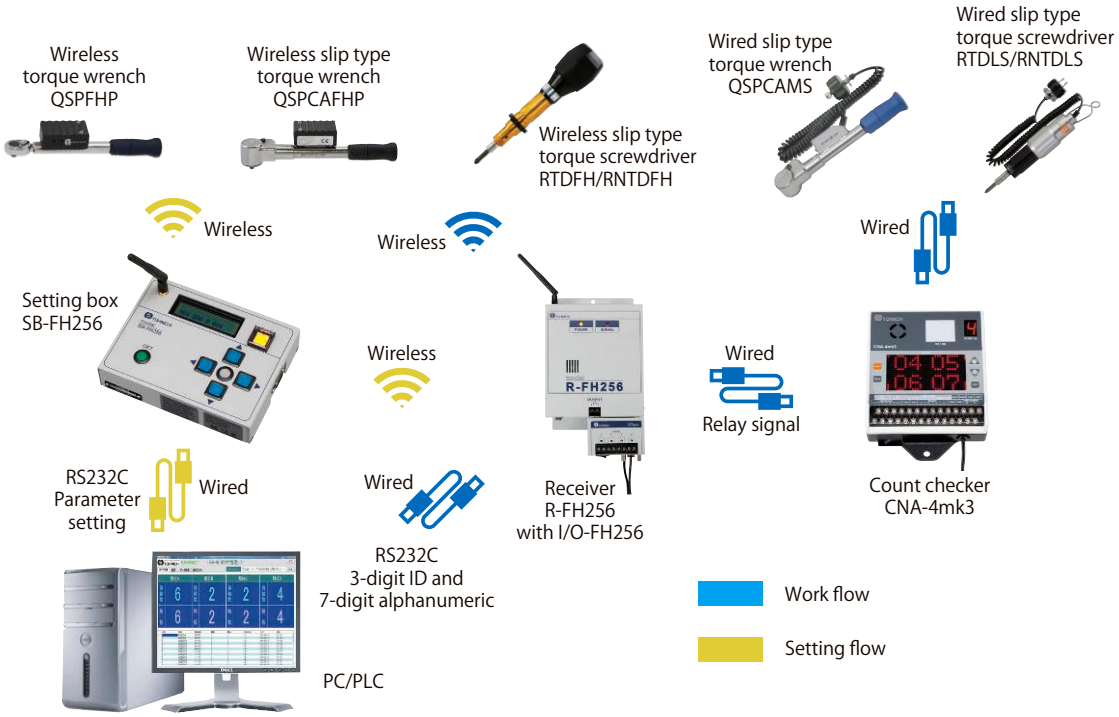
2. Turn the memory pointer in the direction opposite to the measuring direction until it matches the main indicator.

3. Carry out torque measurement or torque tightening.



Example of Error-Proofing System using wireless/wired Pokayoke torque screwdrivers

- Up to 4 tightening verification tools can be managed for assembling M2 to M6 size of small screws using wired torque screwdrivers "RTDLS/RNTDLS" series, wired slip type torque wrench "QSPCAMS" series with a count checker"CNA-4mk3".
- "R-FH256" for "FH256MC" series is a common receiver for wireless Pokayoke torque screwdriver "RTDFH / RNTDFH" series and wireless slip type Pokayoke torque wrench "QSPCAFHP" series.
  It is possible to expand your existing Pokayoke system established with FH series wireless torque wrenches into small screws or small size bolts assembly with only by adding small cost.



Example of Tightening Data Management System

●By using STC2-G-BT and TDMS/TDMSHT, it is possible to construct a data management system that transmits measured tightening/inspected data by Bluetooth® communication.
Since TDMS/TDMSHT can automatically calculate "N", "X - bar", "σ", "cp", "cpk" together with measurement data and output it as an Excel® file.
It is useful for managing standard value and early detection of abnormality.

STC2-G-BT

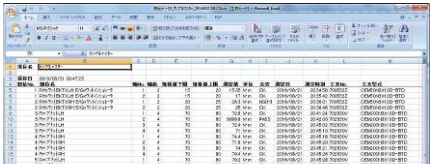
Bluetooth®

TDMSHT

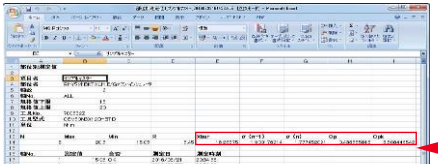
USB memory

PC

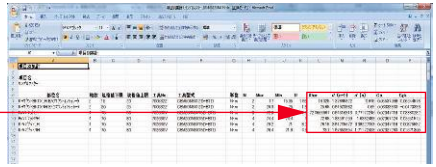
Excel® data example



Output measured data for each spindle



Output data for a part and spindle number and the statistical processing results



Statistical processing result for each part

「Measured value」「X-bar」「σ」「cp」「cpk」

TORQUE WRENCH

Torque Wrench for Assembly

SERIES INDEX

Your Torque Partner TOHNICHI

Ratchet Head Adjustable

QL
P.212
0.4~420 [N·m]
Standard torque wrench.

QLE2
P.216
100~2800 [N·m]
Standard torque wrench for multi-purpose use.

QL-MH
P.218
0.4~280 [N·m]
Knurled metal handle version of QL.

MTQL
P.222
5~140 [N·m]
For motorcycle maintenance.

Ratchet Head Pre-Lock

PQL
P.220
2~420 [N·m]
Pre-Lock type takes advantages of both preset and adjustable type for the torque set style.

TiQL / TiLQL / TiEQL(E)
P.246
40~1400 [N·m]
Light weight Titanium torque wrench. Reduces worker fatigue.

PQLZ
P.248
5~100 [N·m]
Insulated for safety. Ideal for electric auto assembly.

DQL / DQLE2
P.224
40~1000 [N·m]
Dual square drives for bi-directional tightening.

Interchangeable Adjustable

CL
P.230
0.4~420 [N·m]
Interchangeable head type for multi-purpose use.

CLE2
P.234
100~1200 [N·m]
Interchangeable head type for multi-purpose use.

CL-MH
P.236
0.4~280 [N·m]
Knurled metal handle version of CL.

YCL2
P.242
5~180 [N·m]
Two-step motion to prevent over-torque.

SCL
P.238
5~200 [N·m]
With Europian style head connector.

Interchangeable Pre-Lock

PCL
P.240
2~200 [N·m]
Interchangeable head type of PQL.

Multiplier Click type

TW2
P.226
350~1000 [N·m]
Easily and correctly, tightening bolts of big vehicle wheels.

Pipe-wrench Head

PHL / PHLE2
P.228
10~1300 [N·m]
Piping for the water and gas, and building construction.

Moto Tork

MT70N
P.244
10~70 [N·m]
Basic wrench becomes a part of the torque wrench.

SERIES INDEX

Preset

SP
P.266
90~560 [N·m]
Open end spanner type preset torque wrench with a metal grip.

SP2
P.268
0.4~310 [N·m]
Open end spanner type preset torque wrench with a resin grip.

SP2-MH
P.270
0.4~310 [N·m]
Metal grip version of SP2.

RSP2 / RSP2-MH
P.272
2~310 [N·m]
Ring head type preset torque wrench.

QSP / QSP-MH
P.250
0.3~420 [N·m]
Torque wrench for single purpose bolt tightening.

QRSP
P.264
10~45 [N·m]
Open ratchet torque wrench for piping work.

CSP / CSP-MH
P.254
0.3~420 [N·m]
Interchangeable head and preset type torque wrench.

BQSP
P.258
5~420 [N·m]
Click type torque wrench effective for bi-directional use.

BCSP
P.260
5~420 [N·m]
Interchangeable head version of BQSP.

QSPZ
P.262
5~100 [N·m]
Preset insulated torque wrench.

SP2-H / SP2-H-MH
P.274
8~120 [N·m]
Suitable for bolt tightening in hydraulic manifold.

QSPCA
P.252
2~70 [N·m]
Overtorque prevention slip type preset torque wrench.

NSP
P.278
50~100 [cN·m]
Preset torque wrench for SMA connectors.

SP2-N / SP2-N-MH
P.276
3.5~38 [N·m]
Notched head torque wrench for flare nut tightening.

SCSP
P.256
5~200 [N·m]
With Europian style head connector.

SERIES INDEX

Pokayoke

LS wrench
P.280·282
3~420[N·m]
Missed tightening can be eliminated with limit switch.

FH256MC
P.286
5~420[N·m]
Wireless wrench system prevents human tightening errors.

FMA
P.290
5~420[N·m]
900 MHZ frequency wireless error-proofing torque system.

BLA/BLE
P.284
5~280[N·m]
Battery less wireless torque wrench.

MPQL / MQL
P.292
10~280[N·m]
Missed tightening can be visually detected.

MQSP
P.294
10~200[N·m]
Marking torque wrench of preset type.

FHP
P.288
1~15[N·m]
Wireless system for small size torque wrench.

CMQSP
P.298
5~140[N·m]
Marking on cap screws to prevent missed tightening.

MCSP
P.300
10~140[N·m]
Interchangeable open end head marking torque wrench for bolt/nut

Waterproof Pre-Lock

CLWP
P.302
5~200[N·m]
Waterproof and Dustproof torque wrench.

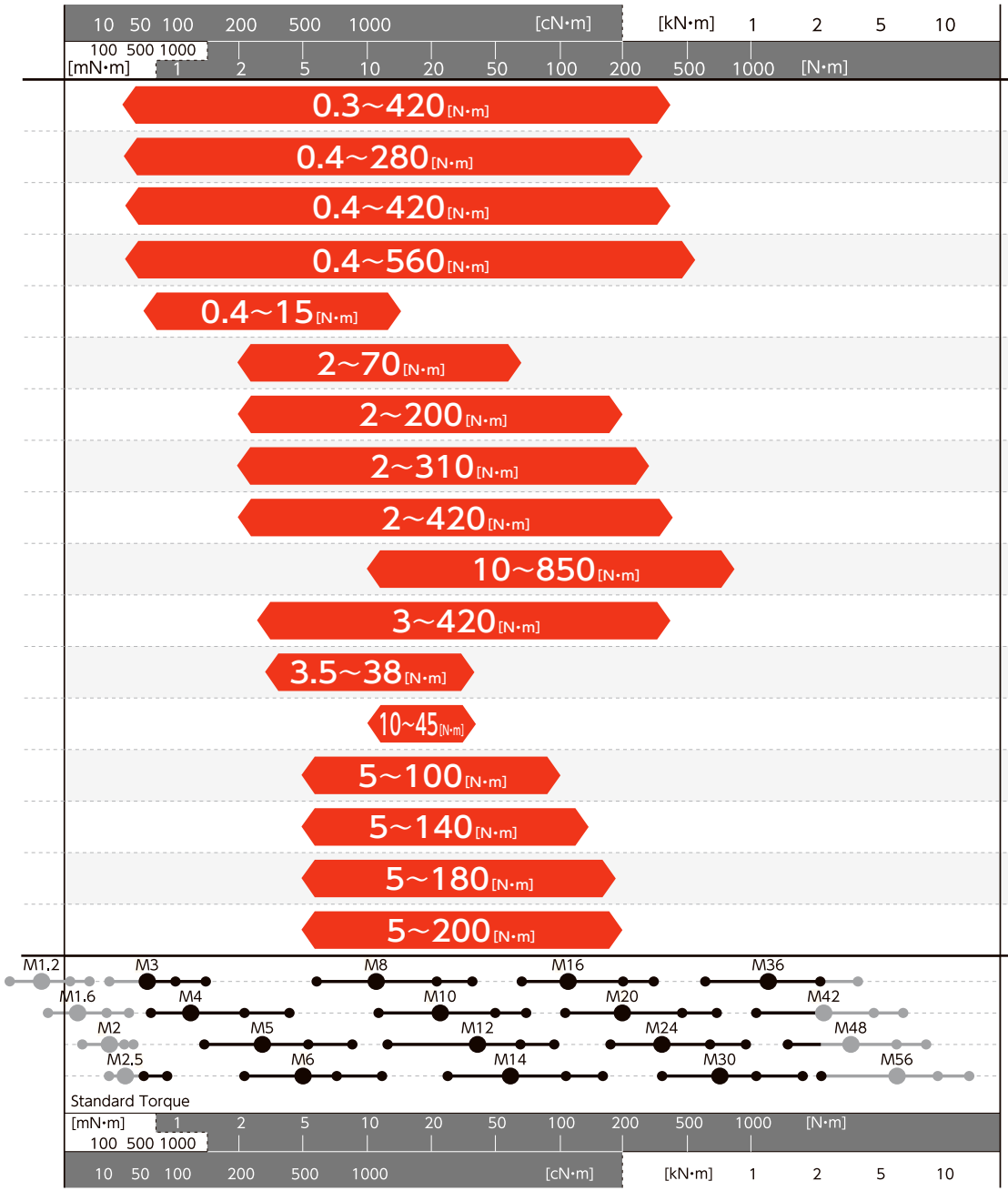
Angle wrench

CTA2-G
P.304
10~850[N·m]
Angle method torque wrench with management software.

DWQL / M-DW
P.306
10~420[N·m]
Standard torque wrench with angle module.

WQL
P.308
10~420[N·m]
Snug torque and angle can simply be set with scale.

TORQUE RANGE INDEX

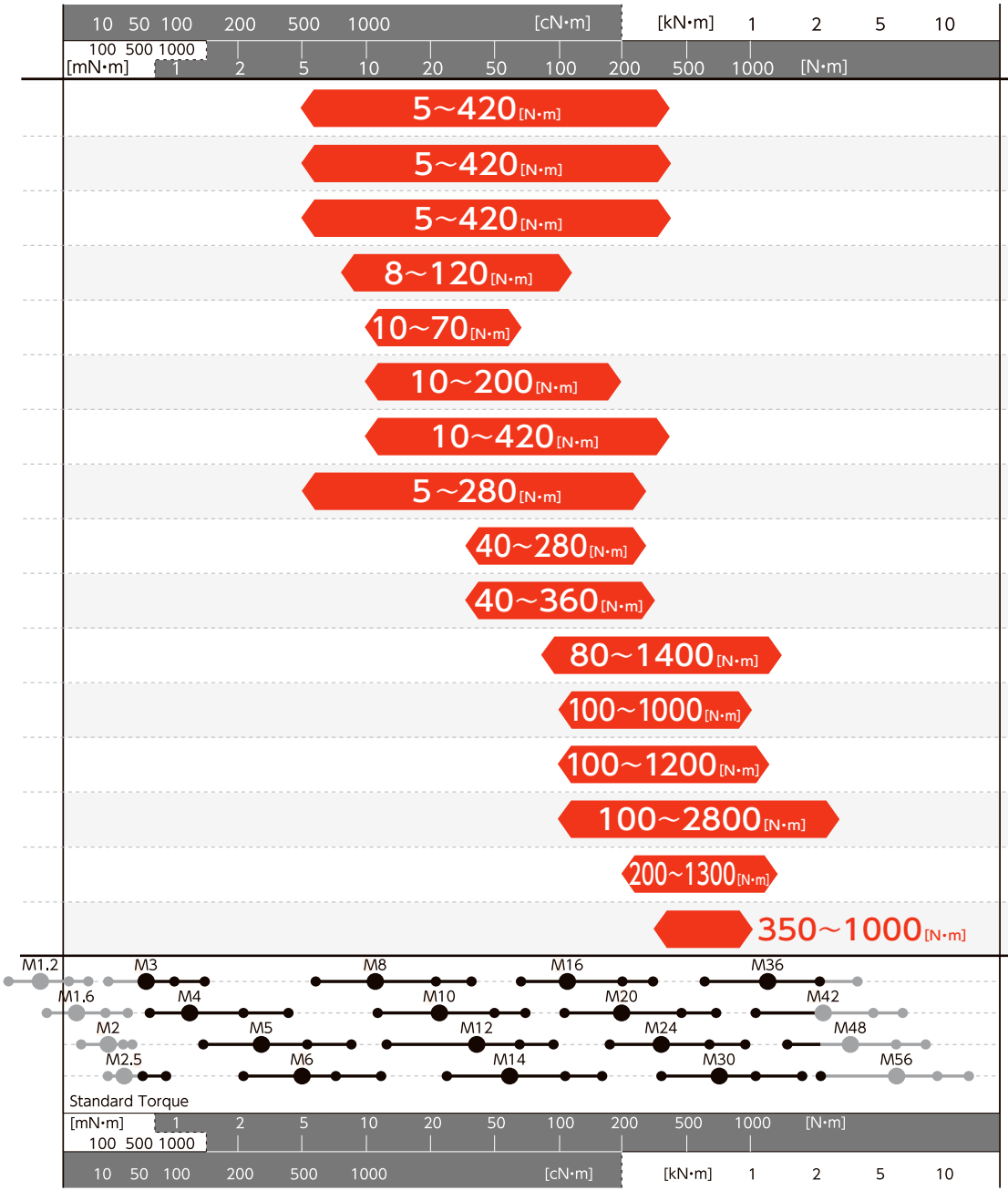


MODEL・TYPE					PAGE
 **QSP/QSP-MH** Ratchet Head	Preset	**CSP/CSP-MH** Interchangeable Head	Preset	250・254
 **QL-MH** Ratchet Head	Adjustable	 **CL-MH**	Adjustable / Interchangeable Head	218・236
 **QL** Ratchet Head	Adjustable / Graduation	 **CL** Interchangeable Head	Adjustable / Graduation	212・230
 **SP/SP2/SP2-MH** Spanner Head	Preset			266・268・270
 **NSP** Slip Type	Preset	 **FHP** Remote Signal	Wireless	275・288
 **QSPCA** Rotary Slip Type	Preset			252
PCL Interchangeable Head	Pre-Lock / Graduation	**CLWP** Interchangeable Head Water Proof	Pre-Lock / Graduation	240・302
RSP2/RSP2-MH Ring Spanner	Preset			272
PQL Ratchet Head	Pre-Lock / Graduation			220
 **CTA2-G** Angle Wrench	Digital			304
 **LS** Wrench	Limit Switch			280・282
 **SP2-N/SP2-N-MH** Notch Type	Preset			276
 **QRSP** Open ratchet	Preset			264
PQLZ Insulated Type	Pre-Lock	**QSPZ** Insulated Type	Preset	248・262
 **CMQSP** Marking Type	Preset	**MTQL** Motorcycle	Adjustable	298・222
YCL2 Over Torque Prevention	Adjustable / Interchangeable Head	**MCSP** Marking Type	Preset	242・300
 **SCL** European Style	Interchangeable Head / Adjustable	 **SCSP** European Style	Interchangeable Head / Preset	238・256

T = Standard Tightening Torque

For more details, refer to "Relation between Screw and Torque" (P.38)

TORQUE RANGE INDEX



MODEL・TYPE					PAGE
	**BQSP** Bi-directional	Preset	 **BCSP** Bi-directionnal	Preset	258・260
	**FH256MC** Remote Signal	Wireless	 **WQL** Angle Wrench	Adjustable	286・308
	**FMA** Remote Signal	Wireless			290
	SP2-H/SP2-H-MH Piping Work	Preset			274
	**MT70N** Moto Tork	Pre-Lock			244
	**MPQL** Marking Type	Pre-Lock	 **MQSP** Marking Type	Preset	292・294
	**PHL** Pipe-wrench Head	Adjustable	 **DWQL/M-DW** Angle Wrench	Adjustable	228・306
	**BL** Battery less wireless	Wireless			284
	**DQL** Bi-directional	Adjustable	 **MQL** Marking Type	Adjustable	224・292
	**Ti(L/E)QL** Titanium Material	Pre-Lock			246
	TiEQLE Titanium Material	Adjustable			246
	DQLE2 Bi-directional	Adjustable			224
	CLE2 Interchangeable Head	Adjustable			234
	QLE2 Ratchet Head	Adjustable			216
	**PHLE2** Pipe-wrench Head	Adjustable			228
	**TW2** Multiplier	Adjustable			226

T = Standard Tightening Torque

For more details, refer to "Relation between Screw and Torque" (P.38)

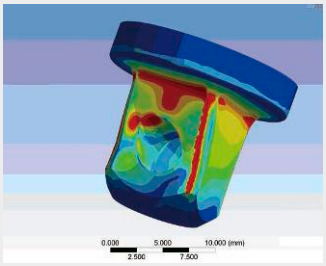
Features of TOHNICHI Torque Wrench

① High Accuracy

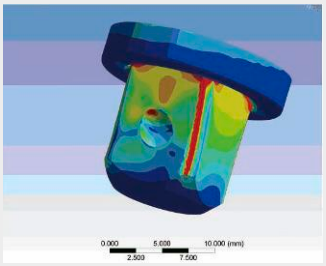
Our click type torque wrenches mostly maintain the accuracy of ±3 % . This accuracy rate exceeds ISO6789 standard. Also the digital torque wrench CEM3 series for inspection/measurement record ±1 % of accuracy and the measuring range of dial type torque wrenches DB series is wider than ISO6789.

② High Durability

Tohnichi guarantees accuracy and durability for the product within a hundred thousand cycles in use or one year use at the maximum torque value. Tohnichi click type torque wrench such as QL series is able to use up to around a million cycles (500,000 cycles for 550-1000N·m size, 250,000 cycles for over 1000N·m size click type torque wrench) if the tool is periodically calibrated and taken the necessary repairing every a hundred thousand cycles use (refer to technical data P.102).



Analyzing sq. drive with the former technology



Analyzing sq. drive with the "high durability & smaller size sq. drive technologies"

Small square drive with high durability

Applying various technologies such as FME (Finite Element Method), Tohnichi has succeeded to develop the smaller size square drive, interchangeable head, and torque wrench (applied to QL25N5-1/4, QL100N4-3/8, QL280N-1/2 and interchangeable heads QH series). This enables our torque wrench to use with the smaller size socket, so that eventually devotes to decrease the total weight of the tool, and leads to increase users' workability.

Durability test to ensure high durability

Tohnichi conducts durability testing when developing new products. Before manufacturing new products, we test durability as type certification test also when mass production, we conduct sampling test regularly to maintain our high level of durability.

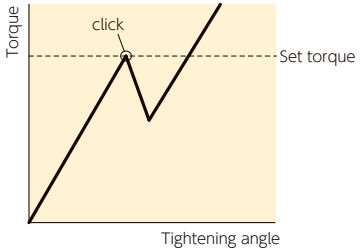
③ Guaranteed supply system

Torque wrenches for manufacturing are often registered with their specifications; therefore stable supply system in a long run is required. We do not only strive for maintaining a long-term and stable supply of our products, but also offer repair parts including tools for discontinued products with a limit of 10 years. Also we strengthen our agency network in overseas, supplying products and calibration/repair services for the customers around the world.

Tohnichi 4 types of torque wrenches for your ideal work

Characteristic of Signal Type Torque Wrench

Click Type Torque Wrench

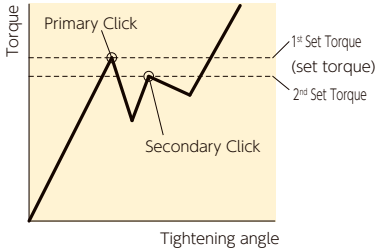


The most standard torque wrench. A clear 'click' sound signals tightening completion upon reaching the set torque. Once recognizing the clicking sound and feeling , stop to apply force and finish tightening to avoid over-torque.

A sample product of click type torque wrench

QL [P.212]

Two Step Click Type Torque Wrench

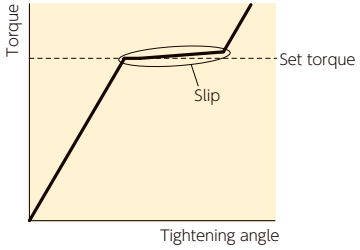


The primary 'click' sound signals reaching the 1st set torque and the secondary click signals tightening completion. Tightening after the 2nd click causes over-torque. Compared with the click type, Two-Step Click Type leaves wider margin after clicking and is more effective against over-torque.

A sample product of two step click type torque wrench

YCL2 [P.242]

Slip Type Torque Wrench

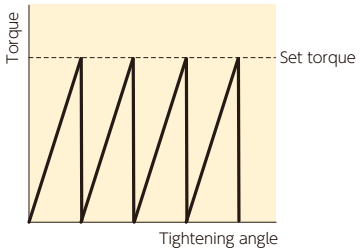


The head starts slipping upon reaching the set torque. The torque is almost stable until the head slips about 90 degrees angle. Tightening after that causes over-torque. Head slipping and bending alert users to stop pulling.

A sample product of slip type torque wrenches

NSP [P.278]

Rotary Slip Type Torque Wrench



Cam-link mechanism generates a 45 degree slip and 'click' feeling upon reaching the set torque. Slip and click are repeatedly felt if tightening after reaching the set torque continues. Because users can tighten no further than the set torque, over-torque is completely prevented.

A sample product of air-slip type torque wrenches

QSPCA [P.252]

QL Ratchet Head Type Adjustable Torque Wrench

General use torque wrench for small tightening bolts.

QL10N [L'=219mm]

Application

- For various tightening applications from 0.4 to 25N·m.

Features

- Basic torque wrench used to tighten bolts.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a knob.
- A large and clear scale in resin grip.

Optional Accessories

·Interchangeable socket [p.504]

·Color cap [p.501]

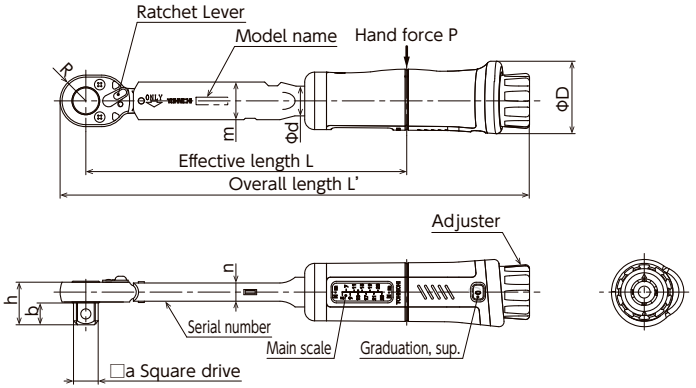
·Protective Head Cover [p.501]

Wearing Color Cap Appearance

QL25N5 Scale

Dimensions

■ QL2N～25N5



Specifications

Accuracy ± 3%

S.I. MODEL			QL2N	QL5N	QL10N	QL15N	QL25N5-1/4	QL25N5
TORQUE RANGE [N·m]	MIN. ～ MAX.		0.4～2	1～5	2～10	3～15	5～25	
	GRAD.		0.02	0.05	0.1		0.2	
METRIC MODEL			20QL	50QL	100QL	150QL	225QL5-1/4	225QL5
TORQUE RANGE [Kgf·cm]	MIN. ～ MAX.		4～20	10～50	20～100	30～150	50～250	
	GRAD.		0.2	0.5	1		2.5	
AMERICAN MODEL			QL15I-2A	QL30I-2A	QL50I-2A	QL100I-2A	QL200I-2A	QL200I-3A
TORQUE RANGE [lbf·in]	MIN. ～ MAX.		3～15	6～30	10～50	20～100	50～200	
	GRAD.		0.1	0.2	0.5		2.5	
APPLICABLE BOLT	COMMON STEEL		M4	M5,M6	(M7)	M8		
	HIGH TENSION		(M3.5)	(M4.5)	M6	(M6) M7	(M7)	
MAX. HAND FORCE [N]			16.5	41.3	69	104	155	
DIMENSION [mm]	EFFECTIVE LENGTH	L	121		145		162	
	OVERALL LENGTH	L'	194		219		237	
	SQ. DRIVE	a	6.35					9.53
		b	7.5					11
	HEAD	R	11.5				13	
		h	17.5				18.5	22
	BODY	m	19					
		n	9.2					
		d	15					
		D	37					
WEIGHT [kg]			0.27		0.29		0.33	

Alternative model

QL-MH ····· p.218
PQL ····· p.220

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
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Parts list for QL ····· p.122

How to order.

Specify MODEL name

[EX.] QL25N5

Note
- Not available for inspection purpose.
- For limit switch models, error proofing type, refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS

Loading Direction | Adjustable | Ratchet Head | Graduation | 24 Gear | 9.53 | 12.7 | 19.05 | RoHS

QL Ratchet Head Type Adjustable Torque Wrench

General use torque wrench for tightening bolts.

QL420N [L'=993mm]

QL140N [L'=399mm]

QL280N [L'=692mm]

QL100N4 [L'=333mm]

QL200N4 [L'=489mm]

QL50N [L'=258mm]

Application

- For various tightening applications from 10 to 420N·m.

Features

- Basic torque wrench used to tighten bolts.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a knob.
- QL50N - QL280N with a resin grip, QL420N with knurled metal handle.

Optional Accessories

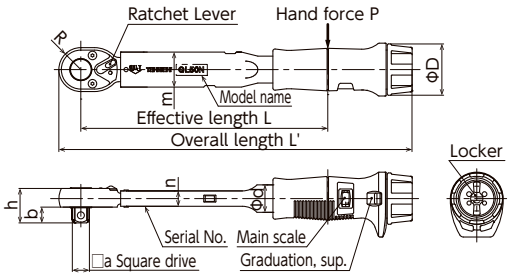
·Interchangeable socket [p.504]

·Carrying case [p.491]

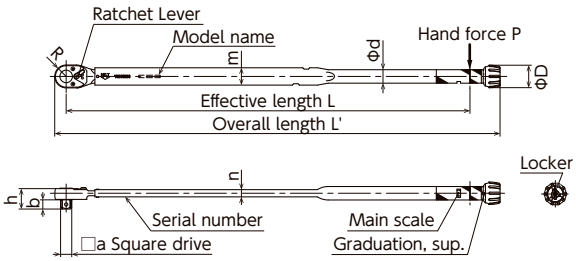
·Protective Head Cover [p.501]

Dimensions

■ QL50N～280N



■ QL420N



Specifications

Accuracy ± 3%

S.I. MODEL			QL50N	QL100N4-3/8	-	QL100N4	QL140N	QL200N4	QL280N-1/2	QL280N	QL420N
TORQUE RANGE [N•m]	MIN. ～ MAX.		10～50	20～100	-	20～100	30～140	40～200	40～280		60～420
	GRAD.		0.5	1				2			
METRIC MODEL			450QL3	900QL4-3/8	-	900QL4	1400QL3	1800QL4	2800QL3-1/2	2800QL3	4200QL2
TORQUE RANGE [Kgf•cm/Kgf•m]	MIN. ～ MAX.		kgf•cm 100～500	200～1000	-	200～1000	300～1400	400～2000	kgf•m 4～28		6～42
	GRAD.		kgf•cm 5	10				20	kgf•m 0.2		
AMERICAN MODEL			QL400I-3A	QL750I-3A	QL75F-3A	-	QL100F-4A	QL150F-4A	QL200F-4A	-	QL300F-6A
TORQUE RANGE [lbf•in/lbf•ft]	MIN. ～ MAX.		lbf•in 100～400	150～750	lbf•ft 15～75	-	30～100	30～150	30～210	-	60～300
	GRAD.		lbf•in 5	10	lbf•ft 1			2			
APPLICABLE BOLT	COMMON STEEL		M10	M12(M14)			M16	(M18)	M20		(M22)
	HIGH TENSION		M8	M10			M12	(M14)	M16		(M18)
MAX. HAND FORCE [N]			278	392			440	500	467		
DIMENSION [mm]	EFFECTIVE LENGTH	L	180	255			318	400	600		900
	OVERALL LENGTH	L'	258	333			399	489	692		993
	SQ. DRIVE	a	9.53			12.7				19.05	
		b	11			14		15.4		20.5	
	HEAD	R	16	17			18.8	20	22.5		
		h	25.6	29		32	33.5	38.4	39.9	44.5	46.5
	BODY	m	25.5	28				35			38.6
		n	11.2	12.2				15			16.1
		d	20	21.7				27.2			30
		D	38.5	40				51.5			50
WEIGHT [kg]			0.45	0.69			0.88	1.4	2		3.4

Note QL50N - QL280N and the equivalent models have Resin Grip, QL420N and the equivalent have Knurled Metal Handle

Alternative model
QL-MH ····· p.218
PQL ····· p.220

Tester / Checker
TCC2-G ····· p.404
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Parts list for QL ····· p.122

How to order.
Specify MODEL name
[EX.] QL100N4
Note
・Not available for inspection purpose.
・For limit switch models, error proofing type, refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS

TORQUE RANGE[N·m]
100~2800

Loading Direction | Adjustable | Ratchet Head | Graduation | 24 Gear | 19.05 | 25.4 | 38.1 | RoHS

QLE2 Ratchet Head Type Adjustable Torque Wrench

General use torque wrench for tightening bolts.

QLE2100N2 [L'=1899mm]

QLE2100N2 [L'=1103mm, Extention handle 911mm]

Application

- For various tightening applications from 100 to 2800N·m.

Features

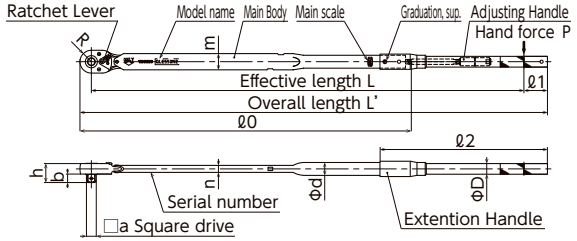
- Basic torque wrench used to tighten bolts.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a build-in handle.

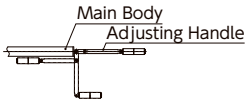
Optional Accessories

·Interchangeable socket [p.504]

Dimensions

■QLE550N2～2800N2





Specifications

Accuracy ± 3%

S.I. MODEL			QLE550N2	QLE750N2	QLE1000N2	QLE1400N2	QLE2100N2	QLE2800N2
TORQUE RANGE [N•m]	MIN. ～ MAX.		100～550	150～750	200～1000	300～1400	500～2100	800～2800
	GRAD.		5			10		20
METRIC MODEL			5500QLE2	7500QLE2	10000QLE2	14000QLE2	21000QLE2	28000QLE2
TORQUE RANGE [Kgf•m]	MIN. ～ MAX.		10～55	15～75	20～100	30～140	50～210	80～280
	GRAD.		0.5			1		2
AMERICAN MODEL			QLE400F-6A	QLE600F-6A	QLE700F-8A	QLE1000F-8A	QLE1500F-8A	QLE2000F-12A
TORQUE RANGE [lbf•ft]	MIN. ～ MAX.		100～400	150～600	200～700	300～1000	500～1500	600～2000
	GRAD.		5			10		20
APPLICABLE BOLT	COMMON STEEL		M24	(M27)	M30	(M33)	M36	(M39) M42
	HIGH TENSION		M20	(M22)	M24	(M27)	M30	(M33)
MAX. HAND FORCE [N]			500	600	715	849	1200	1250
DIMENSION [mm]	EFFECTIVE LENGTH	L	1100	1250	1400	1650	1750	2240
	OVERALL LENGTH	L'	1189	1342	1515	1787	1899	2405
	SQ. DRIVE	a	19.05		25.4			38.1
		b	20.5	21.5	26.5		28.5	42
	HEAD	R	29	32	35	37	44	50
		h	49	52	60	69	73	93
	BODY	m	42	44	52	58	66	79
		n	18		20	24	25.5	31
		d	33	34	40	45	51	60
		D	27.2	30		40		45
		ℓ0	843	900	983	971	1103	1190
		ℓ1	60		80	100	105	115
		ℓ2	426	524	625	921	911	1326
WEIGHT [kg]			4.3	5.6	7.7	11.1	14.6	23.7

Note All models with knurled metal handle
Use a through-hole socket for square drive over 25.4mm.

Alternative model

DQL/DQLE2 ····· p.224
CLE2 ····· p.234

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

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ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.

Specify MODEL name

[EX.] QLE750N2

Note
- Not available for inspection purpose.
- Contact Tohnichi for limit switch models.

TORQUE RANGE[N·m]
0.4~280

Loading Direction
Adjustable | Ratchet Head | Graduation | 24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | RoHS

QL-MH Ratchet Head Type Adjustable Torque Wrench

Knurled metal handle version of QL model.

QL100N4-MH [L'=333mm]

Application

- Suitable for use in greasy conditions (oil, chemicals, etc.) such as garage work.

Features

- Metal handle version of QL model
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a knob.
- Large adjusting knob designed to enhance usability in torque setting by oily hands.

Optional Accessories

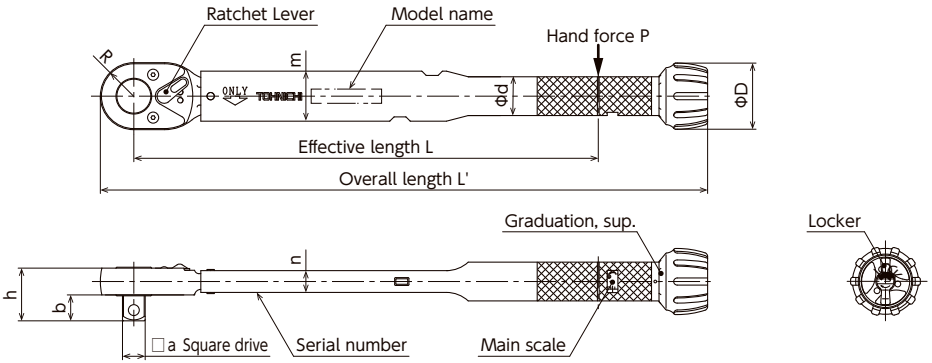
·Interchangeable socket [p.504]

·Carrying case [p.491]

·Protective Head Cover

[p.501]

Dimensions



Specifications

Accuracy ± 3%

S.I. MODEL			QL2N-MH	QL5N-MH	QL10N-MH	QL15N-MH	QL25N-MH	QL50N-MH	QL100N4-MH	QL140N-MH	QL200N4-MH	QL280N-MH
TORQUE RANGE [N•m]	MIN. ~ MAX.		0.4~2	1~5	2~10	3~15	5~25	10~50	20~100	30~140	40~200	40~280
	GRAD.		0.02	0.05	0.1		0.25	0.5	1		2	
METRIC MODEL			20QL-MH	50QL-MH	100QL-MH	150QL-MH	225QL-MH	450QL-MH	900QL4-MH	1400QL-MH	1800QL4-MH	2800QL-MH
TORQUE RANGE [Kgf•cm / Kgf•m]	MIN. ~ MAX.		kgf•cm 4~20	10~50	20~100	30~150	50~250	100~500	200~1000	300~1400	400~2000	kgf•m 4~28
	GRAD.		kgf•cm 0.2	0.5	1		2.5	5	10		20	kgf•m 0.2
AMERICAN MODEL			QL15I-2A-MH	QL30I-2A-MH	QL50I-2A-MH	QL100I-2A-MH	-					
TORQUE RANGE [lbf•in]	MIN. ~ MAX.		3~15	6~30	10~50	20~100	-					
	GRAD.		0.1	0.2	0.5	1	-					
APPLICABLE BOLT	COMMON STEEL		M4	M5,M6	(M7)	M8		M10	M12(M14)	M16	(M18)	M20
	HIGH TENSION		(M3.5)	(M4.5)	M6	(M6)M7	(M7)	M8	M10	M12	(M14)	M16
MAX. HAND FORCE [N]			20	50	74.1	112	155	278	393	438	500	467
DIMENSION [mm]	EFFECTIVE LENGTH	L	100		135		162	180	255	320	400	600
	OVERALL LENGTH	L'	160		195		226	258	333	400	489	692
	SQ. DRIVE	a	6.35				9.53		12.7			19.05
		b	7.5				11		14		15.4	20.5
	HEAD	R	11.5				13	16	17	18.8	20	22.5
		h	17.5				22	25.6	32	33.5	38.4	44.5
	BODY	m	19					25.5	28		35	
		n	9.2					11.2	12.2		15	
		d	15					20	21.7		27.2	
		D	25.5				26.5	36	37		46.5	
WEIGHT [kg]			0.16		0.19		0.25	0.45	0.69	0.79	1.4	1.9

Alternative model

QL ····· p.212
PQL ····· p.220

Error-proofing (Pokayoke)

QLLS/ CLLS/ PQLLS/
PCLLS/ TiQLLS ····· p.280

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
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How to order.

Specify MODEL name

[EX.] QL100N4-MH

Note
•Not available for inspection purpose.

TORQUE RANGE[N·m]
2~420

Loading Direction
Pre-Lock | Ratchet Head | Graduation | 24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | RoHS

PQL Ratchet Head Type Adjustable Torque Wrench

Combined adjustable and preset function.

PQL100N4 [L'=320mm]

PQL10N [L'=190mm]

Application

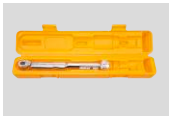
- Suitable for assembly line of critical parts and mass production.

Features

- Pre-lock version of QL model.
- Setting torque can be operated by an attached hex key to avoid torque change by human mistake.
- Suitable for mass production as single purpose with graduation.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.

Optional Accessories

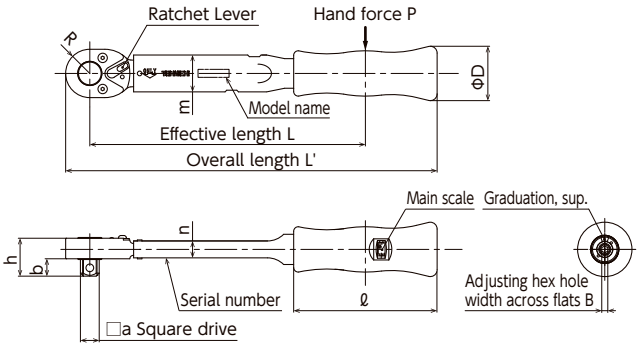
·Interchangeable socket [p.504]



·Carrying case [p.491]

·Protective Head Cover [p.501]

Dimensions



Specifications

Accuracy ± 3%

S.I. MODEL			PQL10N	PQL15N	PQL25N	PQL50N	PQL100N4	PQL140N	PQL200N4	PQL280N	PQL420N
TORQUE RANGE [N·m]	MIN. ～ MAX.		2～10	3～15	5～25	10～50	20～100	30～140	40～200	40～280	60～420
	GRAD		0.1		0.25	0.5	1		2		
METRIC MODEL			100PQL	150PQL	225PQL	450PQL	900PQL4	1400PQL	1800PQL4	2800PQL	4200PQL
TORQUE RANGE [Kgf·cm / Kgf·m]	MIN. ～ MAX.		kgf·cm 20～100	30～150	50～250	100～500	200～1000	300～1400	400～2000	kgf·m 4～28	6～42
	GRAD.		kgf·cm 1		2.5	5	10		20	kgf·m 0.2	
AMERICAN MODEL			PQL50I-2A	PQL100I-2A	225PQL-A	450PQL-A	900PQL4-A	1400PQL-A	1800PQL4-A	-	
TORQUE RANGE [lbf·in / lbf·ft]	MIN. ～ MAX.		lbf·in 10～50	20～100	50～200	100～400	lbf·ft 15～75	30～100	30～150	-	
	GRAD.		lbf·in 1		2.5	5	lbf·ft 1		2	-	
APPLICABLE BOLT	COMMON STEEL		(M7)	M8		M10	M12 (M14)	M16	(M18)	M20	(M22)
	HIGH TENSION		M6	(M6) M7	(M7)	M8	M10	M12	(M14)	M16	(M18)
MAX. HAND FORCE [N]			74.1	111	159	274	396	441	504	470	475
DIMENSION [mm]	EFFECTIVE LENGTH	L	135		158	182.5	253	317.5	397.5	597	885.5
	OVERALL LENGTH	L'	190		215	250	320	385	470	670	972
	SQ. DRIVE	a	6.35		9.53		12.7			19.05	
		b	7.5		11		14		15.4	20.5	
	HEAD	R	11.5		11	16	17	18.8	20	22.5	25.5
		h	17.5		22	25.6	32	33.5	38.4	44.5	46.5
	BODY	m	19			25.5	28		35		38.6
		n	9.2			11.2	12.2		15		16.1
		D	28		30	36	37.7		44.2		49
		ℓ	84		85	95	100			128	138.5
		B	2.5			4					
WEIGHT [kg]			0.19		0.25	0.4	0.65	0.75	1.4	2	3.4

Standard Accessory Hex Key

Alternative model

QL ····· p.212
QL-MH ····· p.218

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
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How to order.

Specify MODEL name

[EX.] PQL100N4

Note

- Not available for inspection purpose.
- For limit switch models, error proofing type, refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS

MTQL Torque Wrench for Motorsports

Wide range torque wrench for motorsports vehicle.

MTQL40N [L'=245㎜]

MTQL70N [L'=286㎜]

MTQL140N [L'=399㎜]

Application

- Maintenance use for sports related vehicles including bicycles, motorcycles and automobiles.

Features

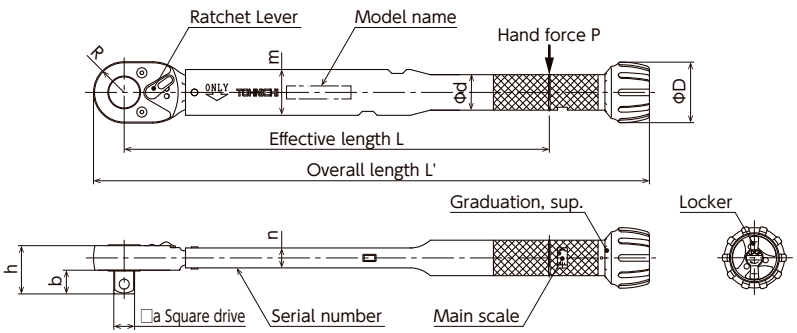
- Wide range torque wrench.
- Knurled Grip.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a knob.
- All models come with a carrying case.

Optional Accessories

·Interchangeable socket [p.504]

·Carrying case [p.491]

Dimensions



Specifications

Accuracy ± 5%

S.I. MODEL			MTQL40N	MTQL70N	MTQL140N
TORQUE RANGE [N·m]	MIN. ~ MAX.		5~40	10~70	20~140
	GRAD.		0.5	1	
METRIC MODEL			400MTQL	700MTQL	1400MTQL
TORQUE RANGE [Kgf·m]	MIN. ~ MAX.		0.5~4	1~7	2~14
	GRAD.		0.05	0.1	
APPLICABLE BOLT	COMMON STEEL		M6, M8, M10	M8, M10, M12, (M14)	M10, M12, (M14), M16
	HIGH TENSION		M5, M6, (M7), M8	M6, (M7), M8, M10	(M7), M8, M10, M12
MAX. HAND FORCE [N]			228	338	438
DIMENSION [mm]	EFFECTIVE LENGTH	L	176	207.5	320
	OVERALL LENGTH	L'	245	286	399
	SQ. DRIVE	a	9.53		12.7
		b	11		14
	HEAD	R	13	16	18.8
		h	27.5	25.6	33.5
	BODY	m	25.5		28
		n	11.2		12.2
		d	20		21.7
		D	36		37
WEIGHT [kg]			0.45	0.47	0.77

Note All MTQL model with 5% accuracy
Standard Accessory Carrying Case

Alternative model

QL ····· p.212
QL-MH ····· p.218
PQL ····· p.220

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.

Specify MODEL name

[EX.] MTQL140N

Note
·Not available for inspection purpose.
·5% Accuracy

TORQUE RANGE[N·m]
40~1000

Loading Direction
Adjustable | Ratchet Head | Graduation | Bi-Direction | 24 Gear | 12.7 | 19.05 | 25.4 | RoHS

DQL/ DQLE2 Dual Square Drives Type Adjustable Torque Wrench

Torque wrench with dual square drives for both clock and counterclockwise tightening.

DQL200N4 [L'=489mm]

DQLE550N2 [L'=1189mm]

Application

- Applicable for bolt tightening of large trucks and buses tires.
- Torque management for bi-directional tightening.

Features

- Applicable for both clock and counterclockwise by one torque wrench with dual square drive.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.
- Easy torque setting by turning a knob.

Optional Accessories

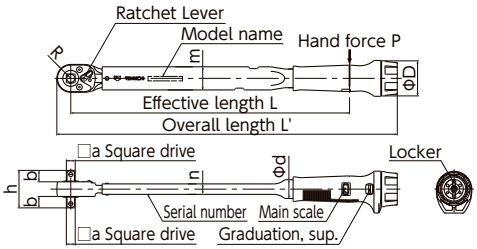
·Interchangeable socket [p.504]

·Carrying case [p.491]

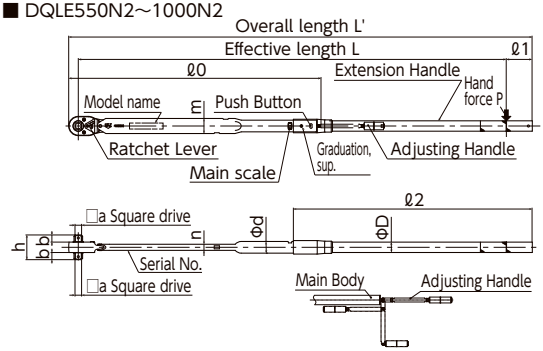
·Protective Head Cover [p.501]

Dimensions

■ DQL200N4, DQL280N



■ DQLE550N2~1000N2



Specifications

Accuracy ± 3%

S.I. MODEL			DQL200N4	DQL280N	DQLE550N2	DQLE750N2	DQLE1000N2
TORQUE RANGE [N·m]	MIN. ~ MAX.		40~200	40~280	100~550	150~750	200~1000
	GRAD.		2		5		
METRIC MODEL			1800DQL4	2800DQL3	5500DQLE2	7500DQLE2	10000DQLE2
TORQUE RANGE [Kgf·cm / Kgf·m]	MIN. ~ MAX.		Kgf·cm 400~2000	Kgf·m 4~28	10~55	15~75	20~100
	GRAD.		Kgf·cm 20	Kgf·m 0.2	0.5		
AMERICAN MODEL			1800DQL4-A	2800DQL3-A	DQLE400F-6A	DQLE600F-6A	DQLE700F-8A
TORQUE RANGE [lbf·ft]	MIN.~MAX.		30~150	30~200	100~400	150~600	200~700
	GRAD.		2		5		
APPLICABLE BOLT	COMMON STEEL		(M18)	M20	M24	(M27)	M30
	HIGH TENSION		(M14)	M16	M20	(M22)	M24
MAX. HAND FORCE [N]			500	467	500	600	715
DIMENSION [mm]	EFFECTIVE LENGTH	L	400	600	1100	1250	1400
	OVERALL LENGTH	L'	489	692	1189	1342	1515
	SQ. DRIVE	a	12.7	19.05			25.4
		b	15.4	20.5		21.5	26.5
	HEAD	R	20	22.5	29	32	35
		h	53.8	63.7	70	74.4	87
	BODY	m	35		42	44	52
		n	15		18		20
		d	27.2		33	34	40
		D	51.5		27.2	30	
		ℓ0	-		843	900	983
		ℓ1	-		60		80
		ℓ2	-		426	524	625
WEIGHT [kg]			1.4	2	4.5	5.7	7.9

Alternative model
TW2 ····· p.226
BQSP ····· p.258
BCSP ····· p.260

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416
ST3-G ····· p.418

How to use
Method of setting torque ····· p.353
How to apply force ···· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO9000 related documents ···· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.
Specify MODEL name
[EX.] DQL200N4
Note
·Not available for inspection purpose.
·All DQLE models with extension handle.

TW2 Adjustable Torque Wrench with Multiplier

Easily and correctly, tightening bolts of big vehicle wheels by one operator.

TW1000N2

Example

Application

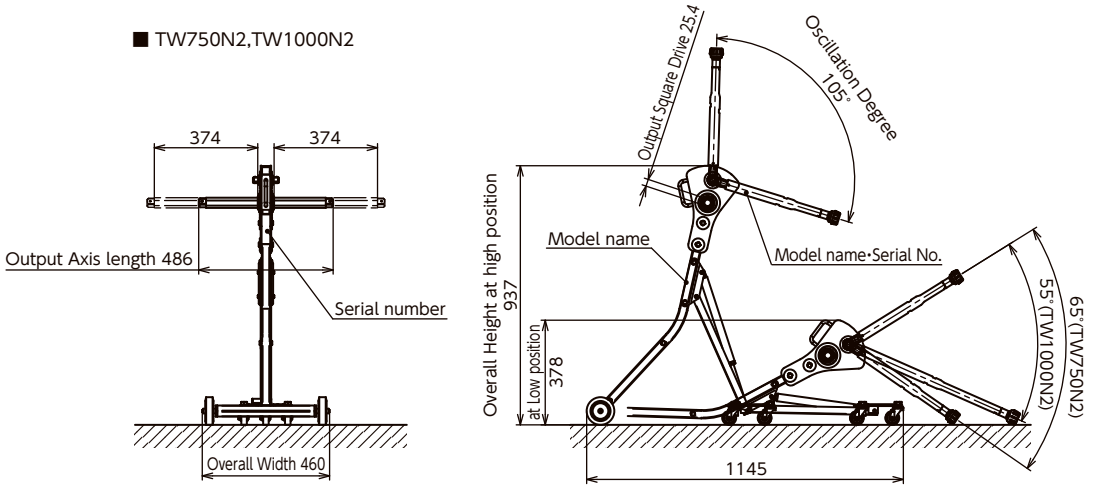
- Applicable for bolt tightening of large trucks and buses tires.

Features

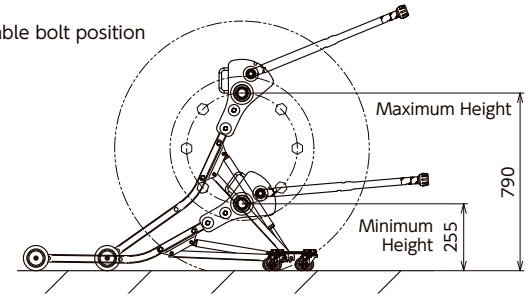
- The TW2 series are large stand-alone torque wrenches. Tasks that generally require two operators can be done with just one.
- The built-in mechanism multiplies force about 3 times, making it suitable even for tightening wheel nuts on large trucks. So less physical strength is required.
- Adjusting tightening position is free by damper.
- The unique caster layout offers freedom of access to the job at hand.
- Less cost without any power source.
- Power source (pneumatic or electrical) not required.
- Torque checking and tightening can be performed easily at the same time with the SPINTORK ST1000N3-G.
- ±5% Accuracy and bi-direction tightening.

Dimensions

■ TW750N2,TW1000N2



■ Available bolt position



Specifications

Accuracy ± 5%

S.I. MODEL		TW750N2	TW1000N2
TORQUE RANGE [N･m]	MIN. - MAX.	350～750	400～1000
	GRAD.	5	
DIMENSION [mm]	SQ. DRIVE	25.4	
WEIGHT [kg]	BODY	20	
	TORQUE WRENCH	1.5	2

Note 1. Interchangeable socket, Pin and O-ring are not attached.
2. Available height of bolt position : 255 to 790mm the ground.

Alternative model
DQL/DQLE2 ····· p.224

Tester / Checker
LC3-G ····· p.416
ST3-G ····· p.418

How to use
Method of setting torque ····· p.353
How to apply force ····· p.356

How to order.
Specify MODEL name
[EX.] TW1000N2

Loading Direction Adjustable Graduation Pipe-Wrench Head RoHS

PHL/ PHLE2 Pipe-Wrench Head Type Adjustable Torque Wrench

Torque wrench suitable for use with pipes and plumbing applications.

PHLE850N2 [L'=1664mm]

PHL140N [L'=517mm]

Application

- For pipe work use in water/gas supply works and building construction.

Features

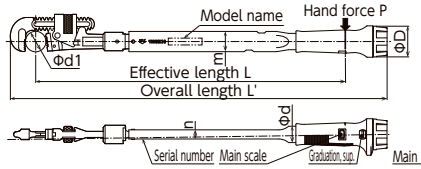
- The head is designed to grip pipes and is ideal for pipe work such as water and gas supply maintenance and construction.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- Easy torque setting by turning a knob.

Usage example

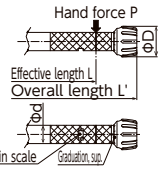
PHL140N

Dimensions

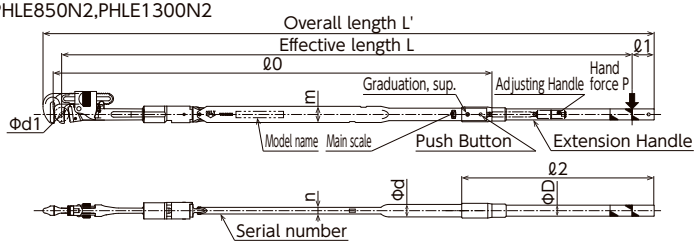
■ PHL50N~280N

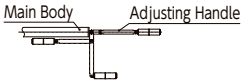


■ PHL420N



■ PHLE850N2,PHLE1300N2





Specifications

Accuracy ± 5%

S.I. MODEL			PHL50N	PHL100N	PHL140N	PHL200N	PHL280N	PHL420N	PHLE850N2	PHLE1300N2
TORQUE RANGE [N·m]	MIN.~MAX.		10~50	20~100	30~140	40~200	40~280	60~420	200~850	300~1300
	GRAD.		0.5	1		2			5	
METRIC MODEL			500PHL3	900PHL3	1400PHL3	1800PHL3	2800PHL3	4200PHL	8500PHLE2	13000PHLE2
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.		kgf·cm 100~500	200~1000	400~1400	400~1800	kgf·m 4~28	6~42	20~85	30~130
	GRAD.		kgf·cm 5	10		20	kgf·m 0.2		0.5	
AMERICAN MODEL			450PHL3-A	900PHL3-A	1400PHL3-A	1800PHL3-A	2800PHL3-A	4200PHL-A	PHLE600F	PHLE900F
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.		lbf·in 100~400	lbf·ft 15~75	30~100	30~150	30~200	60~300	150~600	200~900
	GRAD.		lbf·in 5	lbf·ft 1		2			5	
MAX. HAND FORCE [N]			171	272	329	393	388	412	548	765
GRIPPABLE PIPE DIA. [mm]			13~38					26~52		
Pipe-Wrench	NOMINAL SIZE		350					450		
	STANDARD DIA.	φd1	25.5					39		
DIMENSION [mm]	EFFECTIVE LENGTH	L	293	368	426.6	510	721.7	1020	1553.5	1700.5
	OVERALL LENGTH	L'	396	472	517	620	833	1139	1664	1831
	BODY	m	25.5	28		35		38.6	44	52
		n	11.2	12.2		15		16.1	18	20
		d	20	21.7		27.2		30	34	40
		D	38.5	40		51.5		50	30	30
		ℓ0	-						1396	1473
		ℓ1	-						60	80
		ℓ2	-						524	625
WEIGHT [kg]			1.5	1.6	1.8	2.3	2.9	4.8	8.2	10

Note 1. PHLE2 Models have an extension bar handle.
2. PHL420N, PHLE850N2, and PHLE1300N2 have a knurled handle.
Standard Accessories Adjusting handle (for PHLE850N2 and PHLE1300N2)

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Tool selection ····· p.72
ISO 9000 related documents ··· p.90

How to order.

Specify MODEL name

[EX.] PHLE850N2

Note
- Cannot be used for inspection purpose.
- PHLE2 models come with an extension handle.
- Due to change of the effective length depending on the pipe diameter, accuracy for PHL(E) is limited to ±5%.

Loading Direction Adjustable Interchangeable Graduation 8D 10D RoHS

CL Interchangeable Head Type Adjustable Torque Wrench

Interchangeable head applicable for multi-purpose use.

CL15NX8D [L'=199mm]

Application

- For tightening various kinds of bolts on production lines.

Features

- Same features as QL type with interchangeable heads.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- A large and clear scale in resin grip.
- Easy torque setting by turning a knob.

Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

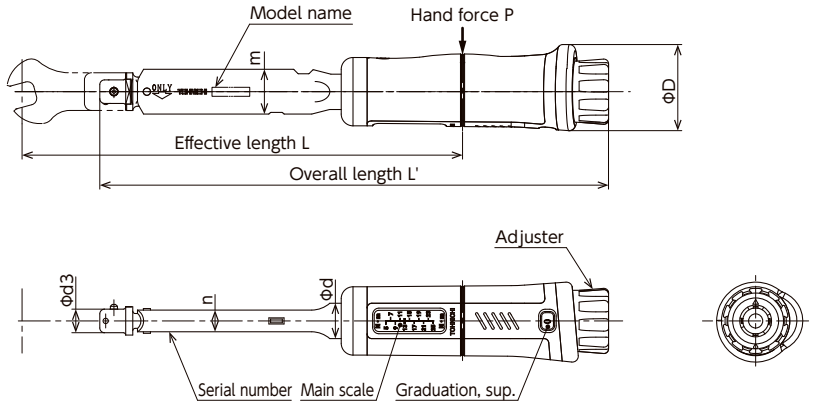
・Cap [p.501]

Cap examples

CL25N5X10D Main Scale

Dimensions

■ CL2N～25N5



Specifications

Accuracy ± 3%

S.I. MODEL			CL2NX8D	CL5NX8D	CL10NX8D	CL15NX8D	CL25N5X10D
TORQUE RANGE [N•m]	MIN. ～ MAX.		0.4～2	1～5	2～10	3～15	5～25
	GRAD.		0.02	0.05	0.1		0.2
METRIC MODEL			20CL	50CL	100CL	150CL	225CL5
TORQUE RANGE [kgf•cm]	MIN. ～ MAX.		4～20	10～50	20～100	30～150	50～250
	GRAD.		0.2	0.5	1		2.5
AMERICAN MODEL			CL15IX8D	CL30IX8D	CL50IX8D	CL100IX8D	CL200IX10D
TORQUE RANGE [lbf•in]	MIN. ～ MAX.		3～15	6～30	10～50	20～100	50～200
	GRAD.		0.1	0.2	0.5		2.5
APPLICABLE BOLT	COMMON STEEL		M4	M5,M6	(M7)	M8	M8
	HIGH TENSION		(M3.5)	(M4.5)	M6	(M6) M7	(M7)
MAX. HAND FORCE [N]			14.6	36.4	61.6	92.4	133.7
DIMENSION [mm]	EFFECTIVE LENGTH	L	137.5		162.5		187
	OVERALL LENGTH	L'	174		199		216
	HEAD	d3	8				10
	BODY	m	19				
		n	9.2				
		d	15				
		D	37				
WEIGHT [kg]			0.24		0.26		0.3

Overall length does not include interchangeable head

Alternative model
CL-MH ····· p.236
PCL ····· p.240
YCL2 ····· p.242

Error-proofing (Pokayoke)
QLLS/CLLS/
PQLLS/ PCLLS/
TiQLLS ····· p.280

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

Refer P.500 for dimension of head adjusting part.

How to order.

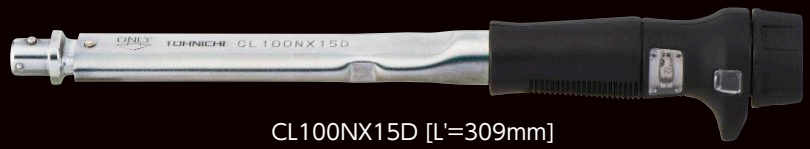
Specify MODEL name

[EX.] CL25N5X10D

Note
- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS.

CL Interchangeable Head Type Adjustable Torque Wrench

Interchangeable head applicable for multi-purpose use.



CL100NX15D [L'=309mm]

CL420NX22D [L'=940mm]

Application

- For tightening various kinds of bolts on production lines.

Features

- Same features as QL type with interchangeable heads.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- CL50N~CL280N have resin grips and CL420N has a knurled handle.
- Easy torque setting by turning a knob.
- AH adjustable head can be attached to CL50Nx15D, CL100Nx15D, and CL140Nx15D.

Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

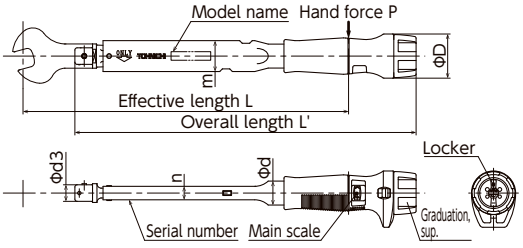
・Carrying case [p.491]
(except for CL420NX22D)

Usage Example

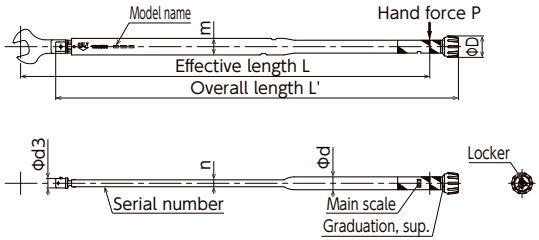
CL50NX15D and AH15D2X26

Dimensions

■ CL50N~280N



■ CL420N



Specifications

Accuracy ± 3%

S.I.MODEL			CL50NX12D	CL50NX15D	CL100NX15D	CL140NX15D	CL200NX19D	CL280NX22D	CL420NX22D
TORQUE RANGE [N•m]	MIN.~MAX.		10~50		20~100	30~140	40~200	40~280	60~420
	GRAD.		0.5		1		2		
METRIC MODEL			450CL3	500CL3	900CL3	1400CL3	1800CL3	2800CL3	4200CL2
TORQUE RANGE [kgf•cm/kgf•m]	MIN.~MAX.		kgf•cm 100~500		200~1000	300~1400	400~2000	kgf•m 4~28	6~42
	GRAD.		kgf•cm 5		10		20	0.2	
AMERICAN MODEL			450CL3-A	500CL3-A	900CL3-A	1400CL3-A	1800CL3-A	2800CL3-A	4200CL3-A
TORQUE RANGE [lbf•in/lbf•ft]	MIN.~MAX.		lbf•in 100~400	100~450	200~800	lbf•ft 30~100	30~150	30~200	60~300
	GRAD.		lbf•in 5		10	lbf•ft 1	2		
APPLICABLE BOLT	COMMON STEEL		M10		M12 (M14)	M16	(M18)	M20	(M22)
	HIGH TENSION		M8		M10	M12	(M14)	M16	(M18)
MAX. HAND FORCE [N]			239	228	339	397	450	425	443
DIMENSION [mm]	EFFECTIVE LENGTH	L	210	220	295	353	445	660	950
	OVERALL LENGTH	L'	232	235	309	368	454	652	940
	HEAD	d3	12	15			19	22	
	BODY	m	25.5		28		35		38.6
		n	11.2		12.2		15		16.1
		d	20		21.7		27.2		30
		D	38.5		40		51.5		45
WEIGHT[kg]			0.37		0.52	0.67	1.2	1.8	3.1

Note 1. Overall length does not include interchangeable head. Interchangeable heads are optional
2. PH(Pipe wrench head) type cannot be used.
3. CL50N ~ CL280N have resin grips and CL420N have a knurled handle.

Alternative model
CL-MH ····· p.236
PCL ····· p.240
YCL2 ····· p.242

Error-proofing (Pokayoke)
QLLS/CLLS/
PQLLS/ PCLLS/
TiQLLS ····· p.280

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

Refer P.500 for dimension of head adjusting part.

How to order.
Specify MODEL name
[EX.] CL100NX15D
Note
・Cannot be used for inspection purpose.
・For limit switch type models (error proofing type), refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS.

Loading Direction | Adjustable | Interchangeable | Graduation | 27D | 32D | RoHS

CLE2 Interchangeable Head Type Adjustable Torque Wrench

Interchangeable head applicable for multi-purpose use.

CLE550N2X27D [L'=1148mm]

Application

- For tightening various kinds of bolts on production lines.

Features

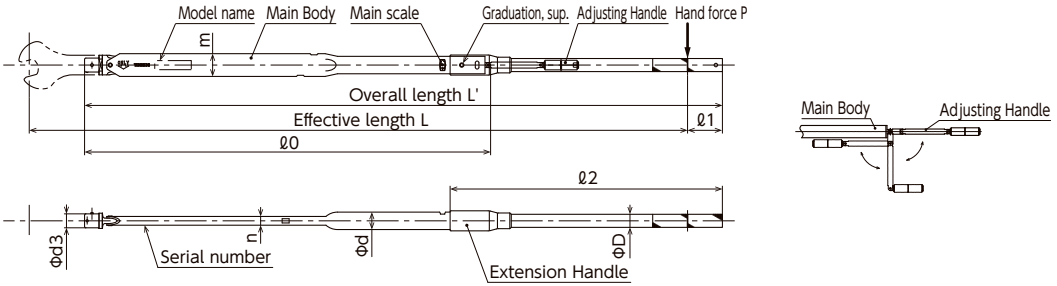
- Interchangeable head type of QLE.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- CLE550N2～1200N2 have knurled handles.
- Easy torque setting by turning a build-in handle.

Optional Accessories

·Interchangeable head [p.492]

·Interchangeable socket [p.504]

Dimensions



Specifications

Accuracy ± 3%

S.I.MODEL			CLE550N2X27D	CLE750N2X27D	CLE850N2X32D	CLE1200N2X32D
TORQUE RANGE [N•m]	MIN.~MAX.		100~550	150~750	200~850	300~1200
	GRAD.		5			
METRIC MODEL			5500CLE2	7500CLE2	8500CLE2	12000CLE2
TORQUE RANGE [kgf•m]	MIN.~MAX.		10~55	15~75	20~85	30~120
	GRAD.		0.5			
AMERICAN MODEL			CLE400FX27D	CLE550FX27D	CLE600FX32D	CLE900FX32D
TORQUE RANGE [lbf•ft]	MIN.~MAX.		100~400	150~550	150~600	200~900
	GRAD.		5			
APPLICABLE BOLT	COMMON STEEL		M24	(M27)	M30	(M33)
	HIGH TENSION		M20	(M22)	M24	(M27)
MAX. HAND FORCE [N]			465	565	624	795
DIMENSION [mm]	EFFECTIVE LENGTH	L	1185	1328	1364	1511
	OVERALL LENGTH	L'	1148	1291	1297	1464
	HEAD	d3	27		32	
	BODY	m	42	44		52
		n	18			20
		d	33	34		40
		D	27.2	30		
		ℓ0	802	849	855	932
		ℓ1	60			80
		ℓ2	426	524		625
WEIGHT[kg]			3.9	4.9	5.1	7.6

Note Overall length does not include interchangeable head.

Error-proofing (Pokayoke)
QLLS/CLLS/ PQLLS/ PCLLS/ TiQLLS ····· p.280

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408

TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical date
Torque unit ····· p.29
Human error ····· p.57

Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

Refer P.500 for dimension of head adjusting part.

How to order.
Specify MODEL name
[EX.] CLE850N2x32D
Note
- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), please contact an appropriate agency.

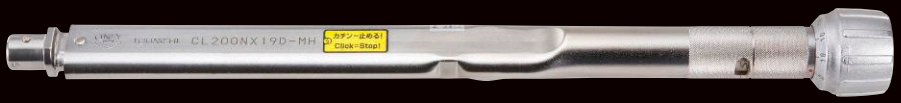
TORQUE RANGE[N·m]
0.4~280

Loading Direction
Adjustable | Interchangeable | Graduation

8D | 10D | 12D | 15D | 19D | 22D | RoHS

CL-MH Interchangeable Head Type Adjustable Torque Wrench with Metal Handle

Knurled metal handle version of CL model.



CL200NX19D-MH [L'=454㎜]

Application

- Suitable for use in greasy conditions(oil, chemicals, etc) such as garage work.

Features

- Same features as QL-MH type with interchangeable heads.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- AH adjustable head can be attached to CL25NX10D-MH, CL50NX12D-MH, CL50Nx15D-MH, CL100Nx15D-MH, and CL140Nx15D-MH.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.

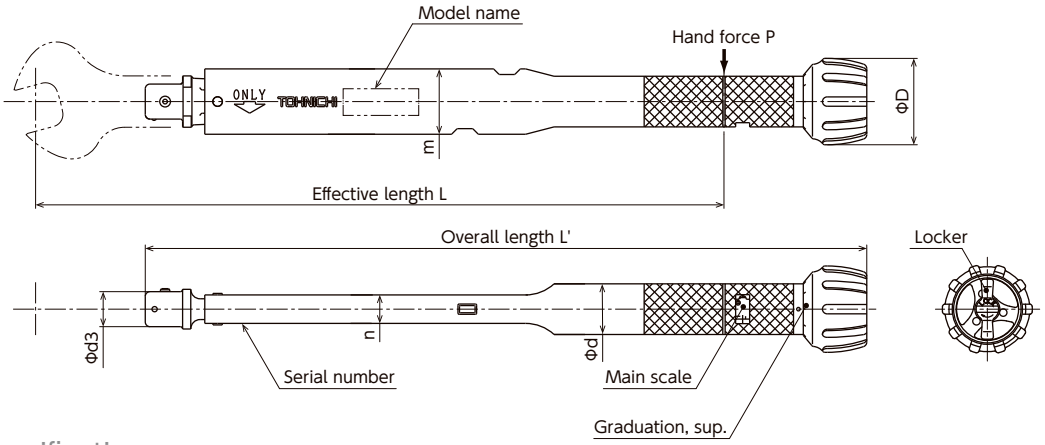
Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

・Carrying case [p.491]
(for CL50N-280N)

Dimensions



Specifications

Accuracy ± 3%

S.I. MODEL			CL2NX8D-MH	CL5NX8D-MH	CL10NX8D-MH	CL15NX8D-MH	CL25NX10D-MH	CL50NX12D-MH	CL50NX15D-MH	CL100NX15D-MH	CL140NX15D-MH	CL200NX19D-MH	CL280NX22D-MH
TORQUE RANGE [N·m]	MIN. ~ MAX.		0.4~2	1~5	2~10	3~15	5~25	10~50		20~100	30~140	40~200	40~280
	GRAD.		0.02	0.05	0.1		0.25	0.5		1		2	
METRIC MODEL			20CL-MH	50CL-MH	100CL-MH	150CL-MH	225CL-MH	450CL-MH	500CL-MH	900CL-MH	1400CL-MH	1800CL-MH	2800CL-MH
TORQUE RANGE [Kgf·cm / Kgf·m]	MIN. ~ MAX.		kgf·cm 4~20	10~50	20~100	30~150	50-250	100-500		200-1000	300-1400	400-2000	kgf·m 4~28
	GRAD.		kgf·cm 0.2	0.5	1		2.5	5		10		20	kgf·m 0.2
AMERICAN MODEL			CL15IX8D-MH	CL30IX8D-MH	CL50IX8D-MH	CL100IX8D-MH	-	-	-	-	-	-	-
TORQUE RANGE [lbf·in]	MIN. ~ MAX.		3~15	6~30	10~50	20~100	-	-	-	-	-	-	-
	GRAD.		0.1	0.2	0.5	1	-	-	-	-	-	-	-
APPLICABLE BOLT	COMMON STEEL		M4	M5,M6	(M7)	M8		M10		M12(M14)	M16	(M18)	M20
	HIGH TENSION		(M3.5)	(M4.5)	M6	(M6)M7	(M7)	M8		M10	M12	(M14)	M16
MAX. HAND FORCE [N]			17.2	43	65.6	98.4	134	239	228	339	395	450	425
DIMENSION [mm]	EFFECTIVE LENGTH	L	116.5		152.5		187	210	220	295	355	445	660
	OVERALL LENGTH	L'	139		174		205	232	235	309	368	454	652
	HEAD	d3	8				10	12	15			19	22
	BODY	m	19					25.5		28		35	
		n	9.2					11.2		12.2		15	
		d	15					20		21.7		27.2	
		D	25.5				26.5	36		37		46.5	
WEIGHT [kg]			0.13		0.16		0.25	0.45		0.69	0.79	1.4	1.9

Note 1. Overall length does not include interchangeable head.
2. PH (Pipe wrench head) cannot be used with CL-MH.

Alternative model

CL ····· p.230
PCL ····· p.240
YCL2 ····· p.242

Torque wrench with Limit switch (Error Proofing)

QLLS/ CLLS/ PQLLS/ PCLLS/ TiQLLS ····· p.280

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ···· p.353
How to apply force ···· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

How to order.

Specify MODEL name

[EX.] CL100NX15D-MH

Note
・Cannot be used for inspection purpose.

SCL European Style Interchangeable Head Type Adjustable Torque Wrench

Adjustable torque wrench with DIN interchangeable head connector.

DIN Style Head

SCL50N - 9x12

Application

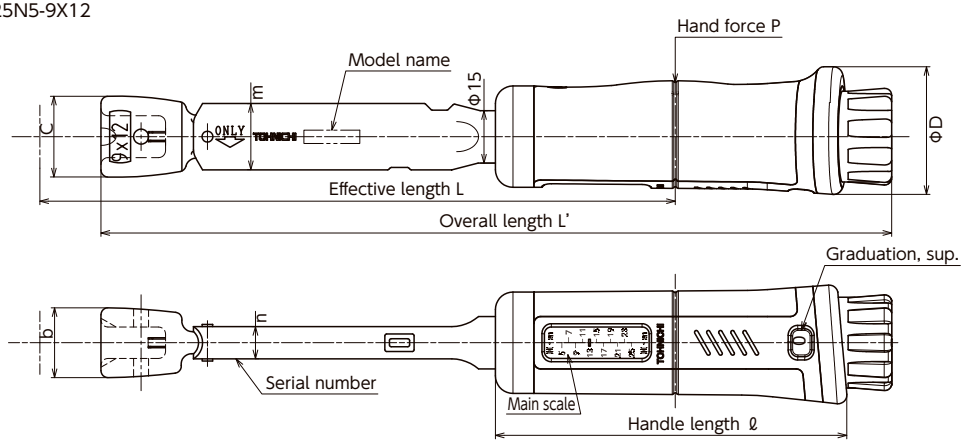
- For tightening various kinds of bolts on production lines.

Features

- Same features as CL torque wrench with DIN connector (DIN = German standard).
- A clear "click" sound signals tightening completion upon reaching the set torque.
- Easy torque setting by turning a knob.

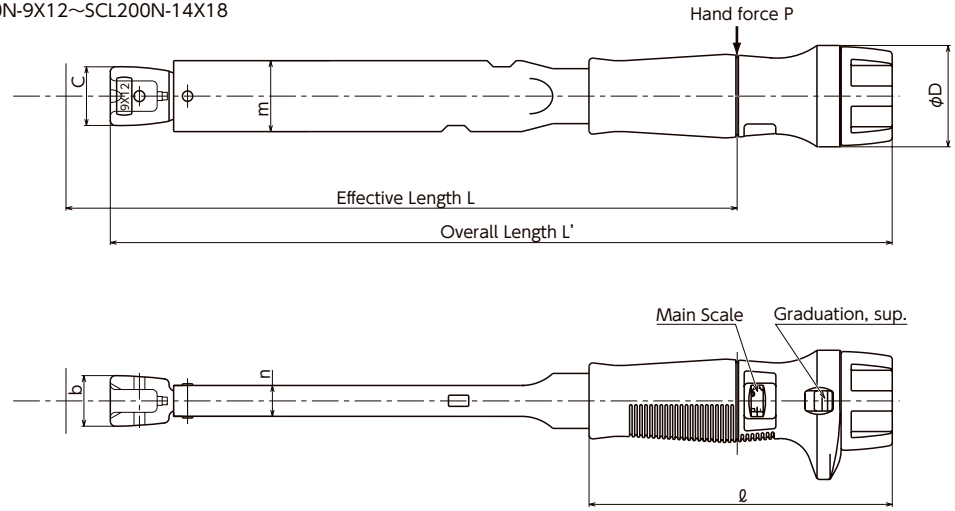
Dimensions

■ SCL25N5-9X12



Dimensions

■ SCL50N-9X12～SCL200N-14X18



Specifications

Accuracy ± 3%

S.I. MODEL			SCL25N5-9X12	SCL50N-9x12	SCL100N-9x12	SCL200N-14x18
TORQUE RANGE[N•m]	MIN. ～ MAX.		5～25	10～50	20～100	40～200
HEAD SIZE [mm]			9x12			14x18
MAX. HAND FORCE [N]			137	256	370	476
DIMENSION [mm]	EFFECTIVE LENGTH	L	182	239	313	464
	OVERALL LENGTH	L'	226	195	270	420
	HEAD	C	23			30
		b	20			26
	BODY	m	19	25.5	28	35
		n	9.2	11.2	12.2	15
		d	37	38.5	40	52.5
		ℓ	110	102	120	
WEIGHT [kg]			0.22	0.37	0.52	1.2

Note 1. Overall length does not include the interchangeable head part.
2. Applicable to European Style head only. TOHNICHI interchangeable head cannot be used.

Alternative model
CL ····· p.230
PCL ····· p.240
YCL2 ····· p.242

Error-proofing (Pokayoke)
QLLS/ CLLS/ PQLLS/
PCLLS/ TiQLLS ····· p.280

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

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Technical data
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Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool method ····· p.103
Adjustment method ····· p.109

How to order.
Specify MODEL name
[EX.] SCL25N-9x12
Note
・Cannot be used for inspection purpose.

PCL Interchangeable Head Type Pre-lock Torque Wrench

Combination of preset and adjustable type torque wrench with interchangeable heads.

PCL100NX15D [L'=296㎜]

PCL10NX8D [L'=168㎜]

Application

- For tightening various kinds of bolts on production lines.

Features

- Pre-lock mechanism as PQL with interchangeable head.
- Interchangeable head type of PQL.
- The set torque cannot be changed without using a hex key(standard accessory), preventing the operator from changing torque by mistake.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- AH adjustable head can be attached to PCL25NX10D, PCL50NX12D, PCL50NX15D, PCL100NX15D, and PCL140NX15D.

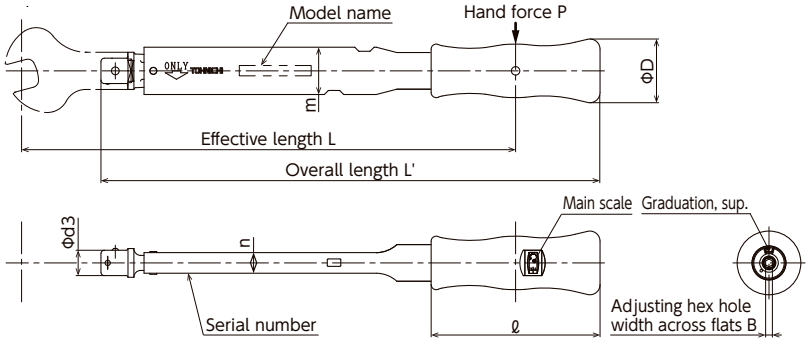
Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

・Carrying case [p.491]
(for PCL50N-200N)

Dimensions



Specifications

Accuracy ± 3%

S.I.MODEL			PCL10NX8D	PCL15NX8D	PCL25NX10D	PCL50NX12D	PCL50NX15D	PCL100NX15D	PCL140NX15D	PCL200NX19D
TORQUE RANGE [N•m]	MIN. - MAX.		2~10	3~15	5~25	10~50		20~100	30~140	40~200
	GRAD.		0.1		0.25	0.5		1		2
METRIC MODEL			100PCL	150PCL	225PCL	450PCL	500PCL	900PCL	1400PCL	1800PCL
TORQUE RANGE [kgf•cm]	MIN. - MAX.		20~100	30~150	50~250	100~500		200~1000	300~1400	400~2000
	GRAD.		1		2.5	5		10		20
AMERICAN MODEL			PCL50IX8D	PCL100IX8D	225PCL-A	450PCL-A	500PCL-A	900PCL4-A	1400PCL-A	1800PCL-A
TORQUE RANGE [lbf•in/lbf•ft]	MIN. - MAX.		lbf-in 10~50	20~100	50~200	100~400	100~450	lbf-ft 15~75	30~100	30~150
	GRAD.		lbf-in 0.5	1	2.5	5		lbf-ft 1		2
APPLICABLE BOLT	COMMON STEEL		(M7)	M8		M10		M12 (M14)	M16	(M18)
	HIGH TENSION		M6	(M6) M7	(M7)	M8		M10	M12	(M14)
MAX. HAND FORCE [N]			65.6	98.4	132	236	225	342	398	454
DIMENSION [mm]	EFFECTIVE LENGTH	L	152.5		189.5	212.5	222.5	292.5	352	441.5
	OVERALL LENGTH	L'	168		199	220	223	296	355	432
	HEAD	d3	8		10	12	15			19
	BODY	m	19			25.5		28		35
		n	9.2			11.2		12.2		15
		D	28		30	36		37.7		44.2
		ℓ	84		85	95		100		
		B	2.5			4				
WEIGHT [kg]			0.16		0.22	0.32		0.48	0.63	1.3

Note 1.Overall length does not include the interchangeable head part 2.PH (Pipe wrench head) cannnot be used with PCL.
Standard Accessory Hex key (for torque adjustment)

Refer P.500 for dimension of head adjusting part.

Alternative model
CL ····· p.230
CL-MH ····· p.236
YCL2 ····· p.242

Torque wrench with Limit switch (Error Proofing)
QLLS/ CLLS/ PQLLS/ PCLLS/ TiQLLS ····· p.280

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

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Method of setting torque ···· p.353
How to apply force ···· p.356

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Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

How to order.
Specify MODEL name

[EX.] PCL100NX15D

Note
- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to QLLS/CLLS/PQLLS/PCLLS/TiQLLS.

TORQUE RANGE[N·m]
5~180

Loading Direction

Adjustable | Interchangeable | Graduation | Two Step Motion | 10D | 12D | 15D | 19D | RoHS

YCL2 Overtorque Prevention Interchangeable Head Type Adjustable Torque Wrench

Two step motion prevents over-torque.

YCL90N2X15D [L'=414㎜]

Application

- Suitable for assembly of critical parts.

Features

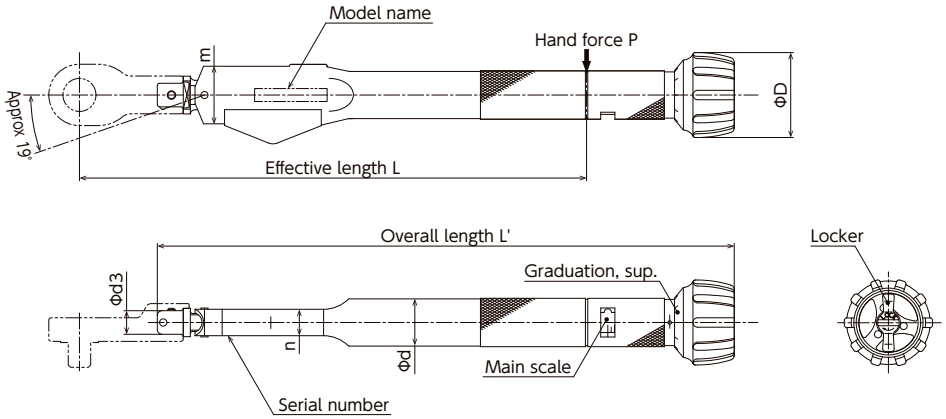
- Two step motion (primary click and secondary click) prevents over-torque.
- Wrench clicks at set torque value with 5 degree toggle operation, then there is a 14 degree "free zone" where the torque does not increase. As a result, the 2nd and final click alerts user to stop pulling.
- Easy torque setting by turning a knob.
- By exchanging heads, the wrench services a variety of applications from open end spanner, ring, ratchet, hex heads, and more, with a single wrench.
- AH adjustable head can be attached to YCL10N2X10D, YCL20N2X10D, YCL40N2X12D, YCL70N2X12D, YCL90N2X15D, YCL140N2X15D.

Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

Dimensions



Specifications

Accuracy ± 3%

S.I. MODEL			YCL10N2X10D	YCL20N2X10D	YCL40N2X12D	YCL70N2X12D	YCL90N2X15D	-	YCL140N2X15D	YCL180N2X19D	-
TORQUE RANGE [N•m]	MIN. ~ MAX.		5~10	10~20	20~40	35~70	45~90	-	70~140	90~180	-
	GRAD.		0.1	0.2	0.25	0.5	0.25	-	0.5		-
METRIC MODEL			100YCL2	200YCL2	400YCL2	700YCL2	900YCL2	-	1400YCL2	1800YCL2	-
TORQUE RANGE [kgf•cm]	MIN. ~ MAX.		50~100	100~200	200~400	350~700	450~900	-	700~1400	900~1800	-
	GRAD.		1	2	2.5	5	2.5	-	5		-
AMERICAN MODEL			YCL100I	YCL200I	YCL400I	YCL600I	YCL750I	YCL1000I	YCL100F	-	YCL150F
TORQUE RANGE [lbf•in/lbf•ft]	MIN. ~ MAX.		lbf-in 50~100	100~200	200~400	300~600	400~750	600~1000	lbf-ft 45~100	-	80~150
	GRAD.		lbf-in 1	2	2.5	5	2.5	5	lbf-ft 0.5	-	0.5
APPLICABLE BOLT	COMMON STEEL		(M7)	M8	M10	M12	M12(M14)		M16	(M18)	
	HIGH TENSION		M5, M6	(M7)	M8	M10			M12	(M14)	
MAX. HAND FORCE [N]			46.6	93.1	146	255	237		369	311	
DIMENSION [mm]	EFFECTIVE LENGTH	L	215		275		380			579	
	OVERALL LENGTH	L'	245		309		414			607	
	HEAD	d3	10		12		15			19	
	BODY	m	25		27.1		34.1			37.9	
		n	12		14.2		17.4			17.9	
		d	20		21.7		27.2			30	
		D	36		37		46.5			50	
WEIGHT [kg]			0.35		0.53		1.05			1.75	

Note 1. Overall length does not include interchangeable head. 2. Interchangeable heads are optional 3. PH(Pipe wrench head) cannot be used with YCL2

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Special heads ····· p.500

Refer P.500 for dimension of head adjusting part.

How to order.
Specify MODEL name
[EX.] YCL90N2X15D
Note
・Cannot be used for inspection purpose.

Loading Direction Pre-Lock Interchangeable Graduation RoHS

MT70N Moto Tork (Prelock Adjustable Specialty Torque Wrench for Motorcycle Maintenance)

For motorcycle maintenance and general use.

MT70N [L'=245㎜]

MT70N with a commevcial tool.

※Ring head wrench (shown above) is not attached.

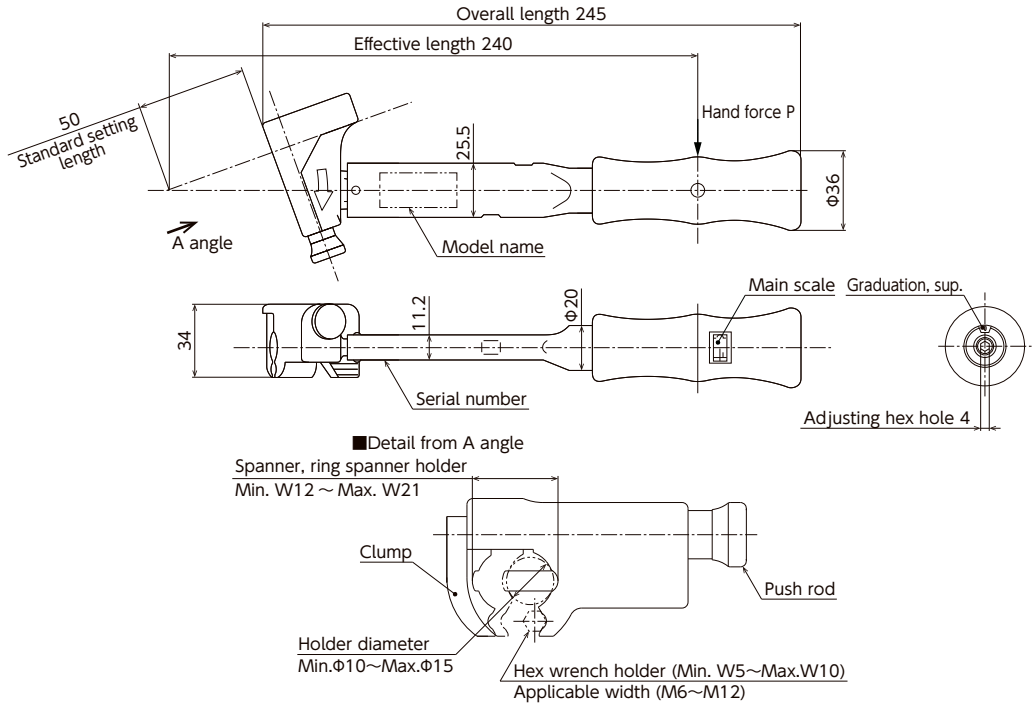
Application

- For tightening various kinds of bolts on production lines.

Features

- Attach a general tightening tool on MT70N to use it as a torque wrench.
- Basic open end spanner, ring spanner, ratchet head wrench and hex wrenches can be mounted on this model.
- MT70N covers a wide range of torque from 10N·m - 70N·m.
- By incorporating a standard wheel wrench onto the MT70N, it can be used to tighten motorcycle wheel nuts.
- A clear “click” sound signals tightening completion upon reaching the set torque.
- Torque is adjustable with the tool provided.
- Comfortable resin grip.

Dimensions



Specifications

Accuracy ± 5%

S.I.MODEL		MT70N
TORQUE RANGE [N•m]	MIN.~MAX.	10~70
	GRAD.	0.2
METRIC MODEL		MT-7
TORQUE RANGE [kgf•m]	MIN.~MAX.	1~7
	GRAD.	0.02
APPLICABLE BOLT	COMMON STEEL	M8, M10, M12, (M14)
	HIGH TENSION	M6, (M7), M8, M10
MAX. HAND FORCE [N]		292
WEIGHT[kg]		0.65

Note Accuracy is ±5%
Standard Accessory 1. Scale 2. Hex key 3. Carrying case

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
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LC3-G ····· p.416

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Method of setting torque ····· p.353
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Technical data
Torque unit ····· p.29
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.] MT70N
Note
・Cannot be used for inspection purpose.
・Accuracy is ±5%.

TORQUE RANGE[N·m]
40~1400

Loading Direction

Pre-Lock | Ratchet head | Graduation | Titanium Material | 24 Gear | 12.7 | 19.05 | 25.4 | RoHS

TiQL/TiLQL/ TiEQL(E) Titanium Type Adjustable Torque Wrench

World's first titanium torque wrench.

TiQL180N [L'=494㎜]

TiEQLE750N [L'=1365㎜]

Application

- Suitable for overhead working conditions with large torque requirement.

Features

- About half the weight of a standard torque wrench.
- Applicable where ordinary torque wrenches are difficult to use because of weight.
- The set torque cannot be changed without using a hex key(standard accessory), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- Comfortable resin grip for 180N - 360N models.
- Preset type with scale, suitable for single purpose torque tightening tasks where scale gradations are required.
- The ratchet head has 24 teeth with a 15 degree operating range, allowing for use in space-limited working conditions.

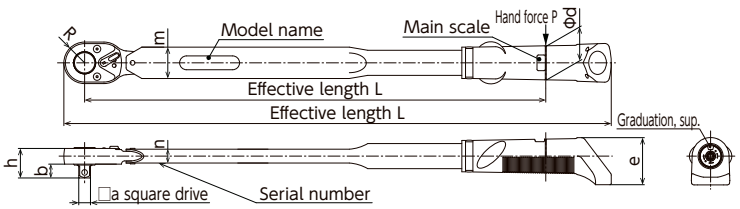
Optional Accessories

·Interchangeable socket [p.504]

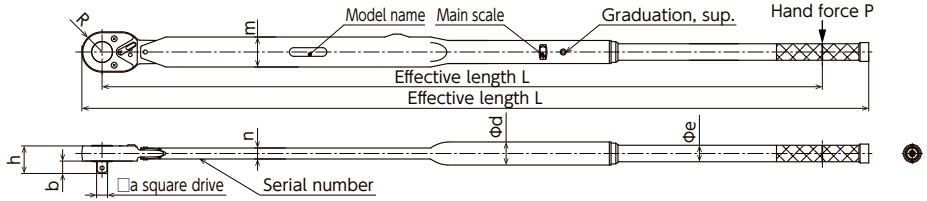
·Adjusting tool for QL [p.490]

Dimensions

■ Ti(L)QL180N、TiEQL360N



■ TiEQLE750N、1400N



Specifications

Accuracy ± 3%

S.I. MODEL			TiQL180N	TiLQL180N	TiEQL360N	TiEQLE750N	TiEQLE1400N
TORQUE RANGE [N•m]	MIN. ～ MAX.		40～180		80～360	100～750	200～1400
	GRAD.		2			5	10
METRIC MODEL			1800TiQL	1800TiLQL	3600TiEQL	7500TiEQLE	14000TiEQLE
TORQUE RANGE [kgf•cm/kgf•m]	MIN. ～ MAX.		kgf•cm 400～1800		kgf•m 8～36	10～75	20～140
	GRAD.		kgf•cm 20		kgf•m 0.2	0.5	1
APPLICABLE BOLT	COMMON STEEL		M12～M20		M16～M24	M16～M30	M20～M36
	HIGH TENSION		M10～M16		M12～M20	M12～M24	M16～M30
MAX. HAND FORCE [N]			450	360	404	600	849
DIMENSION [mm]	EFFECTIVE LENGTH	L	400	500	893	1250	1650
	OVERALL LENGTH	L'	494	594	988	1365	1794
	SQ. DRIVE	a	12.7		19.05		25.4
		b	14		20.5		26.5
	HEAD	R	22.5		29	35	44
		h	33		43.7	48.7	60.5
	BODY	m	34		38	52	67
		n	15		15.5	20	24
		d	36			40	51
		e	51			29	41
WEIGHT [kg]			0.9	1	2.4	4.5	7.5

Note 1. Other limit switch type and wireless type are available upon request. 2. Special model such as TiEQL550N is also available upon request.
Standard Accessories 1. Color marking band (3 colors). 2. Hex key(For TiQL180N, TiLQL180N, TiQL360N, and TiEQL360N). 3. Adjusting tool(For TiEQLE750N, TiEQLE1400N)

Alternative model

QL ····· p.212
QLE2 ····· p.216
QL-MH ····· p.218
PQL ····· p.220

Error-proofing (Pokayoke)

QLLS/ CLLS/ PQLLS/ PCLLS/ TiQLLS ····· p.280

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.

Specify MODEL name

[EX.] TiQL180N

Note

- For limit switch type models (error proofing type), refer to P. 280.
- TiEQLE models come with an extension handle, useful for tightening large size bolts.

PQLZ Prelock Adjustable Insulation Torque Wrench

Designed for use in environments where there are potential electric shock hazards.

PQLZ100N4 [L'=334㎜]

Application

- Assembly for electric cars, batteries, etc.

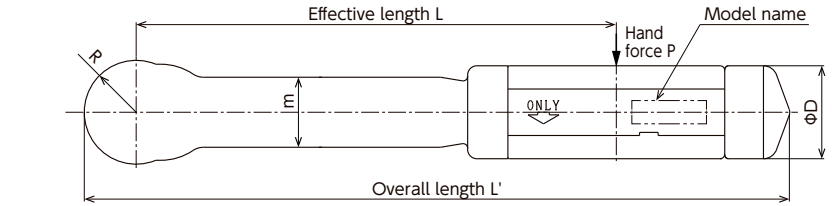
Features

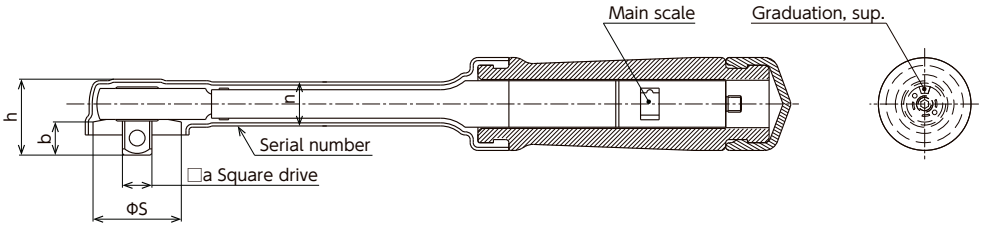
- Insulated wrench withstands up to 1000V AC.
- Helps protect operators from electric shock.
- Suitable for electric car assembly, electrical wiring and connection for battery terminals.
- Torque setting is easy to adjust by knob and scale.

Optional Accessories

・Interchangeable socket [p.504]

Dimensions





Specifications

Accuracy ± 3%

S.I. MODEL			PQLZ25N	PQLZ100N4
TORQUE RANGE [N•m]	MIN.~MAX.		5~25	20~100
	GRAD.		0.25	1
METRIC MODEL			225PQLZ	900PQLZ4
TORQUE RENGE [kgf•cm]	MIN.~MAX.		50~250	200~900
	GRAD.		2.5	10
MAX. HAND FORCE [N]			162	393
DIMENSION [mm]	EFFECTIVE LENGTH	L	155	255
	OVERALL LENGTH	L'	227	334
	SQ. DRIVE	a	9.53	12.7
		b	11	14
	HEAD	R	15.5	19.5
		h	24.5	34.5
		S	26.5	32.5
	BODY	m	23	31.2
		n	14.2	17.2
		D	30	38
WEIGHT [kg]			0.28	0.8

Standard Accessories Hex key

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
LC3-G ····· p.416

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.] PQLZ100N4
Note
・Other insulation torque wrenches can be made upon request.

QSP/ QSP-MH Ratchet Head Type Preset Torque Wrench

For single purpose tightening application.

QSP100N4 [L'=314㎜]

QSP100N4-MH [L'=314㎜]

Application

- For assembly and mass-production.

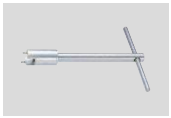
Features

- Preset style.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound by internal toggle mechanism signals tightening completion upon reaching the set torque.
- The ratchet head consists of 24 teeth with 15 degree operating range, allowing for use in space-limited working conditions.

Optional Accessories

·Interchangeable socket [p.504]

·Adjusting tool [p.491]

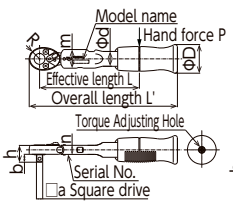


·Thrustring tool [p.491]

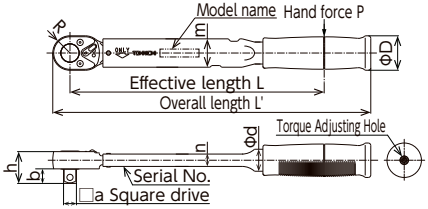
·Protective Head Cover [p.501]

Dimensions

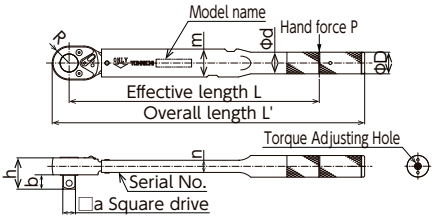
■ QSP1.5N4~12N4



■ QSP25N3~140N3



■ QSP-MH,QSP200N4~420N



QSP1.5N4 ~ QSP50N3 Specifications

Accuracy ± 3%

MODEL			QSP1.5N4	QSP3N4	QSP6N4	QSP12N4	QSP25N3-1/4	QSP25N3	QSP25N3-MH	QSP50N3	QSP50N3-MH
S.I. RANGE [N·m]	MIN.~MAX.		0.3~1.5	0.6~3	1~6	2~12	5~25			10~50	
METRIC RANGE [kgf·cm]			3~15	6~30	10~60	20~120	50~250			100~500	
APPLICABLE BOLT	COMMON STEEL		M3 (M3.5)	M4 (M4.5)	M5, M6	(M7)	M8			M10	
	HIGH TENSION		M2.5	M3 (M3.5)	M4 (M4.5)	M5, M6	(M7)			M8	
MAX. HAND FORCE [N]			14.9	29.7	44.4	88.9	156			281	
DIMENSION [mm]	EFFECTIVE LENGTH	L	101		135		161			178	
	OVERALL LENGTH	L'	150		185		214			240	
	SQ. DRIVE	a	6.35					9.53			
		b	7.5					11			
	HEAD	R	11.5				13			16	
		h	17.5				18.5	22		25.6	
	BODY	m	19							25.5	
		n	9.2							11.2	
		d	15							20	
		D	24				29		15	34	20
WEIGHT [kg]			0.16		0.19		0.25			0.4	
GRIP			Resin grip						Knurled grip	Resin grip	Knurled grip
ADJUSTING TOOL (OPTIONAL ACCESSORY)			No.931							No.930	

Note QSP with a resin grip. -MH models are knurled handle type.

QSP100N4 ~ QSP420N Specifications

Accuracy ± 3%

MODEL			QSP100N4-3/8	QSP100N4	QSP100N4-MH	QSP140N3	QSP140N3-MH	QSP200N4	QSP280N3-1/2	QSP280N3	QSP420N
S.I. RANGE [N·m]	MIN.~MAX.		20~100			30~140		40~200	40~280		60~420
METRIC RANGE [kgf·cm]			kgf·cm 200~1000			300~1400		400~2000	kgf·m 4~28		6~42
APPLICABLE BOLT	COMMON STEEL		M12 (M14)			M16		(M18)	M20		(M22) M24
	HIGH TENSION		M10			M12		(M14)	M16		(M18)
MAX. HAND FORCE [N]			399			446		500	467		
DIMENSION [mm]	EFFECTIVE LENGTH	L	251			314.5		400	600		900
	OVERALL LENGTH	L'	314			379		464	667		971
	SQ. DRIVE	a	9.53	12.7						19.05	
		b	11	14				15.4		20.5	
	HEAD	R	17			18.8		20	22.5		25.5
		h	29	32		33.5		38.4	39.9	44.5	46.5
	BODY	m	28					35			38.6
		n	12.2					15			16.1
		d	21.7					27.2			30
		D	34	21.7	34	21.7		27.2			40
WEIGHT [kg]			0.65			0.7		1.2	1.8		3.1
GRIP			Resin grip	Knurled grip		Resin grip	Knurled grip				
ADJUSTING TOOL (OPTIONAL ACCESSORY)			No.930								No.314

Note QSP100N4 and QSP140N3 with a resin grip. Other models are knurled handle type.

Alternative model

PQL ····· p.220
PCL ····· p.240
CSP ····· p.254

Error-proofing (Pokayoke)

QSPLS/ CSPLS/ SP2LS/ RSP2LS/ SP2LS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque value

[EX.1] QSP100N4X TORQUE FREE

[EX.2] QSP100N4X50N·m

Note

- For limit switch type models (error proofing type), refer to P. 282.
- QSP preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.

TORQUE RANGE[N·m]
2~70

IEC 61340-5-1:2007

Loading Direction

Preset | Ratchet Head | Slip Style | 36 Gear | 6.35 | 9.53 | RoHS

QSPCA Slip Type Torque Wrench

Once set torque achieved, even if more force applied QSPCA does not add additional torque and prevent over-torque.

QSPCA12N [L'=197㎜]

QSPCA30N [L'=267㎜]

QSPCA70N [L'=348㎜]

Application

- For assembly and mass-production.

Features

- Slip type torque wrench.
- Pre-set type.
- Using adjusting tool when changing set torque value.
- With a resin grip, except for 70N models which knurled handle.

Optional Accessories

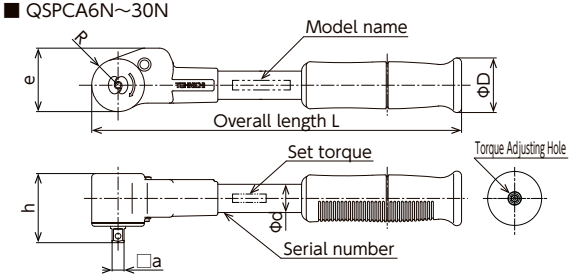
・Interchangeable socket [p.504]

・Adjusting tool [p.491]

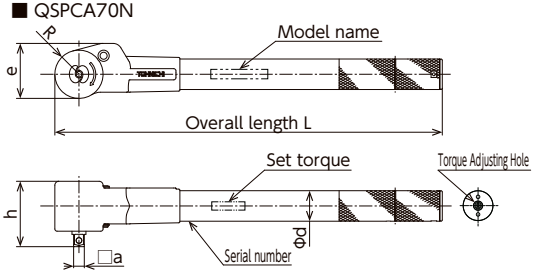
Usage Example

Dimensions

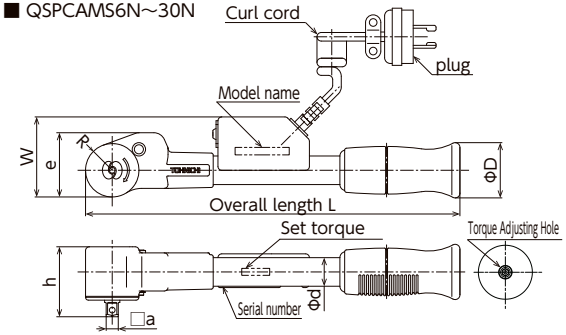
■ QSPCA6N～30N



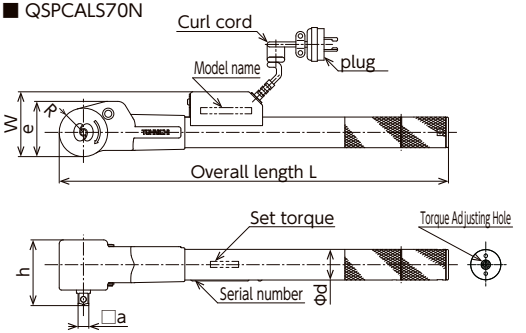
■ QSPCA70N



■ QSPCAMS6N～30N



■ QSPCALS70N



Specifications

MODEL			QSPCA6N	QSPCA12N	QSPCA30N	QSPCA70N	QSPCAMS6N	QSPCAMS12N	QSPCALS30N	QSPCALS70N
S.I. TORQUE RANGE[N•m]	MIN.～MAX.		2～6	4～12	10～30	20～70	2～6	4～12	10～30	20～70
METRIC TORQUE RANGE[kgf•cm]	MIN.～MAX.		20～60	40～120	100～300	200～700	20～60	40～120	100～300	200～700
AMERICAN TORQUE RANGE[lbf•in]	MIN.～MAX.		20～50	40～100	90～270	180～620	20～50	40～100	90～270	180～620
DIMENSION[mm]	OVERALL LENGTH	L	197		267	348	197		267	348
	SQ. DRIVE	a	6.35		9.53		6.35		9.53	
	HEAD	R	14		17	21.5	14		17	21.5
	HEIGHT	h	37		48	58	37		48	58
	BODY	e	34		40.5	49	34		40.5	49
		W	-				42		51	57.5
		ϕd	15		20	27.2	15		20	27.2
		ϕD	24		34	-	24		34	-
WEIGHT[kg]			0.33		0.64	1.24	0.33		0.64	1.24
ACCURACY[%]			±6%	±4%			±6%	±4%		

Alternative model

QSP ····· p.250
CSP ····· p.254

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify MODEL name

[EX.] QSPCA70N

Note

・Can not be used for inspection purpose.

TORQUE RANGE[N·m]
0.3~420

Loading Direction
Preset | Interchangeable

8D 10D 12D 15D 19D 22D RoHS

CSP/ CSP-MH Interchangeable Head Type Preset Torque Wrench

Interchangeable torque wrench for single purpose use.

CSP100N3X15D-MH [L'=290㎜]

CSP6N4X8D [L'=165㎜]

Application

- For assembly in mass-production.

Features

- Interchangeable head version of QSP model. Preset style.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- CSP1.5N4-140N3 with a resin grip. Others are knurled handle type.
- AH adjustable head can be attached to CSP25N3X10D, CSP50N3X12D, CSP50N3x15D, CSP100N3x15D and CSP140N3x15D.

Optional Accessories

·Interchangeable head [p.492]

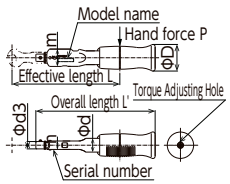
·Interchangeable socket [p.504]

·Adjusting tool [p.491]

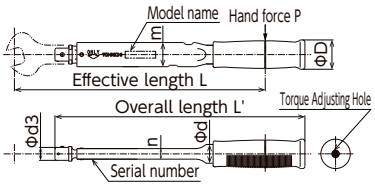
·Thrustring tool [p.491]

Dimensions

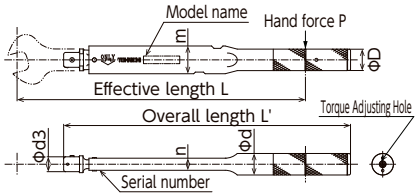
■CSP1.5N4~12N4



■CSP25N3~140N3



■CSP-MH,CSP200N3~420N



CSP1.5N4X8D ~ CSP50N3X15D Specifications

Accuracy ± 3%

MODEL			CSP1.5N4X8D	CSP3N4X8D	CSP6N4X8D	CSP12N4X8D	CSP25N3X10D	CSP25N3X10D-MH	CSP50N3X12D	CSP50N3X12D-MH	CSP50N3X15D	CSP50N3X15D-MH
S.I. RANGE [N•m]	MIN.~MAX.		0.3~1.5	0.6~3	1~6	2~12	5~25		10~50			
METRIC RANGE [kgf•cm]			3~15	6~30	10~60	20~120	50~250		100~500			
AMERICAN RANGE [lbf•in]			2.7~13.2	5.3~26.5	8.9~53.1	17.7~106.2	44.3~221.2		88.5~442.5			
APPLICABLE BOLT (REFERENCE)	COMMON STEEL		M3 (M3.5)	M4 (M4.5)	M5, M6	(M7)	M8		M10			
	HIGH TENSION		M2.5	M3 (M3.5)	M4 (M4.5)	M5, M6	(M7)		M8			
MAX HAND FORCE [N]			12.8	25.6	39.4	78.7	135		241		230	
DIMENSION [mm]	EFFECTIVE LENGTH	L	117.6		152.6		186		208		218	
	OVERALL LENGTH	L'	130		165		193		214		217	
	HEAD	d3	8				10		12		15	
	BODY	m	18.9						25.5			
		n	9.2						11.2			
		d	15						20			
		D	24				29	15	34	20	34	20
WEIGHT [kg]			0.2						0.3			
GRIP			Resin					Knurled	Resin	Knurled	Resin	Knurled
ADJUSTING TOOL (OPTIONAL ACCESSORY)			No.931						No.930			

CSP100N3X15D ~ CSP420NX22D Specifications

Accuracy ± 3%

MODEL			CSP100N3X15D	CSP100N3X15D-MH	CSP140N3X15D	CSP140N3X15D-MH	CSP200N3X19D	CSP280N3X22D	CSP420NX22D
S.I. RANGE [N•m]	MIN.~MAX.		20~100		30~140		40~200	40~280	60~420
METRIC RANGE [kgf•cm/kgf•m]			kgf•cm 200~1000		300~1400		400~2000	kgf•m 4~28	6~42
AMERICAN RANGE [lbf•in]			177~885		265.5~1239.1		354~1770.1	354~2478.2	531.1~3717.3
APPLICABLE BOLT (REFERENCE)	COMMON STEEL		M12(M14)		M16		(M18)	M20	(M22) M24
	HIGH TENSION		M10		M12		(M14)	M16	(M8)
MAX HAND FORCE [N]			344		401		450	425	442
DIMENSION [mm]	EFFECTIVE LENGTH	L	291		349.5		445	660	950
	OVERALL LENGTH	L'	290		349		429	627	918
	HEAD	d3	15				19	22	
	BODY	m	28				35		38.6
		n	12.2				15		16.1
		d	21.7				27.2		30
		D	34	21.7	34	21.7	27.2		40
WEIGHT [kg]			0.45		0.55		1	1.4	2.7
GRIP			Resin	Knurled	Resin	Knurled	Knurled		
ADJUSTING TOOL (OPTIONAL ACCESSORY)			No.930						No.314

Note 1.Overall length does not include interchangeable head part.
2.-MH and over CSP200N3 models are knurled handle type, and others with a resin grip.

Refer P.454 for dimension of head adjusting part.

Alternative model

PCL ····· p.240

Error-proofing (Pokayoke)

QSPLS/CSPLS/
SP2LS/RSP2LS/
SP2LS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque
····· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.

Specify MODEL name X Torque value

[EX.1] CSP100N3X15DX TORQUE FREE

[EX.2] CSP100N3X15DX50N•m

Note

- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to P. 282.
- CSP is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.

Loading Direction | Interchangeable | Preset | 9x12 | 14x18 | RoHS

SCSP European Style Interchangeable Head Type Preset Torque Wrench

Single purpose torque wrench with DIN interchangeable head connector.

SCSP50N-9x12

Application

- For assembly in mass-production.

Features

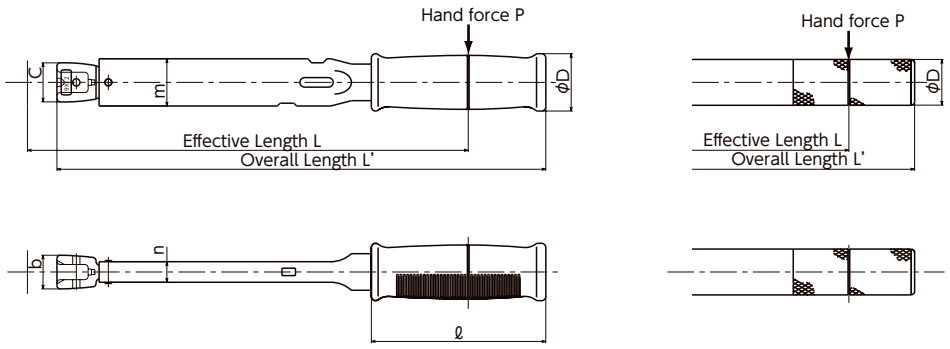
- Same features as CSP torque wrench with DIN connector (DIN = German standard).
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- Cost effective torque wrench because the head can be switched easily to fit a variety of applications.
- A clear "click" sound signals tightening completion upon reaching the set torque.

Optional Accessories

·Adjusting tool
[p.491]

DIN Style Head

Dimensions



Specifications

Accuracy ± 3%

MODEL			SCSP25N-9x12	SCSP50N-9x12	SCSP100N-9x12	SCSP200N-14x18
TORQUE RANGE[N•m]	MIN. ~ MAX.		5~25	10~50	20~100	40~200
TORQUE RANGE[kgf•cm]	MIN. ~ MAX.		50~250	100~500	200~1000	400~2000
HEAD SIZE [mm]			9x12			14x18
MAX. HAND FORCE [N]			138	258	375	476
DIMENSION [mm]	EFFECTIVE LENGTH	L	204	230	302	434
	OVERALL LENGTH	L'	181.5	194	266.5	420
	HEAD	C	23			
		b	20			26
	BODY	m	19	25.5	28	35
		n	9.2	11.2	12.2	15
		D	29	34		27.2
		ℓ	83	89	107	
WEIGHT [kg]			0.15	0.3	0.45	1

Note 1.Overall length does not include interchangeable head part.
2.Applicable for European Style head only. TOHNICHI interchangeable head cannot be used.

Alternative model

CSP ····· p.254

Error-proofing (Pokayoke)

QSPLS / CSPLS / QRSPLS / SPLS / RSPLS / SPLS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data

Tool selection ····· p.72
ISO 9000 related documents ··· p.90

How to order.

Specify MODEL name X Torque value

[EX.1] SCSP25N-9x12 x TORQUE FREE

[EX.2] SCSP50N-9x12 x 50N•m

Note

•Cannot be used for inspection purpose. SCSP preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.

TORQUE RANGE[N·m]
5~420

Loading Direction
Preset | Ratchet head | Bi-directional | 24 Gear | 9.53 | 12.7 | 19.05 | RoHS

BQSP Bi-directional type Preset Torque Wrench

Single purpose torque wrench applicable for bi-directional tightening (clockwise / counterclockwise).

BQSP70N [L'=314㎜]

Application

- For assembly and mass-production.

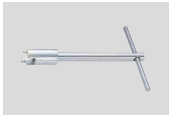
Features

- Bi-directional version of QSP model.
- Preset style.
- Tightening for both directions (clockwise / counter-clockwise) available on one torque wrench.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- Resin grip, except for BQSP400N which with a knurled handle.

Optional Accessories

・Interchangeable socket [p.504]

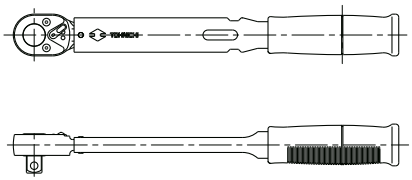
・Adjusting tool [p.491]



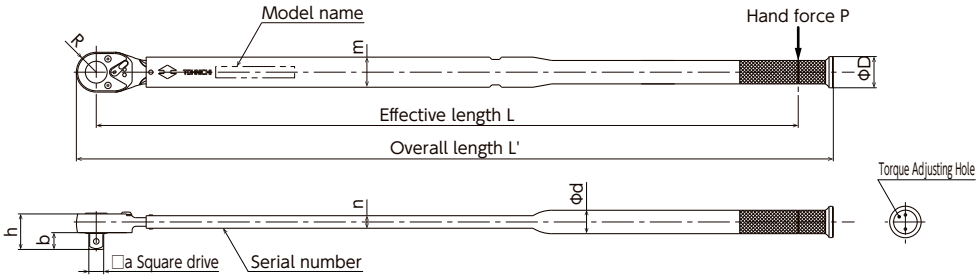
・Thrustring tool [p.491]

Dimensions

■ BQSP10N～300N



■ BQSP400N



Specifications

Accuracy ± 3%

MODEL			BQSP10N	BQSP20N	BQSP40N	BQSP70N	BQSP120N	BQSP220N	BQSP300N	BQSP400N
S.I. RANGE [N•m]	MIN.～MAX.		5～10	10～20	20～40	35～70	60～120	110～220	150～300	200～420
METRIC RANGE [kgf•cm/kgf•m]	MIN.～MAX.		kgf•cm 50～100	100～200	200～400	350～700	600～1200	1100～2200	kgf•m 15～30	20～42
AMERANGE [lbf•in]	MIN.～MAX.		44.3～88.5	88.5～177	177～354	309.8～619.5	531～1062	973.5～1947	1327.5～2655	1770～3717
MAX HAND FORCE [N]			62.1	125	225	279	382	550	500	467
DIMENSION [mm]	EFFECTIVE LENGTH	L	161		178	251	314.5	400	600	900
	OVERALL LENGTH	L'	214		240	314	380	465	667	971
	SQUARE DRIVE	a	6.35	9.53			12.7		19.05	
		b	7.5	11			14	15.4	20.5	
	HEAD	R	13		16	17	18.8	20	22.5	25.5
		h	18.5	22	25.6	29	33.5	38.4	44.5	46.5
	BODY	m	19		25.5	28		35		38.6
		n	9.2		11.2	12.2		15	16.1	
		d	15		20	21.7		27.2		30
		D	29		34			38		40
WEIGHT [kg]			0.2		0.4	0.63	0.73	1.3	2.4	3.7

Alternative model

DQL/DQLE2 ····· p.224
BCSP ····· p.260

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque value

[EX.] BQSP100N5X50N•m

Note

- Cannot be used for inspection purpose.
- BQSP preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.
- Can be set only when left and right torque are the same.

TORQUE RANGE[N·m]
5~420

Loading Direction
Preset | Interchangeable | Bi directional | 10D | 12D | 15D | 19D | 22D | RoHS

BCSP Interchangeable single purpose torque wrench applicable for bi-directional tightening (clockwise / counterclockwise).

Bi-directional click type torque wrench.

BCSP70NX15D [L'=290㎜]

Application

- For Assembly and mass-production.

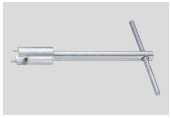
Features

- Same features as BQSP model with interchangeable head.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A wide selection of interchangeable heads, letting you choose the right one for the task and reducing overall purchasing costs.
- Resin grip, except for BCSP400NX22D which with a knurled handle.

Optional Accessories

・Interchangeable head [p.492]

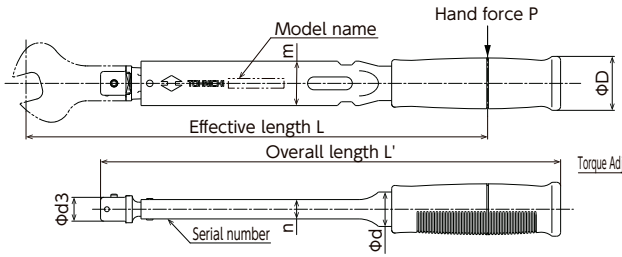
・Adjusting tool [p.491]



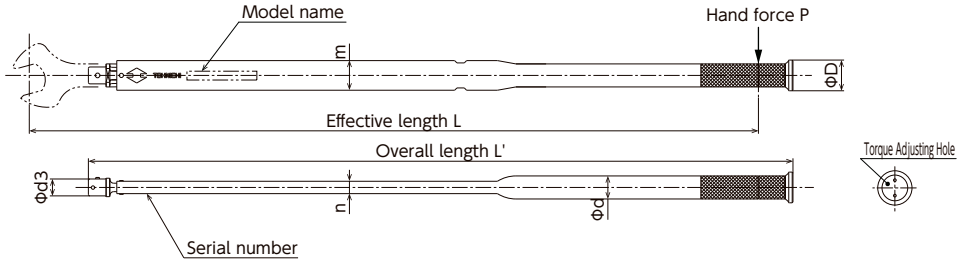
・Thrustring tool [p.491]

Dimensions

■ BCSP10N～300N



■ BCSP400N



Specifications

Accuracy ± 3%

MODEL		BCSP10NX8D	BCSP20NX10D	BCSP40NX12D	BCSP70NX12D	BCSP70NX15D	BCSP120NX15D	BCSP220NX19D	BCSP300NX22D	BCSP400NX22D
S.I. MODEL [N•m]	MIN.~MAX.	5～10	10～20	20～40	35～70		60～120	110～220	150～300	200～420
METRIC RANGE [kgf•cm/kgf•m]	MIN.~MAX.	50～100	100～200	200～400	350～700		600～1200	1100～2200	15～30 kgf•m	20～42
AMERICAN RANGE [lbf•in]	MIN.~ MAX.	44.3～88.5	88.5～177	177～354	309.8～619.5		531～1062	973.5～1947	1327.5～2655	1770～3717
MAX HAND FORCE [N]		57	108	193	250	241	344	495	455	422
DIMENSION [mm]	L	176	186	208	280	291	349.5	445	660	950
	L'	190	193	214	286	290	349	430	628	918
	d3	8	10	12		15		19	22	
	m	19		25.5	28			35		38.6
	n	9.2		11.2	12.2			15		16.1
	d	15		20	21.7			27.2		30
	D	29		34				38		40
WEIGHT [kg]		0.2		0.23	0.57		0.62	1.2	2	3.7

Refer p.454 for dimension of head adjusting part.

Alternative model
BQSP ····· p.258

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ····· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ···p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.

Specify MODEL name X Torque Value

[EX.] BCSP100N5X 15DX50N•m

Note

- Cannot be used for inspection purpose.
- BCSP preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order. [EX.]
- Can be set only when left and right torque are the same.

QSPZ Preset Insulated Torque Wrench

Designed for use in environments where there are potential electric shock hazards.

QSPZ100N4 [L'=334mm]

QSPZ25N [L'=227mm]

Application

- Assembly for electric cars, batteries, etc.

Features

- Insulated design for use in electric shock hazard conditions.
- Ideal for electric car assembly, connection of battery terminal wiring work etc.
- Withstand voltage AC1000V.

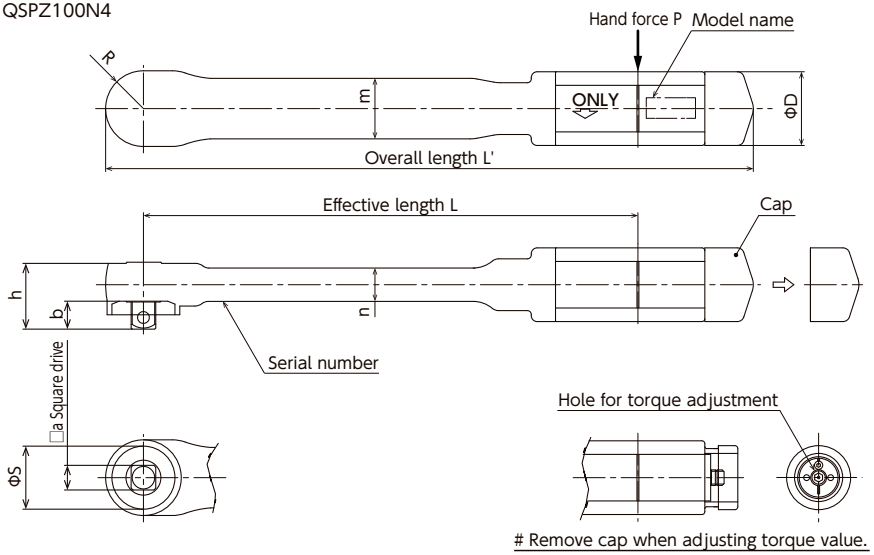
Optional Accessories

·Interchangeable socket [p.504]

·Adjusting tool [p.491]

Dimensions

■ QSPZ25N、QSPZ100N4



Remove cap when adjusting torque value.

Specifications

Accuracy ± 3%

MODEL			QSPZ25N	QSPZ100N4
S.I. RANGE [N•m]	MIN.～MAX.		5～25	20～100
METRIC RANGE [kgf•cm]	MIN.～MAX.		50～250	200～1000
AMERICAN RANGE [lbf•in]	MIN.～MAX.		50～200	100～750
MAX. HAND FORCE [N]			162	393
DIMENSION [mm]	EFFECTIVE LENGTH	L	155	255
	OVERALL LENGTH	L'	227	334
	SQ. DRIVE	a	9.53	12.7
		b	11	14
	HEAD	R	15.5	19.5
		h	24.5	34.5
		S	26.5	32.5
	BODY	m	22.8	31.2
		n	14.2	17.2
		ϕD	30	38
WEIGHT [kg]			0.28	0.8

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
LC3-G ····· p.416

How to use
Method of setting torque ····· p.353
How to apply force ···· p.356

Technical data
Torque unit ····· p.29
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.] QSPZ100N4
Note
・Other insulated torque wrenches can be made upon request.

Loading Direction Preset Open Ratchet Head RoHS

QRSP Open Ring Head Type Preset Torque Wrench

Open ratchet torque wrench for piping work.

QRSP38N×17 [L'=301㎜]

Application

- For flare nut.

Features

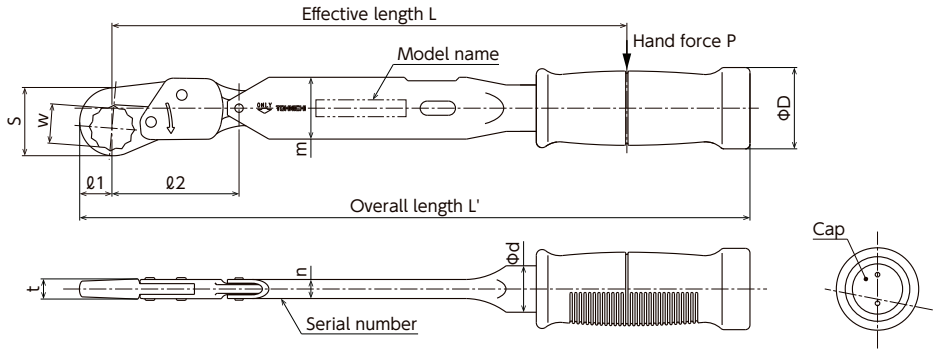
- Preset style.
- Open ratchet ring head allows user to continue tightening without exchanging heads.
- With 30 degree ratcheting mechanism, it can be used in space-limited working conditions.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- With resin grip.

Optional Accessories

・Thrustring tool
[p.491]

Dimensions

■ QRSP



Specifications

MODEL			QRSP38NX17	QRSP38NX19	QRSP38NX21	QRSP38NX24
S.I. RANGE [N•m]	MIN.~MAX.		10~45			
METRIC RANGE [kgf•cm]	MIN.~MAX.		100~450			
APPLICABLE BOLT			Piping			
MAX. HAND FORCE [N]			195	194	193	191
DIMENSION [mm]	EFFECTIVE LENGTH	L	231	232	234	236
	OVERALL LENGTH	L'	301	303	307	312
	HEAD	s	33	36	39	46
		t	9			
		ℓ 1	16.5	18	19.5	23
		ℓ 2	64	65	67	69
	BODY	m	27.3			
		n	8.2			
		d	20			
		D	35			
WEIGHT [kg]			0.4			0.43

Alternative model
CSP/CSP-MH ····· p.254
SP2/SP2-MH ····· p.268・270
SP2-N/ SP2-N-MH ····· p.276

Error-proofing (Pokayoke)
QSPLS/CSPLS/QRSPLS
SP2LS/RSP2LS/
SP2LS-N ····· p.282

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
How to apply force ···· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque Value

[EX.] QRSP38NX17X25N•m

Note

- Cannot be used for inspection purpose.
- For models with limit switch designed to prevent human tightening errors, refer to QSPLS/CSPLS/QRSPLS/SPLS/RSPLS/SPLS-N.
- QRSP is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.
- For QRSP, we cannot manufacture opening widths that are not those listed in catalog.

Loading Direction Preset RoHS

SP Open End Head Type Preset Torque Wrench

Torque wrench for single purpose bolt tightening.

SP420NX30 [L'=836㎜]

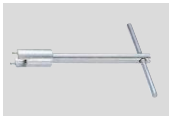
Application

- Assembly work with a single bolt.

Features

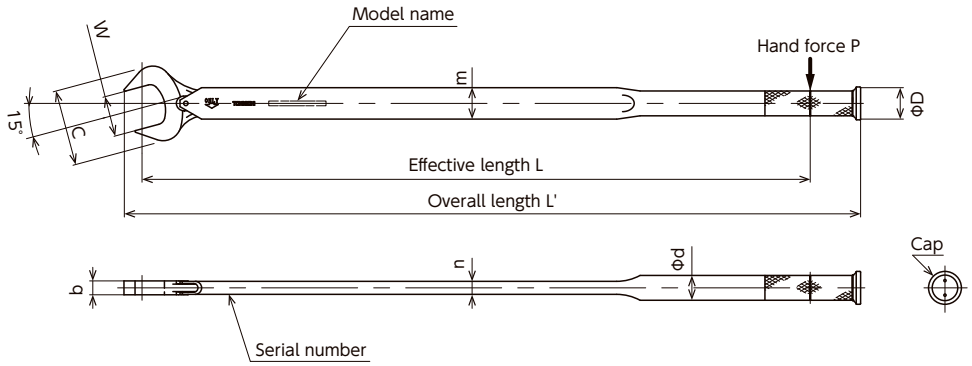
- Open-end head preset torque wrench. Various spanner size are standardized for swift delivery.
- Using thrustring tool when changing set torque value.

Optional Accessories



・Thrustring tool
[p.491]

Dimensions



Specifications

Accuracy ± 3%

MODEL			SP420N						SP560N				
S.I. RANGE [N•m]			90～420						130～560				
METIRC RANGE [kgf.cm]			900～4200						1300～5600				
WIDTH ACROSS FLATS [mm]			27	30	32	34	35	36	30	32	36	46	55
MAX. HAND FORCE [N]			553						616			613	
DIMENSION [mm]	EFFECTIVE LENGTH	L	760						910			915	
	OVEALL LENGTH	L'	837	836	837	838		840	995		997	1005	1009
	HEAD	C	78						81	83	87	97	104
		b	18						19				
	BODY	m	45.4						45.4				
		n	15.8						17.8				
		d	34										
		D	45										
WEIGHT [kg]			3.3						4			4.5	
THRUSTRING TOOL [OPTIONAL ACCESSORY]			A-6(No.315)										

Alternative model
CSP ····· p.254
RSP2/ RSP2-MH ····· p.272

Error-proofing (Pokayoke)
QSPLS/ CSPLS/ QRSPLS
SP2LS/ RSP2LS/
SP2LS-N ····· p.282

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque Value

[EX.1] SP420NX32X TORQUE FREE

[EX.2] SP420NX32X350N•m

Note
- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to P.282.
- SP is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order [EX.2]

SP2 Open End Head Type Preset Torque Wrench

Torque wrench for single purpose bolt tightening.

SP19N2X10 [L'=202㎜]

Application

- Assembly work with a single bolt.

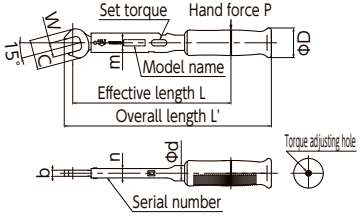
Features

- Open-end head preset torque wrench. Various spanner size are standardized for swift delivery.
- Using adjusting tool when changing set torque value.

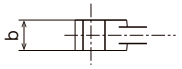
Optional Accessories

・Adjusting tool
[p.491]

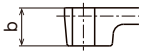
Dimensions



■ SP19N2-1, SP19N2-3 and SP38N2-1, SP38N2-3 head shape



■ SP19N2-2 and SP38N2-2 head shape



Specifications

Accuracy ± 3%

MODEL			SP2N2								SP8N2									SP19N2									-1			-2			-3	
S.I. RANGE[N·m]			0.4~2								1.5~8									3.5~19															
METIRC RANGE[kgf·cm]			4~20								15~80									35~190															
WIDTH ACROSS FLATS[mm]			5.5	7	8	10	12	13	17	19	7	8	9	10	12	13	19	24	27	10	11	12	13	14	17	19	21	10							
MAX. HAND FORCE[N]			16.1	16	15.9	15.7	15.5		15.3		64	63.5	63		62		61.1	59.7	58.8	123		122			121	120	119	121							
DIMENSION [mm]	EFFECTIVE LENGTH	L	124	125	126	127	129		131		125	126	127		129		131	134	136	155		156			158	159	160	158							
	OVEALL LENGTH	L'	168	169	171	173	175	176	180		169	171	172	173	175	176	180	186	189	202	203	204	204		208	209	211	205	204	205					
	HEAD	C	17	18	19	21	23	24	27	28	18	19	20	21	23	24	28	33	36	27		30			31	33	35	24							
		b	5							8	5						8			6.5					8			12	20	15					
	BODY	m	18.9																																
		n	9.2																																
		d	15																																
		D	24																	29															
WEIGHT[kg]			0.15																	0.21															
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.931																																

Specifications

Accuracy ± 3%

MODEL			SP38N2																SP67N2													
															-1	-2	-3															
S.I. RANGE[N·m]			8~38																13~67													
METIRC RANGE[kgf·cm]			80~380																130~670													
WIDTH ACROSS FLATS[mm]			8	9	10	11	12	13	14	16	17	19	22	24	27	10			14	16	17	18	19	21	22	24	27	29	30	32	33.3
MAX. HAND FORCE[N]			227	225	225	224	223			219			216	215	213	227	224	227	292	290	289		288	287	289	280	277	276		275	274
DIMENSION [mm]	EFFECTIVE LENGTH	L	168	169		170	171			174			176	177	179	168	170	168	230	231	232		233	234	235	240	242	243		244	245
	OVEALL LENGTH	L'	220	222		223	225	226		230	231		234	236	240	221	223	221	285	287	288	289	290	292	293	299	303	304	305	307	308
	HEAD	C	31			35				38			41	43	45	24	25	24	35	37	38	39	40	42	43	44	47	49	50	52	54
		b	8													12	20	15	10							11					
	BODY	m	25.5																												
		n	11.2																												
		d	20																												
		D	34																												
WEIGHT[kg]			0.37																0.48													
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.930																													

Specifications

Accuracy ± 3%

MODEL			SP120N2							SP160N2						SP220N2									SP310N2						
S.I. RANGE[N·m]			24~120							30~160						45~220									65~310						
METIRC RANGE[kgf·cm]			240~1200							300~1600						450~2200									650~3100						
WIDTH ACROSS FLATS[mm]			14	17	18	19	21	23	27	30	19	21	22	24	26	41	19	22	24	27	29	30	32	34	36	22	24	27	30	32	41	46
			-	-	-	-	22	24	-	-	-	-	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAX. HAND FORCE[N]			394	393	390		388			386	517				512	500	561	558	557	554	552	550	546	549	543	525		524	522	521	512	
DIMENSION [mm]	EFFECTIVE LENGTH	L	305	306	308		310			312	310				313	320	393	394	395	397	399	400	403	401	405	590		592	594	595	605	
	OVEALL LENGTH	L'	360	362	364	365	368	369	370	373	368			369	373	386	448	451	453	456	458	460	464	463	468	647	648	651	654	655	670	671
	HEAD	C	42	45	46	47	50	51	53	55	50	51	52	53	55	70	53	56	58	61	63		65	67	72	60	62	65	68	70	80	85
		b	10				11	12	14	10	12				14		13							15		14				15		
	BODY	m	28														35															
		n	12.2														15															
		d	21.7														27.2															
		D	34														38															
WEIGHT[kg]			0.75														1.3									1.8						
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.930																													

Alternative model

CSP ····· p.254
RSP2/ RSP2-MH ····· p.272

Error-proofing (Pokayoke)

QSPLS/ CSPLS/ QRSPLS
SP2LS/ RSP2LS/
SP2LS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque Value

[EX.1] SP8N2X10X TORQUE FREE

[EX.2] SP8N2X10X7N·m

Note

- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to P.282.
- SP is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order [EX.2]

Loading Direction Preset RoHS

SP2-MH Open End Head Type Preset Torque Wrench

Torque wrench for single purpose bolt tightening.

SP19N2-1X10-MH [L'=205㎜]

Application

- Assembly work with a single bolt.

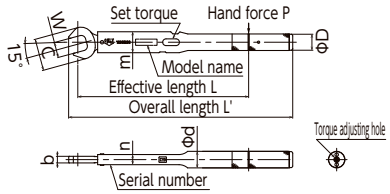
Features

- Open-end head preset torque wrench. Various spanner size are standardized for swift delivery.
- Using adjusting tool when changing set torque value.
- Knurled metal handle type for oily working condition.

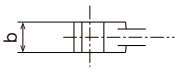
Optional Accessories

·Adjusting tool
[p.491]

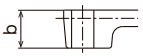
Dimensions



■ SP19N2-1-MH, SP19N2-3-MH and SP38N2-1-MH, SP38N2-3-MH head shape



■ SP19N2-2-MH and SP38N2-2-MH head shape



Specifications

Accuracy ± 3%

MODEL			SP19N2-MH											SP38N2/SP38N2-MH															
											-1	-2	-3														-1	-2	-3
S.I. RANGE[N·m]			3.5~19											8~38															
METIRC RANGE[kgf·cm]			35~190											80~380															
WIDTH ACROSS FLATS[mm]			10	11	12	13	14	17	19	21	10			8	9	10	11	12	13	14	16	17	19	22	24	27	10		
MAX. HAND FORCE[N]			123		122			121	120	119	121			227	225	225	224	223			219			216	215	213	227	224	227
DIMENSION [mm]	EFFECTIVE LENGTH	L	155		156			158	159	160	158			168	169	170	171				174			176	177	179	168	170	168
	OVEALL LENGTH	L'	202		204	204	205	208	210	212	205	204	205	220	221	222	223	225		226	230		231	234	236	239	221	223	221
	HEAD	C	27		30			31	33	35	24			31		35					38			41	43	45	24	25	24
		b	6.5					8			12	20	15	8													12	20	15
	BODY	m	18.9											25.5															
		n	9.2											11.2															
		d	15											20															
		D	14.5											19.5															
WEIGHT[kg]			0.21											0.37															
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.931											No.930															

Specifications

Accuracy ± 3%

MODEL			SP67N2-MH												SP120N2-MH							
S.I. RANGE [N•m]			13~67												24~120							
METIRC RANGE [kgf•cm]			130~670												240~1200							
WIDTH ACROSS FLATS [mm]			14	16	17	18	19	21	22	24	27	29	30	32	33.3	14	17	18	19	21	23	27	30
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	24	-	-
MAX. HAND FORCE [N]			292	290	289		288	287	289	280	277	276		275	274	394	393	390		388			386
DIMENSION [mm]	EFFECTIVE LENGTH	L	230	231	232		233	234	235	240	242	243		244	245	305	306	308		310			312
	OVEALL LENGTH	L'	284	286	287		289	291	292	298	301	303	304	306	307	359	361	364	364	367	368	369	373
	HEAD	C	35	37	38	39	40	42	43	44	47	49	50	52	54	42	45	46	47	50	51	53	55
		b	10							11						10					11	12	14
	BODY	m	25.5													28							
		n	11.2													12.2							
		d	20													21.7							
		D	19.5													21.5							
WEIGHT [kg]			0.48													0.75							
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.930																				

Specifications

Accuracy ± 3%

MODEL			SP160N2-MH						SP220N2-MH									SP310N2-MH						
S.I. RANGE [N•m]			30~160						45~220									65~310						
METIRC RANGE [kgf•cm]			300~1600						450~2200									650~3100						
WIDTH ACROSS FLATS [mm]			19	21	22	24	26	41	19	22	24	27	29	30	32	34	36	22	24	27	30	32	41	46
			-	-	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAX. HAND FORCE [N]			517				512	500	561	558	557	554	552	550	546	549	543	525		524	522	521	512	
DIMENSION [mm]	EFFECTIVE LENGTH	L	310				313	320	393	394	395	397	399	400	403	401	405	590		592	594	595	605	
	OVEALL LENGTH	L'	367			369	373	386	447	450	452	455	458	460	463	462	467	646	647	650	653	654	670	671
	HEAD	C	50	51	52	53	55	70	53	56	58	61	63		65	67	72	60	62	65	68	70	80	85
		b	10	12				14	13							15		14					15	
	BODY	m	28						35															
		n	12.2						15															
		d	21.7						27.2															
		D	21.5						27															
WEIGHT [kg]			0.75						1.3									1.8						
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.930																					

Alternative model

CSP ····· p.254
RSP2/ RSP2-MH ····· p.272

Error-proofing (Pokayoke)

QSPLS/ CSPLS/ QRSPLS
SP2LS/ RSP2LS/
SP2LS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque Value

[EX.1] SP19N2X10-MHX TORQUE FREE

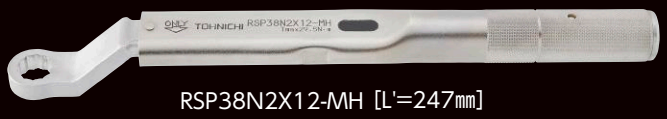
[EX.2] SP19N2X10-MH X12N•m

Note

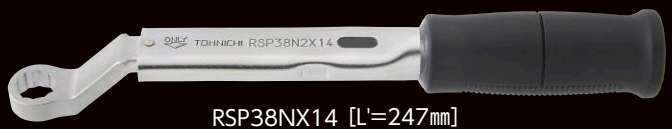
- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to P.282.
- SP is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order [EX.2]

RSP2/ RSP2-MH Ring Head Type Preset Torque Wrench

Torque wrench for single purpose bolt tightening.



RSP38N2X12-MH [L'=247㎜]



RSP38NX14 [L'=247㎜]

Application

- For assembly and mass production.

Features

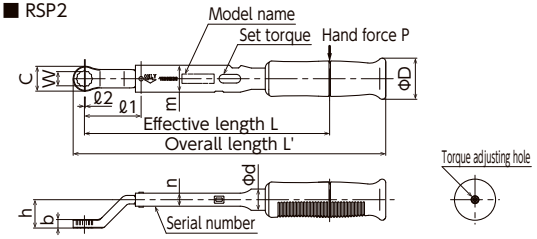
- Preset style with ring head.
- Ring head prevents the wrench from slipping off the bolt. Applicable in confined spaces.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- RSP2 models with a resin grip. RSP2-MH are knurled handle type.
- Various size are standardized for swift delivery.

Optional Accessories

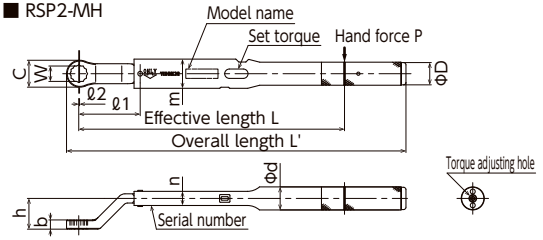
・Adjusting tool
[p.491]

Dimensions

■ RSP2



■ RSP2-MH



Specifications

Accuracy ± 3%

MODEL			RSP8N2		RSP19N2/RSP19N2-MH			RSP38N2/RSP38N2-MH						RSP67N2/RSP67N2-MH				
S.I. RANGE[N•m]			2~9		4~14.1	4~21		9~24.2	9~29.5		9~42			14~59		14~73		
METRIC RANGE[kgf•cm]			20~90		40~141	40~210		90~242	90~295		90~420			140~590		140~730		
WIDTH ACROSS FLATS[mm]			8	10	8	10	13	10	12	13	14	16	17	14	16	17	18	19
MAX. HAND FORCE[N]			61.6		81.5	122		128	156		222			232		287		
DIMENSION [mm]	EFFECTIVE LENGTH	L	146		173			190						255				
	OVERALL LENGTH	L'	192	193	220 (220)	221 (221)	223 (223)	244 (244)	247 (247)	246 (246)	247 (247)	248 (248)		312 (311)	313 (312)	314 (313)		315 (314)
	HEAD	C	15	17.5	15	17.5	21.5	17.5	20.4	21.5	23	25.5	26.5	23.5	26.5	27.5	28.5	29.5
		b	5		6			7	8		9			10		11		12
		h	21		20			22	23		24			25		26		27
		ℓ1	36		40			45						53				
		ℓ2	0.8	1	0.8		1.1	1	0	1.3	1.4			1.3	1.6			1.7
	BODY	m	18.9					25.5										
		n	9.2					11.2										
		d	15					20										
		D	24		29 (14.5)			30 (19.5)										
WEIGHT[kg]			0.15		0.21			0.38						0.47				
ADJUSTING TOOL[OPTIONAL ACCESSORY]			No.931					No.930										

Note 1. RSP8N-310N come with a resin grip. 2. RSP2-MH comes with a knurled grip. 3. Dimensions shown in ( ) is -MH model.

Accuracy ± 3%

MODEL			RSP120N2/RSP120N2-MH					RSP160N2/RSP160N2-MH				RSP220N2/RSP220N2-MH			RSP310N2/RSP310N2-MH		
S.I. RANGE[N•m]			24~100		24~120			30~160				45~220			65~255	65~310	
METRIC RANGE[kgf•cm]			240~1000		240~1200			300~1600				450~2200			650~2550	650~3100	
WIDTH ACROSS FLATS[mm]			17	18	19	21	22	19	21	22	24	22	24	27	24	27	30
MAX. HAND FORCE[N]			300		360			479				526			415	505	
DIMENSION [mm]	EFFECTIVE LENGTH	L	334					334				418			615		
	OVERALL LENGTH	L'	393 (393)	394 (393)	394 (394)	396 (395)	396 (396)	395 (394)	396 (395)	396 (396)	397 (397)	480 (479)	481 (480)	483 (482)	678 (678)	680 (680)	682 (682)
	HEAD	C	29.4	30.6	31.8	34	35	32.8	34	35	38	38.4	40	45	41.8	45	50
		b	12		13			13	15			13			15		
		h	28		29			29	31			29.5			32		
		ℓ1	62.5					62.5				70			75		
		ℓ2	1.7	1.8	1.9	1.5		1.9	1.5		1.9	2.2	2	2.7	2.4	2	3
	BODY	m	28					28				35					
		n	12.2					12.2				15					
		d	21.7					21.7				27.2					
		D	34 (21.5)					34 (21.5)				38 (27)					
WEIGHT[kg]			0.8					0.9				1.5			2		
ADJUSTING TOOL[OPTIONAL ACCESSORY]			No.930														

Note 1. RSP8N-310N come with a resin grip. 2. RSP2-MH comes with a knurled grip. 3. Dimensions shown in ( ) is -MH model.

Alternative model

SP2/SP2-MH ……p.268・270

Error-proofing (Pokayoke)

QSPLS/ CSPLS/ QRSPLS
SP2LS/ RSP2LS/
SP2LS-N …… p.282

Tester / Checker

TCC2-G …… p.404
DOTE4-G …… p.406
DOT …… p.408
TF …… p.414
LC3-G …… p.416

How to use

How to apply force … p.356

Technical data

Torque unit …… p.29
Human error …… p.57
Tool selection …… p.72
ISO 9000 related documents … p.90
Tool control …… p.103

How to order.

Specify MODEL name X Torque Value

[EX.1] RSP8N2X8X TORQUE FREE

[EX.2] RSP8N2X8X7N•m

Note

- Cannot be used for inspection purpose.
- For limit switch type models (error proofing type), refer to P.282.
- RSP preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order. [EX.2]
- Special made torque is available upon request.

Loading Direction Preset RoHS

SP2-H/ SP2-H-MH Torque Wrench for Piping Work

Made with smaller outside width to work in narrow spaces, including hydraulic piping, where current open-end type is unable to access.

SP38N2X19H [L'=224㎜]

SP120N2X32H-MH [L'=363㎜]

Application

- For hydraulic piping.

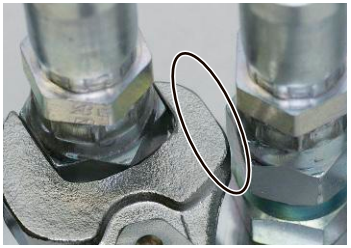
Features

- Preset style.
- Aligned with appropriate inner widths commonly used for hydraulic piping applications.
- Various head sizes available.

Optional Accessories

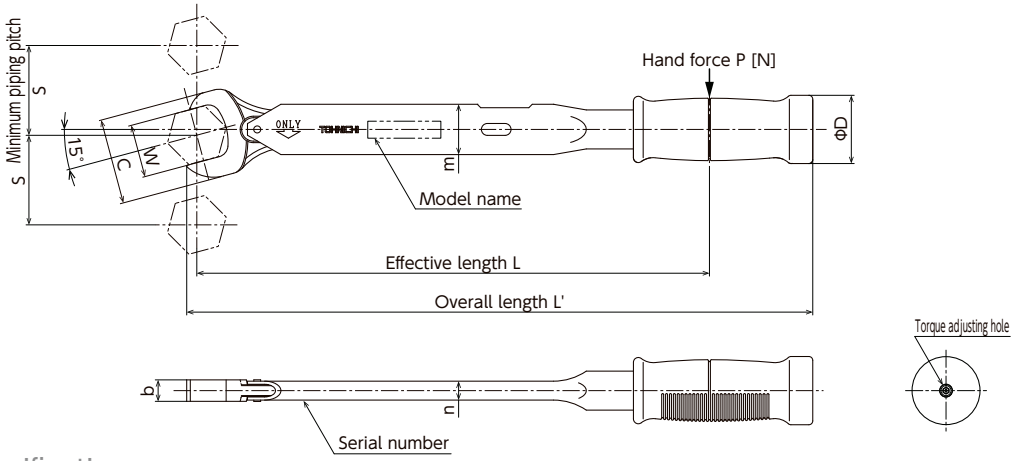
・Adjusting tool
[p.491]

Usage Example



Suitable for tightening at narrow worksite.

Dimensions



Specifications

Accuracy ± 3%

MODEL			SP38N2×14H	SP38N2×19H	SP67N2×27H	SP120N2×32H-MH
S.I. RANGE [N•m]	MIN.~MAX.		8~25	8~39	13~67	24~120
METRIC RANGE [kgf•cm]	MIN.~MAX.		80~250	80~390	130~670	240~1200
WIDTH ACROSS FLATS [mm]			14	19	27	32
MINIMUM PIPING PITCH S [mm]			26	35	46	54
MAX. HAND FORCE [N]			147	219	277	386
DIMENSION [mm]	EFFECTIVE LENGTH	L	171	174	242	312
	OVERALL LENGTH	L'	220	224	294	363
	HEAD	C	26.3	33.1	43.6	51.6
		b	8		11	14
	BODY	m	25.5			28
		n	11.2			12.2
		d	20			21.7
		D	34			21.5
WEIGHT [kg]			0.37		0.48	0.75
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.930			

Note With a resin grip models, except for SP120N2X32D which knurled handle type.

Alternative model

CSP/CSP-MH ····· p.254
SP2/SP2-MH ····· p.268・270

Error-proofing (Pokayoke)

QSPLS/CSPLS/
SP2LS/RSP2LS/
SP2LS-N ····· p.282

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use

How to apply force ···· p.356

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.

Specify MODEL name X Torque Value

[EX.]

SP38N2X14HX15N•m

Note
- Cannot be used for inspection purpose.
- SP2-H is preset style. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order.

Loading Direction Preset Notch Head RoHS

SP2-N/ SP2-N-MH Notched Head Type Preset Torque Wrench

Notched open head torque wrench for brake flare nut.

SP19N2-1X10N [L'=203㎜]

SP19N2-1X10N-MH [L'=203㎜]

Application

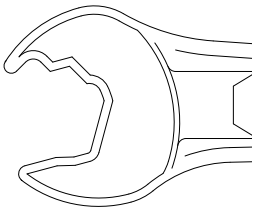
- For brake flare nuts.

Features

- Notched open head version of SP model.
- Preset style.
- Notched open head saves the trouble of taking the wrench off the bolt at each tightening.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.
- A clear "click" sound signals tightening completion upon reaching the set torque.
- Wide range of head thickness.
- SP2-N models with a resin grip. -MH are knurled handle type.

Optional Accessories

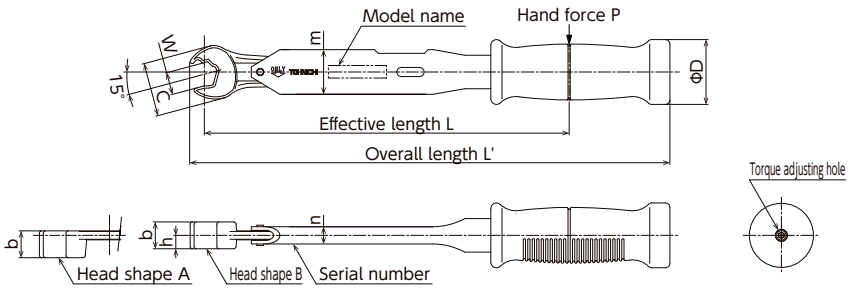
·Adjusting tool
[p.491]



The shape of notched head

Dimensions

■ SP-N



Specifications

Accuracy ± 3%

MODEL			SP19N2-1×10N SP19N2-1×10N-MH	SP19N2-3×10N SP19N2-3×10N-MH	SP19N2-4×10N SP19N2-4×10N-MH	SP19N2-5×10N SP19N2-5×10N-MH	SP19N2-9×10N SP19N2-9×10N-MH	SP38N2×14N SP38N2×14N-MH
			() dimension is -MH					
S.I. RANGE [N・m]	MIN. ～ MAX.		3.5～19					8～38
METRIC RANGE [kgf・cm]	MIN. ～ MAX.		35～190					80～380
NOMINAL SIZE [mm]			10					14
MAX. HAND FORCE [N]			121					223
DIMENSION [mm]	EFFECTIVE LENGTH	L	158					171
	OVERALL LENGTH	L'	203 (203)					224 (224)
	HEAD	C	24					35
		b	12	15	10	15	10	8
		h	6	7.5	5	–	6	4
		HEAD SHAPE	A			B	A	A
	BODY	m	19					25.5
		n	9.2					11.2
		d	15					20
		D	29 (15)					34 (19.5)
WEIGHT [kg]			0.21					0.37
ADJUSTING TOOL [OPTIONAL ACCESSORY]			No.931					No.930

Alternative model
CSP/CSP-MH ····· p.254
SP2/SP2-MH ····· p.268・270

Error-proofing (Pokayoke)
QSPLS/CSPLS/
SP2LS/RSP2LS/
SP2LS-N ····· p.282

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
How to apply force ··· p.356

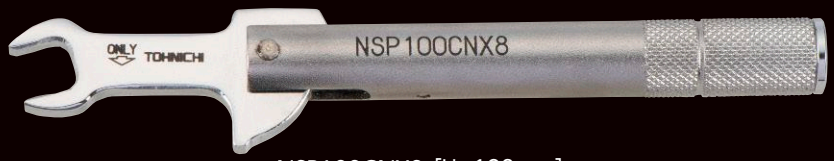
Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify
MODEL name X Torque value
[EX.]
SP19N2-1X10NX15N•m
Note
・Cannot be used for inspection purpose.
・SP-N preset torque wrench needs torque tester for setting torque value. Therefore, if you prefer torque setting prior to delivery, specify required torque value when you order. [EX.]

Loading Direction Preset Spanner head Slip RoHS

NSP Slip Style Torque Wrench

90 degree of “breaking” upon reaching the set torque to reduce possibility of over torque.



NSP100CNX8 [L'=128mm]

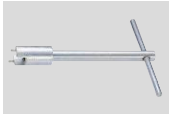
Application

- For tightening SMA connector.

Features

- Preset style.
- The set torque cannot be changed without using a special tool (sold separately), preventing the operator from changing torque by mistake.

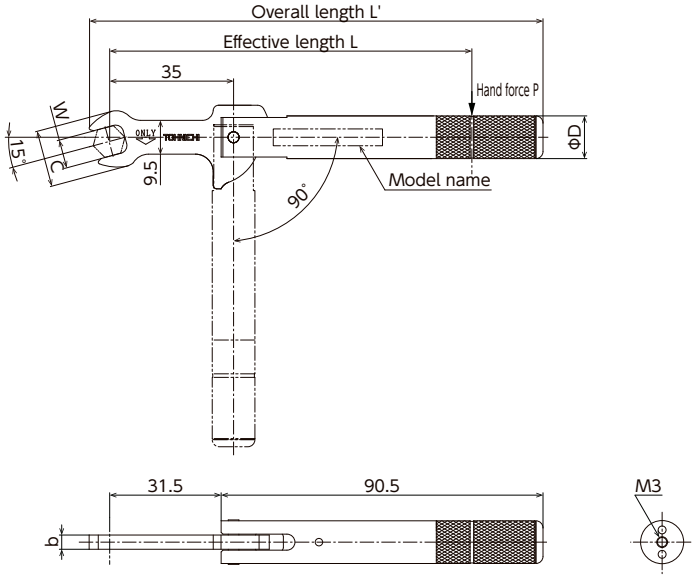
Optional Accessories



・Thrustring tool
[p.491]

Example

Dimensions



Specifications

Accuracy ± 5%

MODEL			NSP100CNX8
TORQUE RANGE [cN•m]			50～100
MAX. HAND FORCE [N]			9.8
DIMENSION [mm]	EFFECTIVE LENGTH	L	102
	OVERALL LENGTH	L'	128
	HEAD	W	8
		C	16
		b	4
	BODY	D	12
WEIGHT [kg]			0.33

Attaching usual eye bolt prevents falling.

Alternative model
SP2/SP2-MH ····· p.268・270
CSP/CSP-MH ····· p.254

Tester / Checker
TDT3-G ····· p.402
TCC2-G ····· p.404

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.]
NSP100CNX8XT60cN•m
Note
・Cannot be used for inspection purpose.
・NSP accuracy is ± 5%.

TORQUE RANGE[N·m]
3~420

Loading Direction | Adjustable | Pre-Lock | Graduation | Limit Switch | RoHS

QLLS/CLLS/PQLLS/ PCLLS/TiQLLS Adjustable Torque Wrench with Limit Switch

Error-proofing (Pokayoke) torque wrench with limit switch output to eliminate missed tightening.

PCLLS200NX19D

QLLS100N4

QLMS15N

Application

- Ideal for torque verification assembly processes.

Features

- Adjustable type torque wrench with a wired limit switch.
- Upon reaching the set torque, the torque wrench "click" to complete tightening while the limit switch simultaneously sends out a contact signal.
- Limit switch can be connected to CNA-4mk3 (count checker) to create tightening count management system.
- Capable of establishing interlock system at assembly line with intaking tightening completion signal from the limit switch to external PLC , Programmable logic controller.
- LS wrenches adopt a durable curled cord.

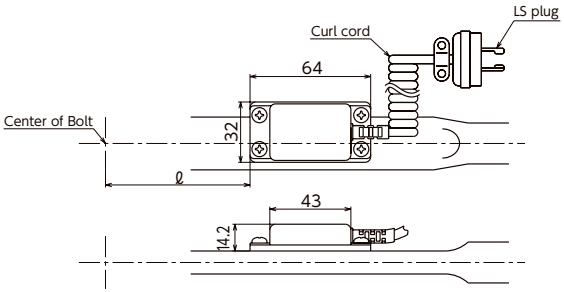
Optional Accessories

·Interchangeable socket [p.504]

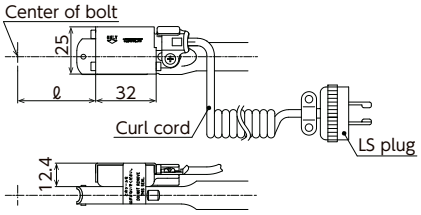
·LS Connector [p.508]

Dimensions

■ LS



■ MS



Limit switch specification
AC30V below 1A
DC30V below 1A

Specifications

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
QLMS15N	31.5	0.48
QLLS25N5	33.5	0.5
QLLS50N	48.5	0.62
QLLS100N4	80.5	0.86
QLLS140N	100.5	0.96
QLLS200N4	178.5	1.57
QLLS280N	248.5	2.47
QLLS420N	498.5	4.07

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
CLMS15NX8D	49	0.45
CLLS25N5X10D	58.5	0.47
CLLS50NX12D	78.5	0.54
CLLS50NX15D	88.5	
CLLS100NX15D	120.5	0.69
CLLS140NX15D	135.5	0.84
CLLS200NX19D	223.5	1.37
CLLS280NX22D	308.5	2.17
CLLS420NX22D	498.5	3.57

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
PQLLS25N	33.5	0.39
PQLLS50N	48.5	0.57
PQLLS100N4	80.5	0.82
PQLLS140N	100.5	0.92
PQLLS200N4	178.5	1.67

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
PCLLS25NX10D	58.5	0.39
PCLLS50NX12D	78.5	0.49
PCLLS50NX15D	88.5	
PCLLS100NX15D	120.5	0.65
PCLLS140NX15D	135.5	0.8
PCLLS200NX19D	223.5	1.47

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
TiQLLS180N	178.5	1
TiLQLLS180N		1.1
TiEQLLS360N	355.5	2.5

Note 1. Refer to the based models (QL, CL, PQL, PCL, TiQL) for specifications.
2. Curled cord is approximate 2m in fully extended.

Alternative model
FH256MC ····· p.286
BLA/BLE ····· p.284
Error-proofing (Pokayoke)
MPQL/ MQL ····· p.292
CMQSP ····· p.298
Option equipment
CNA-4mk3 ····· p.452
Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416
How to use
Method of setting torque ··· p.353
How to apply force ··· p.356
Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.
Specify MODEL name
[EX.] QLLS100N4
Note
・For dimensions, shapes, capacities, etc., refer to models QL, CL, PQL, PCL, TiQL.
・Female connector is not supplied for LS cable.

QSPLS/CSPLS/SP2LS/RSP2LS/SP2LS-N Preset Torque Wrench with Limit Switch

Error-proofing (Pokayoke) torque wrench with limit switch output to eliminate missed tightening.

RSPLS67N2X17

Application

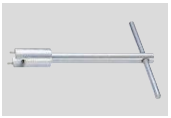
- Ideal for torque verification assembly processes.

Features

- Preset style type torque wrench with a wired limit switch.
- Upon reaching the set torque, the torque wrench "click" to complete tightening while the limit switch simultaneously sends out a contact signal.
- Limit switch can be connected to CNA-4mk3 to create tightening count management system.
- Capable of establishing interlock system at assembly line with intaking tightening completion signal from the limit switch to external PLC, Programmable logic controller.
- LS wrenches adopt a durable curled cord.

Optional Accessories

·Interchangeable socket [p.504]



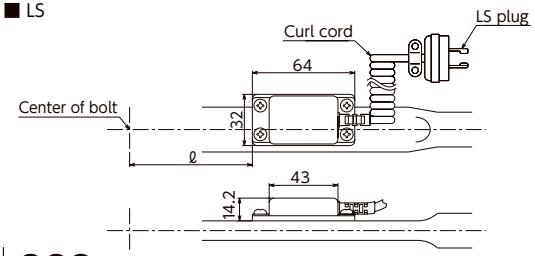
·Thrustring tool [p.491]

·Adjusting tool [p.491]

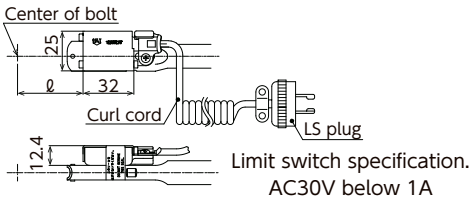
·LS Connector [p.508]

Dimensions

■ LS



■ MS



Limit switch specification.
AC30V below 1A
DC30V below 1A

Specifications

Accuracy ± 3%

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
QSPMS12N4	31.5	0.32
QSPLS25N3	33.5	0.37
QSPLS50N3	48.5	0.57
QSPLS100N4	80.5	0.8
QSPLS140N3	100.5	0.9
QSPLS200N4	178.5	1.47
QSPLS280N3	248.5	2.57
QSPLS420N	448.5	3.87
MODEL	**DIMENSION ℓ [mm]**	**WEIGHT [kg]**
CSPMS12N4×8D	49	0.32
CSPLS25N3×10D	58.5	
CSPLS50N3×12D	78.5	0.5
CSPLS50N3×15D	88.5	
CSPLS100N3×15D	120.5	0.74
CSPLS140N3×15D	135.5	
CSPLS200N3×19D	223.5	1.37
CSPLS280N3×22D	308.5	2.17
CSPLS420N×22D	498.5	3.87
MODEL	**DIMENSION ℓ [mm]**	**WEIGHT [kg]**
QRSPLS38N×17	94	
QRSPLS38N×19	95	0.57
QRSPLS38N×21	97	
QRSPLS38N×24	99	0.6
MODEL	**DIMENSION ℓ [mm]**	**WEIGHT [kg]**
SPMS2N2×5.5	20.5	
SPMS2N2×7	21.5	
SPMS2N2×8	22.5	
SPMS2N2×10	23.5	
SPMS2N2×12	25.5	
SPMS2N2×13		
SPMS2N2×17	27.5	
SPMS2N2×19		
SPMS8N2×7	21.5	0.27
SPMS8N2×8	22.5	
SPMS8N2×9	23.5	
SPMS8N2×10		
SPMS8N2×12	25.5	
SPMS8N2×13		
SPMS8N2×19	27.5	
SPMS8N2×24	30.5	
SPMS8N2×27	32.5	

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
SPLS19N2×10(-MH)	27.5	
SPLS19N2×11(-MH)		
SPLS19N2×12(-MH)	28.5	
SPLS19N2×13(-MH)		
SPLS19N2×14(-MH)		
SPLS19N2×17(-MH)	30.5	
SPLS19N2×19(-MH)	31.5	
SPLS19N2×21(-MH)	32.5	
SPLS19N2-1×10(-MH)		0.36
SPLS19N2-2×10(-MH)		
SPLS19N2-3×10(-MH)		
SPLS19N2-1×10N(-MH)		
SPLS19N2-3×10N(-MH)	30.5	
SPLS19N2-4×10N(-MH)		
SPLS19N2-5×10N(-MH)		
SPLS19N2-8×10N(-MH)		
SPLS19N2-9×10N(-MH)		
SPLS38N2×8(-MH)	38.5	
SPLS38N2×9(-MH)	39.5	
SPLS38N2×10(-MH)		
SPLS38N2×11(-MH)	40.5	
SPLS38N2×12(-MH)		
SPLS38N2×13(-MH)	41.5	
SPLS38N2×14(-MH)		
SPLS38N2×16(-MH)		
SPLS38N2×17(-MH)	44.5	0.52
SPLS38N2×19(-MH)		
SPLS38N2×22(-MH)	46.5	
SPLS38N2×24(-MH)	47.5	
SPLS38N2×27(-MH)	49.5	
SPLS38N2-1×10(-MH)	38.5	
SPLS38N2-2×10(-MH)	40.5	
SPLS38N2-3×10(-MH)	38.5	
SPLS38N2×14N(-MH)	41.5	
SPLS67N2×14(-MH)	57.5	
SPLS67N2×16(-MH)	58.5	
SPLS67N2×17(-MH)	59.5	
SPLS67N2×18(-MH)		
SPLS67N2×19(-MH)	60.5	
SPLS67N2×21(-MH)	61.5	
SPLS67N2×22(-MH)	62.5	0.64
SPLS67N2×24(-MH)	67.5	
SPLS67N2×27(-MH)	69.5	
SPLS67N2×29(-MH)	70.5	
SPLS67N2×30(-MH)		
SPLS67N2×32(-MH)	71.5	
SPLS67N2×33.3(-MH)	72.5	

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
SPLS120N2×14(-MH)	91	
SPLS120N2×17(-MH)	92	
SPLS120N2×18(-MH)	94	
SPLS120N2×19(-MH)		0.96
SPLS120N2×21(-MH)		
SPLS120N2×22(-MH)		
SPLS120N2×23(-MH)		
SPLS120N2×24(-MH)	96	
SPLS160N2×19(-MH)		
SPLS160N2×21(-MH)		
SPLS160N2×22(-MH)		1.11
SPLS160N2×24(-MH)		
SPLS160N2×26(-MH)	99	
SPLS160N2×27(-MH)		
SPLS220N2×19(-MH)	171	
SPLS220N2×22(-MH)	172.5	
SPLS220N2×24(-MH)	173.5	
SPLS220N2×27(-MH)	175.5	
SPLS220N2×29(-MH)	177	1.62
SPLS220N2×30(-MH)	178.5	
SPLS220N2×32(-MH)	181.5	
SPLS220N2×34(-MH)	179.5	
SPLS220N2×36(-MH)	183.5	
SPLS310N2×22(-MH)	238.5	
SPLS310N2×24(-MH)		
SPLS310N2×27(-MH)	240.5	
SPLS310N2×30(-MH)	242	2.17
SPLS310N2×32(-MH)	243.5	
SPLS310N2×41(-MH)	253.5	
SPLS310N2×46(-MH)		
MODEL	**DIMENSION ℓ [mm]**	**WEIGHT [kg]**
RSPMS8N2×8	42.5	0.27
RSPMS8N2×10		
RSPLS19N2×8(-MH)		
RSPLS19N2×10(-MH)	45.5	0.36
RSPLS19N2×13(-MH)		
RSPLS38N2×10(-MH)		
RSPLS38N2×12(-MH)		
RSPLS38N2×13(-MH)	60.5	0.53
RSPLS38N2×14(-MH)		
RSPLS38N2×16(-MH)		
RSPLS38N2×17(-MH)		
RSPLS67N2×14(-MH)		
RSPLS67N2×16(-MH)		
RSPLS67N2×17(-MH)	82.5	0.62
RSPLS67N2×18(-MH)		
RSPLS67N2×19(-MH)		

MODEL	DIMENSION ℓ [mm]	WEIGHT [kg]
RSPLS120N2×17(-MH)	120	0.97
RSPLS120N2×19(-MH)		
RSPLS120N2×22(-MH)		1.02
RSPLS160N2×19(-MH)		
RSPLS160N2×22(-MH)		1.17
RSPLS160N2×24(-MH)		
RSPLS220N2×22(-MH)	196.5	1.67
RSPLS220N2×24(-MH)		
RSPLS220N2×27(-MH)		1.65
RSPLS310N2×24(-MH)	263.5	
RSPLS310N2×27(-MH)		2.17
RSPLS310N2×30(-MH)		

Note
1. For specifications, refer to basic models.
2. Standard curl cord can be extended to about 2m in full extension.
3. The curl cord length of SPLS19N-8x10N is about 5m in full extension.

Error-proofing (Pokayoke)

Tester / Checker

Technical data

Option equipment

How to use

How to order.

Specify

MODEL name X Torque value

[EX.1] QSPLS50N3XTorque free

[EX.2] SPLS19N2X10-MHX70N•m

Note
- For torque wrench dimensions, shapes, capabilities, etc., refer to descriptions of basic models (QSP, CSP, SP2, RSP2, SP2-N).
- Limit switches can be installed on click type torque wrenches other than described in the catalog.
- Female connector is not supplied for LS cable.
- SPLS19N2-8X10N comes with a long cord (5M).

BLA/BLE Battery Less Wireless Pokayoke Torque Wrench

A world first! Uses the "Energy Harvest" solar power generation system.

QLBLA25N5/QLBLE25N5 [L'=237mm]

QLBLA100N4/QLBLE100N4 [L'=335mm]

Receiver R-BLA(Left) R-BLE (Right)

Application

- Ideal for torque verification assembly processes.

Features

- Radio frequency torque wrench system with "Energy Harvest" solar power generation.
- No need to change batteries, reducing cost and time, and no dead batteries to dispose of. Result: A more Eco-friendly torque wrench.
- Capable of charging battery above lighting of 200ix. illumination level at a general factory is between 350 and 750lx.
- Easily convert any Tohnichi LS-type corded torque wrenches to BLA/E solar powered by purchasing T-BLA/E transmitter only
- Quick communications setting with one click
- The T-BLA/R-BLA is for use only in the U.S., Canada and Mexico. The T-BLE/R-BLE model is available for use in the EU and China.

Optional Accessories

·Protective Cover
[p.508]

T-BLA

T-BLE

Specification of T-BLA/BLE and R-BLA/BLE

APPROVAL MARKET	USA AND CANADA		EU AND CHINA	
MODEL	TRANSMITTER	RECEIVER	TRANSMITTER	RECEIVER
	T-BLA	R-BLA	T-BLE	R-BLE
FREQUENCY	902.875MHZ		868.3MHz	
MODURATION METHOD	FSK		ASK	
MODURATION SPEED	125kbps			
ID	8 digits ID/Non-modifiable			
INPUT/OUTPUT	-	Output: Relay x4, RS232C Inout: Reset-in, LS-in	-	Output: Relay x4, RS232C Inout: Reset-in, LS-in
POWER SUPPLY	Solar cell	DC24V/18-36V Power consumption: Less than 5W	Solar cell	DC24V/18-36V Power consumption: Less than 5W
ANTENNA	Whip antenna	Dipole antenna	Helix antenna	Dipole antenna
OPERATING TEMPERATURE [℃]	0-40			
COMMUNICATION DISTANCE	10-20m			
ACQUISITION OF LICENSE	FCC/USA, IC/Canada		CE/EU, CMIIT/China	

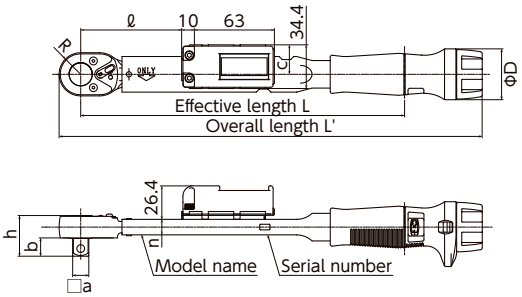
Specifications

Accuracy ± 3%

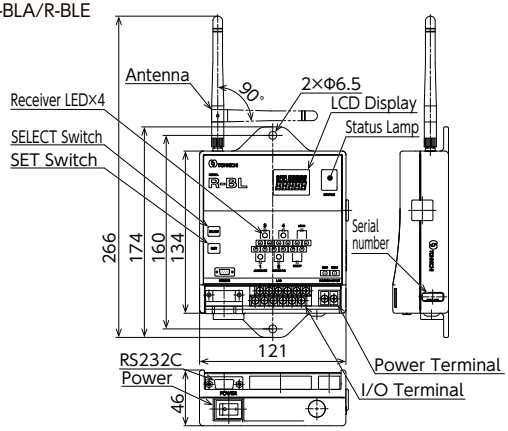
MODEL			QLBLA25N5 / QLBLE25N5	QLBLA50N / QLBLE50N	QLBLA100N4 / QLBLE100N4	QLBLA140N / QLBLE140N	QLBLA200N4 / QLBLE200N4	QLBLA280N / QLBLE280N
TORQUE RANGE [N·m]	MIN.~MAX.		5~25	10~50	20~100	30~140	40~200	40~280
	GRAD.		0.2	0.5	1		2	
DIMENSION [mm]	EFFECTIVE LENGTH	L	162	180	255	318	400	600
	OVERALL LENGTH	L'	237	258	335	399	489	692
	SQ. DRIVE	a	9.53		12.7			19.05
		b	11		14		15.4	20.5
	HEAD	R	13	16	17	18.8	20	22.5
		h	22	25.6	32	33.5	38.4	44.5
	BODY	m	19	25.5	28		35	
		n	9.2	11.2	12.2		15	
		d	15	20	21.7		27.2	
		D	37	38.5	40		51.5	
		ℓ	32.5	47.5	79.5	99.5	177.5	247.5
	c	c	23.7	23.2				

Dimensions

■ QLBLA/QLBLE



■ R-BLA/R-BLE



Alternative model

QLLS ····· p.280
QSPLS ····· p.282

Option equipment

CNA-4mk3 ····· p.452

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Overseas wireless standards ··· p.143

How to order.

・BLA/E wrenches are available in a variety of click wrench types. Consult to TOHNICHI or nearest distributors.

TUD TOHNICHI UNIFIED DESIGN | Loading Direction | Tightening | Wireless | 24 Gear | 9.53 | 12.7 | 19.05 | RoHS

FH256MC Radio Frequency Torque Wrench

Wireless error-proofing (Pokayoke) torque wrench.

QLFH100N4 [L'=333mm]

QLFHSLS100N4 [L'=333mm]
Modified a QLLS100N4 to wireless by T-FHSLS256 transmitter module

Receiver R-FH256

Application

- Ideal for torque verification assembly processes.

Features

- Upon reaching the set torque, a completion signal is transmitted by radio wave.
- Wireless wrench eliminates space limitations.
- Answer-back system allows user to check the communication status.
- Easy to upgrade. Gets higher workability by modifying existing wired LS torque wrenches to wireless with FHSLS256 small transmitter.
- Combining with a receiver, an I/O-FH256 distributor and a CNA-4mk3 counter, establishes error-proofing (Pokayoke) system for up to 4 torque wrenches.
- Legal certificate for radio transmission acquired for Japan, North America, EU, China and others.
- Frequency hopping system enhances transmission reliability.

Optional Accessories

·Interchangeable socket [p.504]

·FH related devices [p.508]

·SB-FH256 [p.454]

Specifications

MODEL	Transmitter T-FH256MC	Transmitter T-FHSLS256	Receiver R-FH256	Setting Box SB-FH256
FREQUENCY BAND	2.4GHzband (2.402GHz~2.479GHz、1MHz interval 78ch)			
COMMUNICATION SYSTEM	Spread spectrum(frequency hopping system)			
MODULATION SYSTEM	GFSK			
MODULATION RATE	1Mbps			
GROUP CHANNEL	256(000~255)			
ID	3 digit (000~999)、7digit (alphanumeric)			
INPUT/ OUTPUT			no voltage contact output(1a) RS232C output	RC232C input
POWER [V]	DC1.5V (AAA alkaline battery)	DC3V(CR2032)	AC100V~240V Less than 5W	DC9V (Alkaline battery)
ANTENNA	chip antenna	pattern antenna	dipole antenna	
OPERATING TEMPERATURE [℃]	0~45 Less than 85% RH no condensation			
COMMUNICATION DISTANCE [m]	about 10~20 (Varies on the radio environment)			

Note Group channel and ID can be set by SB-FH256 (separately sold).
※ LS type wrench can be modified to wireless torque wrench with T-FHSLS256 transmitter.

Specifications

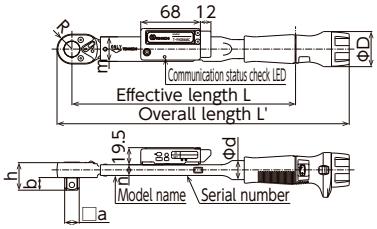
Accuracy ± 3%

MODEL			QLFH25N5 QLFHSLS25N5*2	QLFH50N QLFHSLS50N※	QLFH100N4 QLFHSLS100N4※	QLFH140N QLFHSLS140N※	QLFH200N4 QLFHSLS200N4※	QLFH280N QLFHSLS280N※
TORQUE RANGE [N·m]	MIN.~MAX.		5~25	10~50	20~100	30~140	40~200	40~280
	GRAD.		0.2	0.5	1		2	
DIMENSION [mm]	EFFECTIVE LENGTH	L	162	180	255	318	400	600
	OVERALL LENGTH	L'	237	257.5	333	398.5	489	691.5
	SQ. DRIVE	a	9.53		12.7			19.05
		b	11		14		15.4	20.5
	HEAD	R	13	16	17	18.8	20	22.5
		h	22	25.6	32	33.5	38.4	44.5
	BODY	m	19	25.5	28		35	
		n	9.2	11.2	12.2		15	
		d	15	20	21.7		27.2	
		D	37	38.5	40		51.5	

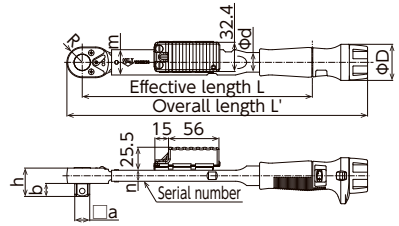
Note Above FH/FHSLS models are samples. Other type, CL, PQL/PCL, QSP/CSP, SP/RSP torque wrenches are available.

Dimensions

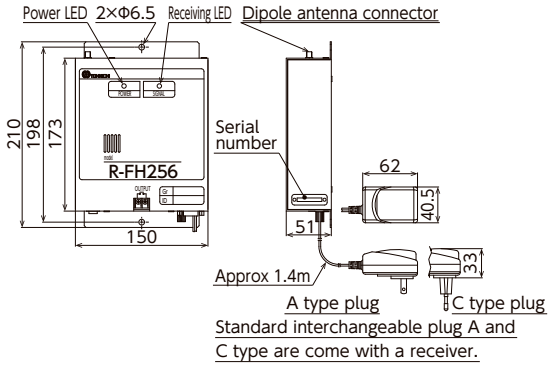
■ QLFH25N5~QLFH280N



■ QLFHSLS25N5~QLFHSLS280N



■ R-FH256



Alternative model
BLA/BLE ····· p.284
QLLS ····· p.280
QSPLS ····· p.282

Option equipment
CNA-4mk3 ····· p.452
I/O-FH256 ····· p.456
SB-FH256 ····· p.454

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Overseas wireless standards ··· p.143

How to order.

Note: Can be applied with other torque wrench.
Consult to TOHNICHI or nearest distributors.
·Group channel and ID can be set by SB-FH256 (separately sold).

TUD TOHNICHI UNIFIED DESIGN Loading Direction Assembly Wireless RoHS

FHP Remote Signal Torque Wrench for small size torque wrenches

Wireless pokayoke (error-proofing) transmitter for small size torque wrenches.

QSPCAFHP12N

QLFHP15N

Application

- Ideal for torque verification assembly processes.

Features

- Radio Frequency Wireless Error Proofing Pokayoke Mini Transmitter for Small Torque Wrenches.
- Upon reaching the set torque, a completion signal is transmitted by radio wave.
- T-FPH transmitter is compatible with FH256MC for the receiver and the setting box.
- Battery life: Approx. 300,000 charges. Wireless transmission distance: Approx. 10 to 20 meters.
- Legal certificate for radio transmission acquired for Japan, North America, EU, China and others.

Optional Accessories

·Interchangeable socket [p.504]

·FH related devices [p.508]

Specifications

MODEL	T-FHP
FREQUENCY BAND	2.4GHzband (2.402GHz~2.479GHz、1MHz interval 78ch)
COMMUNUCATION SYSTEM	Spread spectrum(frequency hopping system)
MODULATION SYSTEM	GFSK
GROUP CHANNEL	256(000~255)
ID	3 digit (000~999)、7digit (alphanumeric)
MATERIAL OF CASE	PBT Plastic
POWER	DC3V(CR2032)
DISPLAY	Communication status check LED (RED/BLUE) Remaining battery (Blue/red alternating flashing 3 times)
OPERATING TEMPERATURE	0~45℃ less than or 85% RH no condensation
COMMUNICATION DISTANCE	10~20m

Specifications

Accuracy ± 3%

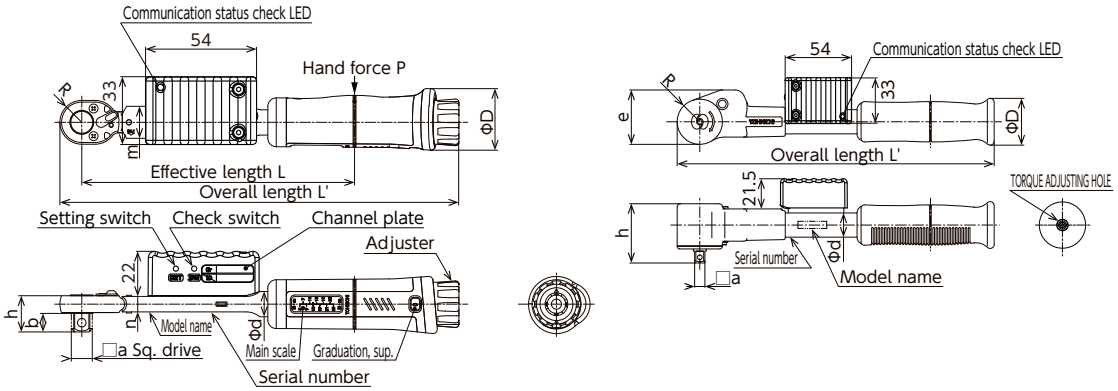
MODEL		QLFHP10N	QLFHP15N
TORQUE RANGE [N·m]	MIN.~MAX.	2~10	3~15
MAX. HAND FORCE[N]		69	104
DIMENSION [mm]	EFFECTIVE LENGTH(L)	145	
	OVERALL LENGTH(L')	219	
	SQ. DRIVE(a)	6.35	
	SQ. DRIVE(b)	7.5	
	HEAD(R)	11.5	
	HEAD(h)	17.5	
	BODY(m)	19	
	BODY(n)	9.2	
	BODY(d)	15	
	BODY(D)	37	

Accuracy ± 6%

MODEL		QSPCAFHP6N	QSPCAFHP12N
TORQUE RANGE [N·m]	MIN.~MAX.	2~6	4~12
MAX. HAND FORCE[N]		41.7	83.3
DIMENSION [mm]	OVERALL LENGTH(L')	197	
	SQ. DRIV(a)	6.35	
	HEAD(R)	14	
	HEAD(h)	37	
	BODY(e)	34	
	BODY(d)	15	
	BODY(D)	29	

Note Other small size CL, PQL/PCL, QSP/CSP, SP/RSP torque wrenches are available.

Dimensions



Alternative model

QLLS ····· p.280
QSPLS ····· p.282

Option equipment

CNA-4mk3 ····· p.452
I/O-FH256 ····· p.456
SB-FH256 ····· p.454

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.

Can be applied with other MS torque wrench.
Consult to TOHNICHI or nearest distributors.
・Group channel and ID can be set by SB-FH256 (separately sold).

Loading Direction Wireless RoHS

FMA Radio Frequency Torque Wrench

900MHz frequency wireless error-proofing torque wrench.

CSPFMA25N3X10D with SH10D-1X10N

Receiver R-FMA

Application

- Ideal for torque verification assembly processes.

Features

- 900 MHz frequency.
- Transceiver Powered by Standard Coin Battery (CR2032).
- Easily change frequency with SB-FMA Controller Box (Sold Separately).
- Optional LAN Output Version Available.
- Optional Equipment: CNA-4mk3 Count Checker, counts click signals to confirm torque tightening in lieu of PLC.
- Use T-FMA Transceiver Module to convert LS (wired) torque wrenches to wireless.
- For United States and Canada only.

Optional Accessories

·Interchangeable socket [p.504]

·FH related devices [p.508]

Specifications

Model	Transmitter T-FMA	Receiver R-FMA	Setting Box SB-FMA
Frequency	900 MHz band (902.5 MHz to 927.5MHz, 250kHz interval, 80ch)		
Channel	00-79		
ID	3-digit (000 to 900), 7-digit (alphanumeric)		
Input/Output	902. to 927.5 MHz Wireless to R-FMA	No Voltage Contact Output X4, RS232C Output LAN output (optional)	RS232C
Power Supply	DC3V coin type battery (CR2032)	DC24V/18-36V AC100-240V (with opitional AC adapter)	DC9V
Antenna	Chip antenna	Dipole antenna	
Display	Communication status check LED	Power LED, Receiving LED X4	Power LED/LCD
Operating Temperature [℃]	0-45		
Communication Distance [m]	10-30		

Note 1) The transmitting/receiving distance may be shortened depending on the surrounding radio environment.

※ Radio frequency communication errors may be caused by noise or a shield placed between the transmitter and the receiver. In addition, radio waves reflected by metal, concrete, etc. may interfere with radio waves directly sent to the antenna of the receiver and a dead point occurs, resulting in communication errors.

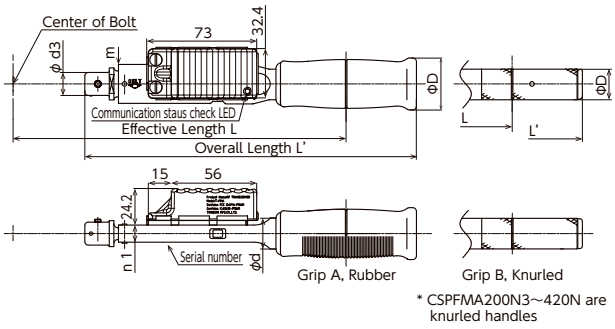
Specifications

Torque Wrench Model with Transceiver			CSPFMA25N3X10D	CSPFMA50N3X12D	CSPFMA50N2X15D	CSPFMA100N3X15D	CSPFMA140N3X15D	CSPFMA200N3X19D	CSPFMA280N3X22D	CSPFMA420NX22D
S.I. RANGE	N.m	MIN.~MAX.	5~25	10~50		20~100	30~140	40~200	40~280	60~420
METRIC RANGE	kgf•cm/kgf•m	MIN.~MAX.	kgf.cm. 50~250	100~500		200~1000	300~1400	400~2000	kgf.m. 4~28	6~42
AMERICAN RANGE	lbf.in	MIN.~MAX.	50~200	100~400		200~850	300~1000	350~1600	350~2500	600~3600
DIMENSION [mm]	EFFECTIVE LENGTH	L	186	208	218	291	350	445	660	950
	OVERALL LENGTH	L'	195	215	220	290	350	430	625	920
	HEAD	d3	10	12	15	15	15	19	22	22
	BODY	m	19	25.5		28	28	35	35	38.6
		n	9.2	11.2		12.2	12.2	15	15	16.1
		d	15	20		21.7	21.7	27.2	27.2	30
		D	29	34		34	34	27.2	27.2	40
Grip			A (Rubber)					B (Knurled)		

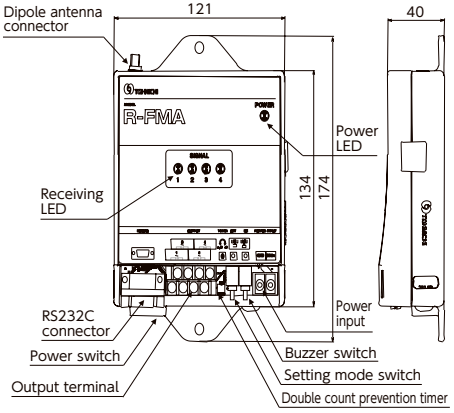
Note Other QL/CL, QSP, PQL/PCL, SP/RSP torque wrenches are available.

Dimensions

■ CSPFMA



■ R-FMA



Alternative model

QLLS ····· p.280
QSPLS ····· p.282

Option equipment

CNA-4mk3 ····· p.452

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Overseas wireless standards ····· p.143

How to order.

Specify MODEL name

[EX.]

Note

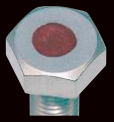
- T-FMA transmitter can be mounted on Tohnichi LS wrenches and makes it wireless pokayoke.
- FMA series are for United States and Canada only.

Loading Direction | Pre-Lock | Adjustable | Ratchet Head | Quick Drying Ink | 24 Gear | RoHS

MPQL/ MQL Marking Torque Wrench

Marking for tightening verification.

MPQL100N4 [L'=320mm]



Marking example

Application

- Ideal for tightening verification assembly processes.

Features

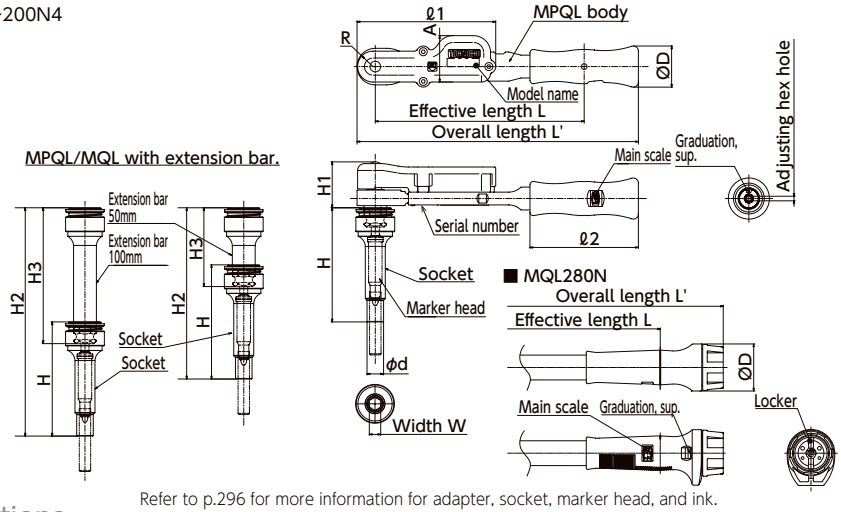
- Oversight preventable by quick visual check on the bolts.
- The marker is designed to stamp only when the torque wrench operates upon reaching the set torque.
- Marking stays on by use of quick dry ink.
- Ink cartridges are easy to install inside specialized socket.
- Extending the socket with the extension bar permits tightening and marking in deeply inset places.
- Since marker is actuated by the wrench part mechanism so not required any extra power source.
- It can be use maximum 6,000 times of stamping with one filling of ink.
- Marking stroke is adjustable within ±5mm.

Optional Accessories

·Refill ink [p.297]

Dimensions

■ MPQL50N～200N4



Refer to p.296 for more information for adapter, socket, marker head, and ink.

Specifications

Accuracy ± 3%

S.I. MODEL			MPQL50N	MPQL100N4	MPQL140N	MPQL200N4	MQL280N
TORQUE RANGE [N·m]	MIN. ～ MAX.		10～50	20～100	30～140	40～200	40～280
	GRAD.		0.5	1		2	
METRIC MODEL			450MPQL	900MPQL4	1400MPQL	1800MPQL4	2800MPQL3
TORQUE RANGE [kgf·cm/kgf·m]	MIN. ～ MAX.		kgf·cm 100～500	200～1000	400～1400	400～2000	kgf·m 4～28
	GRAD.		kgf·cm 5	10		20	kgf·m 0.2
AMERICAN MODEL			450MPQL-A	900MPQL4-A	1400MPQL-A	1800MPQL4-A	2800MPQL3-A
TORQUE RANGE [lbf·in/lbf·ft]	MIN. ～ MAX.		lbf·in 100～400	lbf·ft 15～75	30～100	30～150	30～200
	GRAD.		lbf·in 5	lbf·ft 1		2	3
MAX. HAND FORCE [N]			274	396	443	505	467
DIMENSION [mm]	EFFECTIVE LENGTH	L	183	253	316	396.5	600
	OVERALL LENGTH	L'	246	320	385	469	692
	HEAD	R	16	17	18.75	20	22.5
		H1	40.6	43	45.1	46	48.5
	BODY	ℓ1	121	153		183	
		A	40.6			45.2	45.2
		ΦD	36	37.7		44.2	51.5
		ℓ2	95	100			-
		B	4				-
WEIGHT [kg]			0.7	1	1.1	1.8	2.6

Note 1. Two different sizes of socket adapter, standard and long type are available.
2. Choose a socket with width which matches your bolt size and purchase it together with the torque wrench.
Standard Accessories Hex key for adjustment

Error-proofing (Pokayoke)

QLLS/ CLLS/ PQLLS/ PCLLS/TiQLLS ····· p.280
FH256MC ····· p.286
CMQSP ····· p.298

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to use

Method of setting torque ··· p.353
How to apply force ··· p.356

How to order.

How to order (refer to p.296)

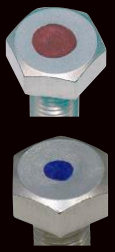
Note
·MPQL models need Tohnichi original sockets. Refer to p.274 for more details.

Loading Direction | Ratchet Head | Preset | Quick Drying Ink | 24 Gear | RoHS

MQSP Marking Torque Wrench

Marking for tightening verification.

MQSP140N [L'=379mm]



Marking example

Application

- Ideal for tightening verification assembly processes.

Features

- Preset Style
- Oversight preventable by quick visual check on the bolts.
- The marker is designed to stamp only when the torque wrench operates upon reaching the set torque.
- Marking stays on by use of quick dry ink.
- Ink cartridges are easy to install inside specialized socket.
- Extending the socket with the extension bar permits tightening and marking in deeply inset places.
- Since marker is actuated by the wrench part mechanism so not required any extra power source.
- Can be use for 6,000 times of stamping with one filling of ink.
- The stamping stroke is adjustable within ±5mm.

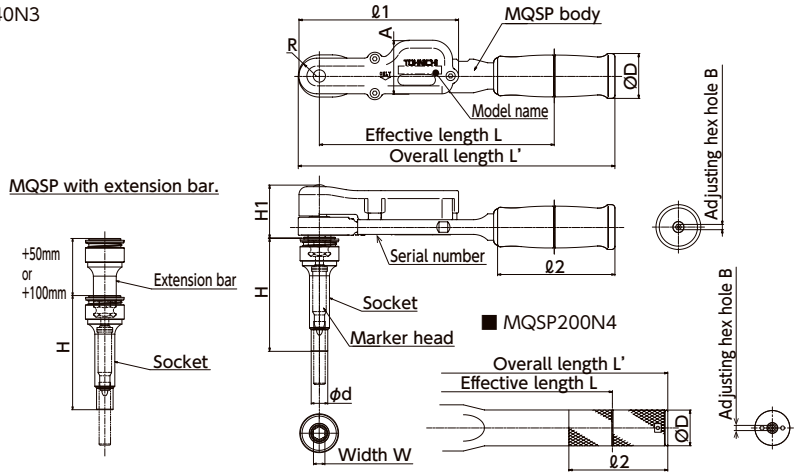
Optional Accessories

·Refill ink [p.297]

·Adjusting tool [p.491]

Dimensions

■ MQSP50N3～140N3



Refer to p.296 for more information for adapter, socket, marker head, and ink.

Specifications

Accuracy ± 3%

MODEL			MQSP50N	MQSP100N	MQSP140N	MQSP200N
TORQUE RANGE [N·m]	MIN.～MAX.		10～50	20～100	30～140	40～200
TORQUE RANGE [kgf·cm]	MIN.～MAX.		100～500	200～1000	400～1400	400～2000
TORQUE RANGE [lbf·in]	MIN.～MAX.		88.54～442.5	177～885	265.5～1239.1	354～1770.1
MAX. HAND FORCE [N]			281	399	446	500
DIMENSION [mm]	EFFECTIVE LENGTH	L	178	251	314.5	400
	OVERALL LENGTH	L'	240	314	379	464
	HEAD	R	16	17	18.8	20
		H1	40.6	43	45.1	46
	BODY	ℓ1	121	153		183
		A	40.6			45.2
		ΦD	34			27
		ℓ2	89	107		77
		B	4			
WEIGHT [kg]			0.7	1	1.1	1.8

Note 1. Choose a Tohnichi original socket with width matches your bolt size and order it together with the torque wrench. Standard sockets cannot be used.
2. Adjusting tools for MQSP are sold separately.
3. MQSP200N has a knurled handle.

Error-proofing (Pokayoke)
QLLS/ CLLS/ PQLLS/ PCLLS/TiQLLS ····· p.280
FH256MC ····· p.286
CMQSP ····· p.298

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data
Torque unit ····· p.29
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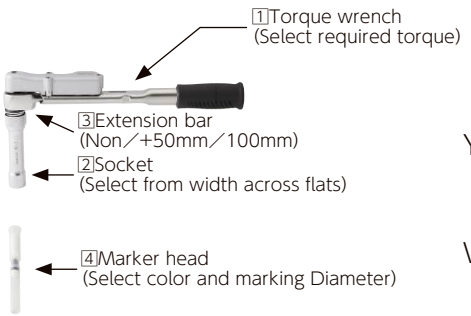
Tool selection ····· p.72
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to use
Method of setting torque ···· p.353
How to apply force ···· p.356

How to order.
How to order (refer to p.296)
Specify MODEL name

How to select MPQL/MQL/MQSP



4 colors(Yellow, Blue, White, and Red) and Marking Diameter(5mm & 9mm)are available.

Yellow	MK92+Refill ink Y (φ9)	Blue	MK92B (φ9)	
	MK52+Refill ink Y (φ5)		MK52B (φ5)	
White	MK92+Refill ink W (φ9)	Red	MK92R (φ9)	
	MK52+Refill ink W (φ5)		MK52R (φ5)	

MPQL/MQL

Refer to P.293, P.295 for dimensions.

1 TORQUE WRENCH

MPQL/MQL

S.I.MODEL		MPQL50N	MPQL100N4	MPQL140N	MPQL200N4	MQL280N4
TORQUE RANGE [N•m]	MIN.～MAX.	10～50	20～100	30～140	40～200	40～280
	GRAD.	0.5	1		2	
METRIC MODEL		450MPQL	900MPQL4	1400MPQL	1800MPQL4	2800MPQL3
TORQUE RANGE [kgf•cm/kgf•m]	MIN.～MAX.	kgf-cm 100～500	200～1000	400～1400	400～2000	kgf-m 4～28
	GRAD.	kgf-cm 5	10		20	kgf-m 0.2
AMERICAN MODEL		450MPQL-A	900MPQL4-A	1400MPQL-A	1800MPQL4-A	2800MPQL3-A
TORQUE RANGE [lbf•in/lbf•ft]	MIN.～MAX.	lbf-in 100～400	lbf-ft 15～75	30～100	30～150	30～200
	GRAD.	lbf-in 5	lbf-ft 1		2	

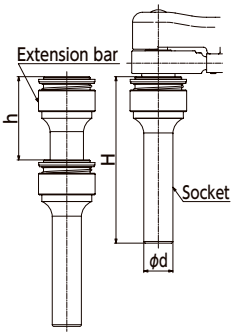
MODEL		MQSP50N	MQSP100N	MQSP140N	MQSP200N
TORQUE RANGE [N•m]	MIN.～MAX.	10～50	20～100	30～140	40～200
TORQUE RANGE [kgf•cm]	MIN.～MAX.	100～500	200～1000	400～1400	400～2000
TORQUE RANGE [lbf•in]	MIN.～MAX.	88.5～442.5	177～885	265.5～1239.1	354～1770.1

2 SOCKET

MPQL/MQL/MQSP SOCKET (mm)

MODEL	4MH-10	4MH-12	4MH-13	4MH-14	4MH-16	4MH-17	4MH-18	4MH-19	4MH-22	4MH-24
PART #	2700	2701	2702	2703	2704	2705	2706	2707	2709	2710
WIDTH [mm]	10	12	13	14	16	17	18	19	22	24
Tmax [N•m]	25	35	40	60	70	110	120	170	190	200
Height [mm]	100						105			
OUTSIDE DIAMETER [mm]	17.5	20.5	21.5	22.5	25	28	29	30	30	32.8
APPLICABLE MODELS	MPQL50N/MQSP50N3～200N4									

MODEL	6MH-22	6MH-24	6MH-27	6MH-30
PART #	2720	2721	2722	2723
WIDTH [mm]	22	24	27	30
Tmax [N•m]	255			280
Height [mm]	105	110		
OUTSIDE DIAMETER [mm]	32	34.5	38.5	42
APPLICABLE MODELS	MQL280N			



MPQL/MQL/MQSP Socket (inch)

MODEL		4MH-7/16	4MH-1/2	4MH-9/16	4MH-5/8	4MH-11/16	4MH-3/4
PART #		2712	2713	2714	2715	2716	2717
WIDTH	[inch]	7/16	1/2	9/16	5/8	11/16	3/4
	[mm]	11.11	12.7	14.29	15.88	17.46	19.05
Tmax[lbf•in] (N•m)		300 (35)	400 (45)	700 (80)	800 (90)	1000 (120)	1500 (170)
Height [mm]		100				105	
OUTSIDE DIAMETER [mm]		20	21	23	25.5	28.5	30
APPRECABLE MODELS		MPQL50N/MQSP50N3～200N4					

3 EXTENSION BAR

NAME	MPQL EXTENSION BAR 50	MPQL EXTENSION BAR 100	MQL EXTENSION BAR 50
PART #	1749	1748	1752
APPLICABLE MODELS	MPQL/MQSP50N～200N4		MQL280N
LENGTH h [mm]	50	100	50

Note Only one extension bar can be connected with a socket.

Wrench with a socket

Wrench with a socket and a 50mm extension

Wrench with a socket and a 100mm extension

4 4-1 MARKER HEAD

NAME	MK53RB	MK53WY	MK53RB	MK53WY	MK93RB	MK93WY
PART #	1780	1782	2780	2782	2783	2785
COLOR	RED/BLUE	WHITE/YELLOW	RED/BLUE	WHITE/YELLOW	RED/BLUE	WHITE/YELLOW
MARKING DIAMETER[mm]	Φ5				Φ9	

1. Width 10 to 16 mm sockets are unavailable the Φ9mm marker.
2. Width 17 to 30 mm sockets require No.1780 or No.1782 marker head and 4-2 marker guide No.2786 to use a Φ5 mm marker.
3. When purchasing marker, ink is not filled in, purchase 6 refill ink separately.
4. Do not use ink other than specified, select appropriate colors for each marker head.

Marker head

4-2 MARKER GUIDE

Necessary to use a maker guide to be combined width 17 mm or more larger sockets and a Φ 5mm marker head.

NAME	MARKER GUIDE	MARKER GUIDE SET for MK53RB	MARKER GUIDE SET for MK53WY
PART #	2786	2787	2788

1. Marker guide set is a set of marker guide and marker head No.1780 or No.1782,
2. Ink is sold separately, purchase 6 refill ink.
3. Marker guide No.2786 is available to No.1780 and 1782 marker heads only.

5 REPLACEMENT TIPS

NAME	Felt Tips for MK53RB	Felt Tips for MK53WY	Felt Tips for MK93RB	Felt Tips for MK93WY
PART #	1775	775	1776	1777
COLOR	For RED/BLUE	For WHITE/YELLOW	For RED/BLUE	For WHITE/YELLOW

6 REFILL INK and SOLVENT

NAME	Refill Ink R	Refill Ink B	Refill Ink W	Refill Ink Y	Solvent
PART #	1770	1771	776	777	794
COLOR	RED	BLUE	WHITE	YELLOW	For White and Yellow

7 ADAPTER

NAME	MQSP 3/8-17 ADAPTER	MQSP 1/2-17 ADAPTER
PART #	817	818
APPLICABLE MODELS	MPQL50N,MQSP50N	MPQL100N4～200N4,MQSP100N～200N
APPLICABLE TESTERS	DOTE50N4-G	DOTE100N4-G, DOTE200N4-G

How to order.

In case of Torque wrench: MPQL100N4,
Width=17mm, Extension bar: unnecessary,
Marker head: MK53RB, Ink: red
[Ex.] MPQL100N4 + No.2705 + No.2780 + No.1770

Note
- Only one piece of extension bar is available to a socket.
- The marking size Φ 9mm marker head MK93RB and MR93WY are unavailable to the width 10 to 16 mm sockets.
- Marker heads are not filled the ink. Ink is sold separately.
- Select a proper ink color for marker heads.

CMQSP Marking Torque Wrench

Marking for cap screw tightening verification.

CMQSP-M8 [L'=240mm]

Marking Example

Application

- Ideal for tightening verification assembly processes.

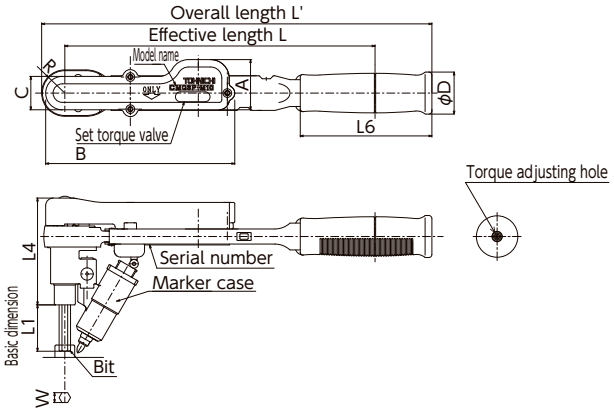
Features

- Upon reaching the set torque the marker is designed to stamp on the bolt and the work.
- Because the match mark is put on the side of the bolt and the work piece, it can not only prevent missed tightening but also detect loosening of bolts.
- The marker is designed to stamp only when the torque wrench operates upon reaching the set torque.
- Marking stays on by use of quick dry ink.
- One refill of ink is capable of approximately 3,000 times of stamping.
- Only hand force required for tightening a bolt and marking the bolt simultaneously.

Optional Accessories

·Adjusting tool
[p.491]

Dimensions



Specifications

Accuracy ± 3%

MODEL		CMQSP-M6	CMQSP-M8	CMQSP-M10	CMQSP-M12
TORQUE RANGE [N•m]	MIN.~MAX.	5~25	10~50	20~100	30~140
HEX BIT SIZE	WIDTH ACROSS FLATS	5	6	8	10
	BASIC DIMENSION L1	37	34	37.5	38
MAX. HAND FORCE [N]		141	281	399	446
DIMENSION [mm]	EFFECTIVE LENGTH L	178		251	314.5
	OVERALL LENGTH L'	240		314	379
	A	40.6			
	B	121		153	
	C	27			
	R	16		17	19
	D	34			
	L4	91		88	90
	L6	89		106.5	
WEIGHT [kg]		0.85		1.1	1.2

Note Components: Torque wrench, hex bit × 2pc (1pc for spare), marker head, marker case, hex bit adjusting tool, instruction manual

Refill ink and solvent for Marking wrench

DESCRIPTION	Refill ink W	Refill ink Y	SOLVENT
PART#	776	777	794
COLOR	white	yellow	For white and yellow ink

Note 1. Ink and solvent are optional.
2. Request ink and Solvent on your demand.

Optional Accessories

DESCRIPTION	Marker Head for CMQSP	CMQSP-M6 Bit	CMQSP-M8 Bit	CMQSP-M10 Bit	CMQSP-M12 Bit
PART#	792	724	725	726	727

Error-proofing (Pokayoke)
QSPLS/ CSPLS/
SP2LS/
RSP2LS/SP2LS-N ····· p.282
FH256MC ····· p.286
MPQL/ MQL ····· p.292

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Human error ····· p.57
Flow chart of tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.1]CMQSP-M8
[EX.2]CMQSP-M10X 50N•m
Note
- Ink and solvent is sold separately. When ordering, purchase desired color ink with the wrench body.
- CMQSP is preset type torque wrench, so you cannot set torque without a tester. When ordering, be sure to specify operating torque.

Loading Direction Interchangeable Preset Quick Drying Ink RoHS

MCSP Marking Torque Wrench

Open-end head type marking torque wrench.

MCSP50NX15D with interchangeable head

Interchangeable head for MCSP

Marker pen (red)

Marker end

Marking example

Application

- Ideal for tightening verification assembly processes.

Features

- Upon reaching the set torque the marker is designed to stamp on the corner of the nut or bolt.
- The clear marking makes it possible to visually check for bolt/nut to prevent missed tightening.
- The wrench does not mark the bolt unless reaching the preset torque.
- Easy to replace the disposable marker can perform up to 2,000 marks.
- The dedicated marker end allows free from stroke adjustment of the marker pen whenever exchange the interchangeable head to the other size.
- Preset style is ideal for successive tightenings as the same torque.

MCSP Specifications

MODEL			MCSP50N X 15D	MCSP100N X 15D	MCSP140N X 15D
TORQUE RANGE [N•m]	MIN.~MAX.		10~50	20~100	30~140
DIMENSION [mm]	EFFECTIVE LENGTH	L'	282	355	419
	OVERALL LENGTH	L	283	356	419.5
	BODY	ℓ1	121	153	
		A	40.6		
		ΦD1	23	26	
		ΦD2	34		
		H1	43.6	45.6	
		B	4		
MAX. HAND FORCE [N]			177	281	334
INTERCHANGEABLE HEAD			MSH15D		
WEIGHT [kg]			0.65	0.9	1.0

INTERCHANGEBLE HEAD FOR MCSP

MODEL [BODY X WIDTH ACROSS FLATS W]	MSH15D X 12	MSH15D X 13	MSH15D X 14	MSH15D X 16
ALLOWABLE TORQUE [N•m]	30			40
OUTSIDE WIDTH [mm]	30	31	32	35
THICKNESS [mm]	8			
WEIGHT [g]	82	83	84.5	95
APPLICABLE MARKER END	1671 SILVER			

MODEL [BODY X WIDTH ACROSS FLATS W]	MSH15D X 17	MSH15D X 18	MSH15D X 19	MSH15D X 21
ALLOWABLE TORQUE [N•m]	55			75
OUTSIDE WIDTH [mm]	38	39		44
THICKNESS [mm]	9		10	
WEIGHT [g]	106.5	108	115	123
APPLICABLE MARKER END	1671 SILVER		1672 BLACK	

MODEL [BODY X WIDTH ACROSS FLATS W]	MSH15D X 22	MSH15D X 24	MSH15D X 26	MSH15D X 27
ALLOWABLE TORQUE [N•m]	75		100	
OUTSIDE WIDTH [mm]	44	46	50	51
THICKNESS [mm]	11		12	
WEIGHT [g]	132.5	132	152.5	150.5
APPLICABLE MARKER END	1672 BLACK		1673 GOLD	

MODEL [BODY X WIDTH ACROSS FLATS W]	MSH15D X 30	MSH15D X 32
ALLOWABLE TORQUE [N•m]	140	
OUTSIDE WIDTH [mm]	58	60
THICKNESS [mm]	13	
WEIGHT [g]	192	194.5
APPLICABLE MARKER END	1673 GOLD	

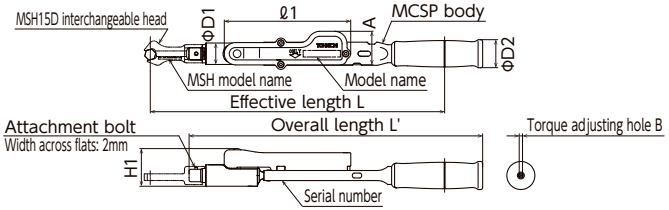
MARKER END FOR MCSP

PART #	1671	1672	1673
COLOR	SILVER	BLACK	GOLD
APPLICABLE HEAD SIZE	12~18mm	19~24mm	26~32mm

MARKER PEN FOR MCSP

PART #	1651	1652	1653	1654
DESCRIPTION	MCSP MARKER RED 10 pcs/pack	MCSP MARKER RED 100 pcs/pack	MCSP MARKER BLUE 10 pcs/pack	MCSP MARKER BLUE 100 pcs/pack

Dimensions



Alternative model

QLLS p.280
QSPLS p.282
MPQL p.292
MQSP p.294

Tester / Checker

TCC2-G p.404
DOTE4-G p.406
DOT p.408
TF p.414
LC3-G p.416

Technical data

Torque unit p.29
Human error p.57
Tool selection p.72
ISO 9000 related documents p.90
Tool control p.103
Adjustment method p.109

How to order.

Specify MODEL name X Torque Value

[EX.]

MCSP50NX25N•m

Note
- Not available for inspection purpose.
- MCSP is preset style so torque wrench tester is required to set torque. Specify the set torque when ordering.
- Interchangeable head and marker pen is dedicated design and it is optional of MCSP, purchase them when ordering.

TORQUE RANGE[N·m]
5~200

Loading Direction | Interchangeable | Pre-Lock | Water Proof | 10D | 12D | 15D | 19D | RoHS

CLWP Water Proof Torque Wrench

Washable, water proof torque wrench with anti-corrosion coating.

PAT.PEND.

CLWP50NX12D [L'=243mm]

Application

- For water-supply works, field works.

Features

- Water proof and dust protection meets IP55/IP57 rating.
- Pre-lock style, torque adjusting part in the removable grip end rubber cap allows torque setting at working field and it prevent dust contamination.
- Capable of use variety of Tohnichi interchangeable heads for various application.
- Fall prevention ring for hanging a strap wire is attached.
- Anti-corrosion coating interchangeable ratchet CPQH (P496) is available.

Optional Accessories

·Interchangeable head [p.492]

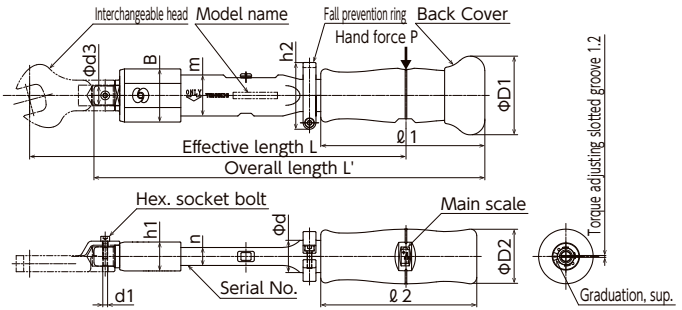
Washable torque wrench

Specifications

Accuracy ± 4%

MODEL			CLWP15NX10D	CLWP25NX10D	CLWP50NX12D	CLWP100NX15D	CLWP140NX15D	CLWP200NX19D
TORQUE RANGE [N•m]	MIN.~MAX.		5~15	10~25	20~50	40~100	60~140	80~200
	GRAD.		0.25		0.5	1		2
APPLICABLE BOLT	COMMON STEEL		M8	M8	M10	M12 (M14)	M16	(M18)
	HIGH TENSION		(M6) M7	(M7)	M8	M10	M12	(M14)
MAX. HAND FORCE [N]			72.5	121	214	308	379	439
DIMENSION [mm]	EFFECTIVE LENGTH	L	207		234	325	370	456
	OVERALL LENGTH	L'	221		243	334	379	458
	HEAD	d1	M3			M4		
		d3	10		12	15		19
	BODY	m	19		25.5	28		35
		n	9.2		11.2	12.2		15
		d	15		20	21.7		27.2
		D1	44		49	50		56
		D2	29		34	36		42
		ℓ1	96.5		102	106		130
		ℓ2	91.5		97	101		125
		B	25		33	34.5		44.5
		h1	16		18	19		23.5
		h2	36.5		41.5	43.5		49
WEIGHT[kg]			0.3		0.5	0.7	0.8	1.4

Dimensions



Alternative model

CL ····· p.230
CL-MH ····· p.236

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109

How to order.

Specify MODEL name X Torque Value

[EX.]

CLWP100NX15D

Note

- Not available for inspection purpose.
- A variety of heads are available and sold separately.

TORQUE RANGE[N·m]
10~850

Loading Direction | Digital | Signal | Interchangeable | Re-chargeable | 24 Gear | 9.53 | 12.7 | 19.05 | 25.4 | RoHS

CTA2-G Digital Torque and Angle Wrench

CE

Digital angle torque wrench with snug and angle setting functions for production use.

CTA100N2X15D-G [L'=384mm]

CTA500N2X22D-G [L'=949mm]

Application

- For angle-controlled bolt tightening in small lot production.

Features

- Applicable in angle-controlled bolt tightening in small lot production for maintenance and after-sales service, or back up for angle-tightening nut runners.
- Designed for a work that sequentially tighten the bolts by angle control like a cylinder head.
- Provide data creative and data management software through website.
- When reaches to snug torque, display shifts to angle mode and when angle reaches to target, buzzer and LED inform the operation is completed.
- Two different modes, Single spindle mode for one spindle of 1st angle tightening, Production mode for multiple spindles of up to 3rd angle tightening function.

Optional Accessories

·Interchangeable head [p.492]

·Interchangeable socket [p.504]

·Connecting Cable [p.507]

·Battery pack (BP-5) [p.507]

·Quick Battery Charger (BC-3-100) [p.506]

Specifications

DATA MEMORY	999 data (Tightening Torque,1st angle value, 2nd angle value, 3rd angle value and final torque value)
MEASUREMENT MODE	Single spindle/Production mode
DATA OUTPUT	RS232C compliant
ZERO ADJUSTMENT	Auto zero (Angle, Torque)
POWER	Ni-MH rechargeable battery
CONTINUOUS USE	Approx, 20 hours with fully charged (8 hours by 1 hour recharging)
RECHARGING TIME	Approx. 3.5 hours
TEMPERATURE IN USE [℃]	0~40℃ below 85% RH no condensation
OTHER FUNCTIONS	Snug torque / tightening torque / max tightening torque / 1st, 2nd, 3rd angle / 1st, 2nd, 3rd max angle / number of bolts / auto reset / judgment. Setting thru PC. Battery indicator.

Specifications

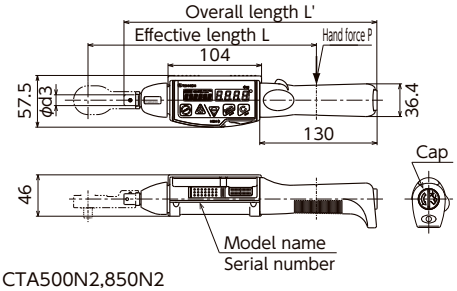
Torque Accuracy ± 1%

MODEL		CTA50N2X12D-G	CTA100N2X15D-G	CTA200N2X19D-G	CTA360N2X22D-G	CTA500N2X22D-G	CTA850N2X32D-G
TORQUE RANGE [N·m]	MIN.~MAX.	(2.5) 10~50	(5) 20~100	(10) 40~200	(18) 72~360	(25) 100~500	(43) 170~850
	1 DIGIT	0.05	0.1	0.2	0.4	0.5	1
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	kgf·cm (25) 100~500	(50) 200~1000	(100) 400~2000	(180) 720~3600	kgf·m (2.5) 10~50	(4.3) 17~85
	1 DIGIT	0.5	1	2	4	5	0.1
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in (25) 100~450	(50) 200~900	lbf·ft (7.6) 30~150	(13) 52~260	(18) 72~360	(31) 124~620
	1 DIGIT	lbf·in 0.5	1	lbf·ft 0.2	0.4	0.5	1
ANGLE MEASURING RANGE	MIN.~MAX.	0~999°					
	1 DIGIT	1°					
ANGLE ACCURACY		±2°+1digit (Angular velocity is 30°/s~180°/s when the bolt turned to 90°)					
MAX. HAND FORCE [N]		196.9	275.5	428.3	498.6	549.5	608
DIMENSION [mm]	EFFECTIVE LENGTH (L)	254	363	467	722	910	1398
	OVERALL LENGTH (L')	282	384	475	713	949	1387
	HEAD (d3)	12	15	19	22		32
WEIGHT [kg]		0.58	0.63	0.78	1.13	4	5.14
INTERCHANGEABLE HEADS		(SH,RH,QH,RQH,HH,DH,FH)12D	(SH,RH,QH,RQH,HH,DH,FH)15D	(SH,RH,QH,RQH,HH,DH,FH)19D	(SH,RH,QH,RQH,HH,DH,FH)22D		(SH,RH,QH,RQH,HH,DH,FH)32D

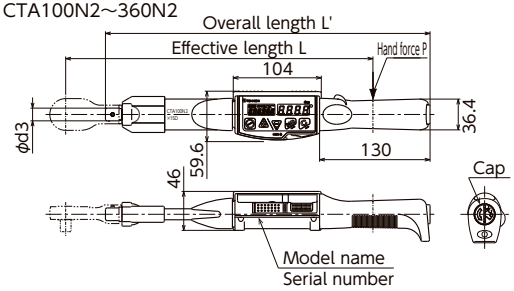
Note 1. The values in ( ) shows the lowest snug torque. Accuracy cannot be guaranteed for snug torque set beyond the operative torque range.
2. Overall length does not include interchangeable head. 3. PH (Pipe wrench) type interchangeable head cannot be used with this model.
Standard Accessories 1. Battery Pack (BP-5) 2. QH interchangeable head 3. Quick battery charger (BP-3-G) 4. Connecting cable (No.584)

Dimensions

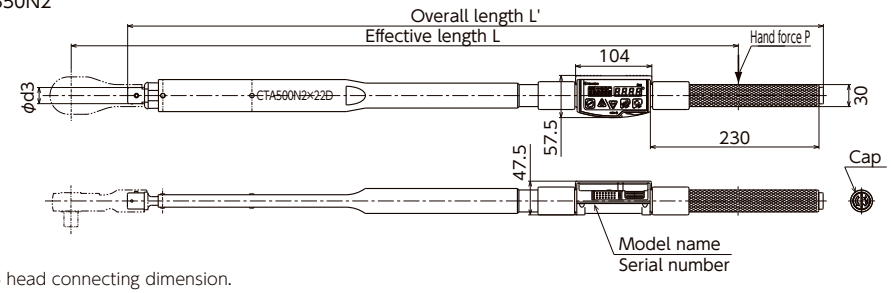
■ CTA50N2



■ CTA100N2~360N2



■ CTA500N2,850N2



#Refer to P. 496 head connecting dimension.

Alternative model
WQL ····· p.308
DWQL ····· p.306

Optional equipment
EPP16M3 ····· p.464

Tester / Checker
TCC2-G ····· p.404

DOTE4-G ····· p.406
TF ····· p.414

How to use
How to apply force ··· p.356

Technical data
Torque unit ····· p.29

Various Tightening Method ····· p.34
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.
Specify MODEL name
[EX.1] CTA100N2X15D-G
Note
- Quick battery charger BC-3-G can use in AC100-240V current.
- Wired data transfer type is available upon request.
- Not available for inspection purpose.

Loading Direction Digital 24 Gear 9.53 12.7 19.05 RoHS

DWQL/ M-DW

Analog Torque Wrench with Digital Angle Module/Digital Angle Module

Angle measuring starts once snug torque achieved.

CE

M-DW

DWQL100N

Application

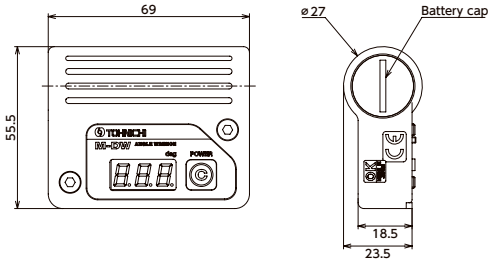
- For angle-controlled bolt tightening.

Features

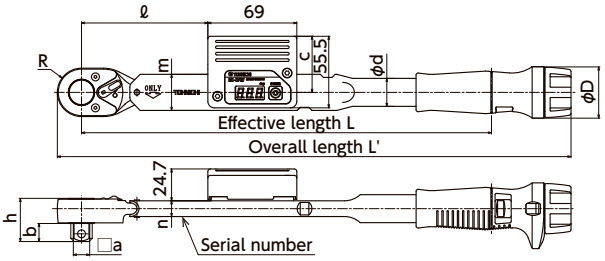
- LS type torque wrench can be converted to Angle torque wrench by installing M-DW.
- Angle measuring starts once the torque wrench clicks at setting snug torque value.
- Digital angle module mounted torque wrenches, DWQL are total 6 models.

Dimensions

■ M-DW



■ DWQL50N~420N



Angle module M-DW Specifications

ANGLE MODULE M-DW SPECIFICATIONS	
ANGLE MEASURING RANGE	0～999°
1DIGIT	1°
ANGLE ACCURACY	±2°＋1digit (Angular velocity is 30° /s～180° /s when the bolt turned to 90°)
DISPLAY	7 segment LED 3digits / Character height 10mm
MAX CONTINUOUS OPERATION	Approx. 60 hrs
OPERATING TEMPERATURE	0～40℃ Below 85% RH (No condensation)
STANDARD ACCESSORIES	Manual:1copy, Limit switch with connector:1pc, screws for attaching switch, washer:2pcs each, AA battery:1pc

Click type Angle wrench DWQL series

Torque Accuracy ± 3%

MODEL			DWQL50N	DWQL100N	DWQL140N	DWQL200N	DWQL280N	DWQL420N
ANGLE MEASURING RANGE [°]	MIN.～MAX.		0～999					
	1 DIGIT		1					
ANGLE ACCURACY			±2°＋1digit (Angular velocity is 30°/s～180°/s when the bolt turned to 90°)					
S.I. MODEL [N•m]	MIN.～MAX.		(5) 10～ 50	(10) 20～100	(25) 30～140	(30) 40～200	(30) 40～280	(40) 60～420
	1 GRAD		0.5	1		2		
DIMENSION [mm]	EFFECTIVE LENGTH	L	180	255	318	400	600	900
	OVERALL LENGTH	L'	258	333	399	489	692	993
	SQUARE DRIVE	a	9.53	12.7			19.05	
		b	11	14		15.4	20.5	
	HEAD	R	16	17	18.8	20	22.5	25.5
		h	25.6	32	33.5	38.4	44.5	46.5
	BODY	m	25.5	28		35		38.6
		n	11.2	12.2		15		16.1
		d	20	21.7		27.2		30
		D	38.5	40		51.5		50
		ℓ	46	78	98	124	246	376
		c	44.3	43.5				41.5
WEIGHT[kg]			0.62	0.86	1.0	1.6	2.2	3.6

The values in ( ) shows the lowest snug torque. Accuracy cannot be guaranteed for snug torque set beyond the operative torque range.

Alternative model
CTA2-G ····· p.304
WQL ····· p.308

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Various tightening methods ····· p.34
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.1] DWQL100N
[EX.2] M-DW

TORQUE RANGE[N·m]
10~420

Loading Direction

Dial Indicating | Ratchet Head | Torque Graduation | Angle Direct Reading | 24 Gear | 9.53 | 12.7 | 19.05 | RoHS

WQL Analog Torque and Angle Wrench

Manual angle torque wrench with snug and angle setting functions.

WQL100N4 [L'=350㎜]

Application

- For angle-controlled bolt tightening.

Features

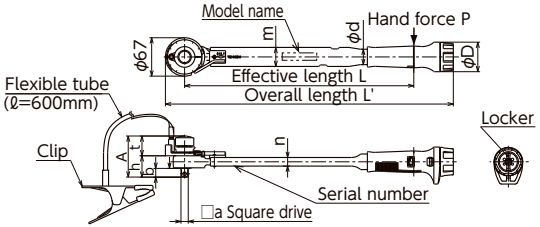
- Applicable in angle-controlled bolt tightening in small lot production, maintenance and after-sales service, or back up for angle-tightening nut runners.
- Snug torque can be easily set on the torque wrench by scale.
- Angle pointer can be set either to the target angle first and load down to zero, or set to zero first, and load up to the target angle.
- The angle pointer does not activate until the torque value reaches the snug torque.
- Features standard clip with flexible cable to attach on the adjacent surface. A magnet version is also available as optional accessory.
- WQL model can be also used as a standard torque wrench.

Optional Accessories

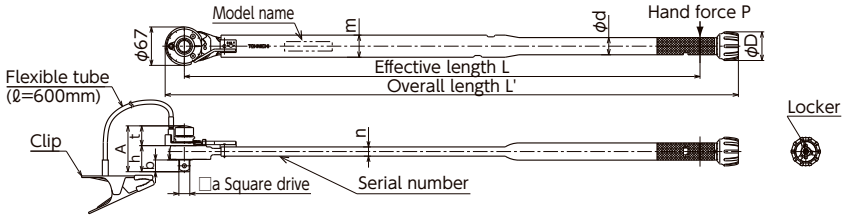
·Interchangeable socket [p.504]

Dimensions

■ WQL50N~280N



■ WQL420N



Specifications

Torque Accuracy ± 3%

S.I. MODEL			WQL50N	WQL100N4	WQL200N	WQL280N	WQL420N
TORQUE RANGE [N·m]	MIN.~MAX.		(5) 10~50	(10) 20~100	(30) 40~200	(30) 40~280	(40) 60~420
	GRAD.		0.5	1	2		
METRIC MODEL			450WQL3	900WQL4	1800WQL4	2800WQL3	4200WQL2
TORQUE RANGE [kgf.cm/kgf.m]	MIN.~MAX.		kgf·cm (50) 100~500	(100) 200~1000	(300) 400~2000	kgf·m (3) 4~28	(4) 6~42
	GRAD.		kgf·cm 0.5	1	2	kgf·m 0.2	
AMERICAN MODEL			450WQL3-A	900WQL4-A	1800WQL4-A	2800WQL3-A	4200WQL2-A
TORQUE RANGE [lbf.in/lbf.ft]	MIN.~MAX.		lbf·in (40) 100~400	lbf.ft (7) 15~75	(20) 30~150	(20) 30~200	(30) 60~300
	GRAD.		lbf·in 5	lbf·ft 1	2		3
ANGLE SCALE	ANGLE GRAD.		2°				
	MAX.		360°				
DIMENSION [mm]	EFFECTIVE LENGTH	L	180	255	400	600	900
	OVERALL LENGTH	L'	275	350	503	703	1001
	SQUARE DRIVE	a	9.53	12.7		19.05	
		b	11	15.4		20.5	
	HEAD	h	25.1	31.4	37.4	43.5	45.5
		t	34.5				
		A	59.6	65.9	71.9	78	80
	BODY	m	25.5	28	35		38.6
		n	11.2	12.2	15		16.1
		d	20	21.7	27.2		30
		D	38.5	40	51.5		50

Note The values in ( ) shows the lowest snug torque. Accuracy cannot be guaranteed for snug torque set beyond the operative torque range.

Alternative model
CTA2-G ····· p.304
M-DW/DWQL ····· p.306

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

How to use
Method of setting torque ··· p.353
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Various tightening method ····· p.34
Human error ····· p.57
Tool selection ····· p.72

ISO 9000 related documents ···p.90
Tool control ····· p.103

How to order.
Specify MODEL name
[EX.] WQL100N4

TORQUE WRENCH

Direct Reading Torque Wrench

SERIES INDEX

Digital

CEM3-G
P.324
2~850 [N·m]
Excellent visibility in light and dark with LCD and LED.

CEM3-P
P.326
2~850 [N·m]
Inspection torque wrench with data management software that links work name with test results.

CTB2-G
P.330
2~850 [N·m]
Detect the tightened torque value easily by re-tightening.

CPT-G
P.328
4~280 [N·m]
Bright LED indicates the current torque level against the target torque.

Digital Wireless data transfer

CEM3-G-BT
P.314
2~850 [N·m]
Transfer torque data wirelessly

CEM3-G-BTA
P.316
2~850 [N·m]
Judge by both torque and angle.
It is able to detect double tightening

CEM3-G-WF
P.318
2~850 [N·m]
2.4/5GHz wireless LAN method for wide communication range.

FD / FDD
P.320
2~280 [N·m]
Transfer torque data wirelessly.
Applied torque value indicated with LED light.

CSPLD/LDC
P.322
2~280 [N·m]
Send tightened torque value with wire.
Applied torque value indicated with LED light.

Dial indicating

DB
P.332
0.2~420 [N·m]
Inspection torque wrench.

DBE / DBR
P.334
50~6000 [N·m]
Inspection torque wrench.

CDB-S
P.336
0.7~420 [N·m]
Interchangeable head and dial indicating type torque wrench.

SCDB-S
P.338
3~200 [N·m]
Inspection torque wrench with European head connector.

T-S
P.340
3~4200 [N·m]
Dual grip dial indicating type torque wrench used to transfer stable torque to bolts, for both tightening and measuring.

Beam

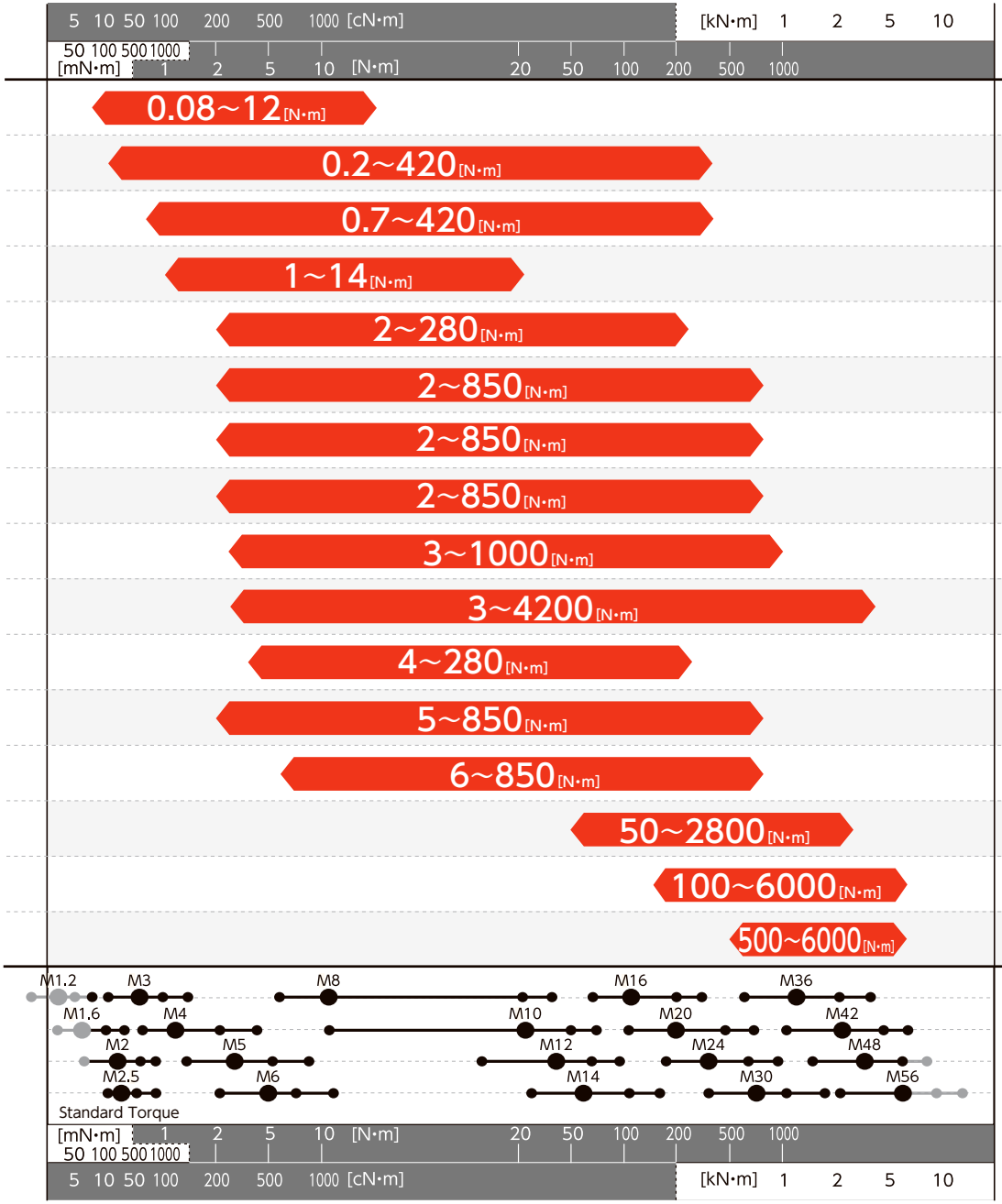
SF / F
P.342
0.08~1000 [N·m]
Direct reading type for tightening and measuring.

CSF / CF
P.348
1~850 [N·m]
Interchangeable head type of SF/F.

FR
P.344
100~6000 [N·m]
Beam type torque wrenches for high torque range.

QF / QFR
P.346
6~6000 [N·m]
For efficient bolt tightening operations even in confined places by ratchet function.

TORQUE RANGE INDEX



MODEL・TYPE				PAGE
 SF	Beam			342
 DB	Dial indicating			332
 CDB-S	Dial indicating Interchangeable Head			336
 CSF	Beam Interchangeable Head			348
 CSPLD	Wired Data Transfer	 FD/FDD	Wireless Data Transfer	322・320
 CEM3-G	DATA TORK	 CEM3-P	DATA TORK	324・326
 CEM3-G-BT	Wireless Data Transfer	 CTB2-G	Digital Retightening	314・330
 CEM3-G-BTA	Wireless Data Transfer	 CEM3-G-WF	Wireless LAN Data Transfer	316・318
 F	Beam			342
 T-S	T-handle			340
 CPT-G	Digital			328
 CF	Beam Interchangeable Head			348
 QF	Beam Ratchet Head			346
DBE	Dial indicating			334
 FR	Large Beam	 QFR	Beam Ratchet head	344・346
DBR	Dial indicating			334

T = Standard Tightening Torque

For more details, refer to "Relation between Screw and Torque" (P.35)

TUD TOHNICHI UNIFIED DESIGN

Loading Direction

Digital | Interchangeable | Direct Reading | Re-Chargeable

24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | 25.4

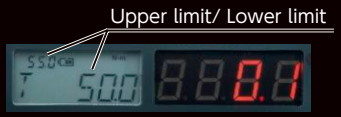
RoHS

CEM3-G-BT DATA TORK (Digital Torque Wrench)

Wireless Data Transfer Torque Wrench

CEM100N3X15D-G-BTS [L'=384mm]

CEM3-G-BTS Display



CEM3-G-BTD Display

Application

- For inspection or tightening

Features

- "-BTS" for inspection, and "-BTD" for tightening
- Wireless data transfer with Bluetooth®
- 2 types; -BTS as simplex communication and -BTD duplex communication.
- "-BTS" is standard type of wireless data-transfer CEM3 model.
- "-BTS" model is able to store tightened torque data and output data all at once wirelessly.
- "-BTD" model is easy to change target torque. It can replace multiple pieces of standard torque wrench.
- "-BTD"model can transfer tightened data to external equipment each time.

Optional Accessories

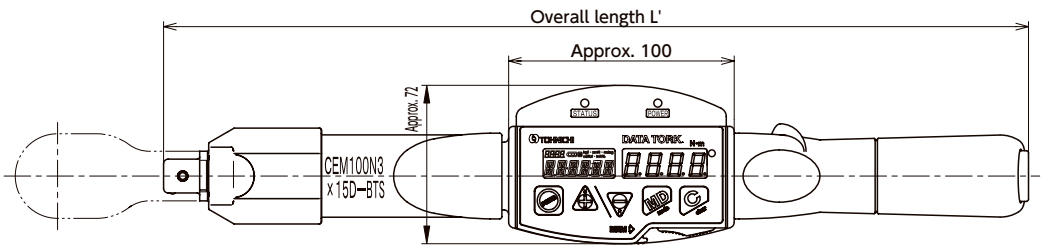
·Interchangeable head [p.492]

·Interchangeable socket [p.504]

·Battery Pack [p.507]

·Battery charger [p.506]

Dimensions



Specifications

Accuracy ± 1%

MODEL		CEM10N3X8D-G-BTS	CEM20N3X10D-G-BTS	CEM50N3X12D-G-BTS	CEM100N3X15D-G-BTS	CEM200N3X19D-G-BTS	CEM360N3X22D-G-BTS	CEM500N3X22D-G-BTS	CEM850N3X32D-G-BTS
	DUPLEX-BTD	CEM10N3X8D-G-BTD	CEM20N3X10D-G-BTD	CEM50N3X12D-G-BTD	CEM100N3X15D-G-BTD	CEM200N3X19D-G-BTD	CEM360N3X22D-G-BTD	CEM500N3X22D-G-BTD	CEM850N3X32D-G-BTD
TORQUE RANGE [N·m]	MIN.~MAX.	2~10	4~20	10~50	20~100	40~200	72~360	100~500	170~850
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
TORQUE RANGE [kgf·cm]	MIN.~MAX.	20~100	40~200	100~500	200~1000	400~2000	720~3600	1000~5000	-
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	-
TORQUE RANGE [kgf·m]	MIN.~MAX.	0.2~1	0.4~2	1~5	2~10	4~20	7.2~36	10~50	17~85
	1 DIGIT	0.001	0.002	0.005	0.01	0.02	0.04	0.05	0.1
TORQUE RANGE [lbf·in]	MIN.~MAX.	20~90	36~180	100~440	200~880	360~1700	650~3100	890~4400	-
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	-
TORQUE RANGE [lbf·ft]	MIN.~MAX.	1.5~7.3	3~14.5	7.5~36	15~73	30~150	52~260	73~360	124~620
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
OVERALL LENGTH	L'	212	214	282	384	475	713	949	1387
WEIGHT [kg]		0.54	0.55	0.66	0.71	0.86	1.21	4.08	5.22

Note 1. Refer to CEM3-G (P.325) for dimensions. 2. PH (Pipe wrench head) type interchangeable head is not available for this model.

Common Specifications

Model	Simplex communication (-BTS)	Duplex communication (-BTD)
Communication Direction	CEM3-G-BTS ⇒ External equipment	CEM3-G-BTD ⇔ External equipment
Data Memory	999	0
Continue Use	Approx. 8 hours	

※Bluetooth is registered trademark of the Bluetooth SIG, Inc.

Bluetooth® Communication Specification

Bluetooth® Version	Ver3.0
Communication Method	AFH
Modulation Method	GFSK
Wireless Output	4dBm
Transmission Power Class	Class2
Profile	SPP
Communication Distance	Approx. 10m

Alternative model
CEM3-P ····· p.326
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment
TDMS/TDMSHT ····· p.468

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

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Inspection of the tightened torque ···· p.45
Machine error ····· p.54
Tool selection flowchart ····· p.72
ISO9000 related documents ···· p.90
Management ····· p.103
Special heads ····· p.500
Overseas wireless standards ··· p.143

How to order.
Specify MODEL name
[EX.1]CEM100N3X15D-G-BTS
[EX.2]CEM200N3X19D-G-BTD

TUD TOHNICHI UNIFIED DESIGN

Loading Direction

Digital | Interchangeable | Direct Reading | Re-Chargeable

24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | 25.4

RoHS

CEM3-G-BTA DATA TORK (Digital Torque Wrench)

Able to detect double tightening.
measuring tightening angle, Judge by both torque and angle.

CEM100N3X15D-G-BTA [L'=384mm]

Application

- For work which needs to manage both torque and angle.
- Can be used for error-proofing by detecting double tightening(Pokayoke).

Features

- Store and output tightening torque and angle value.
- Judge OK/NG by both tightening torque and angle.
- Set target torque and angle needed for judgment.
- Detect double tightening from torque and angle.
- Transfer data by Bluetooth®.
- Contact to Tohnichi for conditions of wireless certification acquisition for each country.

Optional Accessories

·Interchangeable head [p.492]

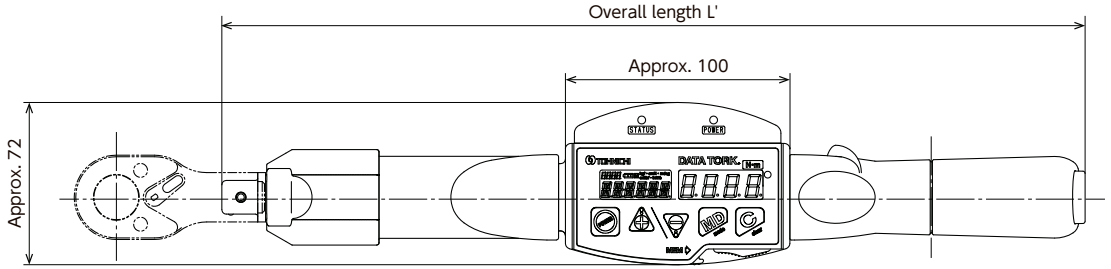
·Interchangeable socket [p.504]

·Battery Pack [p.507]

·Battery charger [p.506]

Refer P.500 for head insert part dimension

Dimensions



Specification

Model			CEM10N3X8D-G-BTA	CEM20N3X10D-G-BTA	CEM50N3X12D-G-BTA	CEM100N3X15D-G-BTA
TORQUE RANGE [N·m]	MIN.~MAX.		(0.5) 2~10	(1) 4~20	(2.5) 10~50	(5) 20~100
	1 DIGIT		0.01	0.02	0.05	0.1
DIMENSION [mm]	OVERALL LENGTH	L'	212	214	282	384
WEIGHT [kg]			0.54	0.55	0.66	0.71

Accuracy ±1%

Model			CEM200N3X19D-G-BTA	CEM360N3X22D-G-BTA	CEM500N3X22D-G-BTA	CEM850N3X32D-G-BTA
TORQUE RANGE [N·m]	MIN.~MAX.		(10) 40~200	(18) 72~360	(25) 100~500	(43) 170~850
	1 DIGIT		0.2	0.4	0.5	1
DIMENSION [mm]	OVERALL LENGTH	L'	475	713	949	1387
WEIGHT [kg]			0.86	1.21	4.08	5.22

Note Refer CEM3, page 324-325 for torque units and other details.
Note PH (Pipe wrench head) type interchangeable head is not available for this model due to effective length difference.
Note Value in ( ) is the lowest snug torque. Accuracy cannot guaranteed for snug set beyond the operative torque range.

Accuracy ±1%

Specifications

Angle Accuracy	± 2° +1digit (30~180° / s When the bolt turned 90°)
Display	7 segments LED 4 digits (character height 10mm) 14 segments LED 6 digits (character height 7mm) 7 segments LED 4 digits (character height 3mm) OK/NG judgment lED 2 color (blue/red) Bluetooth® power supply LED: red Bluetooth® connection LED: blue Bluetooth® remain indication: 4 stages
Data Memory	999 data(tightening torque, final angle, OK/NG judgment, measured date and time)
Basic Function	Peak hold Transfer measured data Auto reset (Torque/ Angle) Tightening completion alert OK/NG judgment Auto zero Auto power off Auto torque alert Timer
Weight	Bluetooth® V3.0 (Profile :SPP) RS232C compliant (2400~19200bps) Output serial number with USB connector
Power Supply	Ni-MH rechargeable battery pack
Continuous Use	Approx. 8 hours
Charging Time	Approx. 3.5 hours
Communication Mode	Key operation
Usage Environment	0~40℃ 85%RH or less (No condensation)

Bluetooth® Communication system

Bluetooth® Version	Ver3.0
Modulation Method	GFSK
Transmission Power Class	Class2
Communication Distance	Approx.10m
Communication Method	AFH
Wireless output	4dBm
Profile	SPP

※Bluetooth is registered trade mark of Bluetooth SIG, Inc.

Alternative model
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment
TDMS/TDMSHT ····· p.468

Tester/Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

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ISO9000 related documents ···· p.90
Tool control ····· p.103
Special heads ····· p.500
Overseas wireless standards ··p.143

How to order.
Consult to TOHNICHI or nearest distributors.

TORQUE RANGE [N·m]
2~850

TUD TOHNICHI UNIFIED DESIGN

Loading Direction

Digital | Interchangeable | Direct Reading | Re-Chargeable

24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | 25.4

RoHS

CEM3-WF Interchangeable Head Type Digital Torque Wrench

Wireless LAN communication
Perfect for wide working area

CEM100N3X15D-G-WF [L'=384mm]

Application

- For inspection or tightening

Features

- Wireless LAN communication conformable international standard correspondence IEEE802.11
- Dualband 2.4Ghz and 5GHz, 5GHz can be used where 2.4Ghz is restricted.
- 「Inspection mode」or「Tightening mode」can be chosen according to the work.
- Not only by wireless LAN communication, it can be connected to tablet directly.

Optional Accessories

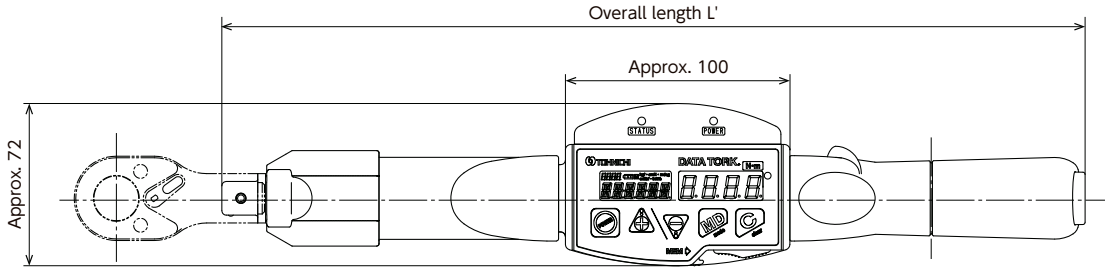
·Interchangeable head [p.492]

·Interchangeable socket [p.504]

·Battery Pack [p.507]

·Battery charger [p.506]

Dimensions



Specifications

Model			CEM10N3X8D-G-WF	CEM20N3X10D-G-WF	CEM50N3X12D-G-WF	CEM100N3X15D-G-WF
TORQUE RANGE [N·m]	MIN.~MAX.		2~10	4~20	10~50	20~100
	1 DIGIT		0.01	0.02	0.05	0.1
DIMENSION [mm]	OVERALL LENGTH	L'	212	214	282	384
WEIGHT [kg]			0.54	0.55	0.66	0.71

Accuracy ±1%

Model			CEM200N3X19D-G-WF	CEM360N3X22D-G-WF	CEM500N3X22D-G-WF	CEM850N3X32D-G-WF
TORQUE RANGE [N·m]	MIN.~MAX.		40~200	72~360	100~500	170~850
	1 DIGIT		0.2	0.4	0.5	1
DIMENSION [mm]	OVERALL LENGTH	L'	475	713	949	1387
WEIGHT [kg]			0.86	1.21	4.08	5.22

Note Refer CEM3(P.318) for other detail specifications.
Note PH (Pipe wrench head) type interchangeable head is not available for this model due to effective length difference.

Accuracy ±1%

Common Specifications

Display	LED: 7 segments, 4 line LCD: 14 segments, 6 lines 7 segments, 4 lines Judgment LED: RED/BLUE
Character Height	LED: 10mm LCD: 14 segments, 7mm 7 segments, 3mm
Data Memory	999
Basic Function	PEAK/RUN, Auto memory, Tightening completion alert, measured data (measured torque value, measured date and time), Memory calculation, OK/NG judgment, clock, Remained battery indication, Auto zero, Auto power off (3 minutes)
Data Output	Wireless LAN, RS232C compliant, Output serial number with USB connector
Power Supply	Ni-MH rechargeable battery pack
Continuous Use	Approx. 8 hours
Charging Time	Approx. 3.5 hours
Communication Mode	Key operation
Usage Environment	0~40℃ 85%RH or less (No condensation)

Wireless LAN Common Specifications

Wireless Standard	IEEE802.11a/b/g/n	
Frequency	11b/g/n	2.4/5GHz
	11b/g	2.4GHz
	11n/a	5GHz
Transmission Speed	11b	MAX.11Mbps
	11a/g	MAX.54Mbps
	11n	MAX.72.2Mbps
Modulation Method	11b	DSSS
	11a/g/n	OFDM
Modulation Method	WAP2	
Protocol	TCP / IPv4	
Communication Distance	Approx.50m ※1	
Display	Power LED ※2 Confirm Connection LED ※3	
Acquisition of License	TELEC, FCC, IC, SRRC	

※1: Communication distance varies due to Radio wave environment and the performance of the communication connection partner device
※2: RED LED turns on when wireless LAN power is on.
※3: Blue LED flush/ on according on access point and connection situation with PC.

Refer P.500 for head insert part dimension

Alternative model
CEM3-G-BT ····· p.314
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment
TDMS/TDMSHT ····· p.468

Tester/Checker
TCC2-G ····· p.404
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How to order.
Contact to Tohnichi for conditions of wireless certification acquisition for each country.

FD/FDD Click type wireless data transfer torque wrench

FDD prevents double tightening counting by angle detection

CSPFD100N3X15D

R-FHD256

Application

- Tightening torque data management.

Features

- Wireless transfer of tightening torque data at the time of clicking.
- Immediate pass/fail decision offers highest level of workability.
- Pokayoke for just managing the number of times of tightening or simple tightening torque data management offer highly reliable torque management.
- Available for Japan, USA, Canada, Mexico, EU and Asian countries. Refer page p.143.
- Actual torque date of tightening completion is transferred.

Optional Accessories

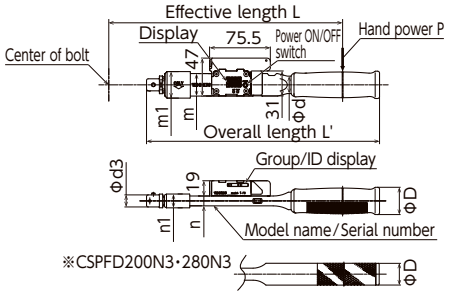
·Interchangeable head [p.492]

·Interchangeable socket [p.504]

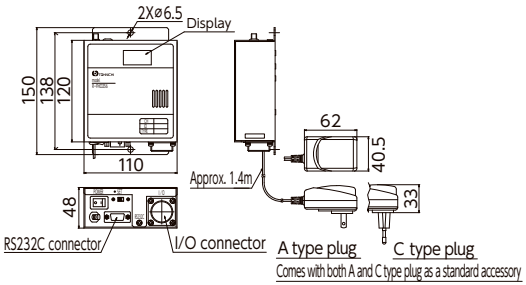
Note: Refer P.500 for interchangeable head.

Dimensions

■ CSPFD/FDD25N3-10NX10D~CSPFD/FDD280N3X22D



■ R-FHD256



Specifications

MODEL			CSPFD25N3-10N×10D	CSPFD25N3×10D	CSPFD50N3×12D	CSPFD50N3×15D	CSPFD100N3×15D	CSPFD140N3×15D	CSPFD200N3×19D	CSPFD280N3×22D
	FDD		CSPFDD25N3-10N×10D	CSPFDD25N3×10D	CSPFDD50N3×12D	CSPFDD50N3×15D	CSPFDD100N3×15D	CSPFDD140N3×15D	CSPFDD200N3×19D	CSPFDD280N3×22D
TORQUE RANGE [N·m]	MIN.~MAX.		2~10	5~25	10~50		20~100	30~140	40~200	40~280
	1 DIGIT		0.1		0.2	0.5	1			
TORQUE RANGE [kgf·m]	MIN.~MAX.		kgf·m 0.2~1	0.5~2.5	1~5		2~10	3~14	4~20	4~28
	1 DIGIT		0.01		0.02		0.05		0.1	
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.		lbf·in 20~85	50~200	100~400		20~850	lbf·ft 25~100	30~150	30~200
	1 DIGIT		lbf·in 0.5	1	1		1	lbf·ft 0.5	1	
MAX. HAND FORCE P [N]			53.8	135	241	230	344	401	450	425
DIMENSION [mm]	EFFECTIVE LENGTH	L	186		208	218	291	349.5	445	660
	OVERALL LENGTH	L'	193		214	217	290	349	429	627
	HEAD	d3	10		12	15	15		19	22
	BODY	m	18.9		25.5		28		35	
		n	9.2		11.2		12.2		15	
		m1	Approx.23		Approx.29.5		Approx.33		Approx.40	
		n1	Approx.13.2		Approx.15.2		Approx.17.2		Approx.20	
		d	15		20		21.7		27.2	
		D	29		34		34		27.2	
WEIGHT [kg]			0.32		0.46		0.65	0.77	1.2	1.65

Accuracy ±3%+1digit

Common Specifications

Model	Transmitter		Receiver
	FD	FDD	R-FHD256
Available Angle for Double Tightening Prevension	N/A	0 to 360 degree	–
LED Display	Blue: Judgment OK	Blue: Double Tightening Prevension and Torque Judgment OK	N/A
	Blinks Red: Communications Error	Blinks Red: Communications Error	
	Red; Judgment NG	Red; Double Tightening Prevension or Torque Judgment NG	
LCD Display	Torque 3 digits, torque unit, battery level 4 steps	Torque 3 digits, torque unit, battery level 4 steps	ID 3 digits, torque 3 digits, torque unit
Switch	Power/Test/Set Switch		
Power Supply	2XAAA Battery		AC100V-240V
Opeartion	24 hours	12 hours	–
Function	Auto Zero and Auto Off, upto 99 minutes		–
Frequency	2.402GHz - 2.479GHz (1MHz interval, 78 kinds)		
Communication method	Frequency hopping spread spectrum		
Moduration System	GFSK		
Communication Direction	Duplex (transmitter ⇔ receiver)		
	Duplex (receiver ⇔ PLC, Tohnichi software)		
No. of channels	256 (000-255)		
ID	3-digit (000-999), 7-digits (alphanumeric)		
Antenna	Built-in (Chip antenna)		Dipole antenna
Communication Distance	Approx. 10~20m		
Temperature in Use	0-45degrees C		

Alternative model
CSPLD/LDC ····· p.322

Optional equipment
SB-FH256 ····· p.454

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data
Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Overseas wireless standards ··p.143

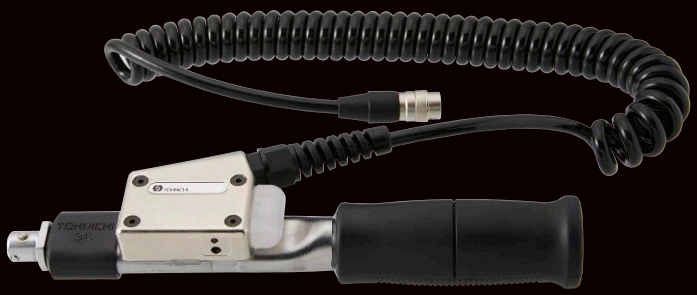
How to order.
Contact to Tohnichi for conditions of wireless certification acquisition for each country.

Note
・Group and ID can be set by SB-FH256 (separately sold).

TUD TOHNICHI UNIFIED DESIGN Loading Direction Assembly Interchangeable Re-Chargeable RoHS

CSPLD/LDC Wired deta communication torque wrench

Transfer tightened data by cable.
LED light on the body indicate Judgment result.



CSPLD50N3X12D

CD5 (Sold separately)

Application

- Manage tightening data

Features

- Wired data transfer preset type torque wrench CSPLD series has a large LED judgment lights confirm OK-Blue or Hi/Lo NG-Red on the wrench for confirmation by user on the wrench.
- LED light up indicates next tool to use (Management Software is needed. Contact Tohnichi for detail information)
- The transmitter size is approx. 60% smaller than previous model, CSPD.
- Adoppted curled cord to improve usability and prevent disconnection.
- CSPLDC features Quick Connect Cable Style which allows for easy exchange or replacement of the cable.

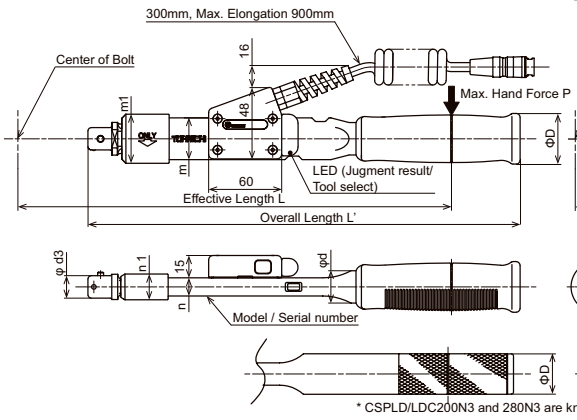
Optional Accessories

・Interchangeable Head [p.492]

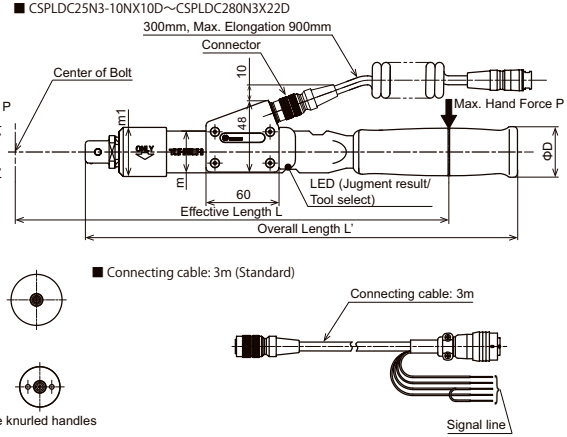
・Interchangeable socket [p.504]

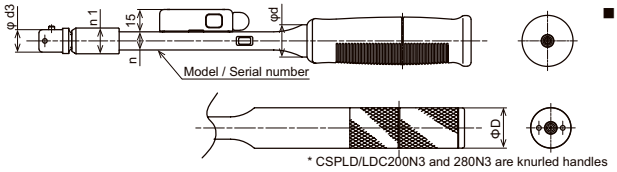
Dimensions

■ CSPLD25N3-10NX10D～CSPLD280N3X22D



■ CSPLDC25N3-10NX10D～CSPLDC280N3X22D





■ Connecting cable: 3m (Standard)

Specifications

MODEL			CSPLD/LDC 25N3-10NX10D	CSPLD/LDC 25N3X10D	CSPLD/LDC 50N3X12D	CSPLD/LDC 50N3X15D	CSPLD/LDC 100N3X15D	CSPLD/LDC 140N3X15D	CSPLD/LDC 200N3X19D	CSPLD/LDC 280N3X22D
TORQUE RANGE [N·m]		MIN.~MAX.	2~10	5~25	10~50		20~100	30~140	40~200	40~280
HAND POWER P[N] WHEN APPLIED MAX TORQUE			53.8	135	241	230	344	401	450	425
DIMENSION [mm]	EFFECTIVE LENGTH	L	186		208	218	291	349.5	445	660
	OVERALL LENGTH	L'	193		214	217	290	349	429	627
	HEAD	Φd3	10		12	15			19	22
	BODY	m	18.9		25.5		28		35	
		n	9.2		11.2		12.2		15	
		m1	Approx.23		Approx.29.5		Approx.33		Approx.40	
		n1	Approx.13.2		Approx.15.2		Approx.17.2		Approx.20	
		Φd	15		20		21.7		27.2	
		ΦD	29		34				27.2	
WEIGHT [kg]			0.42		0.56		0.75	0.87	1.3	1.75

Accuracy ±3%+1digit

Note: Refer P.500 for interchangeable head.

Alternative model

FD/FDD ····· p.320

Optional equipment

CD5 ····· p.460

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414
LC3-G ····· p.416

Technical data

Torque unit ····· p.29
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Overseas wireless standards ··p.143

How to order.
Consult to TOHNICHI or nearest distributors.

TUD TOHNICHI UNIFIED DESIGN

Loading Direction

Digital | Interchangeable | Direct Reading | Re-Chargeable

24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | 25.4

RoHS

CEM3-G DATA TORK (Digital Torque Wrench) CE

Eye-friendly dual display (LCD and LED).

CEM100N3X15D-G [L'=384㎜]

CEM20N3X10D-G [L'=214㎜]

CEM850N3X32D-G [L'=1387㎜]

Application

- For inspection of already tightened bolt or tightening operation.

Features

- For bolt inspection or tightening.
- Clear visibility with dual display of LCD and LED.
- Saved data can be output with USB cable.
- A durable and strong aluminum body.
- CE mark applied for EU user.
- Design considered of individual differences in color vision (Tohnichi Unified Design).

Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

・Connecting Cable [p.507]

・Battery pack [p.507]

・Quick battery charger [p.506]

Common Specifications

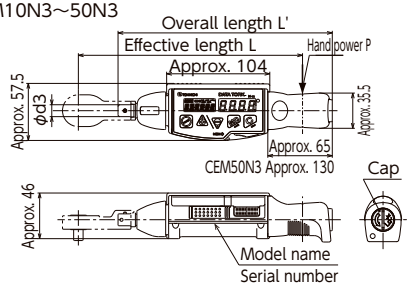
Display	7 segments LED 4 lines 10 mm
	14 segments LCD 6 lines 7 mm
	7 segments LED 4 lines 3 mm
	Battery Life Indicator (4 steppes)
	Judgment LED RED / BLUE
Memory	999 (M-2 mode: 99 data)
Communication Functions	RS232C (2400-19200 bps)
	Output serial number with USB connector
Power Supply	Ni-MH rechargeable battery
Continuous Use	Approx. 20 hrs with fully charged (8 hrs by 1 hrs recharging)
Recharging Time	Approx. 3.5 hrs
Operation Temperature	0~40℃ RH less than 85% (no condensation)

Basic Function	Peak Hold
	Measured Data Memory (measured value, measured date and time)
	Auto Memory & Resetting
	Tightening Completion Buzzer
	OK / NG Judgment
	Auto Zero setting
	Auto power off (3 min)
	Clock

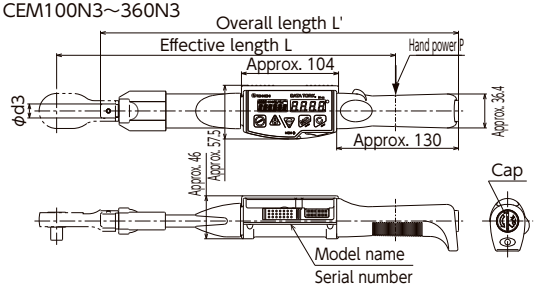
Note Overall length does not include interchangeable head.
PH (Pipe wrench head) type interchangeable head is not available for this model.

Dimensions

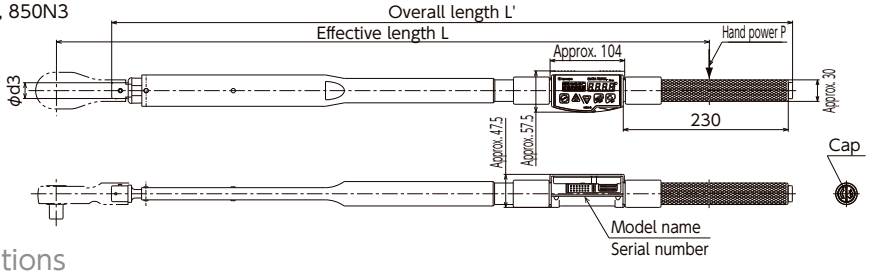
■ CEM10N3～50N3



■ CEM100N3～360N3



■ CEM500N3, 850N3



Specifications

MODEL		CEM10N3X8D-G	CEM20N3X10D-G	CEM50N3X12D-G	CEM100N3X15D-G	CEM200N3X19D-G	CEM360N3X22D-G	CEM500N3X22D-G	CEM850N3X32D-G
TORQUE RANGE [N·m]	MIN.～MAX.	2～10	4～20	10～50	20～100	40～200	72～360	100～500	170～850
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
TORQUE RANGE [kgf·cm]	MIN.～MAX.	20～100	40～200	100～500	200～1000	400～2000	720～3600	1000～5000	–
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	–
TORQUE RANGE [kgf·m]	MIN.～MAX.	0.2～1	0.4～2	1～5	2～10	4～20	7.2～36	10～50	17～85
	1 DIGIT	0.001	0.002	0.005	0.01	0.02	0.04	0.05	0.1
TORQUE RANGE [lbf·in]	MIN.～MAX.	20～90	36～180	100～440	200～880	360～1700	650～3100	890～4400	–
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	–
TORQUE RANGE [lbf·ft]	MIN.～MAX.	1.5～7.3	3～14.5	7.5～36	15～73	30～150	52～260	73～360	124～620
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
HAND POWER P[N] WHEN APPLIED MAX TORQUE		48.1	92.2	196.9	275.5	428.3	498.6	549.5	608
DIMENSION [mm]	EFFECTIVE LENGTH(L)	208	217	254	363	467	722	910	1398
	OVERALL LENGTH(L')	212	214	282	384	475	713	949	1387
	HEAD (d3)	8	10	12	15	19	22		32
WEIGHT [kg]		0.46	0.47	0.58	0.63	0.78	1.13	4.00	5.14
INTERCHANGEABLE HEAD		(SH,RH,QH,HH) 8D	(SH,SH-N,RH,QH,DH,HH) 10D	(SH,RH,QH, RQH,DH,HH) 12D	(SH,RH,QH, RQH,DH,HH) 15D	(SH,RH,QH,RQH,DH,HH) 19D	(SH,RH,QH,RQH,DH,HH) 22D		(SH,RH,QH) 32D

Standard Accessories Battery pack (BP-5), QH head, Quick battery charger (BC-3-G) Accuracy ±1%

#Refer P.500 for dimension of head adjusting part.

Alternative model

CEM3-P ····· p.326
CEM3-G-BT ····· p.314
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment

EPP16M3 ····· p.464
R-DT999 ····· p.466
TDMS/TDMSHT ····· p.468

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightning torque ··· p.45
Machine error ····· p.54
Tool selection ····· p.72
ISO9000 related documents ··· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.

Specify MODEL name

[EX.] CEM100N3X15D-G

TORQUE RANGE [N·m]
2~850

TUD TOHNICHI UNIFIED DESIGN
Loading Direction
Digital | Interchangeable | Direct Reading | Re-Chargeable
24 Gear | 6.35 | 9.53 | 12.7 | 19.05 | 25.4
RoHS

CEM3-P Interchangeable Head Type Digital Torque Wrench CE

Quality inspection torque wrench with data management software that links work name with test results.

CEM100N3X15D-P [L'=384㎜]

※Application software

Application

- For inspection or error-proofing tightening.

Features

- ID management capabilities for measured parts and results.
- "Standard inspection software" developed for low cost data management.
- Can be used for error-proofing (Pokayoke).
- Design considered of individual differences in color vision (Tohnichi Unified Design).

Optional Accessories

・Interchangeable head [p.492]

・Interchangeable socket [p.504]

・Connecting Cable [p.507]

・Battery pack [p.507]

・Quick battery charger [p.506]

Common Specifications

Display	7 segments LED 4 lines 10 mm
	14 segments LCD 3 lines 7 mm
	7 segments LED 4 lines 3 mm
	Battery Life Indicator (4 steppes)
	Judgment LED RED / BLUE
Communication Functions	RS232C (2400-19200 bps)
	Output serial number with USB connector
Power Supply	Ni-MH rechargeable battery
Continuous Use	Approx. 20 hrs with fully charged (8 hrs by 1 hour recharging)
Recharging Time	Approx. 3.5 hrs
Operation Temperature	0~40℃ RH less than 85%(no condensation)

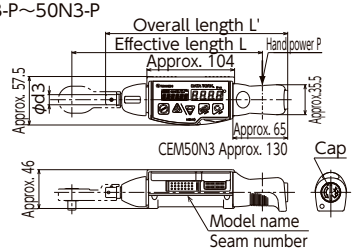
Basic Function	Peak Hold
	Auto Memory & Resetting
	Tightening Completion Buzzer
	Judgment of Measured Data
	Auto Zero setting
	Auto power off (3 min)
	Clock

※Indicates work name on the LCD display of CEM3-P.

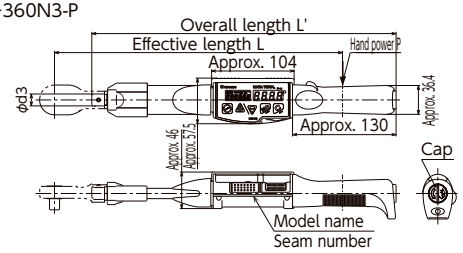
Note Overall length does not include interchangeable head.PH (Pipe wrench head) type interchangeable head is not available for this model.

Dimensions

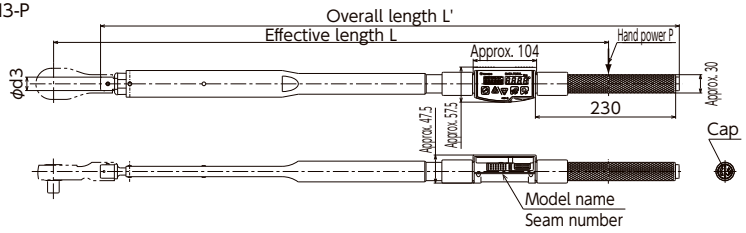
■ CEM10N3-P～50N3-P



■ CEM100N3-P～360N3-P



■ CEM500N3,850N3-P



Specifications

MODEL		CEM10N3X8D-P	CEM20N3X10D-P	CEM50N3X12D-P	CEM100N3X15D-P	CEM200N3X19D-P	CEM360N3X22D-P	CEM500N3X22D-P	CEM850N3X32D-P
TORQUE RANGE [N·m]	MIN.～MAX.	2～10	4～20	10～50	20～100	40～200	72～360	100～500	170～850
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
MAX. HAND FORCE P [N]		48.1	92.2	196.9	275.5	428.3	498.6	549.5	608
DIMENSION [mm]	EFFECTIVE LENGTH(L)	208	217	254	363	467	722	910	1398
	OVERALL LENGTH(L')	212	214	282	384	475	713	949	1387
	HEAD (d3)	8	10	12	15	19	22		32
WEIGHT [kg]		0.46	0.47	0.58	0.63	0.78	1.13	4.00	5.14
INTERCHANGEABLE HEAD		(SH,RH,QH,HH) 8D	(SH,SH-N,RH,QH,DH,HH) 10D	(SH,RH,QH, RQH,DH,HH) 12D	(SH,RH,QH, RQH,DH,HH) 15D	(SH,RH,QH,RQH,DH,HH) 19D	(SH,RH,QH,RQH,DH,HH) 22D		(SH,RH,QH) 32D

Note Refer CEM3 (P.324) for other detail specifications. Accuracy ±1%
Note PH (Pipe wrench head) type interchangeable head is not available for this model due to effective length difference.
Accessories Battery pack (BP-5), Suitable QH, Charger, Connecting cable(584)

CEM3-P standard software general discriptions	
Work Place Memory	Max.100 work places (Work place name, number of screws, tightening direction, uper / lower torque limit, measuring order)
Measurement Data Storage	Up to 3000 screw data (Vary depending on work place registered) (measurement work place name, measured value, OK / NG judgement, measured time and date)

#Refer P.500 for dimension of head adjusting part.

Alternative model
CEM3-G ····· p.324
CEM3-G-BT ····· p.314
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment
EPP16M3 ····· p.464

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

How to use
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Inspecting the tightning torque p.45
Machine error ····· p.54
Tool selection ····· p.72
ISO9000 related documents ···· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.
Specify MODEL name
[EX.] CEM100N3X15D-P

CPT-G PROTORK™ CE

LED indicator allows the user to follow the changing torque values.

CPT20X10D-G-SET [L'=330㎜]

CPT100X15D-G-SET [L'=476㎜]

CPT280X22D-G-SET [L'=700㎜]

Preset Tightening Mode
(Red LED shows the level of the applied torque)

Judgment Tightening Mode
(As torque is being applied prior to completion)

Judgment Tightening Mode
(The case of exceeding target torque range)

Application

- For inspection of already tightened bolt or tightening operation.

Features

- It has data memory, communication function, able to manage measured data on PC.
- LED indicator allows the user to follow the changing torque value towards target torque.
- A durable and strong aluminum body.
- CE mark applied for EU user.

Optional Accessories

·Interchangeable head [p.492]

·Interchangeable socket [p.504]

·Connecting cable [p.507]

·Storage case [p.491]

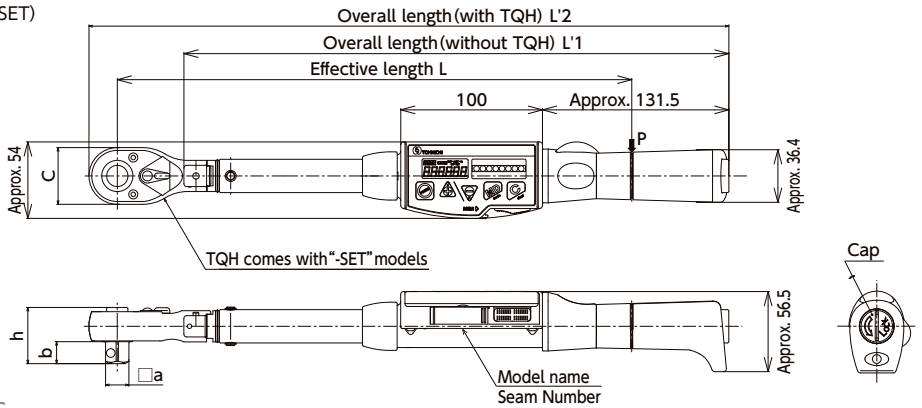
Common Specifications

DISPLAY	14-segment LCD 6 line 7mm height
	7-segment LCD 4line 3mm height
	Battery life indicator (4 steps)
MEMORY	50
TORQUE SETTING MEMORY	Preset mode: 10 torque values to register
	Judge mode: Up to 10 values of each Upper/Lower/Tightening direction
BASIC FUNCTION	Auto power off (3 minutes)
	Auto memory/Reset
	Auto zero
COMMUNICATION FUNCTION	RS232C compliance
POWER	AA battery x 2 pcs
CONTINUOU USE	Approx. 40 hours
TEMPERATURE IN USE	0~40℃ below 85% RH (no condensation)

Note 1. Not included interchangeable head and battery for the weight
2. PH (Pipe wrench head) type interchangeable head is not available for this model.

Dimensions

■ CPT20～CPT280(-SET)



Specifications

MODEL			CPT20X10D-G	CPT50X12D-G	CPT100X15D-G	CPT200X19D-G	CPT280X22D-G
TORQUE RANGE [N·m]	MIN. ～ MAX.		4～20	10～50	20～100	40～200	56～280
	1 DIGIT		0.02	0.05	0.1	0.2	0.2
TORQUE RANGE [kgf·cm]	MIN. ～ MAX.		40～200	100～500	200～1000	400～2000	560～2800
	1 DIGIT		0.2	0.5	1	2	
TORQUE RANGE [kgf·m]	MIN. ～ MAX.		0.4～2	1～5	2～10	4～20	5.6～28
	1 DIGIT		0.002	0.005	0.01	0.02	
TORQUE RANGE [lbf·in]	MIN. ～ MAX.		36～180	100～440	200～880	360～1700	500～2400
	1 DIGIT		0.2	0.5	1	0.2	
TORQUE RANGE [lbf·ft]	MIN. ～ MAX.		3～14.5	7.5～36	15～73	30～150	42～200
	1 DIGIT		0.02	0.05	0.1	0.2	
HAND POWER P[N] WHEN APPLIED MAX TORQUE			81.6	196.9	275.5	428.3	466.7
DIMENSION [mm]	EFFECTIVE LENGTH	L	245	254	363	467	600
	OVERALL LENGTH	L'1	281	283	385	476	592
		L'2	330	339	476	556	700
	SQ. DRIVE	a	9.5		12.7		19
		b	11		15.5		23
	HEAD	C	32		40		63
		h	32		40		55
WEIGHT [kg]			0.63	0.65	0.85	1.37	1.76

Accuracy ±3%

MODEL		CPT20X10D-G-SET	CPT50X12D-G-SET	CPT100X15D-G-SET	CPT200X19D-G-SET	CPT280X22D-G-SET
STANDARD ACCESSORIES	RATCHET HEAD	TQH10D	TQH12D	TQH15D	TQH19D	TQH22D
	STORAGE CASE	CPT Small case (844)			CPT Large case (845)	
	BATTERY	AA Ni-mh Battery x 2				

#Refer P.500 for dimension of head adjusting part.

Alternative model
CEM3-G ····· p.324

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

How to use
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Machine error ····· p.54
Tool selection ····· p.72
ISO9000 related documents ···· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.
Specify MODEL name

[EX.1] CPT100X15D-G

[EX.2] CPT200X19D-G-SET

Note
- ·CPT-G models do not come with TQH head, Storage case, Battery.
- ·Above comes with CPT-G-SET only.
- ·TQH head is not provided individually, use standard QH head as the replacement.

CTB2-G Digital Retightening Wrench

CE

With CTB type of wrench, Technical skill is not necessary to detect the original tightened torque applied on the blot.

CTB100N2X15D-G [L'=384mm]

CTB850N2X32D-G [L'=1387mm]

Application

- For quality inspection using the retightening torque test method.

Features

- For re-tightening inspection of tightened bolts.
- Adopted Tonichi original re-tightening measurement algorithm "T-point method".(PAT.PEND)
- Detect the originally applied tightening torque on the bolt without influenced by personal error.
- Internal memory saves up to 999 records, which can be downloaded via RS232C.
- Spanner, ring spanner and other type of head can be used according to interchangeable type of wrench.

Optional Accessories

·Interchangeable head [p.492]

·Interchangeable socket [p.504]

·Connecting Cable [p.507]

·Battery pack [p.507]

·Quick battery charger [p.506]

Common Specifications

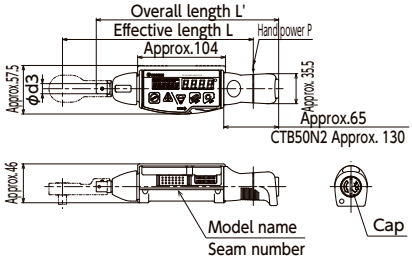
DISPLAY	7 segments LED 4 lines 10 mm
	14 segments LCD 6 lines 7 mm
	7 segments LED 4 lines 3 mm
	Battery Life Indicator (4 steppes)
	Judgment LED RED / BLUE
MEMORY	999 (M-2 mode: 99 data)
COMMUNICATION FUNCTIONS	RS232C (2400~19200 bps)
	Serial output corresponding to a USB connecter
POWER SUPPLY	Ni-MH rechargeable battery
CONTINUOUS USE	Approx. 20 hrs with fully charged (8 hrs by 1 hour recharging)
RECHARGING TIME	Approx. 3.5 hrs
OPERATION TEMPERATURE	0~40℃ RH less than 85% (no condensation)

BASIC FUNCTION	Peak Hold
	Peak Data Memory with date and time
	Auto Memory & Resetting
	Tightening Completion Buzzer
	Judgment of Measured Data
	Auto Zero setting
	Auto power off (3 min)
	Clock

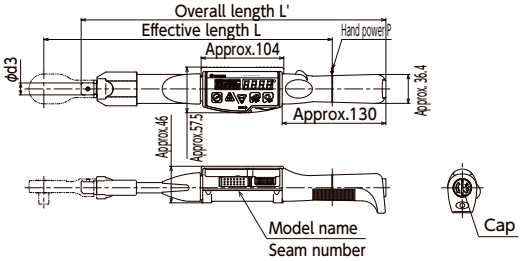
Note 1. Overall length does not include interchangeable head.
2. PH (Pipe wrench head) type interchangeable head is not available for this model.

Dimensions

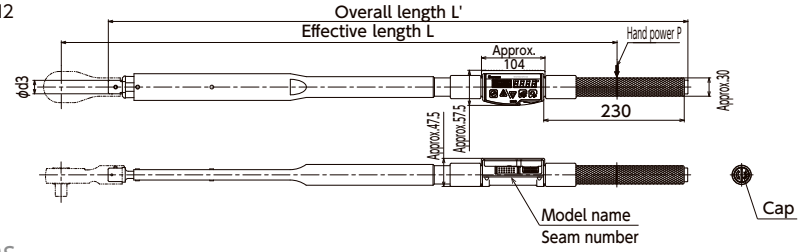
■ CTB10N2～50N2



■ CTB100N2～360N2



■ CTB500N2, 850N2



Specifications

MODEL		CTB10N2X8D-G	CTB20N2X10D-G	CTB50N2X12D-G	CTB100N2X15D-G	CTB200N2X19D-G	CTB360N2X22D-G	CTB500N2X22D-G	CTB850N2X32D-G
TORQUE RANGE [N·m]	MIN.～MAX.	2～10	4～20	10～50	20～100	40～200	72～360	100～500	170～850
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
TORQUE RANGE [kgf·cm]	MIN.～MAX.	20～100	40～200	100～500	200～1000	400～2000	720～3600	1000～5000	–
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	–
TORQUE RANGE [kgf·m]	MIN.～MAX.	0.2～1	0.4～2	1～5	2～10	4～20	7.2～36	10～50	17～85
	1 DIGIT	0.001	0.002	0.005	0.01	0.02	0.04	0.05	0.1
TORQUE RANGE [lbf·in]	MIN.～MAX.	20～90	36～180	100～440	200～880	360～1700	650～3100	890～4400	–
	1 DIGIT	0.1	0.2	0.5	1	2	4	5	–
TORQUE RANGE [lbf·ft]	MIN.～MAX.	1.5～7.3	3～14.5	7.5～36	15～73	30～150	52～260	73～360	124～620
	1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.4	0.5	1
HAND POWER P[N] WHEN APPLIED MAX TORQUE		48.1	92.2	196.9	275.5	428.3	498.6	549.5	608
DIMENSION [mm]	EFFECTIVE LENGTH(L)	208	217	254	363	467	722	910	1398
	OVERALL LENGTH(L')	212	214	282	384	475	713	949	1387
	HEAD (d3)	8	10	12	15	19	22		32
WEIGHT [kg]		0.46	0.47	0.58	0.63	0.78	1.13	4.00	5.14
INTERCHANGEABLE HEAD		(SH,RH,QH,HH) 8D	(SH,SH-N,RH,QH,DH,HH) 10D	(SH,RH,QH, RQH,DH,HH) 12D	(SH,RH,QH, RQH,DH,HH) 15D	(SH,RH,QH,RQH,DH,HH) 19D	(SH,RH,QH,RQH,DH,HH) 22D		(SH,RH,QH) 32D

Standard Accessories Battery pack (BP-5), Suitable QH head, Battery charger (BC-3-G) Accuracy ±1%

#Refer P.500 for dimension of head adjusting part.

Alternative model

CEM3-G ····· p.324
CEM3-P ····· p.326
DB ····· p.332
DBE/ DBR ····· p.334
SF/ F ····· p.342

Optional equipment

EPP16M3 ····· p.464
R-DT999 ····· p.466
TDMS/TDMSHT ····· p.468

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
TF ····· p.414

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Technical data

Torque unit ····· p.29
Retightening method ····· p.47
Machine error ····· p.54
Tool selection ····· p.72
ISO9000 related documents ···· p.90
Tool control ····· p.103
Special heads ····· p.500

How to order.

Specify MODEL name

[EX.] CTB100N2X15D-G

Note

・Wireless data transfer type is available upon request.

DB Dial Indicating Torque Wrench

Dial indicating inspection torque wrench with wide range and high accuracy.

DB100N-S [L'=398㎜]

DB12N4-S [L'=204㎜]

Application

- For inspection and tightening.

Features

- Wide range, high accuracy, lightweight, large scale which is easy to see.
- DB-S model is equipped with a memory pointer to capture peak torque.
- Since the dial is movable, the pointer can be set to the desired torque first and complete tightening as the pointer indicates "0".
- The accuracy of DB(-S) model is not affected by hand force point (place where apply force)
- The dial indicator has a protective cover to prevent damage to external objects (except DB420N)
- DB25N~280N grip is made by resin.

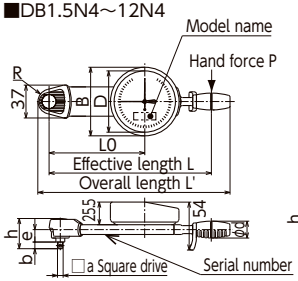
Optional Accessories

・Interchangeable socket [p.504]

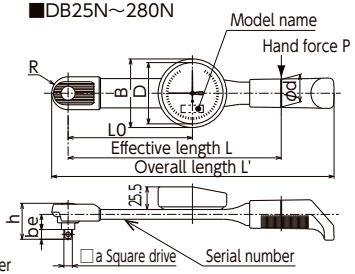
・Adjusting tool for DB [p.491]

Dimensions

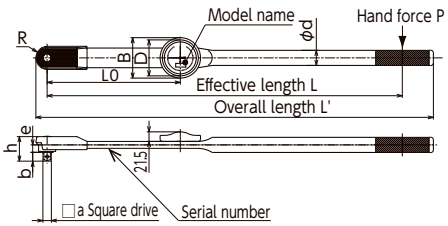
■DB1.5N4～12N4



■DB25N～280N



■DB420N



Specifications

S.I. MODEL		DB1.5N4 (-S)	DB3N4 (-S)	DB6N4 (-S)	DB12N4 (-S)	DB25N-1/4-S	DB25N (-S)	DB50N (-S)	DB100N-3/8-S	DB100N (-S)	–	–	–	DB200N (-S)	–	DB280N-1/2-S	DB280N (-S)	DB420N (-S)
TORQUE RANGE [N·m]	MIN.～MAX.	0.2～1.5	0.3～3	0.6～6	1～12	3～25		5～50	10～100		–	–	–	20～200	–	30～280		40～420
	1 GRAD.	0.02	0.05	0.1	0.2	0.5			1		–	–	–	2	–	5		
METRIC MODEL		15DB4-S	30DB4-S	60DB4-S	120DB4-S	230DB3-1/4-S	230DB3-S	450DB3-S	900DB3-1/4-S	900DB3-S	–	–	–	1800DB3-S	–	2800DB3-1/2-S	2800DB3-S	4200DB2-S
TORQUE RANGE [Kgf·cm / Kgf·m]	MIN.～MAX.	kgf·cm 2～15	3～30	6～60	10～120	30～250		50～500	100～1000		–	–	–	200～2000	–	kgf·m 3～28		4～42
	1 GRAD.	kgf·cm 0.2	0.5	1	2	5			10		–	–	–	20	–	kgf·m 0.5		
AMERICAN MODEL		DB13I-2AS	DB26I-2AS	DB40I-2AS	DB75I-2AS	DB150I-2AS	DB150I-3AS	DB300I-3AS	DB600I-3AS	DB600I-4AS	DB25F-3AS	DB50F-3AS	DB50F-4AS	DB100F-4AS	DB175F-4AS	–	DB250F-6AS	DB350F-6AS
TORQUE RANGE [lbf·in / lbf·ft]	MIN.～MAX.	lbf·in 0～13	0～26	0～40	0～75	0～150		0～300	0～600		lbf·ft 0～25	0～50	0～50	0～100	0～175	–	0～250	0～350
	1 GRAD.	lbf·in 0.2	0.5		1	2		5	10		lbf·ft 0.5			1	2	–	5	
APPLICABLE BOLT	STEEL	(M3.5)	M4(M4.5)	M5,M6	(M7)	M8		M10	M12(M14)		M10	M12(M14)		M16(M18)		M20		(M22)
	HIGHT TENSION	M3(M3.5)	M4	M4(M4.5)	M5,M6	(M7)		M8	M10		M8	M10		(M14)		M16		(M18)
MAX. HAND FORCE P [N]		8.8	17.6	35.3	70.6	125		209	323		141.2	218.7		488	486.2	467		525
DIMENSION [mm]	EFFECTIVE LENGTH L	170				200		240	310		240	310		410	488	600		800
	OVERALL LENGTH L'	204				247		318	398		320	40		500	580	690		890
	WIDTH B	77.2																91
	SCALE DIA. D	67																81
	SQ. DRIVE a	6.35					9.53			12.7	9.53			12.7			19.05	
	SQ. DRIVE b	7.5			8.5	11		12.4		14	11	12.4		14		17.7	20.5	
	HEAD e	14				17								21.5		14.7		16.7
	HEAD h	34			38	40.5		41.9		43.5	40.5	41.9	43.5	47.2		49.3	52.1	53.1
	HEAD R	14				18.5								21.5				26
	BODY d	19			30.6		32		31.3		32		31.3	35.4				34
	BODY L0	95			114		140		180		140		180	230		300		
WEIGHT [kg]		0.4					0.6		0.7		0.6		0.7	1		1.65		2.6

Note Model with memory pointer has"-s" in model name. The appearance is the same with model without memory pointer. Accuracy ±3%
Warrant from 20% of maximum range for American models.

Alternative model

Tester / Checker

How to use

Technical data

How to order.

Specify MODEL name

[EX.1] DB100N

[EX.2] DB12N4-S

Note

- Without a memory pointer model is also available upon request [EX.2].
- Without memory pointer model is also available upon request [EX.1]

TORQUE RANGE [N·m]
50~6000

Loading Direction | Dial Indicating | Direct Reading | Memory Pointer | 19.05 | 25.4 | 38.1 | 44.45 | RoHS

DBE/DBR Dial Indicating Torque Wrench

Dial indicating inspection torque wrench with wide range and high accuracy.

DBE700N [L'=1267㎜]

DBE2100N-S [L'=2150㎜ with an extention bar]

Application

- For Inspection and Tightening.

Features

- Wide range, high accuracy, lightweight, large scale which is easy to see.
- DBE-S/DBR-S models is equipped with a memory pointer to capture peak torque.
- Since the dial is movable, the pointer can be set to the desired torque first and complete tightening as the pointer indicates "0".
- DBE model comes with extension bar. DBR model is mechanical force application type, applies load by lever block or winch.
- The accuracy of DBE/DBR is not affected by hand force point (place where apply force)

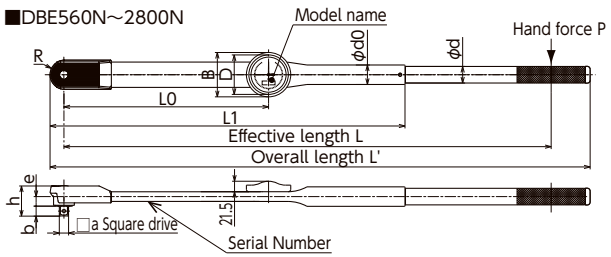
Optional Accessories

·Interchangeable socket [p.504]

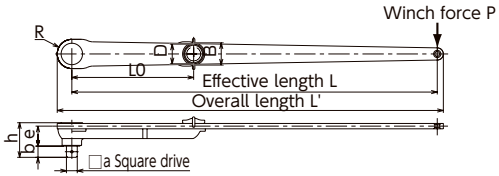
·Adjusting tool for DB [p.491]

Dimensions

■DBE560N~2800N



■DBR4500N,6000N



Specifications

S.I. MODEL		DBE560N (-S)	DBE700N (-S)	DBE850N (-S)	DBE1000N (-S)	DBE1400N (-S)	DBE2100N (-S)	DBE2800N (-S)	DBR4500N (-S)	DBR6000N (-S)
TORQUE RANGE [N·m]	MIN.~MAX.	50~560	70~700	100~850	100~1000	200~1400	200~2100	300~2800	0.5~4.5kN·m	0.6~6kN·m
	1 GRAD.	5	10			20		50	0.05kN·m	0.1kN·m
METRIC MODEL		5600DBE2-S	7000DBE2-S	8500DBE2-S	10000DBE2-S	14000DBE2-S	21000DBE2-S	28000DBE2-S	45000DBR-S	60000DBR-S
TORQUE RANGE [kgf·m]	MIN.~MAX.	5~56	7~70	10~85	10~100	20~140	20~210	30~280	50~450	60~600
	1 GRAD.	0.5	1			2		5		
AMERICAN MODEL		-	DB500F-6AS	-	DB800F-8AS	DB1000F-8AS	DB1500F-8AS	DB2000F-12AS	DB3000F-12AS	-
TORQUE RANGE [lbf·ft]	MIN.~MAX.	-	0~500	-	0~800	0~1000	0~1500	0~2000	0~3000	-
	1 GRAD.	-	10	-	10		20		50	-
APPRICABLE BOLT	STEEL	M24	(M27)		M30	(M33)	M36	(M39) M42	(M45) M48	M52
	HIGHT TENSION	M20		(M22)	M24	(M27)	M30	(M33)	M36 (M39)	M42 (M45)
MAX. HAND FORCE P [N]		560	609	680	741	875	1050	1250	3750	4000
DIMENSION [mm]	EFFECTIVE LENGTH L	1000	1150	1250	1350	1600	2000	2240	1200	1500
	OVERALL LENGTH L'	1109	1267	1369	1496	1748	2150	2390	1285	1585
	WIDTH B	91							128	
	SCALE DIA. D	81							91	
	SQ. DRIVE a	19.05		25.4				38.1		44.45
	SQ. DRIVE b	20.5		26.5			28.5	42		46
	HEAD e	19.6	22	16.9	14.5	18.8	18.3	23.7	82	
	HEAD h	63.1	67	67.9	63	73	78.3	104.5	138.5	142.5
	HEAD R	29	34	34.8		39.8	45.8	46.5	60	
	BODY L1	728.6	810.1	812.4		737.4	729.9	889.9		
	BODY d	34	38			34				
	BODY d0	40	45			51	60.3	63.5		
	BODY L0	420	500							
WEIGHT [kg]		4.1	5.7	6.3	6.6	8.8	13.1	17.2	24.5	25.5

Note 1. Warrant from 20% of maximum range for American models.
2. DBR models requires winch or mechanical loading device.

Accuracy ±3%

Alternative model

Tester / Checker

How to use

Technical data

How to order.

Specify MODEL name

[EX.1] DBE700N

[EX.2] DBE1000N-S

Note
- Without memory pointer models is also available. Refer to [EX.1]
- DBR model is made to order product.

CDB-S Dial Indicating Torque Wrench with Interchangeable Head

Dial-Indicating torque wrench with interchangeable head.

CDB100NX15D-S [L'=413㎜]

CDB14N4X8D-S [L'=215㎜]

Application

- For inspection and tightening.

Features

- Interchangeable head, light weight, easy to see, suitable for inspection.
- Cost saving, head could be replaced according to the application,
- CDB-S has a memory pointer as standard equipment, it is easy to read check the max torque.
- Since the deformation is smaller compare to beam type, operator's fatigue is reduced.
- The dial is movable
- The dial indicator has a protective cover to prevent damage to external objects (except CDB300N, 420N)
- Comes with resin grip for CDB25N~200N

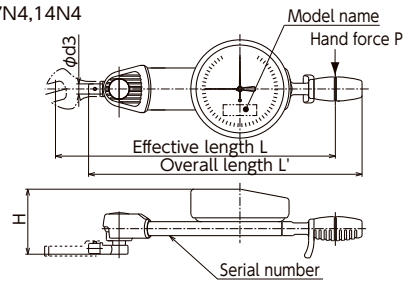
Optional Accessories

·Interchangeable head [p.492]

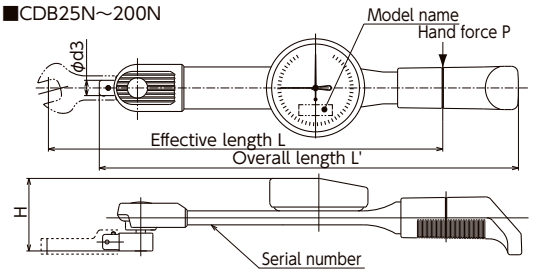
·Adjusting tool for DB [p.491]

Dimensions

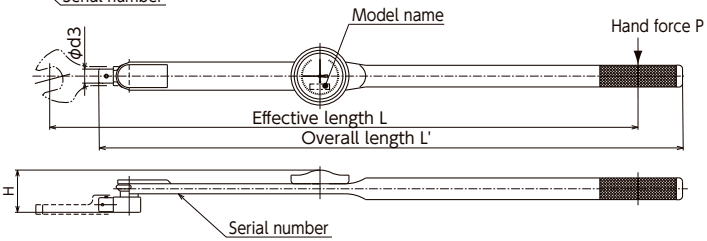
■CDB7N4,14N4



■CDB25N~200N



■CDB300N, 420N



Specifications

S.I. MODEL		CDB7N4X8D-S	CDB14N4X8D-S	CDB25NX10D-S	CDB50NX12D-S	CDB100NX15D-S	CDB200NX19D-S	CDB300NX22D-S	CDB420NX22D-S
TORQUE RANGE [N·m]	MIN.~MAX.	0.7~7	2~14	3~25	5~50	10~100	20~200	30~300	40~420
	1 GRAD.	0.1	0.2	0.5		1	2	5	
METRIC MODEL		70CDB4-S	140CDB4-S	250CDB-S	500CDB-S	1000CDB-S	2000CDB-S	3000CDB-S	4200CDB-S
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	kgf·cm 7~70	20~140	30~250	50~500	100~1000	200~2000	kgf·m 3~30	4~42
	1 GRAD.	kgf·cm 1	2	5		10	20	kgf·m 0.5	
AMERICAN MODEL		70CDB4-A-S	140CDB4-A-S	250CDB-A-S	500CDB-A-S	1000CDB-A-S	2000CDB-A-S	3000CDB-A-S	4200CDB-A-S
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 6~60	20~120	30~220	40~430	lbf·ft 7~70	14~140	20~220	30~300
	1 GRAD.	lbf·in 1	2	5		lbf·ft 1	2	5	
APPLICABLE BOLT (REFERENCE)	STEEL	M5,M6	(M7) M8	M10	M12	M12 (M14)	M16 (M18)	M20 (M22)	M24
	HIGHT TENSION	M4 (M4.5)	M5,M6	(M7)	M8	M10	M12 (M14)	M16	(M18)
MAX. HAND FORCE [N]		31.8	63.6	96.2	161.3	256.4	388.3	413.8	454.1
DIMENSION [mm]	EFFECTIVE LENGTH L	220		260	310	390	515	725	925
	OVERALL LENGTH L'	215		255	330	413	525	718	918
	HEIGHT H	51.1		57		60	60.5	66.5	64.5
	HEAD d3	8		10	12	15	19	22	
WEIGHT [kg]		0.4		0.48	0.53	0.76	1	1.65	2.8

Note 1. Overall length does not include interchangeable head.
2. PH (Pipe wrench head) type interchangeable head is not available for this model.
3. Refer P.500 for dimension of head adjusting part.

Accuracy ±3%

#Refer P.500 for dimension of head adjusting part.

Alternative model

CEM3-G ····· p.324
CTB2-G ····· p.330
DB ····· p.332
SF/ F ····· p.342
CSF/ CF ····· p.348

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use

Way of Loading ····· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Machine error ····· p.54
Tool selection ····· p.72
ISO9000 related documents ····· p.90
Tool control ····· p.103
Adjustment method ····· p.109
Parts list for DB ····· p.125

How to order.

Specify MODEL name

[EX.] CDB100NX15D-S

Loading Direction

Dial Indicating | Interchangeable | Direct Reading | Memory Pointer | 9x12 | 14x18 | RoHS

SCDB-S European Style Interchangeable Head Type Dial Indicating Torque

Dial-indicating torque wrench with DIN interchangeable head connector.

SCDB50N-S

Application

- For inspection or tightening.

Features

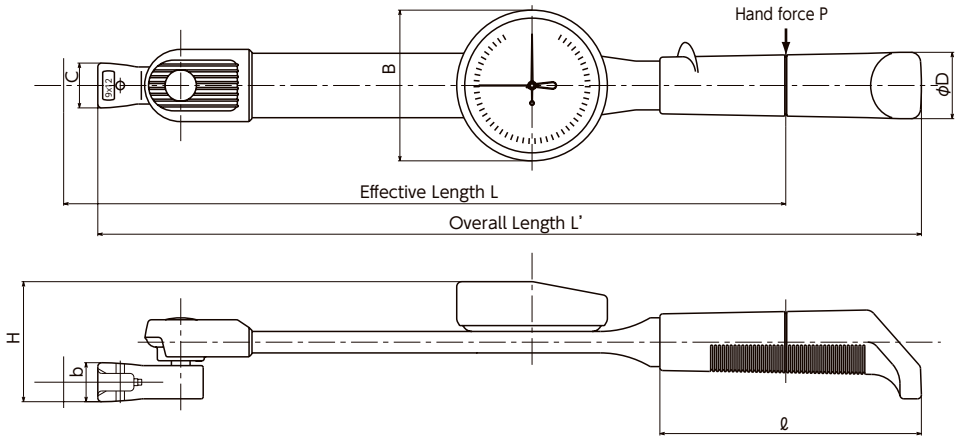
- Same features as CDB torque wrench with DIN connector (DIN = German standard).
- SCDB-S is equipped with a memory pointer as standard to capture peak torque reading.
- The dial indicator has a protective cover to prevent damage to external objects.
- Since the dial is movable, operator can set to the desired torque first, and finish as the pointer indicates "0".

Optional Accessories

·Interchangeable head [p.492]

·Adjusting tool for DB [p.491]

Dimensions



Specifications

S.I MODEL			SCDB25N-9x12-S	SCDB50N-9x12-S	SCDB100N-9x12-S	SCDB200N-14x18-S
TORQUE RANGE [N•m]	MIN. ~ MAX.		3~25	5~50	10~100	20~200
	GRAD.		0.5		1	2
HEAD SIZE [mm]			9x12			14x18
MAX. HAND FORCE [N]			96	167	270	408
DIMENSION [mm]	EFFECTIVE LENGTH	L	271	342	422	535
	OVERALL LENGTH	L'	260	300	370	490
	HEAD	C	23			30
		b	20			26
	BODY	H	63	61	62	63
		B	77.2			
		D	31	34		38
		ℓ	59	95	134	
WEIGHT [kg]			0.48	0.53	0.76	1

Accuracy ±3%

Note 1. Overall length does not include interchangeable head.
2. Applicable to European Style head only. TOHNICHI interchangeable head cannot be used.

Alternative model

CEM3-G ····· p.324
CTB2-G ····· p.330
DB ····· p.332
SF/ F ····· p.342
CSF/ CF ····· p.348

Tester / Checker

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use

Way of Loading ····· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Machine error ····· p.54
Tool selection ····· p.72
ISO 9000 related documents ····· p.80
Tool method ····· p.103
Adjustment method ····· p.109
Parts list for DB ····· p.125

How to order.

Specify MODEL name

[EX.] SCDB25N-9x12-S

T-S T-Handle Dial Indicating Torque Wrench

Dial-indicating torque wrench with dual grip to apply stable torque for tightening and inspection.

T90N-S [L'=376mm]

Scale Plate (A red needle is memory pointer)

T180N-S [L'=656mm]

T700N-S [L'=1300mm]

Application

- For inspection or tightening.

Features

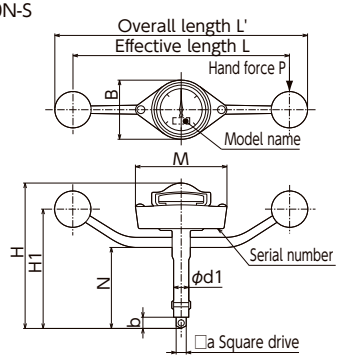
- Bimanual operation.
- Light weight, easy to read dial, suitable for inspection and tightening.
- Dial scale and thin pointer indicate precise torque value. It is graduated for clockwise and counterclockwise.
- Since the deformation is smaller compare to beam type, operator's fatigue is reduced.
- Since T-S has a memory pointer as standard equipment, it is easy to read check the peak torque.
- Since load is applied with both hands or two person, the applied force is offset, allowing for easy and precise tightening or inspection.
- THe dial is movable, the pointer can be set to the desired torque first and complete tightening as the pointer indicates"0".

Optional Accessories

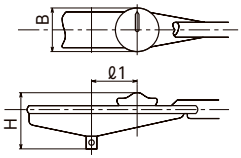
・Interchangeable socket [p.504]

Dimensions

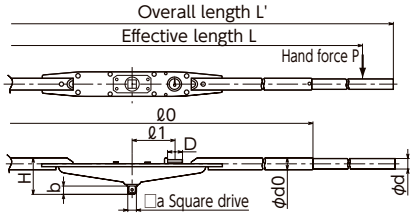
■ T23N-S～180N-S



■ T700N-S～2100N-S



■ T2800N-S～4200N-S



Specifications

S.I. MODEL		T23N-S	T45N-S	T90N-S	T180N-S	T700N-S	T1000N-S	T1400N-S	T2100N-S	T2800N-S	T4200N-S
TORQUE RANGE [N·m]	MIN.~MAX.	3～23	5～45	10～90	20～180	70～700	100～1000	200～1400	200～2100	300～2800	500～4200
	GRAD.	0.5		1	2	10		20		50	
METRIC MODEL		230T-S	450T-S	900T-S	1800T-S	7000T-S	10000T-S	14000T-S	21000T-S	28000T-S	42000T-S
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	kgf·cm 30～230	50～450	100～900	200～1800	kgf·m 7～70	10～100	20～140	20～210	30～280	40～420
	GRAD.	kgf·cm 5		10	20	kgf·m 1		2		5	
AMERICAN MODEL		T200I-3AS	T400I-3AS	T65F-4AS	T130F-4AS	7000T-A-S	10000T-A-S	14000T-A-S	21000T-A-S	28000T-A-S	42000T-A-S
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 20～200	50～400	lbf·ft 10～65	20～130	50～500	50～700	100～1000	200～1500	200～2000	400～3000
	GRAD.	lbf·in 2	5	lbf·ft 1	2	5		10	20		50
APPRICABLE BOLT (REFERENCE)	STEEL	M8	M10	M12 (M14)	(M18)	(M27)	M30	(M33)	M36	(M39) M42	(M45) M48
	HIGHT TENSION	(M7)	M8	M10	(M14)	M20	M24	(M27)	M30	(M33)	M36 (M39)
MAX. HAND FORCE P [N]		128	200	265	290	608	676	809	905	1015	1214
DIMENSION [mm]	EFFECTIVE LENGTH L	180	225	340	620	1150	1480	1730	2320	2760	3460
	OVERALL LENGTH L'	205	261	376	656	1300	1630	1880	2500	2960	3660
	WIDTH B	61.2				91				94	104
	HEIGHT H	127.5	141.5	163	182	102	117	123	130	144	161.3
	SQ. DRIVE a	9.53		12.7		19.05	25.4			38.1	
	SQ. DRIVE b	11		15.5		20.5	26.5			42	
	BODY H1	95	113	140.5	162.5						
	BODY M	94									
	BODY N	71	82	102.5	118.5						
	BODY d1	16		21							
	BODY ℓ0								1200	1600	2000
	BODY ℓ1					143	144	155.5	158		165
	BODY d0					34			40	45	48.6
	BODY d								34	40	
WEIGHT [kg]		0.41	0.53	0.8	1.2	4	4.8	6.2	10	15.5	21.5

Note:T700N-S～4200N-S is production on order.

Accuracy ±3%

Alternative model
CEM3-G ····· p.324
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
CDB-S ····· p.336
SF/ F ····· p.342

Tester / Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use
How to apply force ··· p.356

Technical data
Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO9000 related documents ···· p.90
Tool control ····· p.103

How to order.

Specify MODEL name

[EX.] T90N-S

Note

・T700N-S ～ T4200N-S models are supplied upon request only.

SF/F Beam Type Torque Wrench

Direct-reading beam type torque wrench for measuring and tightening.

F92N [L'=402mm]

SF6N [L'=205mm]

Application

- For inspection or tightening.

Features

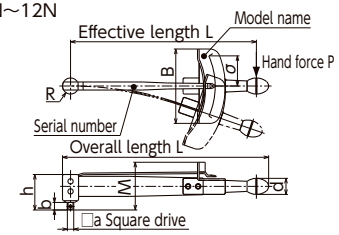
- Basic style torque wrench.
- Simple direct-reading beam type torque wrench.
- Light weight, easy-to-read scale, suitable for inspection.
- Graduated in clockwise and counterclockwise directions, and applicable for retightening and loosening torque inspection methods.
- The unique shape of the arm is designed to keep the internal force at stable level without any friction, which contributes to enhanced durability.
- F model grip is shaped to conform to the hand in order to prevent slipping.

Optional Accessories

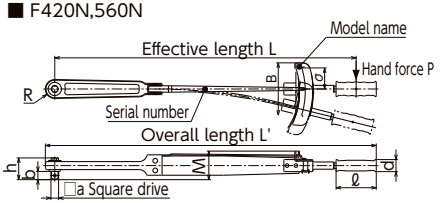
・Interchangeable socket [p.504]

Dimensions

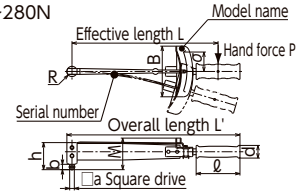
■ SF40CN～12N



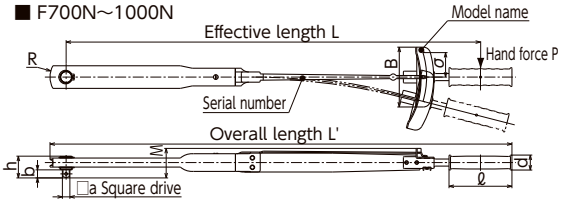
■ F420N,560N



■ F23N～280N



■ F700N～1000N



Specifications

S.I. MODEL		SF40CN	SF70CN	SF1.5N	SF3N	SF6N	SF12N	F23N	F46N	F92N	F130N	F190N	F280N	F420N	F560N	F700N	F850N	F1000N
TORQUE RANGE [cN·m/N·m]	MIN.～MAX.	cN·m 8～40	10～70	N·m 0.2～1.5	0.5～3	0.6～6	2～12	3～23	5～46	10～92	20～130	30～190	50～280	70～420	100～560	100～700	100～850	100～1000
	GRAD.	cN·m 2		N·m 0.05	0.1	0.2	0.5		1	2		5		10			20	
METRIC MODEL		4SF	7SF	15SF	30SF	60SF	120SF	230F	460F	920F	1300F	1900F	2800F	4200F	5600F	7000F	8500F	10000F
TORQUE RANGE [kgf·cm/kgf·m]	MIN.～MAX.	kgf·cm 0.8～4	1～7	2～15	5～30	6～60	20～120	30～230	50～460	100～920	200～1300	300～1900	kgf·m 5～28	7～42	kgf·cm 1000～5600	1000～7000	kgf·m 10～85	10～100
	GRAD.	kgf·cm 0.2		0.5	1	2	5		10	20		50	kgf·m 0.5	1	kgf·cm 100		kgf·m 2	
AMERICAN MODEL		4SF-A	7SF-A	15SF-A	30SF-A	60SF-A	120SF-A	230F-A	460F-A	920F-A	1300F-A	1900F-A	2800F-A	4200F-A	5600F-A	7000F-A	8500F-A	10000F-A
TORQUE RANGE [lbf·in/lbf·ft]	MIN.～MAX.	lbf·in 0～3.4	0～6	0～13	0～26	0～50	0～100	0～200	0～400	lbf·ft 10～66	10～95	25～135	30～200	30～300	50～400	50～500	60～600	70～700
	GRAD.	lbf·in 0.2		0.5	1	2	5		10	lbf·ft 2		5		10			20	
APPLICABLE BOLT (REFERENCE)	STEEL	M2(M2.2)	M2.5,M3	(M3.5)	M4(M4.5)	M5,M6	(M7)	M8	M10	M12(M14)	M16	(M18)	M20	(M22)	M24	(M27)		M30
	HIGH TENSION	(M1.8)M2	(M2.2)M2.5	M3(M3.5)	M4	M4(M4.5)	M5,M6	(M7)	M8	M10	M12	(M14)	M16	(M18)	M20		(M22)	M24
MAX. HAND FORCE P [N]		4.1	5.9	11.7	18.9	32.8	57.8	92.9	155	269	345	450	564	568	677		680	686
DIMENSION [mm]	EFFECTIVE LENGTH L	100	120	130	160	185	210	250	300	345	380	425	500	750	840	1054	1282	1511
	OVERALL LENGTH L'	111	133	144	175	205	231	294	356	402	443	490	567	823	943	1174	1408	1637
	HEIGHT M	24.2	26.2	28.2	30.2	47.5	50.5	59.8	64.8	75.8	77.2	80.9	92.2	71		75.1	82.6	
	WIDTH B	50		54	56	74	84	90	104	110	115	120	130		152			
	SCALE SPAN δ	20.4		22.4		26.7	31.9	34.8	38.7	42.5	44.2	49.3	50.5	51.0	62.5			
	SQ. DRIVE a	6.35						9.53		12.7			19.05				25.4	
	SQ. DRIVE b	7.5						11		14			20.5				26.5	
	HEAD h	22.7	24.7	26.7	28.7	35.1	40.1	50.6	55.6	66	68.8	71.5	83.1	54.1		55.3	64.8	
	HEAD R	5		6		8	8.5	9.5	10.5	12	13	14.5	17	23.5		60		
	HOOK d	8	10	11	12	16		20	26		30				38			
	HOOK ℓ							70	90		100				160			
WEIGHT [kg]		0.04	0.05	0.07	0.09	0.2	0.25	0.4	0.6	0.95	1.2	1.45	2.2	3.5	4	6	7.8	8.5

Accuracy ±3%

Alternative model

CEM3-G ····· p.324
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
CDB-S ····· p.336
CSF/ CF ····· p.348

Tester / Checker

TDT3-G ····· p.402
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify MODEL name

[EX.1] F92N

[EX.2] F92N-S

Note

・With a memory pointer model is also available upon request [EX.2].

Loading Direction | Beam | Direct Reading | Memory Pointer | 25.4 | 38.1 | RoHS

FR Large Capacity Beam Type Torque Wrench

Winch-operated direct-reading beam type for measuring and tightening.

FR2800N [L'=1292㎜]

Application

- Inspection or tightening for large size bolts.

Features

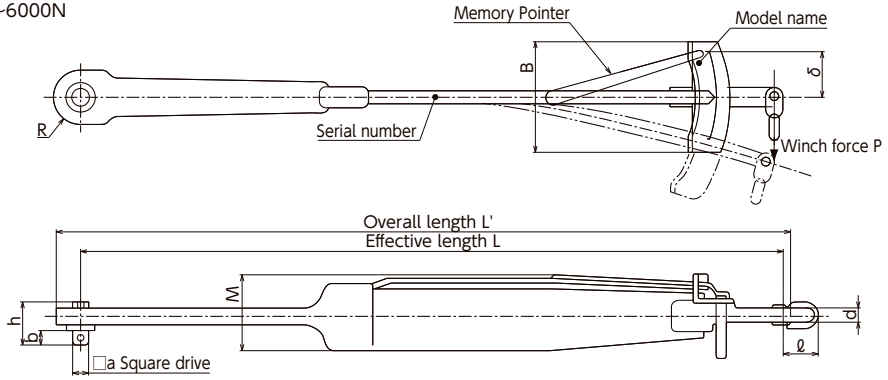
- For Large size bolts.
- Direct-reading beam type, graduated in clockwise and counterclockwise.
- The unique shape of the arm is designed to keep the internal force at stable level without any friction, which contributes to enhanced durability.
- FR is equipped with a memory pointer as standard.

Optional Accessories

・Interchangeable socket [p.504]

Dimensions

■FR1050N～6000N



Specifications

S.I. MODEL			FR1050N	FR1400N	FR2100N	FR2800N	FR4200N	FR6000N
TORQUE RANGE [N·m]	MIN.～MAX.		100～1050	200～1400	300～2100	300～2800	400～4200	600～6000
	GRAD.		20		50		100	
METRIC MODEL			10500FR	14000FR	21000FR	28000FR	42000FR	60000FR
TORQUE RANGE [kgf·m]	MIN.～MAX.		10～105	20～140	30～210	30～280	40～420	60～600
	GRAD.		2		5		10	
AMERICAN MODEL			10500FR-A	14000FR-A	21000FR-A	28000FR-A	42000FR-A	60000FR-A
TORQUE RANGE [lbf·ft]	MIN.～MAX.		100～750	100～1000	200～1500	200～2000	300～3000	400～4300
	GRAD.		20		50			
APPLICABLE BOLT (REFERENCE)	STEEL		M30	(M33)	M33	(M39) M42	M45,M48	(M52)
	HIGHT TENSION		M24	(M27)	M30	(M33)	M36 (M39)	M42 (M45)
MAX. WINCH FORCE P [N]			1340	1510	1940	2320	3050	3960
DIMENSION [mm]	EFFECTIVE LENGTH L		797	940	1100	1240	1400	1540
	OVERALL LENGTH L'		835	981	1148	1292	1460	1624
	HEIGHT M		90.5	93.5	95.5	117	126	131
	WIDTH B		160	180	190	216	220	236
	SCALE SPAN δ		66.3	71.3	81.6	87.7	91.8	96.7
	SQ. DRIVE	a	25.4			38.1		
		b	26.5			42		
	HEAD	h	57.5	59.5	63.5	83		90
		R	30	33	40	42	50	57
	HOOK	d	20			24		31
		ℓ	45			65		81
WEIGHT [kg]			8	11.5	14.5	20	28	30

Note Use a through-hole socket for this model.

Accuracy ±3%

Alternative model

DBE/DBR ····· p.334
T-S ····· p.340
QF/QFR ····· p.346

Tester / Checker

TF ····· p.414

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify MODEL name

[EX.] FR1050N

Note

・FR models are supplied upon request only.

QF/QFR Ratchet Head Beam Type Torque Wrench

For efficient bolt tightening operations in confined places with ratcheting head.

QF120N [L'=517㎜]

Application

- Inspection or tightening for large size bolts.

Features

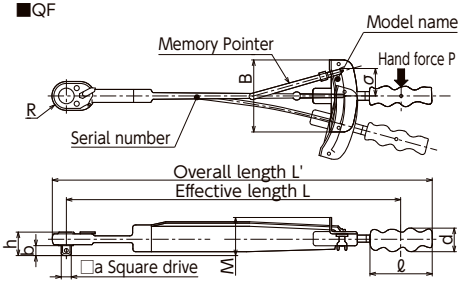
- With Ratchet Head.
- Light weight, Scale is easy to sea, great for inspection.
- The scale is for both clockwise and counterclockwise torque.
- The ratchet head consist of 24 teeth with 15 degree operating range, allowing use in narrow space.
- The unique shape arm is designed to keep the internal force at stable level without any friction, which contributes to enhanced durability.
- Waveformed design handle makes it not slippery.
- QF60N~420N is available for memory pointer type as regular product. Other models are custom made.
- QFR models are mechanical loading type. Force is applied by winch or lever block.
- QFR model is equipped with a memory pointer.

Optional Accessories

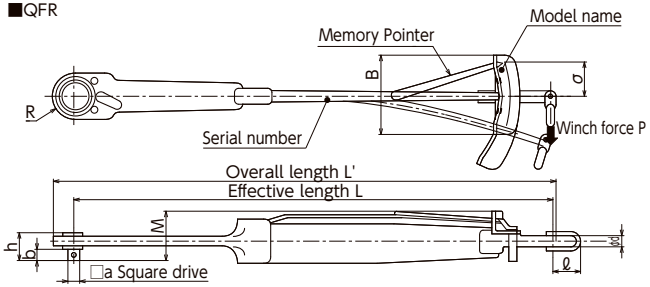
·Interchangeable socket
[p.504]

Dimensions

■QF



■QFR



Specifications

S.L MODEL		QF60N	QF120N	QF220N	QF320N	QF420N	QF560N	QF700N	QF850N	QFR1050N	QFR1400N	QFR2100N	QFR2800N	QFR4200N	QFR6000N
TORQUE RANGE [N·m]	MIN.~MAX.	6~60	10~120	30~220	60~320	70~420	100~560	100~700	100~850	100~1050	200~1400	300~2100	300~2800	400~4200	600~6000
	GRAD.	1	2	5			10			20			50		100
METRIC MODEL		600QF	1200QF	2200QF	3200QF	4200QF	5600QF	7000QF	8500QF	10500QFR	14000QFR	21000QFR	28000QFR	42000QFR	60000QFR
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	Kgf·cm 60~600	100~1200	300~2200	Kgf·m 6~32	7~42	10~56	10~70	10~85	10~105	20~140	30~210	30~280	40~420	60~600
	GRAD.	Kgf·cm 10	20	50	Kgf·m 1					2		5		10	
AMERICAN MODEL		600QF-A	1200QF-A	2200QF-A	3200QF-A	4200QF-A	5600QF-A	7000QF-A	8500QF-A	10500QFR-A	14000QFR-A	21000QFR-A	28000QFR-A	42000QFR-A	60000QFR-A
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 0~520	lbf·ft 6~86	25~160	40~230	30~300	50~400	50~500	60~600	100~750	100~1000	200~1500	200~2000	300~3000	400~4300
	GRAD.	lbf·in 10	lbf·ft 2	5			10			20			50		
APPRICABLE BOLT (REFERENCE)	STEEL	M12	(M14)	(M18)	M20	(M22)	M24	(M27)		M30	(M33)	M36	(M39) M42	(M45) M48	(M52)
	HIGHT TENSION	M8	M10	(M14)	M16	(M18)	M20		(M22)	M24	(M27)	M30	(M33)	M36 (M39)	M42 (M45)
MAX. HAND FORCE P [N]		155	269	437	556	569	677		681	1340	1510	1940	2320	3050	3960
MEMORY POINTER		OPTIONAL								STANDARD					
DIMENSION [mm]	EFFECTIVE LENGTH L	395	453	510	582	750	840	1053.5	1282.4	797	940	1100	1240	1400	1540
	OVERALL LENGTH L'	455	517	583	657	825	952	1169	1400	845	992	1158	1305	1473	1624
	HEIGHT M	56.5	54	57.5	66.8	71.2	69.1	71.6	77.1	93	96	99.5	120	131.5	134.5
	WIDTH B	104	110	120	130		152			160	180	190	216	220	236
	SCALE SPAN δ	39.6	43.6	48.8	52.2	51.0	62.5			66.3	71.3	80.6	87.7	91.8	96.8
	SQ. DRIVE a	9.53	12.7		19.05				25.4				38.1		
	SQ. DRIVE b	11	14		20.5				26.5				42		
	HEAD h	25.6	30	33	41.1	46.5	45.7	49.7	55.7	58.5	60.5	67	84.5	89.5	91.5
	HEAD R	15	18.8	22.5	25.5	26.5	32	35	37	40	44	50	55	63	70
	HOOK d	26		30			38			20			24		31
	HOOK ℓ	90		100			160			53			75		81
WEIGHT [kg]		0.8	1.2	1.8	2.6	3.4	4.3	6.5	8.5		12.5	15.5	21	30	32

Note 1. For models having over 25.4mm square drive, use with a through-hole socket.
2. Warrant from 20% of maximum range for American models.

Accuracy ±3%

Alternative model

Tester / Checker

How to use

Technical data

How to order.

Specify MODEL name

[EX.1] QF120N

[EX.2] QF120N-S

Note
- QFR models are supplied upon request only.
- Add "-S" for the model with a memory pointer [EX.2].

CSF/CF Beam type torque wrench with interchangeable head

Beam type torque wrench with interchangeable head for a variety of works

CF25NX10D [L'=317mm]

CSF7NX8D [L'=221mm]

用　途

- 検査、締付け用。

特　長

- Interchangeable head type.
- Cost efficient, enable to use approx. 300 types of Tohnichi interchangeable heads.
- The scale is for both clockwise and counterclockwise torque. Applicable for re-tightening and losing torque inspections methods.
- The unique shape arm is designed to keep the internal force at stable level without any friction, which contributes to enhanced durability.
- Waveformed design handle makes it not slippery.
- CSF7N ~ 230N is available for memory pointer type as regular product.

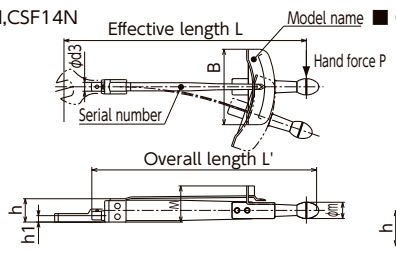
Optional Accessories

·Interchangeable head [p.492]

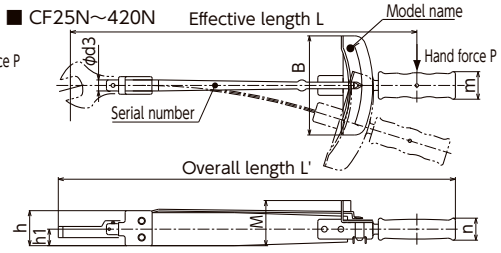
·Interchangeable socket [p.504]

Dimensions

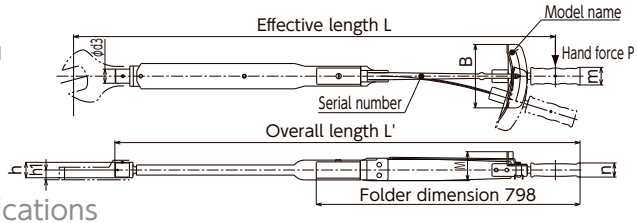
■ CSF7N,CSF14N



■ CF25N~420N



■ CF850N



Specifications

S.I MODEL		CSF7NX8D	CSF14NX8D	CF25NX10D	CF50NX12D	CF100NX15D	CF150NX19D	CF230NX22D	CF420NX22D	CF850NX32D
TORQUE RANGE [N·m]	MIN.~MAX.	1~7	2~14	5~25	10~50	10~100	20~150	30~230	70~420	100~850
	GRAD.	0.2	0.5	1	2		5		10	20
METRIC MODEL		70CSF	140CSF	250CF	500CF	1000CF	1500CF	2300CF	4200CF	8500CF
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	Kgf·cm 10~70	20~140	50~250	100~500	100~1000	200~1500	Kgf·m 3~23	7~42	42~85
	GRAD.	Kgf·cm 2	5	10	20		50	Kgf·m 0.5	1	2
AMERICAN MODEL		70CSF-A	140CSF-A	250CF-A	500CF-A	1000CF-A	1500CF-A	2300CF-A	4200CF-A	8500CF-A
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 10~60	20~120	40~220	80~420	lbf·ft 6~70	15~110	20~160	30~300	60~600
	GRAD.	lbf·in 2	5	10	20	lbf·ft 2		5		20
APPLICABLE BOLT (REFERENCE)	STEEL	M5,M6	(M7)	M8	M10	M12 (M14)	M16	(M18)	M24	M30
	HIGH TENSION	M4 (M4.5)	M5,M6	(M7)	M8	M10	M12	(M14)	M20	M24
MAX. HAND FORCE [N]		30.5	55	80.4	135	233	310	420	569	668
DIMENSION [mm]	EFFECTIVE LENGTH L	235	260	315	375	435	490	555	750	1307.4
	OVERALL LENGTH L'	221	246	317	380	433	480	528	723	1260
	HEIGHT M	34	36	41	45	52	53	56	60	
	WIDTH B	74	84	90	104	110	115	120	130	152
	HEAD d3	8		10	12	15	19	22		32
	BODY h	21.8	25.8	31.8	35.8	42.2	44.6		50.8	
	BODY h1	6		15	17	20	21	22	24	
	BODY m	ϕ16		25	33		38			48
	BODY n			20	26		30			38
WEIGHT [kg]		0.2	0.25	0.4	0.6	1.0	1.3	1.6	3.1	7.1
INTERCHANGEABLE HEAD		(SH,RH,QH,HH) 8D		(SH,SH-N,RH,QH,DH,HH) 10D	(SH,RH,QH,RQH,DH,HH) 12D	(SH,RH,QH,RQH,DH,HH) 15D	(SH,RH,QH,RQH,DH,HH) 19D	(SH,RH,QH,RQH,DH,HH) 22D		(SH,RH,QH,) 32D

Note 1. Overall length does not include interchangeable head.
2. PH (Pipe wrench head) type interchangeable head is not available for this model.

Accuracy ±3%

#Refer P.500 for dimension of head adjusting part.

Alternative model

CEM3-G ····· p.324
CTB2-G ····· p.330
DB ····· p.332
DBE/ DBR ····· p.334
CDB-S ····· p.336
SF/F ····· p.342

Tester / Checker

TDT3-G ····· p.402
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
TF ····· p.414

How to use

How to apply force ··· p.356

Technical data

Torque unit ····· p.29
Inspecting the tightening torque ····· p.45
Tool selection ····· p.72
ISO9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify MODEL name

[EX.1] CF100NX15D

[EX.2] CF100NX15D-S

Note

- Memory pointer style is also available as standard for CSF7N~230N, consult to Tohnichi.
- Add "-S" for the model with a memory pointer [EX.2].

Special designed torque wrenches and interchangeable heads.

Tohnichi designs and manufactures special shape torque wrenches according to customer applications.

●Torque wrench for Bicycle pedals
Torque wrench head designed thiner for Bicycle pedals.

●Ultra short tube type torque wrench
short body enable the use for limited space

●Special preset torque wrench SSPLS
Use it to avoid obstacle for automotive assembly

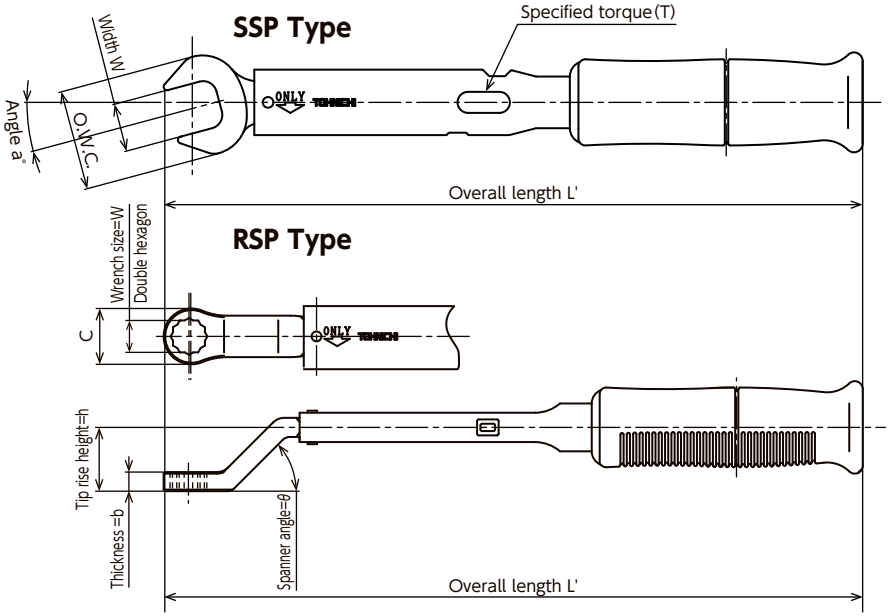
●Special flare type interchangeable head
Knurled shape nut tightening special interchangeable head

●Special RH type interchangeable head
For tightening bolt in recessed area

●Special SH type interchangeable head
For inspection of brake flare nut.

Method of ordering a preset special tool

When ordering an SP (SSP, RSP)special torque wrench, indicate the following specifications.

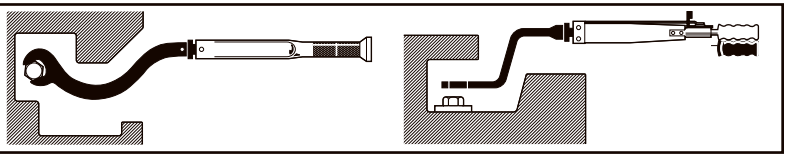


■Head Shape	SSP(Spanner) , RSP(Ring), SP-N(Notch) etc.
■Width(W)	The width of the bolt or the diagonal length of the nut this tool is going to use for.
■Specified torque(T)	△△N·m or free
■Outer width(C)	△△mm, with in △△mm, or base on Tohnichi standard
■Head thickness(b)	△△mm, with in △△mm, or base on Tohnichi standard
■Spanner angle(a°)	a=△△°or base on Tohnichi standard(15°)
■Offset angle (θ°)	θ=△△°or base on Tohnichi standard(45°)
■Offset height(h)	h=△△mm or base on Tohnichi standard
■Overall length(L')	Within △△mm or base on Tohnichi standard

Special Interchangeable Heads

We design and manufacture special shape interchangeable head

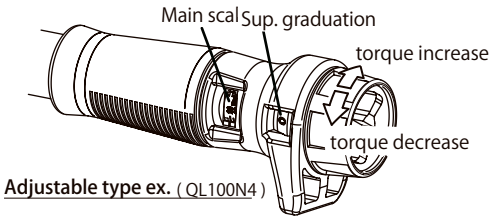
Example of special interchangeable head



※Refer P.500 for details of sepcial heads.

Deference between adjustable type / preset type / pre-lock type torque wrench

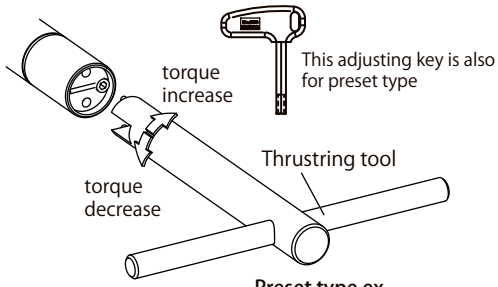
Torque set procedures are each different.



Adjustable type ex. (QL100N4)

Adjustable type: Typical Click torque wrench QL, adjustable type torque wrench with a scale. When the tightening reached set torque, 「Click 」 sound informs the tightening completion. It is very easy to change set torque by twist adjuster. Please be careful not to change set torque accidentally.

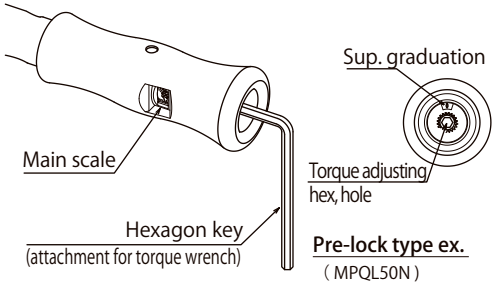
Typical Model: QL/ CL/ DQL/ MTQL / QLLS / MQL etc.



Preset type ex.
(NSP100CN x 8)

Preset type: This type does not have a scale and it need to be set torque with torque tester. User need to specify set torque in purchase order sheet in case user do not have a torque tester.
※Set torque in Tohnichi is free of charge for new orders.
Preset type torque wrench is often used in assembly line to tighten same size of bolts repeatedly. This type of wrench is simple low cost.
Less possibility to change set torque accidentally, but torque tester and setting tool is needed to set torque.

Typical Model: SP/ RSP/ QSP/ CSP/ QSPCA/ MQSP etc.



Pre-lock type ex.
(MPQL50N)

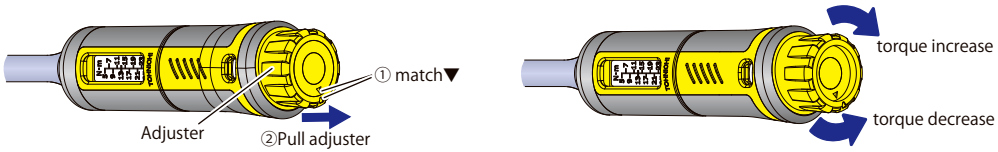
Pre-lock type: Pre-lock type torque wrench has a scale, but setting tool is needed to set torque. This type is less likely to change torque unexpectedly while using. Pre-lock type takes the advantages of both adjustable type and preset type. It can prevent human error and change torque without a tester.

Typical Model: PQL/ PCL/ MPQL/ PQLLS/ PQLZ etc.

Method of Setting Torque

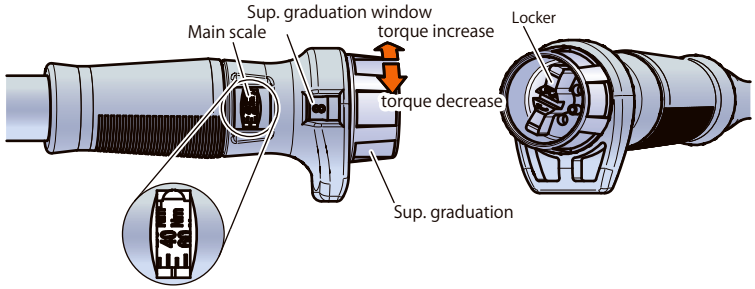
■Preset type

Adjustable type QL2N~25N5 ▶P.212 CL2N~25N5 ▶P.230



Match the ▼marks and keep the adjuster pulling, twist adjuster.
Adjuster will return to the original position after releasing it.
Adjuster will slip without pulling.

Resin Handle Type QL50N~280N ▶P.214 DQL ▶P.224 PHL ▶P.228 CL50N~280N ▶P.232 MQL280N ▶P.292



Loosen locker, and twist sup. graduation
Tighter locker once torque setting completed.

■How to read scale

Add the value shown on the main scale and the value shown on the sup. graduation.
(only for the torque wrench with main and sup. Graduation)

The above example indicates 48N・m because its main scale shows 40 and sup. graduation shows 8.

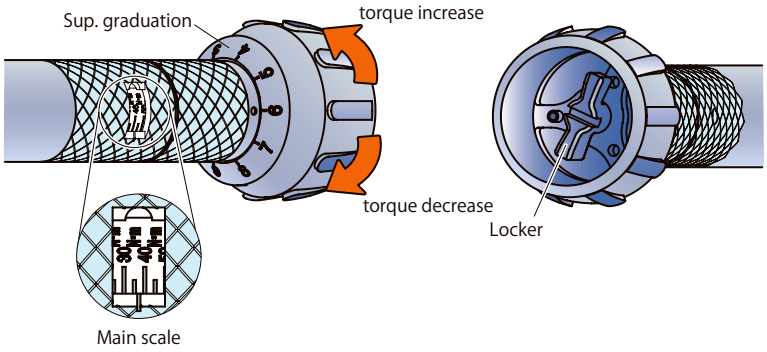
Main scale Value　　Sup. graduation Value

40 + 8 = 48N·m

Method of setting torque

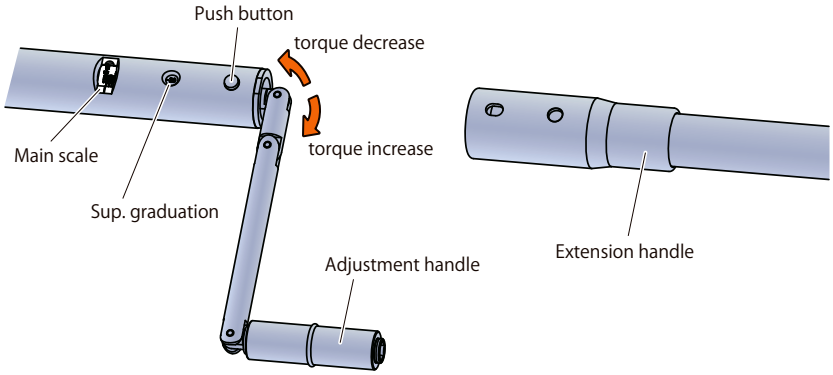
■Adjustable type

●Metal handle type QL-MH ▶P.218 CL-MH ▶P.236 MTQL ▶P.222 YCL2 ▶P.240 QL420N ▶P.214 CL420N ▶P.232 A3 ▶P.372



Loosen locker, and twist sup. graduation
Tighter locker once torque setting completed.

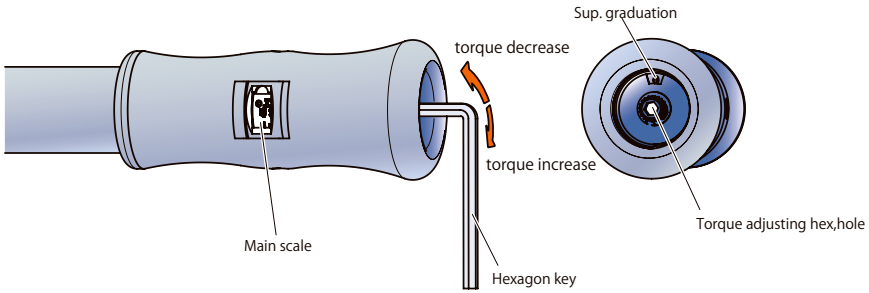
●Extension Handle type QLE2 ▶P.216 CLE2 ▶P.234 PHLE2 ▶P.228 DQLE2 ▶P.224



Push the Push button and remove the extension handle.
Turn adjustment handle built in the wrench to set the torque.
Finally, attach the extension handle.

■Pre-lock type

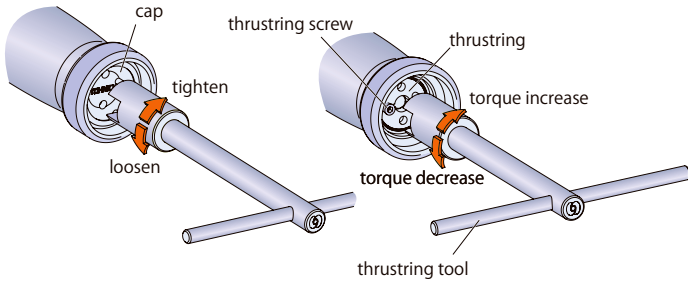
PQL ▶P.220 PCL ▶P.240 PQLZ ▶P.248 MT70N ▶P.244 MPQL ▶P.292 AC3 ▶P.374



Insert the hexagon key into the torque adjusting hex, hole and turn the hexagon key to set the torque.

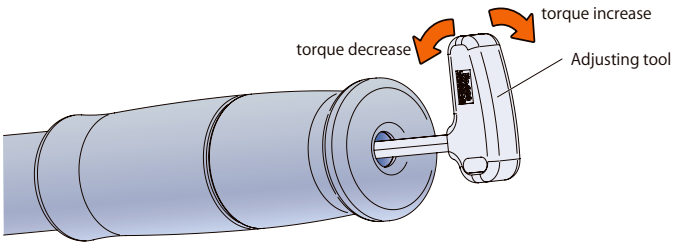
■Preset type

thrustring type SP ▶P.266 NSP ▶P.278 QSP420N ▶P.250 CSP420N ▶P.254



Remove the cap using thrustring tool.
Loosen the thrustring screw and turn the thrustring.
Torque wrench tester is needed for comfirming the torque value.

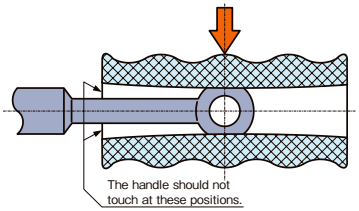
Adjusting tool type QSP/QSP-MH ▶P.250 CSP/CSP-MH ▶P.254 QSPZ ▶P.262 QSPCA ▶P.252 SP2 ▶P.268
SP2-MH ▶P.270 RSP2/RSP2-MH ▶P.272 SP2-H/SP2-H-MH ▶P.274 SP2-N/SP2-N-MH ▶P.276



Insert the adjusting tool and turn it.
Torque wrench tester is needed for confirming the torque value.

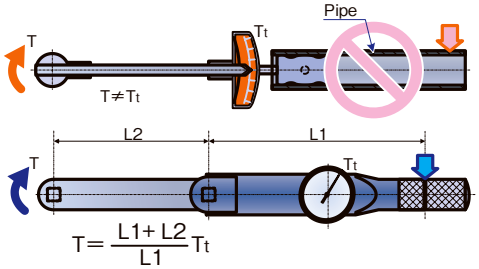
How to apply force

■Torque is affected by the position where force is applied.



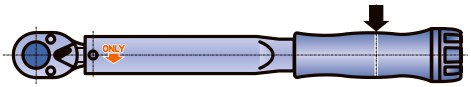
1.Beam type (F type) ... Apply force to the center of the handle (pin).
2.Dial type (DB, T type) ... The influence of the position for applying force is not so crucial.
3.Click type (QL, SP type) ... The torque will be affected by the position where the force is applied. Grasp the center of the effective length line on the handle.

■Using torque wrenches with extensions

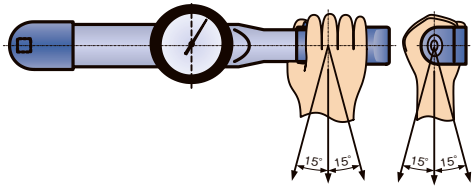


1.Do not add extensions to the handle (There is a danger that the scale will not indicate the correct torque.).
2.Extension to the head is possible; however, it will require recalculation of the torque.

■Direction of force



1.The click types (QL, SP) are designed only to be used in the ONLY direction indicated on each wrench, while BQSP and BCSP can be used in both directions.
2.The direction of the force should be at right angles to the torque wrench (The angle tolerance should be within ±15°).



■Method of applying force

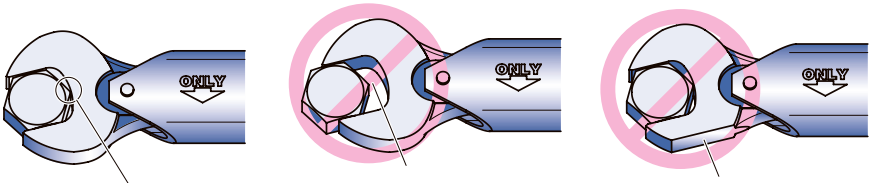
1.Apply force steadily, so as not to create momentum.
2.Stop at once when you feel the “click” using the click types (QL, SP,etc).

■Torque wrenches and loosening operations

When you loosen bolts with torque wrenches, take care not to damage the wrench. It is easy to apply over-torque because torque wrenches are longer than spanners. Particularly if you change the direction of the ratchet, check the proper running of ratchet before use. It may be dangerous if the ratchet is not seated correctly.

■Cautions for SP types

Insert the nut to the full depth



Insert the nut to the full depth of SP.

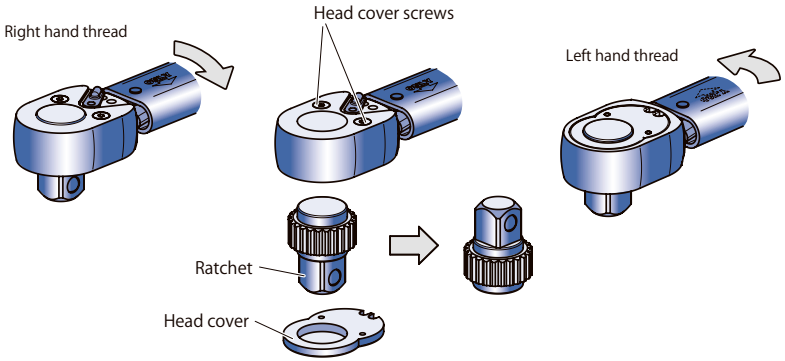
In case that you do not insert the nut to the full depth of SP, accurate tightening torque is not applied due to change the effective length and it causes damage of spanner.

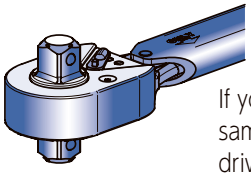
Do not shave parts from the spanner part. Contact Tohnichi about special shapes.

■Tightening of left hand threads

Ratchet type

Take out the head cover screws and head cover, and then turn over the ratchet and assemble.

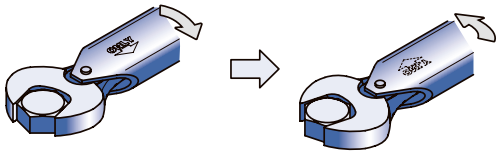




DQL/DQLE2 ▶P.224

If you have to use both clockwise and counterclockwise tightening in the same application, there is no need to use two wrenches. By using a dual drive ratchet you can have both turns in one wrench (DQL/DQLE2).

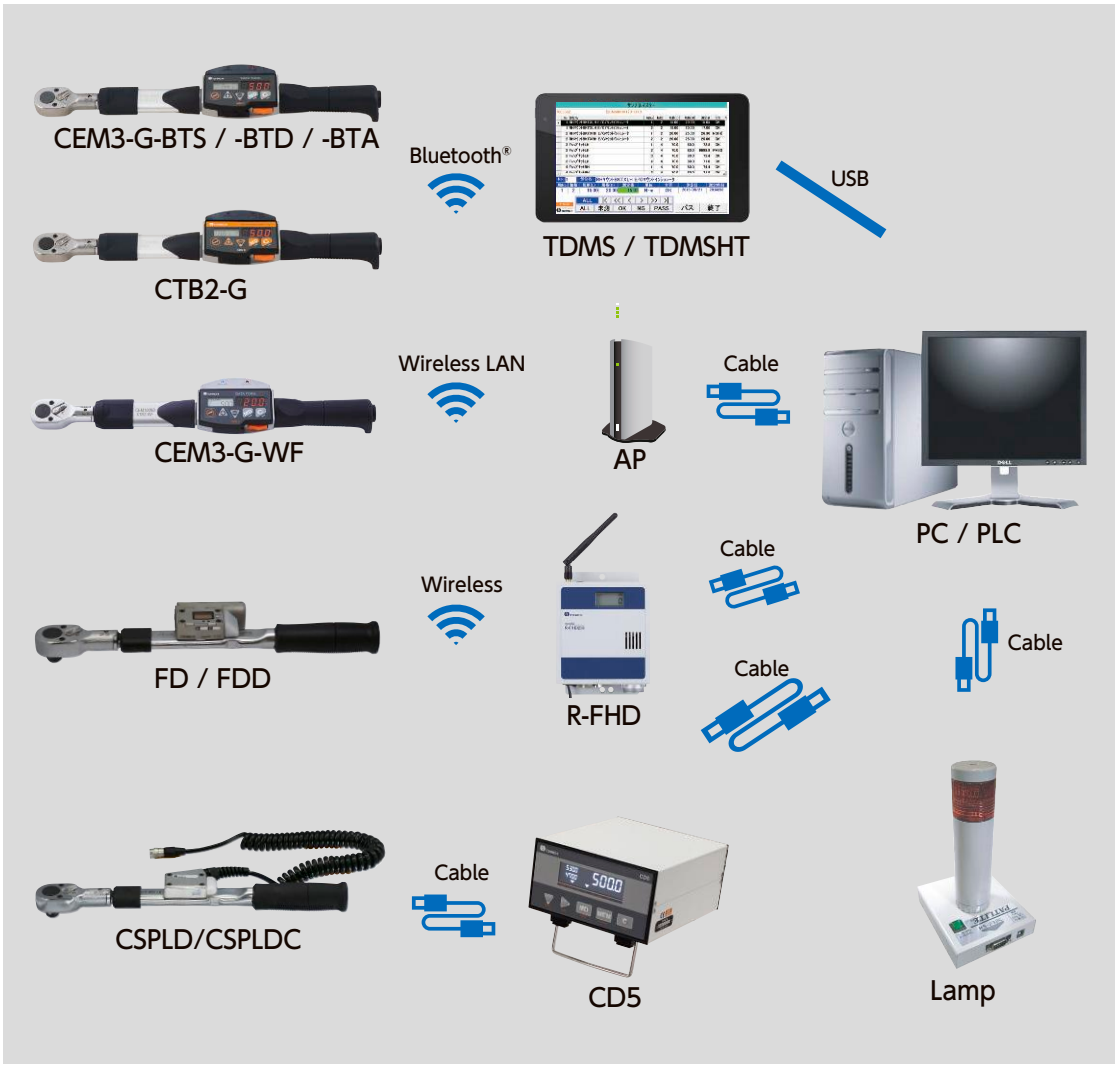
Spanner type



Use by turning over the torgue wrench

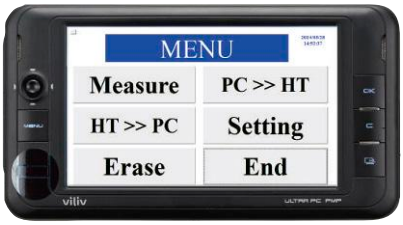
Data Management System

Samples of data management systems which can statistically process tested data.



■Data communication system

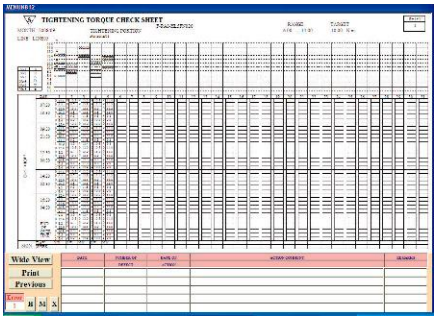
Handy Terminal

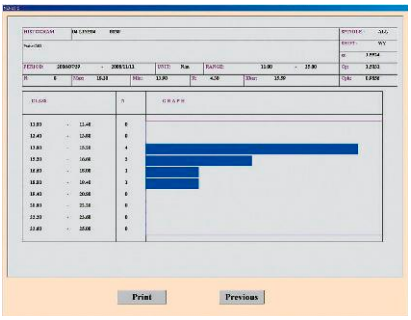


Practical menu

1:Measurement: The required part No. and part names for measurement are displayed, and the measured results taken by the CEM3-G torque wrench are automatically input to the Handy Terminal by pressing the MEM key on the CEM3-G torque wrench. The Handy Terminal then judges whether the transmitted data is OK or NG.
2:Inquiry: Inquire for the measurement date stored in the Handy Terminal.
3:Receiving: The required part No., part names and specification data are received by the Handy Terminal from the personal computer (Master).
4:Sending: After measurement, the measurement data is sent to the personal computer (Data).
5:Deletion: All part No., part names and measurement data stored in the Handy Terminal can be deleted (Master and data).
6:Setting: Install a communication setting between Handy Terminal and CME3-G or PC.

■Data processing





■System example (Hardware and software)

●Master file maintenance
Car model, type and parts data can be stored. These data items can be retrieved at any time and statistical processing can be made by the data. Input, update and deletion can be simply executed due to expressing the items as card-like images.

●Master file transmission
The master file saved in the system disk can be transmitted to the handy terminal. The parts data of respective car models are stored in the handy terminal and repeated data sampling is possible.

●Measurement data receiving
The torque values measured by the CEM3-G/CTB2-G are stored in the designated area of the handy terminal. The stored data is transmitted and also accumulated to the designated area of the specified car model on the display of the personal computer.

■Vehicle inspection example

●Inspection data search
There is a search function that allows required data to be searched and listed from the accumulated inspection data.

●Graph display, daily reports and monthly reports
By using the accumulated data, custom-made graph display, daily reports and monthly reports are available as required.

●Help function
A wide-ranging help function is available for users to use from the very first day of purchase.

POWER TORQUE TOOL

SERIES INDEX

Your Torque Partner TOHNICHI

Uni-screwdriver Pistol

AUR
P.364
2~25[N·m]
High speed, high accuracy of tightening with easy to set torque by graduation.

U / UR
P.368
10~1000[cN·m]
For tightening small screws from M2 to M6 which require precise torque tightening.

Electric Straight

DU
P.370
10~250[cN·m]
Adjustable by the graduation on the body enables to easy to manage and traceable.

Airtork Angle

A3
P.372
3~180[N·m]
Provisional tightening by air motor followed by final tightening by manual torque wrench.

AC3
P.374
5~180[N·m]
High speed provisional tightening by air motor followed by final tightening by manual torque wrench.

AS
P.380
6~120[N·m]
Pneumatic angle wrenches. High speed and fully automatic.

Battery Type Pistol

HAT
P.366
10~25[N·m]
Light weight battery operated torque screwdriver.

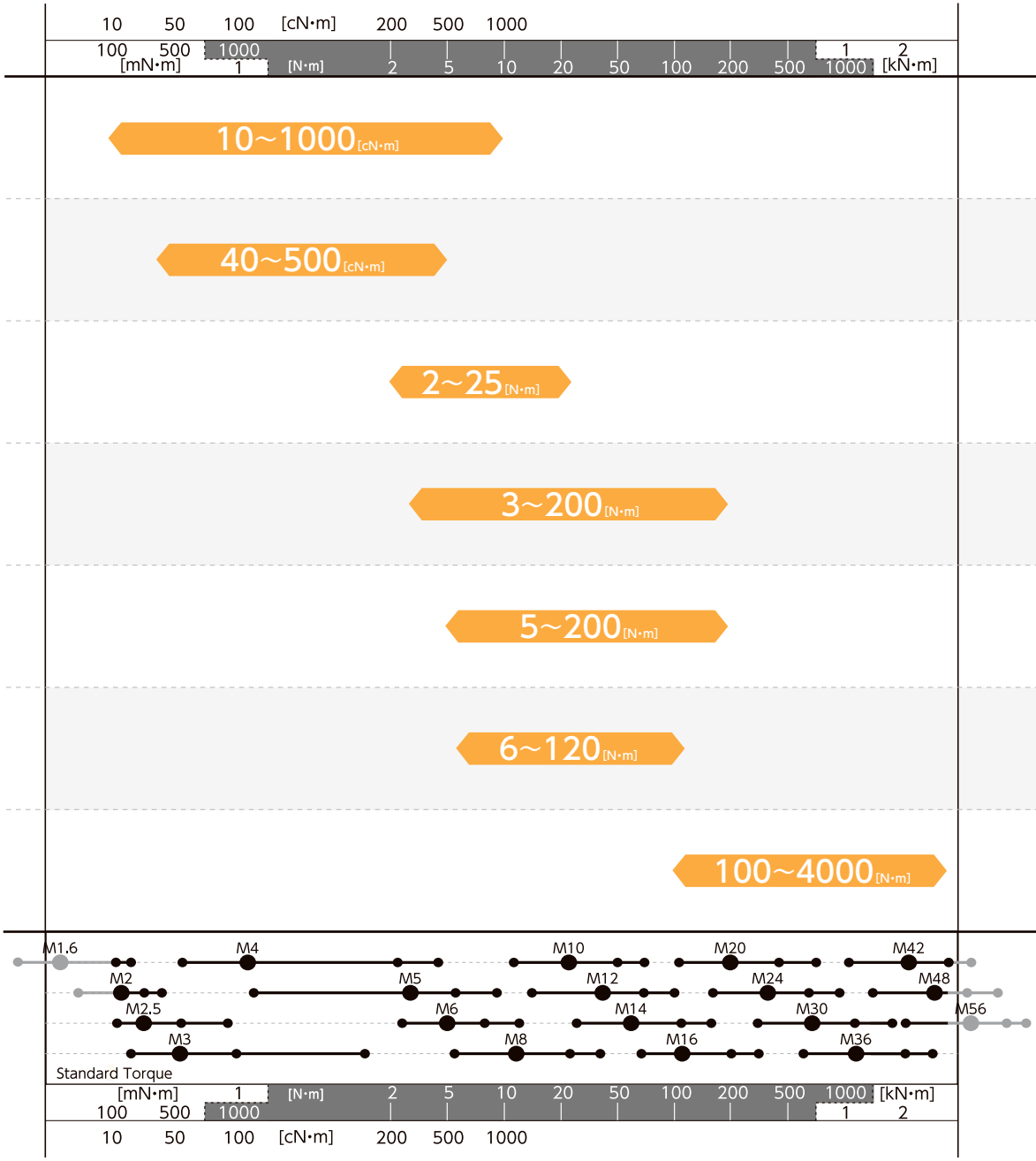
Battery Type Angle

HA/HAC
P.376
5~200[N·m]
Send tightening completion signal by Bluetooth®. Capable of calibration by torque wrench tester.

Airtork Pistol

AP2
P.378
100~4000[N·m]
Pneumatic heavy duty nutrunners for large bolt application.

TORQUE RANGE INDEX



MODEL·TYPE					PAGE
 **U** Uni-screwdriver	Pistol Straight				368
 **ULR/UR** Uni-screwdriver	Pistol Straight	 **DU** Electric Uni-screwdriver	Straight		368·370
 **AUR** Uni-screwdriver	Pistol Limit Switch	 **HAT** Battery Type (Auto)	Pistol		364·366
 **A3** Airtork (Semi-auto)	Angle Limit Switch	 **HA/HAC** Battery Type (Semi-auto)	Angle		372·376
 **AC3** Airtork (Semi-auto)	Angle Limit Switch				374
 **AS** Airtork (Auto)	Angle				380
 **AP2** Airtork (Auto)	Pistol				378

T = Standard Tightening Torque

Refer to page 38, "Relation between Screw and Torque" for more details.

AUR UNITORK

High speed and accuracy
Easy adjustable pistol Type

AUR25N

Application

- For plastic screws and tapping screws. Used in mass production and assembly applications.

Features

- High speed tightening with trigger activated precise torque.
- Easy torque setting change indicated by scale.
- Torque remains stable regardless of fluctuations in air pressure.
- Small reaction force when set torque is reached.
- LS version available with limit switch, which creates tightening assurance system when used with CNA-4mk3 count checker.

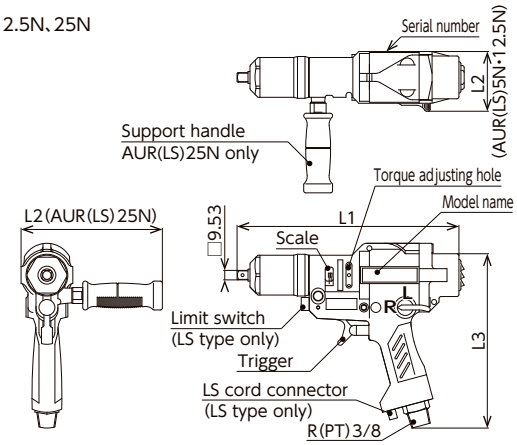
Optional Accessories

·Interchangeable bit [p.502]

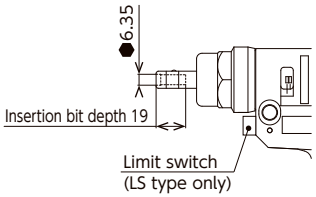
·Interchangeable socket [p.504]

Dimensions

■ AUR(LS)12.5N、25N



■ AUR(LS)5N



Rated voltage of limit switch
AC 30V less than 1A
DC 30V less than 1A

Specifications

S.I. MODEL			AUR5N	AUR12.5N	AUR25N	AURLS5N	AURLS12.5N	AURLS25N
LIMIT SWITCH				WITHOUT			WITH	
TORQUE RANGE [N·m]	MIN.~MAX.		2~5	5~12.5	10~25	2~5	5~12.5	10~25
	GRAD.		0.1	0.25	0.5	0.1	0.25	0.5
METRIC MODEL			AU50R	AU125R	AU250R	AU50RLS	AU125RLS	AU250RLS
TORQUE RANGE [kgf·cm]	MIN.~MAX.		20~50	50~125	100~250	20~50	50~125	100~250
	GRAD.		1.0	2.5	5.0	1.0	2.5	5.0
AMERICAN MODEL			AU50R-A	AU125R-A	AU250R-A	AU50RLS-A	AU125RLS-A	AU250RLS-A
TORQUE RANGE [lbf·in]	MIN.~MAX.		15~45	37.5~112.5	75~225	15~45	37.5~112.5	75~225
	GRAD.		1.0	2.5	5.0	1.0	2.5	5.0
FREE ROTATION [r.p.m.]			2100	800	400	2100	800	400
APPLICABLE BOLT	COMMON STEEL		M5,M6	(M7)M8	M10	M5,M6	(M7)M8	M10
	HIGH TENSION		M4(M4.5)	M5,M6	(M7)M8	M4(M4.5)	M5,M6	(M7)M8
AIR PRESSURE [MPa]			0.5					
AIR MASS FLOW [m³/min]			0.9					
FASTENING AIR MASS FLOW [m³PC]			0.008	0.02	0.04	0.008	0.02	0.04
HOSE INLET DIA. [mm]			ϕ10					
DIMENSION [mm]	OVERALL LENGTH	L1	219	228		219	228	
	OVERALL WIDTH	L2	60		142	60		142
	OVERALL HEIGHT	L3	185					
AIR INLET			R(PT)3/8					
WEIGHT [kg]			1.5	1.7		1.5	1.7	
ACCESSORY BIT			#3			#3		

Note Counterclockwise has no torque control; for loosening purpose only. Accuracy ±5%
Standard Accessories 1. Torque Adjusting key 2. Support Handle (for AUR(LS)25N) 3. W12 Open Ended Wrench (for AUR(LS)25N).

Alternative model
U/ UR ····· p.368
A3 ····· p.372
AC3 ····· p.374

Optional equipment
CNA-4mk3 ····· p.452

Tester/Checker
ST3-G ····· p.418
TCF ····· p.438

How to use
Good piping ····· p.378
Calculating compressor capacity ····· p.380

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.
Specify Model name
[EX.1] AUR5N
[EX.2] AURLS5N

Note
- AUR5N has #3 bit (6.35 HEX) with a double bit. Any other bits are available in the local market.
- AUR12.5N and AUR25N have a fixed 9.53mm square drive. Use pneumatic sockets only.

HAT HANDYTORK

Accuracy can be checked with a standard torque wrench tester.

HAT25N

Application

- For mass production, assembly and general tightening use.
- Error-proofing version available upon request to avoid tightening errors (Pokayoke system).

Features

- Battery-operated version of AUR model.
- Compact size and high-powered.
- HATR and HATRFH has reverse mode.
- Easily portable battery-operated (DC12V).
- Easy torque setting change indicated by scale.
- Torque measurement can be done easily with a torque wrench tester.
- A variety of versions available featuring bi-directional rotation, and wireless transmission of tightening completion signal, etc.

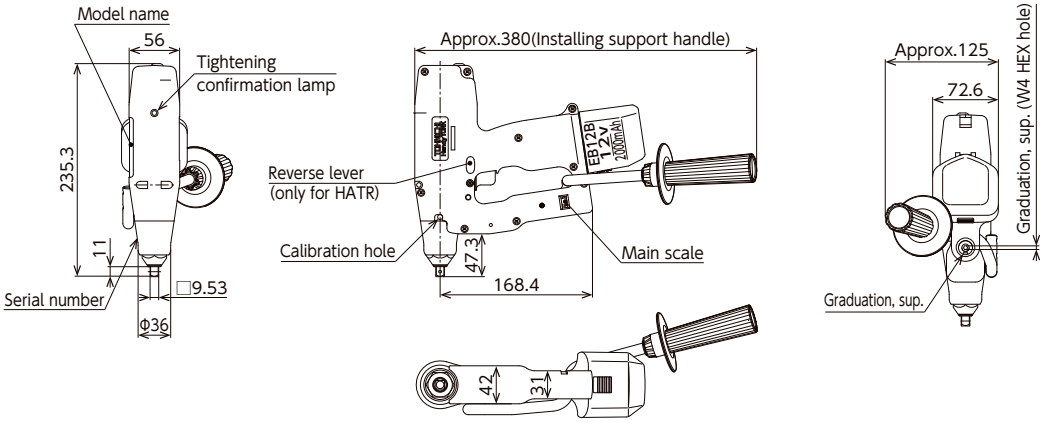
Optional Accessories

·Interchangeable socket [p.504]

·Battery charger [p.506]

·Battery [p.487]

Dimensions



Specifications

S.I. MODEL		HAT25N	HATFH25N	HATR25N	HATRFH25N
FH	WITH/WITHOUT	WITHOUT	WITH	WITHOUT	WITH
TORQUE RANGE [N·m]	MIN.~MAX.	10~25			
	GRAD.	0.5			
APPLICABLE BOLT	COMMON STEEL	M10			
	HIGH TENSION	(M7) M8			
FREE ROTATION [r.p.m]		700		140	
RATED VOLTAGE DC [V]		12			
NUMBER OF TIGHTENING BOLTS		1000			
SQ. DRIVE [mm]		□9.53			
NOISE LEVEL [dB(A)]		70			
WEIGHT [kg]		1.8			

Note 1. Torque accuracy is based upon static torque measured by torque wrench tester. Accuracy ±5%
2. HATR/HATRFH has reverse mode to loosen screws.
3. HATFH/HATRFH is error-proofing type (Pokayoke), and it can be used only with R-FH256 receiver (separately sold) as count verification system.
4. Counterclockwise has no torque control; for loosening purpose only.

Standard Accessories W4 HEX key and Support handle.

Alternative model
AUR ····· p.364
A3 ····· p.372
AC3 ····· p.374

Error-proofing (Pokayoke)
MPQL/ MQL ····· p.292
CMQSP ····· p.298

Optional equipment
FH256MC ····· p.286
CNA-4mk3 ····· p.452
SB-FH256 ····· p.454

Tester/Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
LC3-G ····· p.416
ST3-G ····· p.418

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.
Specify Model name
[EX.1] HAT25N
[EX.2] HATFH25N

Note
- Use pneumatic sockets only.
- HAT battery and battery charger are optional (separately sold).
- HATFH/HATRFH is error-proofing (Pokayoke) type, and it can be used only with R-FH256 receiver (separately sold) as count verification system.

U/UR UNITORK

For large volume tightening of machine screws (M2-M6) requiring high torque accuracy.

U120CN

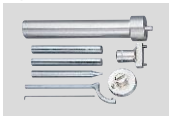
Application

- For plastic and tapping screws. Used in mass production and assembly applications.

Features

- Straight version of AUR model.
- High speed and high accuracy tightening with lever activation.
- Easy torque adjustment with scale.
- Torque remains stable regardless of fluctuations in air pressure.
- Small reaction force when set torque is reached.
- UR / ULR operates bi-directionally.

Optional Accessories



・Tool kit [p.486]

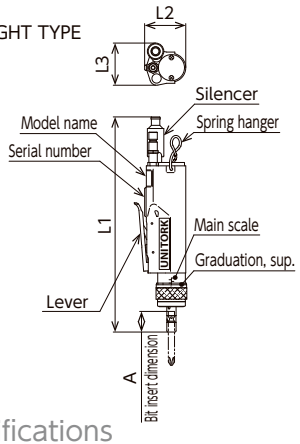
・One touch joint [p.486]

・Torque-fix [p.486]

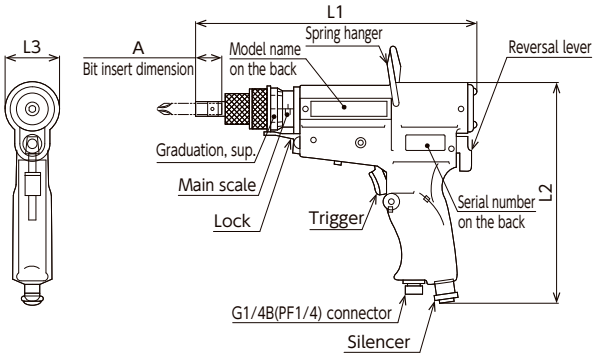
・Interchangeable bit [p.502]

Dimensions

■ STRAIGHT TYPE



■ PISTOL TYPE



Specifications

S.I. MODEL		U30CN	U60CN	U120CN	U250CN	U500CN	U1000CN	ULR120CN	ULR250CN	UR500CN
STYLE		STRAIGHT				PISTOL		STRAIGHT		PISTOL
START MECHANISM		LEVER				TRIGGER		LEVER		TRIGGER
TORQUE RANGE [cN·m]	MIN.~MAX.	10~30	20~60	40~120	100~250	200~500	400~1000	40~120	100~250	200~500
	GRAD.	0.5	1	2	5	10		2	5	10
METRIC MODEL		U3	U6	U12	U25	U50-2	U100	U12LR	U25LR	U50R
TORQUE RANGE [kgf·cm]	MIN.~MAX.	1~3	2~6	4~12	10~25	20~50	40~100	4~12	10~25	20~50
	GRAD.	0.05	0.1	0.2	0.5	1.0		0.2	0.5	1.0
AMERICAL MODEL		U3-A	U6-A	U12-A	U25-A	U50-2-A	U100-A	U12LR-A	U25LR-A	U50R-A
TORQUE RANGE [lbf·in]	MIN.~MAX.	1~3	2~5	4~10	8~22	15~45	30~90	4~10	8~22	15~45
	GRAD.	0.05	0.1	0.2	0.5	1.0		0.2	0.5	1.0
FREE ROTATION [r.p.m.]		1600	1700	1400	1200	950	700	1300	1000	950
APPLICABLE BOLT	COMMON STEEL	M2 (M2.2)	M2.5,M3	(M3.5)	M4 (M4.5)	M5,M6	(M7)	(M3.5)	M4 (M4.5)	M5,M6
	HIGH TENSION	(M1.8) M2	(M2.2) M2.5	M3 (M3.5)	M4	(M4.5)	M6	M3 (M3.5)	M4	(M4.5)
AIR PRESSURE [Mpa]		0.4	0.5		0.6	0.5	0.6	0.5	0.6	
AIR MASS FLOW [m³/min]		0.043	0.067	0.071	0.15	0.35	0.68	0.07	0.15	0.43
FASTENING AIR MASS FLOW [m³PC]		0.0010		0.0012	0.0020	0.0031	0.013	0.0012	0.0020	0.0040
HOSE INLET DIA. [mm]		φ5			φ6			φ5	φ6	
AIR INTAKE		with Coupler				G1/4B (PF1/4)		with Coupler		G1/4B (PF1/4)
NOISE LEVEL [dB(A)]		67	68	69	72	68	75	71	65	75
DIMENSION [mm]	OVERALL LENGTH L1	219	222	237	254	234	257	248	270	234
	OVERALL WIDTH L2	56			64	184	189	56	66	184
	OVERALL THICNESS L3	50				44	57.5	47	51	44
	BIT A	14	18			24		18	24	
WEIGHT [kg]		0.32	0.42	0.48	0.75	1.35	2.0	0.56	0.95	1.45
ACCESSORY BIT		#0	#1	#2		#3		#2		#3

Note 1. U1000CN has a fixed square drive (9.53 mm). Use socket bits or bit holders for this model.
2. For U30CN ~ U250CN, ULR120CN and ULR250CN, use one-touch coupler (Female).
3. Counterclockwise has no torque control; for loosening purpose only.

Accuracy ±5%

*Refer to page 397 for air connector information.

Alternative model

A3 ..... p.372
AC3 ..... p.374

Tester/Checker

TCF p.438

How to use

Good piping p.382
Calculating compressor capacity p.384

Technical data

Torque unit p.29
Joint coefficient p.56
Human error p.57
Tool selection p.72
ISO 9000 related documents ... p.90
Tool control p.103
Torque tools and testers p.104

How to order.

Specify Model name

[EX.1] U60CN

[EX.2] ULR120CN

Note

- U500CN, 1000CN, and UR500N are pistol type with trigger mechanism.
- Standard bits available in the local market can be used.

DU Electric UNITORK

Fully-automatic electric torque screwdriver with graduation and error-proofing (Pokayoke) functions.

DU250CN [L'=305㎜]

DU-COUNTER

Application

- For plastic and tapping screws.

Features

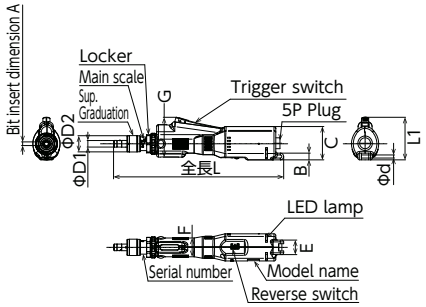
- Torque is adjustable by the graduation on the body and it is traceable.
- Capable of fully automatic tightening with ±5% of accuracy.
- The LED and buzzer alarm on the main body clearly inform the tightening completion to the operator.
- Clockwise direction with torque control and counter-clockwise for loosing.
- DU-COUNTER has count down, high/low rotary speed change function.
- Power source AC100V~240V, available for international use.

Optional Accessories

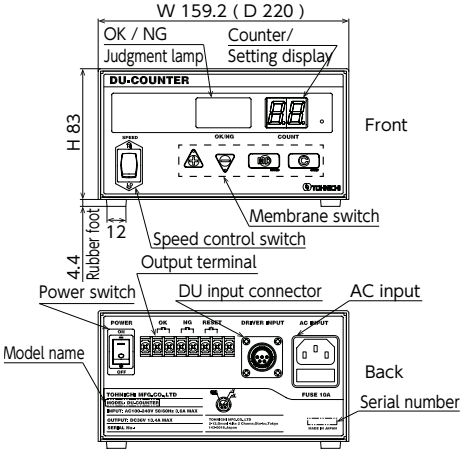
・Interchangeable bit [p.502]

Dimensions

■ DU



■ DU-COUNTER



Specifications

S.I. MODEL			DU30CN	DU60CN	DU100CN	DU250CN
TORQUE RANGE [cN•m]	MIN.~MAX.		10~30	20~60	40~100	100~250
	GRAD.		0.5	1	2	5
FREE ROTATION [r.p.m]	HI		1500		1400	1200
	LO		1050		980	840
APPLICABLE BOLT (Ref.)			M2, (M2.2)	M2.5, M3	(M3.5)	M4
			(M1.8), M2	(M2.2), M2.5	M3, (M3.5)	M4, (M4.5)
DIMENSIONS [mm]	OVERALL LENGTH	L'	281			305
	OVERALL WIDTH	L1	70.5			76.5
		C	55			58
	Bit insert dimension	A	6.35			
	HANGING PART	B	11			
		Φd	5			
		E	24			
	BODY	ΦD1	11			
		ΦD2	27			34.5
		G	66			74
		F	31			37
WEIGHT [kg]			0.6			0.82

Note: Counterclockwise has no torque control, for loosing purpose only.

Accuracy ±5%

DU-COUNTER Specifications

MODEL	DU-COUNTER
COUNT DISPLAY	2-digit 7-segment LED (Height 14.6mm)
JUDGMENT DISPLAY	35x19 square lamp (OK/NG)
COUNTER	1~99
OUTPUT	Preset, auto judgment (0~99sec. 1sec. interval)
INPUT	RESET
TIMER	Double count prevention (0~99sec. 1sec. interval) Auto reset (0~60sec. 1sec. interval) Interval alert (0~99sec. 1sec. interval)
INPUT POWER	AC100V~240V ±10% 50/60Hz 3.6A MAX
OUTPUT VOLTAGE	DC36V 13.4A MAX
WEIGHT [kg]	1.2
OPERATING TEMPERATURE RANGE	0~40℃ less than 85%RH no condensation
STANDARD ACCESSORIES	AC power cable (3Pin with ground)
APPLICABLE MODEL	DU30CN, 60CN, 100CN, 250CN

Connecting Cable

PART #	516	517
LENGTH	2m	5m

Alternative model

U/UR ····· p.368

Optional equipment

TP ····· p.450

Tester/Checker

TCF ····· p.438

Technical data

Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.

Specify Model name

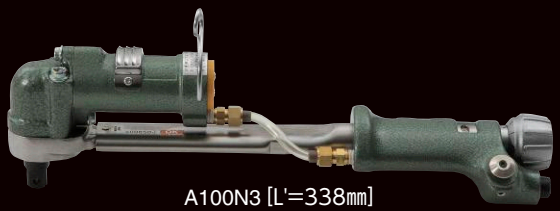
[EX.] DU250CN + DU-COUNTER + No.516

Note

・DU-COUNTER does not come with DU body.

A3 Semi-Automatic Airtork

Provides high speed and high accuracy by applying provisional tightening with air motor, followed by conventional torque wrench work to complete tightening.



A100N3 [L'=338㎜]

A180N3 [L'=487㎜]

Application

- For assembly and mass production.

Features

- Replaces conventional two-step tightening process with one tool in great efficiency.
- Provisional tightening is applied using the air motor operation, and completed in high accuracy by manual torque wrench operation.
- Accuracy improved with final tightening completed by manual torque wrench work.
- From the version 3 model, the newly designed square drive make it possible to use an anti-vibration socket for reducing vibration and improving workability.
- Easy torque adjustment with scale.
- Easy calibration with torque wrench tester.
- LS version available with limit switch, which creates error-proofing (Pokayoke) system when used with CNA-4mk3 count checker.

Optional Accessories

·Interchangeable socket [p.504]

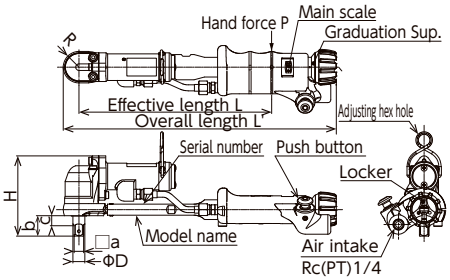
Comparison of standard socket and anti-vibration socket.

Standard extension socket

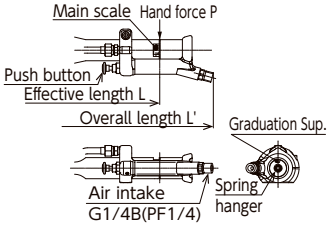
Anti-vibration socket

Dimensions

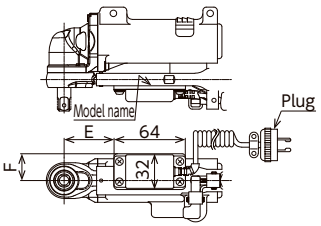
■ A10N3～100N3



■ A180N3



■ ALS3



Specifications

S.I. MODEL			A10N3	A25N3	A50N3	—	—	A100N3	A180N3
TORQUE RANGE [N•m]	LIMIT SWITCH TYPE		ALS10N3	ALS25N3	ALS50N3	—	—	ALS100N3	ALS180N3
	MIN.～MAX.		3～10	5～25	10～50	—	—	20～100	40～180
	GRAD.		0.1	0.25	0.5	—	—	1	2
METRIC MODEL			A100M3	A250M3	A500M3	—	—	A1000M3	A1800M3
TORQUE RANGE [kgf•cm]	LIMIT SWITCH TYPE		ALS100M3	ALS250M3	ALS500M3	—	—	ALS1000M3	ALS1800M3
	MIN.～MAX.		30～100	50～250	100～500	—	—	200～1000	400～1800
	GRAD.		1	2.5	5	—	—	10	20
AMERICAN MODEL			A90I3-3/8	A200I3-3/8	A400I3-3/8	A800I-3/8	A75F3-3/8	—	A130F3-1/2
TORQUE RANGE [lbf•in/lbf•ft]	LIMIT SWITCH TYPE		ALS90I-3/8	ALS200I3-3/8	ALS400I3-3/8	ALS800I-3/8	ALS75F3-3/8	—	ALS130F3-1/2
	MIN.～MAX.		lbf•in 30～90	50～200	100～400	200～800	lbf•ft 15～75	—	30～130
	GRAD.		lbf•in 1	2.5	5	10	lbf•ft 1	—	2
PROVISIONAL TIGHTENING TORQUE [N•m]			1.8			2.5			5
FREE ROTATION [r.p.m]			750			800			
APPLICABLE BOLT (Ref.)	COMMON STEEL		M6	(M7)	M8	M10			M12
	HIGH TENSION		M4, (M4.5)	M6	M6, (M7)	M8			M10
MAX. HAND FORCE [N]			51.0	127.6	255.1	396.8			450.0
AIR PRESSURE [Mpa]			0.6						
AIR MASS FLOW [m³/min]			0.2			0.29			0.31
DIMENSIONS [mm]	EFFECTIVE LENGTH	L	196			252			400
	OVERALL LENGTH	L'	277			338			487
	OVERALL HEIGHT	H	82.8			95.2			114
	HEAD	R	16			17			20
	S.q. DRIVE	□a	9.53			12.7			
		b	20.9			24.9			26.4
		c	11						12.2
		ΦD	12			16			
	LS POSITION	E	44.5			—			
		F	24			—			
WEIGHT [kg]			1.0 (1.2)*			1.4 (1.6)*			2.6 (2.8)*

Note 1. Provisional tightening torque is not warranty the accuracy. Accuracy ±3%
2. The weight shows in ( )* is limit switch type.
Standard accessory: Torque adjusting hex. key for A180N3.

Alternative model
AUR ····· p.364
HAT ····· p.366
AC3 ····· p.374

Optional equipment
CNA-4mk3 ····· p.452

Tester/Checker
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
LC3-G ····· p.416
TF ····· p.414

How to use
Good piping ····· p.382
Calculating compressor capacity ····· p.384

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.
Specify Model name

[EX.1] A10N

[EX.2] ALS50N

Note
- A model: low provisional torque.
- Rated voltage of the limit switch is AC / DC 30V, below 1A.
- Use pneumatic sockets only.

AC3 High Power Semi-Automatic Airtork

2 step tightening, provisional tightening by air motor and completion by manual.

ACLS100N3 [L'=334㎜]

AC100N3 [L'=334㎜]

Application

- For assembly and mass production.

Features

- Same features as A with high provisional torque tightening.
- Conventional two-step tightening of impact wrench + torque wrench can be executed with one wrench, which greatly improves work efficiency.
- Provisional tightening is processed with the air motor operation, and completed in high accuracy by manual torque wrench work.
- Accuracy improved with final tightening completed by manual torque wrench operation.
- Easy torque adjustment with scale.
- Easy calibration with torque wrench tester.
- LS version available with limit switch, which creates error-proofing (Pokayoke) system when used with CNA-4mk3 count checker.

Optional Accessories

·Interchangeable socket [p.504]

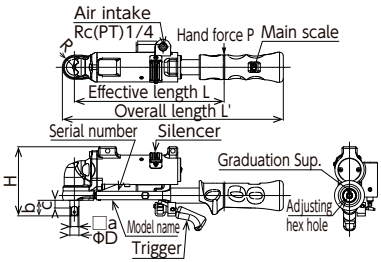
Comparison of vibration

Standard extension socket

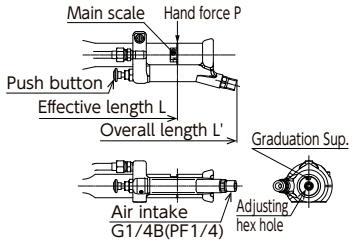
Anti-vibration socket

Dimensions

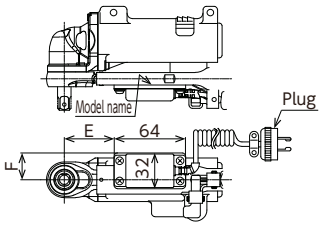
■ AC25N3～100N3



■ AC180N3



■ ACLS3



Specifications

S.I. MODEL			AC25N3	AC50N3	—	—	AC100N3	AC180N3
TORQUE RANGE [N·m]	LIMIT SWITCH TYPE		ACLS25N3	ACLS50N3	—	—	ACLS100N3	ACLS180N3
	MIN.～MAX.		5～25	10～50	—	—	20～100	40～180
	GRAD.		0.25	0.5	—	—	1	2
METRIC MODEL			AC250M3	AC500M3	—	—	AC1000M3	AC1800M3
TORQUE RANGE [kgf·cm]	LIMIT SWITCH TYPE		ALS250M3	ALS500M3	—	—	ACLS1000M3	ACLS1800M3
	MIN.～MAX.		50～250	100～500	—	—	200～1000	400～1800
	GRAD.		2.5	5	—	—	10	20
AMERICAN MODEL			AC200I3-3/8	AC400I3-3/8	AC800I3-3/8	AC75F3-3/8	—	AC130F3-1/2
TORQUE RANGE [lbf·in/lbf·ft]	LIMIT SWITCH TYPE		ACLS200I3-3/8	ACLS400I3-3/8	ACLS800I3-3/8	ACLS75F3-3/8	—	ACLS130F3-1/2
	MIN.～MAX.		lbf·in 50～200	100～400	200～800	lbf·ft 15～75	—	30～130
	GRAD.		lbf·in 2.5	5	10	lbf·ft 1	—	2
PROVISIONAL TIGHTENING TORQUE [N·m]			11		17.5			19
FREE ROTATION [r.p.m]			1000		900			800
APPLICABLE BOLT (Ref.)	COMMON STEEL		(M7)	M8	M10			M12
	HIGH TENSION		M6	M6, (M7)	M8			M10
MAX. HAND FORCE [N]			125.9	251.9	420.2			450
AIR PRESSURE [Mpa]			0.6					
AIR MASS FLOW [m³/min]			0.2		0.29			0.31
DIMENSIONS [mm]	EFFECTIVE LENGTH	L	198.5		238			400
	OVERALL LENGTH	L'	293		334			488
	OVERALL HEIGHT	H	92.8		107.7			124.5
	HEAD	R	16		17			20.5
	SQ. DRIVE	□a	9.53		12.7			
		b	20.9		24.9			26.4
		c	11					12.2
		ΦD	12		16			
	LS POSITION	E	44.5		76.5			174.5
		F	24					25
WEIGHT [kg]			1.5 (1.7)*		2.0 (2.2)*			3.3 (3.5)*

Note 1. Provisional tightening torque is not warranty the accuracy. Accuracy ±3%
2. Weights in ( )* are limit switch models.
Standard accessory: Torque adjusting hex. key.

Alternative model

Optional equipment

Tester/Checker

How to use

Technical data

How to order.
Specify Model name

[EX.1] AC25N3

[EX.2] ACLS100N3

Note
- AC model: high provisional torque.
- Specific capacity of the limit switch: AC/DC30V, below 1A.
- Use pneumatic sockets only.

HA/HAC Battery operated semi-automatic torque wrench

High workability by battery operation.
Transmit tightening completion signal by Bluetooth®.

HAC100N+BP1850 [L'=540㎜]

Application

- For tightening operation in cell production lines, sub assembly lines.

Features

- One step operation, provisional tightening by electric motor and final tightening by the torque wrench part.
- High accuracy torque control with the final tightening by ±3% of the torque wrench.
- Free from cable disconnection trouble by cordless operation.
- Selectable from 3 steps of provisional tightening torque settings and it's changeable with setting software via Bluetooth® signal.
  *Setting software is provided on Tohnichi web site.
- Easy maintenance, capable of calibration by standard torque wrench tester.

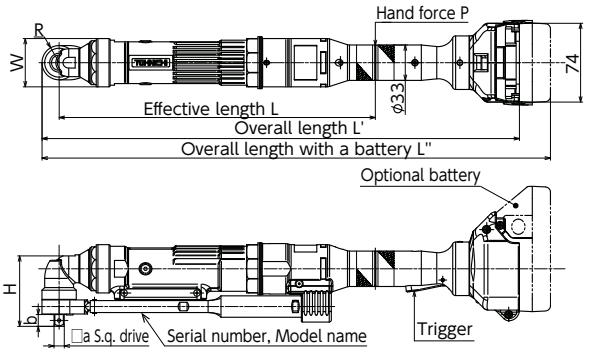
Optional Accessories

·Battery charger [p.506]

·Battery [p.487]

·Hoisting accessory [p.487]

Dimensions



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Specifications

S.I. MODEL			HA25N	HAC25N	HAC50N	HAC100N	HAC140N	HAC200N
TORQUE RANGE [N•m]	MIN.~MAX.		5~25		10~50	20~100	30~140	40~200
	GRAD.		0.25		0.5	1		2
MAX. PROVISIONAL TIGHTENING TORQUE [N•m]			5	11		17.5		30
FREE ROTATION [r.p.m]			1000 (850)	1100 (850)		1000		580
APPLICABLE BOLT (Ref.)	COMMON STEEL		M8		M10	M12 (M14)	M16	(M18)
	HIGH TENSION		(M7)		M8	M10	M12	(M14)
MAX. HAND FORCE [N]			98	85	169	294	347	412
DIMENSIONS [mm]	EFFECTIVE LENGTH	L	256	295		340	403.5	485.5
	OVERALL LENGTH	L'	406	445		491	557	640
	OVERALL LENGTH WITH BATTERY	L"	435	474		520	586	669
	OVERALL HEIGHT	H	66			74	75.5	83
	OVERALL WIDTH	W	34	45		48.5		
	SQ. DRIVE	□a	9.53			12.7		
		b	11			14		
	HEAD	R	16			17	18.8	20
WEIGHT [kg]			1.5	1.9		2.4	2.8	3.6

Note 1. The free rotation at lower provisional tightening torque is 850rpm for HA25N, HAC25N and HAC50N.
Note 2. The overall length L"" is the one when installed BP 1825 battery.

Accuracy ±3%

Bluetooth® Specifications

VERSION	V3.0
COMMUNICATION METHOD	AFH
MODULATION METHOD	GFSK
OUTPUT POWER	4dBm
TRANSMITTING CLASS	Class2
PROFILE	SPP
COMMUNICATION DISTANCE	10m※

Note. Communication distance varies on the radio wave environment.

Communication conditions

BAUD RATE	Varies on the host device
PARITY	None
DATA LENGTH	8 bit
STOP BIT	1 bit
FLOW CONTROL	Hardware (RTS/CTS)

Alternative model
A3 ····· p.372
AC3 ····· p.374

Optional equipment
CNA-4mk3 ····· p.452
R-BT ····· p.458

Tester/Checker
TCC2-G ····· p.404
DOTE4 ····· p.406
DOT ····· p.408
LC3-G ····· p.416
TF ····· p.414

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.
Specify Model name
[EX.1] HAC100N + BP1825
[EX.2] HAC100N + BP1850 + No.344 + BC18YCL3

Note
・Battery is optional.
Hitachi koki UC18 series are available.
・Use pneumatic sockets only.

AP2 Fully-Automatic Airtork

Fully-automatic torque controlled for large bolt applications.

AP400N2 [L'=275㎜]

AP2 with a shell arm

AP2 with an universal arm

Application

- For large bolt tightening, such as construction machinery.

Features

- Automatic gear shift mechanism allows high speed provisional tightening, and low speed tightening to completion to maintain stable tightening operation.
- Torque remains stable regardless of air fluctuations.
- Easy torque adjustment with scale.
- Upon reaching the set torque, reverse rotation applies to ease tension on the socket and bolt.
- Reaction arm is designed to absorb the reaction force, which assures safe operation even when the operator is working in difficult position.
- Reaction arm can be positioned freely at 360 degree rounding upon the axis of the main body to allow flexibility in position setting.

Optional Accessories

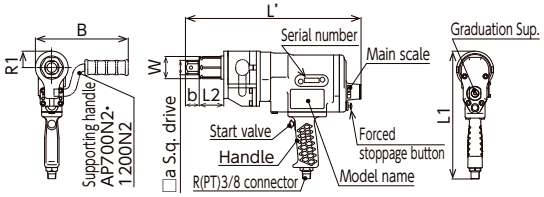
·Universal arm [p.506]

·Shell arm [p.506]

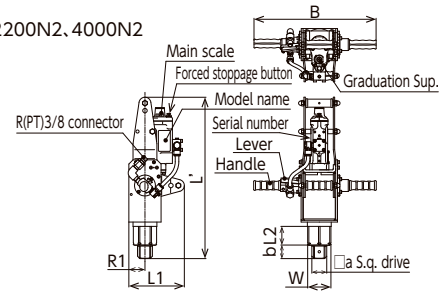
·Interchangeable socket [p.504]

Dimensions

■ AP220N2～1200N2



■ AP2200N2、4000N2



Specifications

S.I. MODEL			AP220N2	AP400N2	AP700N2	AP1200N2	AP2200N2	AP4000N2
TORQUE RANGE [N·m]	MIN.～MAX.		100～220	200～400	300～700	600～1200	1000～2200	2000～4000
	GRAD.		10		20	50	100	
METRIC MODEL			AP22M2	AP40M2	AP70M2	AP120M2	AP220M2	AP400M2
TORQUE RANGE [kgf·m]	MIN.～MAX.		10～22	20～40	30～70	60～120	110～220	200～400
	GRAD.		1		2	5	10	
AMERICAN MODEL			AP160F2	AP300F2	AP500F2	AP900F2	AP1600F2	AP3000F2
TORQUE RANGE [lbf·ft]	MIN.～MAX.		80～160	150～300	220～500	450～900	800～1600	1500～3000
	GRAD.		5	10	10	25	50	100
FREE ROTATION [r.p.m.]			277	175	79	46	19.2	12
APPLICABLE BOLT	COMMON STEEL		M20	(M22) M24	(M27)	M30 (M33)	M36,M42	M48
	HIGH TENSION		M16	(M18)	M20 (M22)	M24	M30 (M33)	M36 (M39)
FASTENING AIR MASS FLOW [m³PC]			0.07	0.12	0.25	0.46	1.0	1.7
HOSE DIA. [mm]			Φ12					
AIR INLET			R (PT) 3/8					
NOISE LEVEL [dB(A)]			80					
DIMENSION [mm]	OVERALL LENGTH	L'	275		364	376	508	541
	OVERALL HEIGHT	L1	262		264	269	182	196
	OVERALL WIDTH	B	64		192.5	197.5	397	411
	SQ. DRIVE	a	19.05		25.4		31.75	38.1
		b	21.5		28.5		36.5	45
	BODY	R1	32		34	39	47	54
		W	36		41	50	60	70
		L2	30.5		45	50	55.5	63
WEIGHT [kg]			4.7		6.7	8.1	15	22
REACTION ARM (UA,SA) (Optional accessory)			SA400N, UA450N		SA700N, UA900N	SA1200N, UA1800N	UA3000N	UA4500N

Note 1. For dimensions of air connector part, please refer to P.367. 2. For dimension of reaction arm, please refer to P.464. Accuracy ±5%
Standard Accessories 1. W5 HEX Key 2. Supporting Handle (only for AP700N2, 1200N2)

Common Specifications

RATED AIR PRESSURE	0.5[MPa]
AIR MASS FLOW	0.63[m³/min]

Tester/Checker

ST3-G ····· p.418
TCF ····· p.438

How to use

Good piping ····· p.382
Calculating compressor capacity ····· p.384

Technical data

Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.

Specify Model name and Universal arm (UA, SA)

[EX.] AP400N+UA450N

Note

- Reaction arm, such UA or SA must be set when operating AP2 models in order to absorb reaction force.
- Use pneumatic sockets only

※You can purchase AP and reaction arm (UA or SA) separately.

TORQUE RANGE [N·m]	TORQUE RANGE [N·m]
HIGH AIR PRESSURE 6~120	LOW AIR PRESSURE 15~90

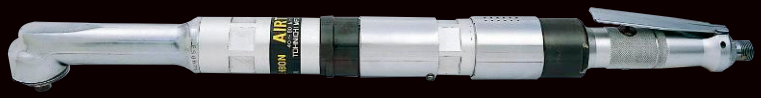
Loading Direction

Angle | Pneumatic
Graduation/Preset | Lever

9.53 | 12.7 | RoHS

AS Fully-Automatic Airtork

Fully-automatic right angle nut runner which incorporates high speed provisional tightening and final tightening in one step.



ASH80N [L'=592㎜]

AS12N [L'=359㎜]

Application

- Single purpose tightening for mass production.

Features

- Preset style (except AS12N).
- Fully-automatic torque wrench which incorporates high speed provisional tightening and final tightening in one step.
- With the mechanical torque control, torque remains stable regardless of fluctuations in air pressure.
- High and low air pressure versions available, for use with screw sizes M6 to M16.
- Small reaction force against the tightening torque.
- AS12N has external scale for easy torque adjustment.

Optional Accessories

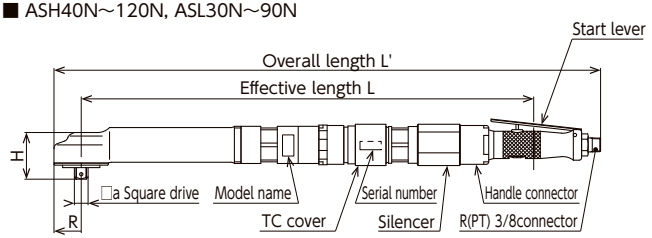
·Interchangeable socket [p.504]

·Torque adjust key [p.486]

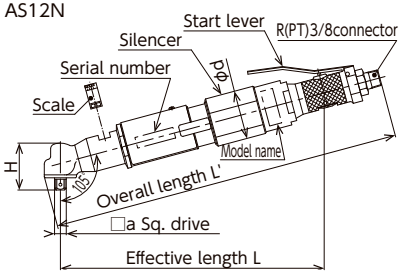
·Spanner Wrench [p.486]

Dimensions

■ ASH40N~120N, ASL30N~90N



■ AS12N



Specifications

S.I. MODEL			AS12N	ASH40N	ASH60N	ASH80N	ASH120N	ASL30N	ASL45N	ASL60N	ASL90N
				HIGH AIR PRESSURE				LOW AIR PRESSURE			
TORQUE RANGE [N·m]	MIN.~MAX.		6~12	20~40	30~60	40~80	60~120	15~30	22.5~45	30~60	45~90
	GRAD.		0.2	Preset Type							
METRIC MODEL			A120S	A400SH	A600SH	A800SH	A1200SH	A300SL	A450SL	A600SL	A900SL
TORQUE RANGE [kgf·cm]	MIN.~MAX.		60~120	200~400	300~600	400~800	600~1200	150~300	225~450	300~600	450~900
	GRAD.		2	Preset Type							
FREE ROTATION [r.p.m.]			1000	2000	1330	1000	640	1700	1130	850	540
APPLICABLE BOLT	COMMON STEEL		(M7)	M8	M10	M12(M14)	M16	M8	M10	M12	(M14)
	HIGH TENSION		M5,M6	(M7)	M8	M10	M12	(M7)	M8		M10
MAX. HAND FORCE [N]			44	105	157	164	219	79	118	123	154
RATED AIR PRESSURE [MPa]			0.5	0.6				0.45			
TORQUE RANGE ON EACH AIR PRESSURE [MPa]	0.7		6~12	20~40	30~60	40~80	60~120	15~30	22.5~45	30~60	45~90
	0.6										
	0.5			20~36	30~50	40~66	60~100				
	0.45			20~30	30~45	40~60	60~90				
	0.4			20~26.5	30~40	40~53	60~80	15~26.5	22.5~40	30~53	45~80
AIR MASS FLOW [m³/min]			0.54	0.58				0.46			
FASTENING AIR MASS FLOW [m³PC]			0.0056	0.0051	0.0067	0.01	0.015	0.0060	0.0079	0.0017	0.0018
HOSE INLET DIA. [mm]			φ12								
AIR INTAKE			R(PT)3/8								
NOISE LEVEL [dB(A)]			78								
DIMENSION [mm]	EFFECTIVE LENGTH	L	270	380	383	488	548	380	383	488	548
	OVERALL LENGTH	L'	359	477	484	592	662	477	484	592	662
	OVERALL HEIGHT	H	48.5	53.5	55.5	56	56.5	53.5	55.5	56	56.5
	SQ. DRIVE	a	9.53			12.7		9.53		12.7	
	HEAD	R	16.5		20	22.5	33	16.5	20	22.5	33
	BODY	d	50								
WEIGHT [kg]			1.9	2.6	2.8	3.2	4.1	2.6	2.8	3.2	4.1

Note For ASH120N with extension unit (optional), dimensions will be overall length 842mm, max hand power 165N and weight 4.7kg. Accuracy ±5%

Standard Accessories 1. Torque adjust key for AS/AUR type 2. Spanner for AS type (except AS12N)

Alternative model

AUR ····· p.364

Tester/Checker

ST3-G ····· p.418
TCF ····· p.438

How to use

Good piping ····· p.382
Calculating compressor capacity ····· p.384

Technical data

Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Torque tools and testers ····· p.104

How to order.

Specify Model name X Torque value

[EX.] ASH40NX30N·m

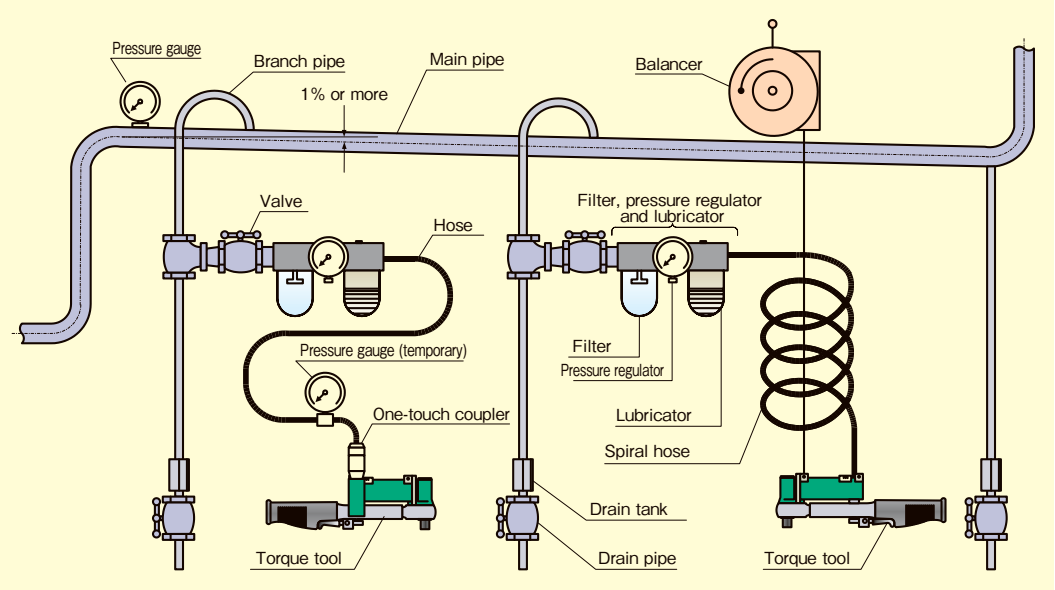
※Specify "Extension unit" when requested

Note

- AS model (except AS12N) is preset type, specify the required set torque when ordering.
- Use pneumatic sockets only.

How to Use

A good air supply, proper preparation and knowledge of correct usage ensure that TOHNICHI power torque tools perform at their best.



■ GOOD PIPING

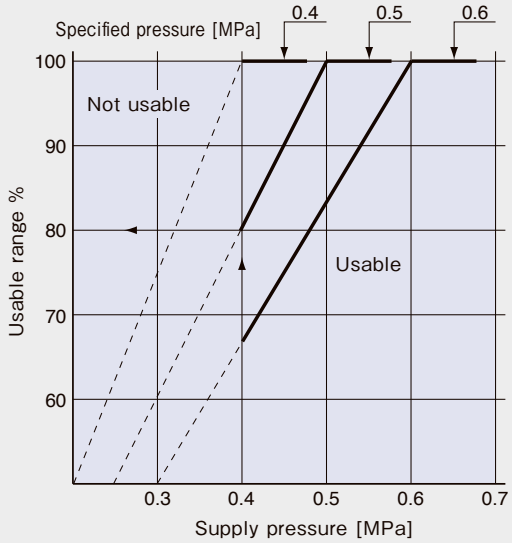
Most troubles with pneumatic equipment are caused by bad air pressure. Use with a sufficiently large pipe diameter and filter, pressure regulator and lubricator.

● **Good piping has the following features:**

1. It should not reduce air pressure.
   Pneumatic equipment requires a certain minimum level of pressure for it to function. The inner diameters of the main pipe, branch pipes and hoses must be large enough, and the pipes must also be as short as possible. Use a filter, pressure regulator, lubricator, valves and joints that suit the flow. Pressure loss in the piping must be 0.1MPa or less.
2. It should not admit drain or foreign materials.
   Compressed air naturally contains moisture, which should be removed with an after-cooler. Piping should have a gradient of 1% or more so that accumulated drain inside does not enter the pneumatic equipment. Branch pipes should come out from the upper side of the main pipe. Drain tanks and drain pipes should be arranged at the lowest part of the main pipe and in branch pipes. Before connecting piping to pneumatic equipment for the first time, blow air through it to expel foreign materials.
3. It should have oil inserted.
   The air motor of a power torque tool rotates at 10,000rpm. Supply ISO VGA32 (turbine oil # 90) to the piping with a lubricator. If you do not use the tool for more than a week, remove the one-touch coupler and add about ten drops of oil. Then, rotate the tool slightly to make the oil infiltrate into the motor. This will prevent rust.

■ Air pressure and operating range

When the air pressure is lower than the specified value, the allowable torque setting range of TOHNICHI' s power torque tools will be limited (See the diagram below). Be sure to use the tools at their specified pressure. Providing that the air pressure is within the allowable torque setting range, the tightening torque due to the air pressure will not change.



Example:

When using a U120CN tool (with a specified pressure 0.5 [MPa]) at a supply pressure of 0.4 [MPa].

Usable range limit (80% from the figure on the left)

120×0.8 = 96cN・m

Set torque

The torque can be set between **40 and 96 [cN·m]**.
If the torque is set between **96 and 120 [cN·m]**, the automatic stop will not operate and the tool will stall. In such a situation, the tightening torque may be insufficient.

(If the tool stops automatically, the normal tightening torque is guaranteed.)

※ Set torque = Tightening torque

Notes

1. When the supply pressure is 0.4MPa or less, the valve function will not be reliable.
2. The supply pressure does not affect the usable range of semi-automatic tools.
3. When the supply pressure is low, use a tool that is one size larger.

TOHNICHI power torque tools tighten screws accurately when they are used correctly.

■ Calculating the compressor capacity.

The compressor capacity necessary to drive a power torque tool can be determined by the volume of air required to tighten each screw (m³/piece) and the number of screws requiring tightening (piece/h). Provide some allowance, however, for leakage and future system expansion.

$$\underset{[m^3/min]}{\text{Volume of air consumption}} = \underset{[m^3/piece]}{\text{Volume of air required to tighten each screw}} \times \underset{[Piece/h]}{\text{Number of screws to be tightened}} \times \underset{[Thread/10]}{\text{Thread ratio}} \times \frac{1}{60}$$

Volume of air required to tighten each screw : Volume of air (standard air) necessary for tightening one screw (number of threads tightened = 10). Values are given in the specification column for each tool.

Number of screws to be tightened : Number of screws to be tightened per hour.

Thread ratio : The number of threads to be tightened divided by 10, the standard number of threads. For example, when the number of threads is 6, the ratio is 0.6.

Example:

When four thousand M5 screws (number of threads: eight) are to be tightened using several U500CN tools. (volume of air required to tighten each screw: 0.0031 [m³/piece])

Volume of air consumption $=0.0031\times4000\times0.8\times\frac{1}{60}$ [m³/min]

$=0.165$ [m³/min]

Compressor output $=0.165\times6.5$ [kW]

$=1.07$ [kW]

(The motor output necessary for the compressor to discharge 1 [N] is 6.5 [kW] at a gauge pressure of 0.7 [MPa])

Cost of tightening power $=0.0031\times4$ [yen/piece]

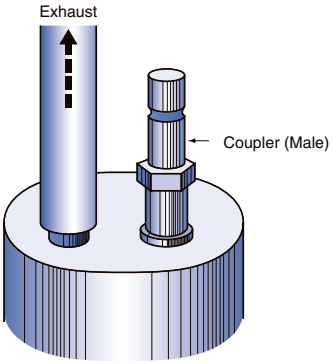
$=0.0124$ [yen/piece]

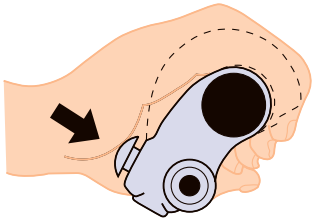
(Cost of compressed air is 4 [yen/piece] at a gauge pressure of 0.7 [MPa], including the costs of electricity, compressor depreciation, etc.)

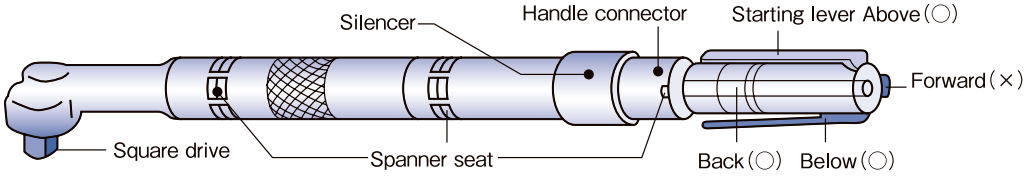
■ Preparation

1. Socket and bit
   Select the specified socket and bit that match the square drive of the torque tool, coupler shape and the screw head dimensions. The socket and bit columns are given in the specifications for each torque tool on pages p.502-p.505. Also see page p.132 in the Technical Data for the screw dimensions. Using a non-standard socket or bit will damage the screw head.
2. Fixing
   Ease of use is the most important requirement for a tightening tool. Suspend it with a balancer, a spiral hose or a spiral hose with a balancer. Use a one-touch coupler to connect the tool with the compressed air supply hose. This will prevent the tool from swinging, and will facilitate oiling and tool exchange.
3. Exhaust
   TOHNICHI' s torque tools come with an exhaust silencer. Rotate the silencer to point away from the operator (AS) or attach an exhaust pipe (Uni-Screwdriver) to lessen the noise.
4. Handle position
   The handle positions of A and AS Airtork tools can be rotated. Before using the tool, set the handle in the position that will be most comfortable. When you use an Airtork (A) tool, the starting button should be pushed with the palm of your hand. If the button of the Airtork is difficult to push, rotate the handle.

The position of the Airtork (AS) starting lever can be easily rotated by loosening the handle connector. Do not set it at the forward position (see the upper figure) because of the danger that you will not be able to loosen the starting lever from this position if the automatic stop device fails to work (at low pressure).

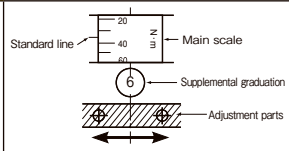
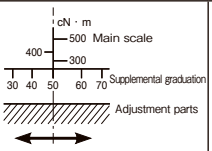
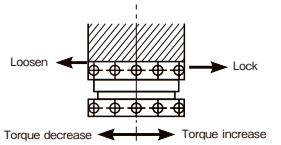






■ Torque setting of power torque tools

Turn the adjustment parts, set the required torque with the main graduation, and finally set the torque accurately with the supplemental graduation.

Setting method	Main scale slide type	Supplemental graduation slide type	Preset type (without graduation)
Adjusting scale			
Set torque	Main scale + Supplemental graduation 30 + 6 = 36 [N·m]	Main scale + Supplemental graduation 200 + 50 = 250 [cN·m]	(Operation torque measurement) using a tester
Model	AUR, HAT, AP, MG, MF, ME, MC2	U, UR, AS12N	AS (Except AS12N)

■ Tightening work

1. Reaction force

When tightening an object with a power torque tool, a reaction force equivalent to the tightening torque generally works on your hand (This is not the case with the semi-automatic A3 or AC3 Airtorks, because you manually perform the final tightening, or with the MF, ME, or MC2 multi-units or the AP2 Airtorks, in which the reaction force is absorbed by the machine). Though in most cases, you may not feel reaction force because of inertia when tightening at high speed, you may feel it when low air pressure in the air motor causes insufficient output or when the screw is a soft joint. Therefore, be sure to hold the powered air tool tightly at all times.

2. Automatic stop

TOHNICHI' s power torque tools stop automatically when the torque reaches the set value. Confirm that the automatic stop has occurred before releasing the starting lever. If you release the starting lever before the tool has automatically stopped, the set torque will not be reached. In addition, if the tool stalls due to insufficient air pressure or air amount before the automatic stop has been activated, the set torque will not be obtained, so be certain to confirm that the automatic stop device has activated. Press the starting lever fully, then after the automatic stop device has activated, remove the power tool from the screw head before releasing the starting lever (If you do not press the starting lever far enough, a shortage of air will cause the output of the air motor to be insufficient, and the system will be half-clutched). The semi-automatic Airtorks do not have an automatic stop mechanism. When using one of these tools, keep the starting button pressed until the tool stalls. Once it does, tighten manually with the torque wrench, and then release the starting button.

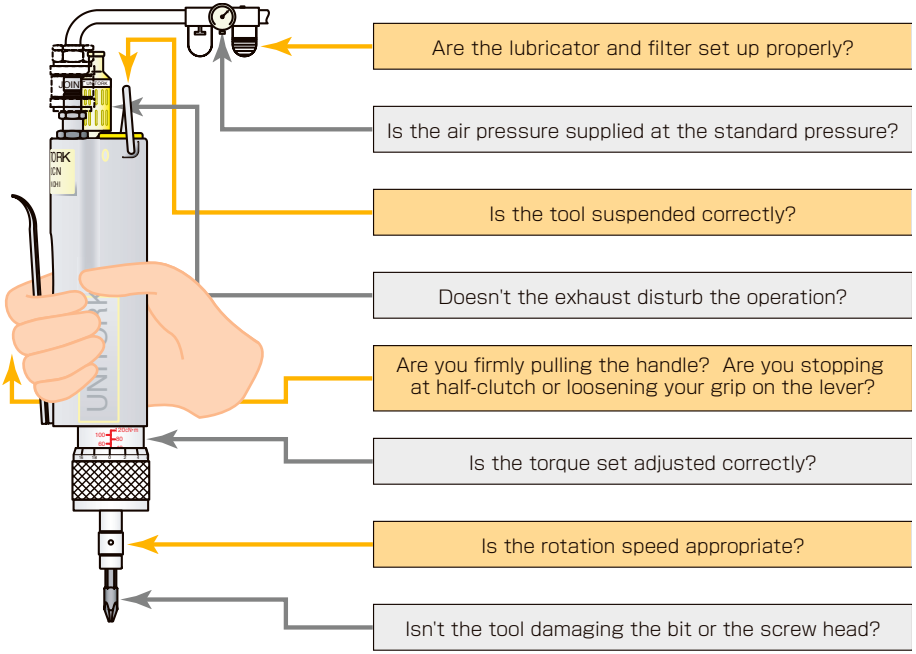
Correct tightening

1. Hold the tool firmly.
2. Press in the starting lever fully.
3. Release the starting lever only after the tool has stopped.

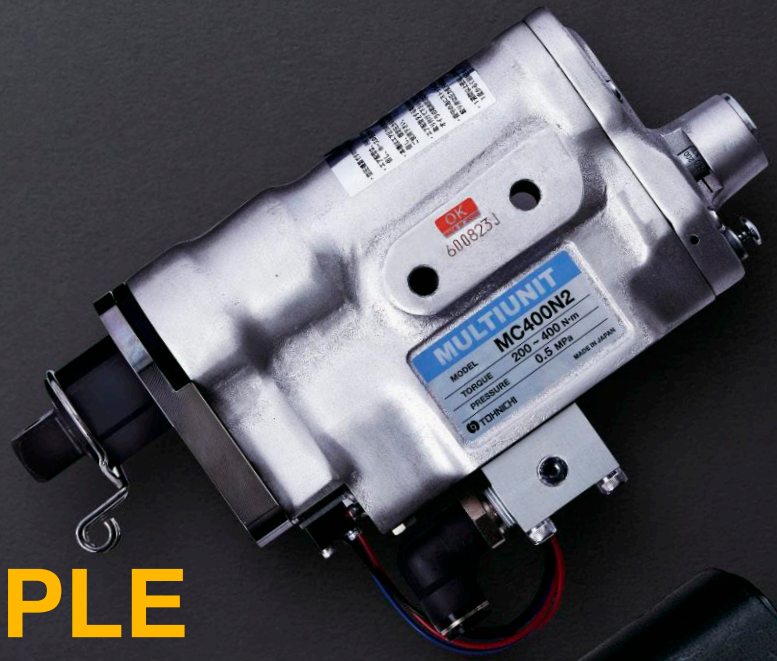
■ Trouble shooting

If a problem occurs, check the following:

- The tool does not rotate
  1. Re-check the air line (Confirm the filter, pressure regulator and lubricator).
  2. Check the one-touch coupler (Older one-touch couplers sometimes do not take in air).
  3. Check the vane motor for sticking (If so, rotate the tip with pliers).
  4. Check the reversing lever to make sure it is not in the neutral position.
- The tool does not stop
  1. Shortage of air (Measure the supply pressure).
  2. The diameter of the one-touch coupler or the hose is too small.
  3. Shortage of vane motor oil (Insert ISO VGA32 (turbine oil #90) from the coupler and rotate the motor).
  4. The speed of rotation is too low (Pull the lever sufficiently).
  5. The valve is sticking (Move the valve from outside).
- The torque is not sufficient (Although the tool stops automatically, the screw is not fully tightened).
  1. You are releasing the lever too early (Confirm that the tool has automatically stopped before releasing the lever).
  2. The torque setting is wrong (Confirm the set torque).
  3. The stopper is poorly adjusted.



MULTIPLE UNIT



Multiple Unit | Straight

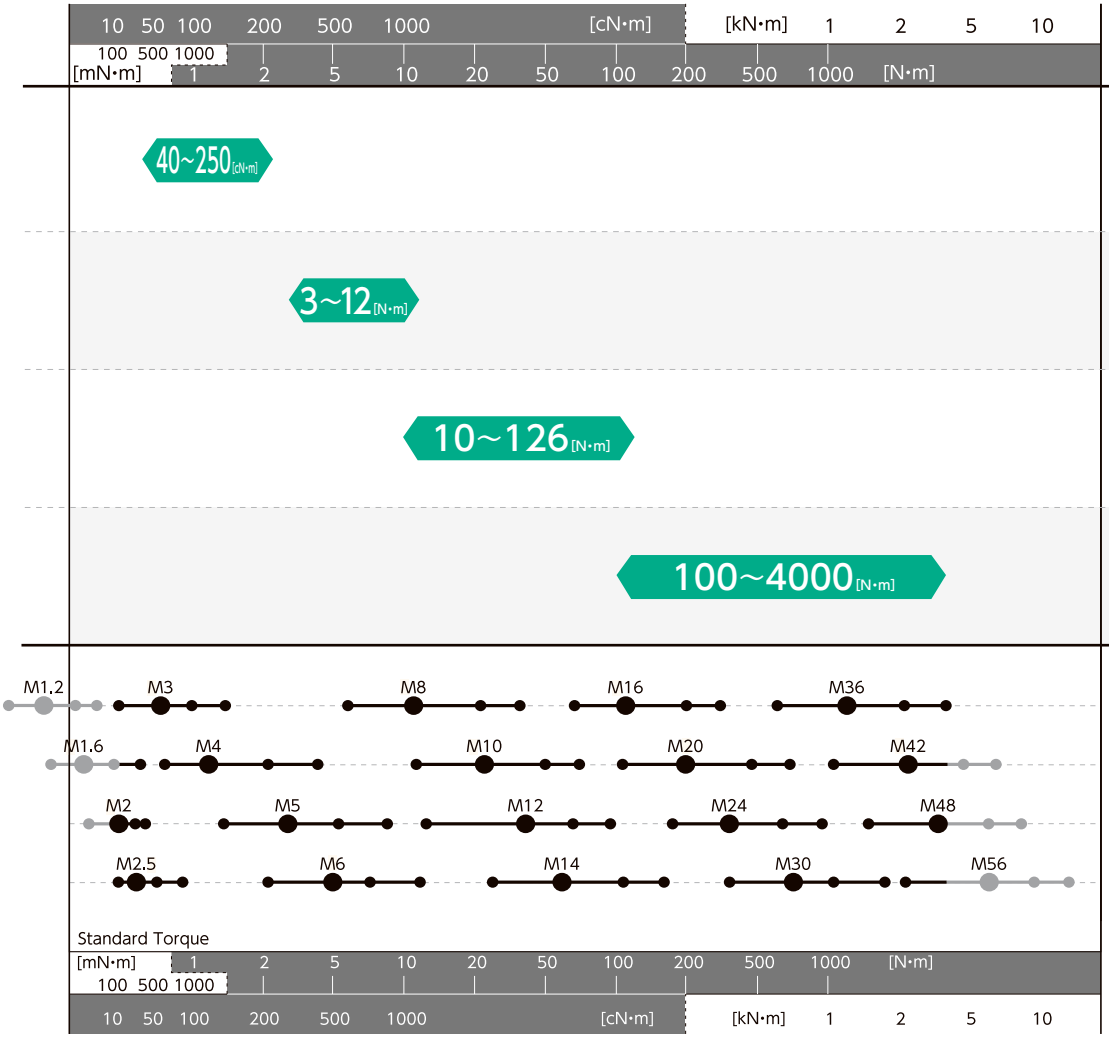
MG
P.392
40~250[cN·m]
Multi-spindle nutrunner for small screws and bolts.

MF
P.392
3~12[N·m]
Multi-spindle nutrunner for small screws and bolts.

MC2
P.394
100~4000[N·m]
Multi-spindle nutrunner for various type of screws.

ME
P.394
10~126[N·m]
Multi-spindle nutrunner for various type of screws.

TORQUE RANGE INDEX



MODEL・TYPE			PAGE
	**MG** Multiple Unit	Straight	392
	**MF** Multiple Unit	Straight	392
	**ME** Multiple Unit	Straight	394
	**MC2** Multiple Unit	Straight	394

T = Standard Tightening Torque

Refer to page 38, "Relation between Screw and Torque" for more details.

MG TORQUE RANGE [cN·m]	MF TORQUE RANGE [N·m]
40～250	3～12

Loading Direction

Straight | Pneumatic | Graduation | Master Valve Operation | 6.35 | RoHS

MG/MF Multiple Unit

For automation of multi-spindle tightening M3 to M6 screws.

MG60CN [L'=295mm]

MF12N [L'=410mm]

Application

- For automatic tightening system / multi-spindle tightening system.

Features

- With mechanical torque control, torque stays at stable level regardless of fluctuation in air pressure.
- Easy torque change with scale.
- Upon reaching the set torque, the internal toggle clicks and automatically stops operation, while the micro switch turns on simultaneously to signal tightening completion.

Optional Accessories

·Handle valve [p.489]

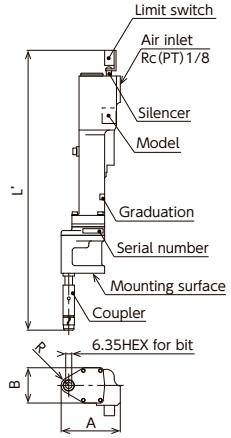
·Switch handle [p.489]

·Master valve [p.489]

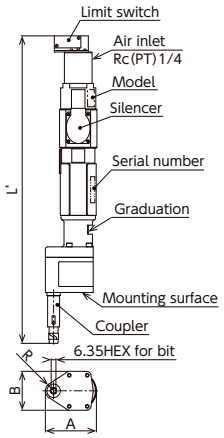
·Interchangeable bit [p.502]

Dimensions

■MG



■MF



Specifications

Accuracy ± 5%

S.I. MODEL		MG120CN	MG250CN	MF6N	MF12N
TORQUE RANGE [cN·m/N·m]	MIN.~MAX.	cN·m 40~120	100~250	N·m 3~6	6~12
	GRAD.	cN·m 2	2.5	N·m 0.1	0.2
METRIC MODEL		M12G	M25G	M60F	M120F
TORQUE RANGE [kgf·cm]	MIN.~MAX.	4~12	10~25	30~60	60~120
	GRAD.	0.1	0.25	1	2
AMERICAN MODEL		M12G-A	M25G-A	M60F-A	M120F-A
TORQUE RANGE [lbf·in]	MIN.~MAX.	4~10	8~22	25~50	50~100
	GRAD.	0.2	0.5	1	2
FREE ROTATION [r.p.m]		720	350	1000	500
APPLICABLE BOLT	COMMON STEEL	(M3.5)	M4, (M4.5)	M5, M6	(M7)
	HIGH TENSION	M3, (M3.5)	M4	(M4.5)	M6
RATED AIR PRESSURE [MPa]		0.4			
AIR MASS FLOW [m^3/min]		0.12		0.42	
FASTENING AIR MASS FLOW [m^3PC]		0.0017	0.0034	0.0046	0.0091
HOSE INTER DIA. [mm]		ϕ5		ϕ6	
NOISE LEVEL [dB(A)]		75		78	
DIMENSION [mm]	OVERALL LENGTH L'	295~287		410~402	
	OVERALL THICKNESS A	62.4		69	
	SQUARE WIDTH B	37.2		52	
	HEAD R	8		11	
WEIGHT [kg]		0.68		2	

Note 1. MG/MF is 6.35 HEX bit holder type. 2. Auto-reset functions. 3. For dimension of air connecting part, please refer to P.397.
Standard Accessories Torque adjusting key

Tester/Checker

TCF ····· p.438

How to use

Basic piping ····· p.396
Connecting part dimensions ····· p.397

Technical data

Torque unit ····· p.29
Joint coefficient ····· p.56
Human error ····· p.57
Tool selection ····· p.72
ISO 9000 related documents ····· p.90
Tool control ····· p.103
Testers for torque tools ····· p.104

How to order.

Specify Model name

[EX.]MG120CN

*Specify "Extension unit" when requested.

Note

- For bit use.
- For designing a multi-spindle nut runner, check the minimum distance between the spindles, or PCD.
- For first-time user, contact Tohnichi or nearest our distributors.

ME TORQUE RANGE [N·m]	MC2 TORQUE RANGE [N·m]
10～126	100～4000

Loading Direction

Straight | Pneumatic | Graduation | Master Valve Operation

9.53 | 19.05 | 31.75 | 12.7 | 25.4 | 38.1

RoHS

ME/MC2 Multiple Unit

For automation of multi-spindle tightening with wide range of screws, M8 to 48.

ME126N [L'=424mm]

MC400N2 [L'=275mm]

Application

- For automatic tightening system/multi-spindle tightening system.

Features

- Easy torque adjustment with scale.
- Upon reaching the set torque, reverse rotation applies to ease tensions of socket and bolt.
- Upon reaching the set torque, the toggle clicks and automatically stops operation, while the micro switch turns on to signal tightening completion.
- A torque sensor (separately sold) can be equipped on the body to provide OK / NG judgment.

Optional Accessories

·Slide drive [p.488]

·Torque sensor [p.489]

·Handle valve [p.489]

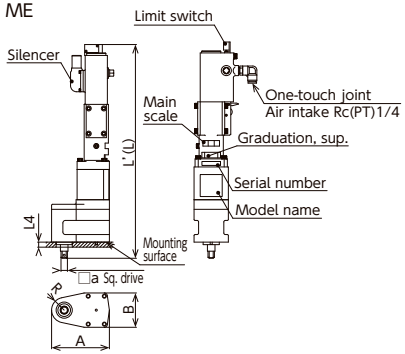
·Switch handle [p.489]

·Master valve [p.489]

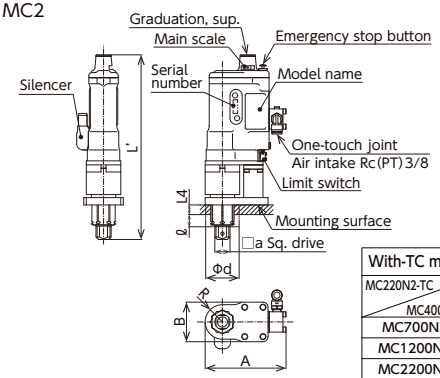
·Interchangeable socket [p.504]

Dimensions

■ ME



■ MC2



[mm]

With-TC model	φd	ℓ
MC220N2-TC / MC400N2-TC	60	14
MC700N2-TC	66	24
MC1200N2-TC	78	20
MC2200N2-TC	84	22
MC4000N2-TC	98.6	24

※For dimension of mounting surface, see page P.488
※For square head size ,see P.501

Specifications

Accuracy ± 5%

S.I. MODEL		ME25N	ME45N	ME80N	ME126N	MC220N2	MC400N2	MC700N2	MC1200N2	MC2200N2	MC4000N2
TORQUE RANGE [N·m]	MIN.~MAX.	10~25	20~45	35~80	50~126	100~220	200~400	300~700	600~1200	1000~2200	2000~4000
	GRAD.	0.5		1	2	10		20	50	100	
METRIC MODEL		M250E2	M450E2	M800E2	M1260E2	MC22M2	MC40M2	MC70M2	MC120M2	MC220M2	MC400M2
TORQUE RANGE [kgf·cm/kgf·m]	MIN.~MAX.	kgf·cm 100~250	200~450	350~800	500~1260	kgf·m 10~22	20~40	30~70	60~120	100~220	200~400
	GRAD.	kgf·cm 5		10	20	kgf·m 1		2	5	10	
AMERICAN MODEL		M250E2-A	M450E2-A	M800E2-A	M1260E2-A	M22C-A	M40C-A	M70C-A	M120C-A	M220C-A	M400C-A
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 90~220	200~400	310~700	lbf·ft 35~90	80~160	150~300	220~500	450~900	700~1600	1500~3000
	GRAD.	lbf·in 5		10	lbf·ft 2	10		20	50	100	
FREE ROTATION [r.p.m]		1050	540	310	200	277	175	79	46	19.2	12
APPLICABLE BOLT	COMMON STEEL	M8, M10	M10, M12	M12(M14)	(M14)M16	M20	(M22)M24	(M27)	M30(M33)	M36, M42	M48
	HIGH TENSION	M6, M8	M8, M10	M10, M12	M12, (M14)	M16	(M18)	M20(M22)	M24	M30(M33)	M36(M39)
RATED AIR PRESSURE [MPa]		0.4				0.5					
AIR MASS FLOW [m³/min]		0.68				0.63					
FASTENING AIR MASS FLOW [m³PC]		0.011	0.017	0.025	0.051	0.07	0.12	0.25	0.46	1	1.7
HOSE INTER DIA. [mm]		φ7.5				φ8					
NOISE LEVEL [dB(A)]		78				80					
DIMENSION [mm] OVERALL LENGTH	L'	421 (458)	424 (461)			275		364	376	473	506
DIMENSION [mm] OVERALL WIDTH	A	86.4	100.4		114.6	157.5		159.5	164.5	172.5	179
DIMENSION [mm] OVERALL THICKNESS	B	68				64		78		108	122
DIMENSION [mm] SQ. DRIVE	a	9.53	12.7			19.05		25.4		31.75	38.1
DIMENSION [mm] HEAD	R	14	17.5		25	32		34	39	47	54
DIMENSION [mm] MOUNTING BOARD THICHNESS	L4	10				14		19	23	25	
WEIGHT [kg]		4.7	5.3		5.7	4.6		6.7	8.1	17	24

Note 1. Over all length in ( ) is with TC sensor. 2. Auto-reverse/auto-reset functions. 3. For dimension of air connecting part, refer to P.397
Standard Accessories Torque adjusting bar (ME), W5 hex key (MC2)

Tester/Checker

TCF ····· p.438
ST3-G ····· p.418

How to use

Basic piping ····· p.396
Connecting part dimensions ····· p.397

Technical data

Joint coefficient ····· p.56
Tool selection ····· p.77
ISO 9000 related documents ····· p.90
Testers for torque tools ····· p.104

How to order.

Specify Model name

[EX.1] ME80N

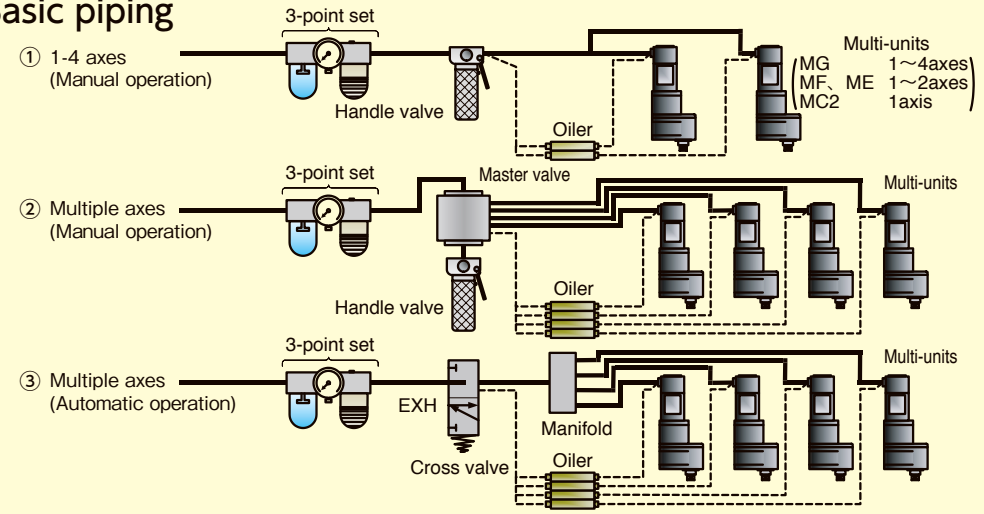
[EX.2] ME80N-TC

Note

- For designing a multi-spindle nut runner, please check the minimum distance between the spindles, or PCD.
- Add –TC for sensor-equipped version [EX.2].
- For first-time user, contact Tohnichi or nearest our distributors.

Correctly use TOHNICHI multi-spindle torque tools to facilitate precise, comfortable, and high performance screw tightening.

■Basic piping



■Cautions for handling multi-units

●Automatic machines

Air supply method

1.Use an electromagnetic or manual valve with three or more ports to stop and start the supply of compressed air.

2.The multi-unit starts rotating when air is supplied and automatically stops or reverses the direction of rotation once the set torque is obtained. If automatic reversing of the direction of rotation is carried out, close the air supply electromagnetic valve 2 to 3 seconds after the unit starts reversing by stopping the signal of the limit switch with a relay or a timer.

Method of tightening

1.Use the multi-unit with the bolts inserted 6-7 mm more after they have been contacted by the socket.

2.When you use a cylinder to move the frame of an automatic multi-unit, use a speed control valve so that the socket does not press on the bolt head too strongly.

3.Use a slide drive when tightening in the horizontal or vertical directions (ME, MC2).

●Manual machines

1.The use of compressed air supply from the handle valve is limited to between 1 to 4 axes. If the multi-unit is to be used to tighten more axes, use a master valve (See figure above).

2.Use a master valve for simultaneous tightening of a large number of bolts.

3.Use a slide drive to facilitate coupling and uncoupling of bolts.

●Others

1.For oiling multi-unit, use a forced oiling apparatus, and use ISO VGA32 (turbine #90) oil.

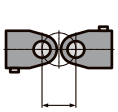
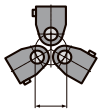
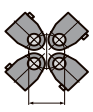
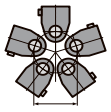
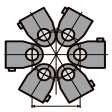
2.TOHNICHI's unique patented system with a built-in high precision sensor allows a tightening control system to be developed.

3.Automatic stop and reverse operations are not accompanied by residual torque (ME, MC2).

■Minimum distance between the spindles of multi-units

The following table gives the minimum distances that must be maintained between multi-unit axes when assembling a multi-unit.

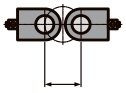
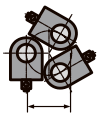
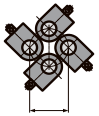
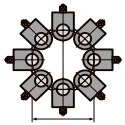
[mm]

Number of axes / Type	2	3	4	5	6
					
MG120CN~250CN	16	19	23	28	33
MF6N、12N	22	26	32	38	51
ME25N	28	33	40	48	62
ME45N、ME80N	35	41	50	60	84
ME126N	50	58	71	86	100
MC220N2~MC400N2	64	75	91	109	129
MC700N2~MC1200N2	78	91	111	133	157

This table is applicable to 4 types, MG, MF, ME, and MC2.

●Example of distances between axes for the MC2200N2 and MC4000N2.

[mm]

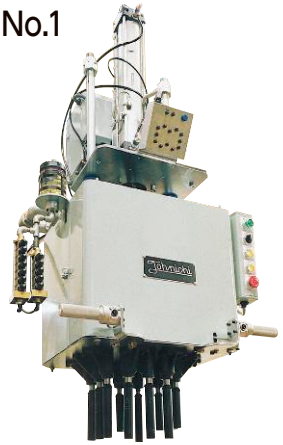
Number of axes / Type	2	3	4	6	8
					
MC2200N2	94	141	141	238	368
MC4000N2	128	160	163	336	420

■Tohnichi air tool fitting information

Air coupling thread	Rc(PT)¼ Female screw, Auxiliary one-touch coupler	G¼B(PF¼) Male screw	R(PT)¾ Male screw	Rc(PT)⅛ Female screw	Rc(PT)¼ Female screw	G¼B(PF¼) Male screw
Type	U30CN~250CN	U500CN、UR500CN U1000CN	AUR5N~25N AS12N ASH40N~120N ASL30N~90N AP220N2~1200N2	MG60CN~250CN	A10N3~100N3 AC25N3~100N3 MF6N、12N ME25N~126N	A180N3/AC180N3

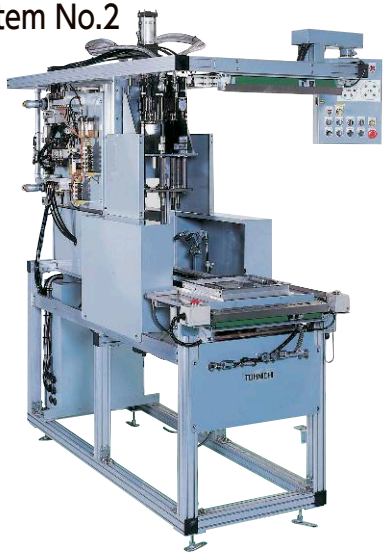
Multi-Spindle Fully-Automatic Airtork Patented System

Tightening Verification System No.1



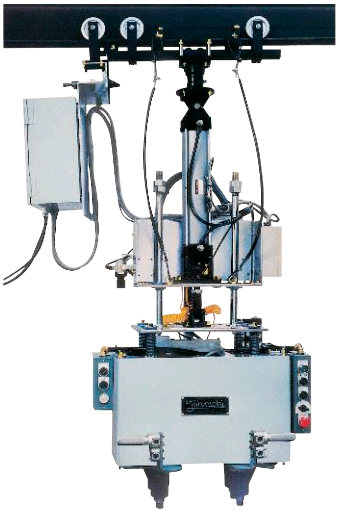
This system eliminates missed tightening which often takes place in bolt tightening assembly. Tightening completion can be directly verified by the lighting of a lamp or buzzer sound using a micro switch.

Tightening Verification System No.2



When the work piece is set in front, it is automatically transferred to the back, where bolts on the upper face and side faces are automatically tightened. When the tightening is completed, the lamp will light and the work piece will return to the original position.

Torque & Angle monitoring system



Multi-Spindle Nutrunner + Torque Sensor + Computer Control

Nutrunners with angle sensors monitor the tightening angle and tightening torque at the same time. When respective conditions are set in advance, defects of bolts, lubrication or materials can be detected.

Multiple Spindle Monitoring System

On this machine each spindle will tighten individually one by one, stopping automatically at the preset torque value. At the same time the machine will check the tightening torque value and perform OK-NG judgment automatically. It features provisional tightening control, work piece model selection, and detection of product defects. The measured data can be transferred to a computer for data processing.

Multi-Spindle Fully-Automatic Airtork Patented System

TESTER /CHECKER

Your Torque Partner TOHNICHI

Torque Screwdriver Tester

TDT3-G
P.402
2~600 [cN·m]
Loading device eliminates measurement errors.

Torque Calibrator and Controller

TCC2-G
P.404
1~1000 [N·m]
Wide range digital torque wrench tester with torque management system,

Torque Wrench Checker

LC3-G
P.416
0.5~1400 [N·m]
Torque wrench checker for quick daily inspection.

ST3-G(-BT)
P.418
2~1000 [N·m]
World's smallest precision torque checker for nut runners.

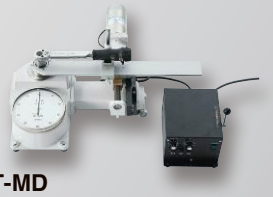
Torque Wrench Tester

DOTE4-G
P.406
2~1000 [N·m]
Standard digital torque wrench tester.

DOT
P.408
5~700 [N·m]
Standard manual torque wrench tester.

DOTE4-G-MD2
P.410
2~1000 [N·m]
Digital torque wrench tester with a motor driven unit.

TF
P.414
0.5~3000 [N·m]
Central torque management system. Automatic measurement, automatic judgment, etc.



DOT-MD
P.412
5~700 [N·m]
Analog torque wrench tester with a motor driven unit.

TDT3-G Digital Torque Screwdriver Tester

CE

High-accuracy digital torque screwdriver tester with loading device eliminates measurement errors.

TDT60CN3-G

TDT600CN3-G with LTA

※Optional TDTLA is used when calibrating small range torque wrenches.

TDT600CN3-G with TDTLA3

Application

- For calibration and adjustment of torque screwdrivers
- For calibration and adjustment of small torque wrenches

Features

- Digital type torque screwdriver tester eliminates visual reading errors.
- The loading device keeps stable measuring conditions to avoid reading errors.
- The measuring range is wide and applicable for various types of torque screwdriver.
- RS232C output makes it possible to transmit the data to a computer or printer.
- Judgment function shows results in 3 colors (white/blue/red).
- Power source : AC100V-240V. Battery pack is available as an option.

Optional Accessories

·Connecting cable [p.507]

·AC Adapter [p.507]

·Hex Adapter [p.510]

·Battery pack [p.507]

Specifications

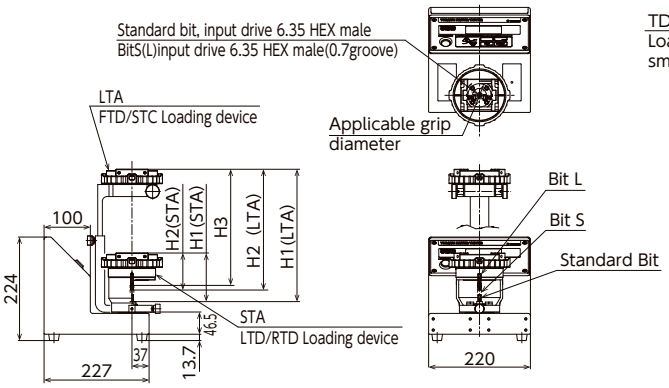
Accuracy ± 1%+1digit

MODEL		TDT60CN3-G	TDT600CN3-G
TORQUE RANGE [cN·m]	MIN.～MAX.	2～60	20～600
	1 DIGIT	0.005※	0.05※
TORQUE RANGE [kgf·cm]	MIN.～MAX.	0.2～6	2～60
	1 DIGIT	0.0005※	0.005※
TORQUE RANGE [ozf·in]	MIN.～MAX.	3～80	30～800
	1 DIGIT	0.005※	0.05※
TORQUE RANGE [lbf·in]	MIN.～MAX.	0.2～5	2～50
	1 DIGIT	0.0005※	0.005※
INLET DRIVE [mm]		6.35 HEX (Male) with a groove (minus 0.7mm)	
WEIGHT [kg]		11	

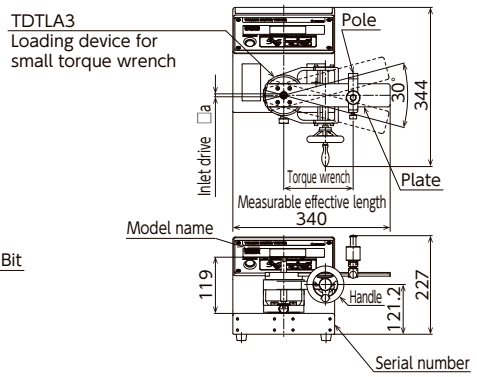
※ The resolution will be decline at M99: TDT2 compatible mode.

Dimensions

■ TDT3+STA、TDT3+LTA



■ TDT3+TDTLA3



Common specifications

Accuracy ± 1%+1digit

DATA MEMORY	1000 data (99 data in M99 mode)
STATISTICAL PROCESSING	Number of samples/max./min./mean value
UPPER/LOWER LIMIT VALUE SETTING	10 settings
MEASURING MODE	PEAK/RUN
ZERO ADJUSTMENT	Automatic
DATA OUTPUT	RS232C (compliant), USB (B type) serial communication
RESET	Manual/Auto (0.1～5.0 sec. selectable)
OPERATING TEMPERATURE RANGE [℃]	0～40℃ Less than 85% RH no condensation
POWER CONSUMPTION [W]	Less than 5W
POWER AC [V]	100～240 ±10% 50/60Hz ※12V (Battery pack BP-100-4 (Optional Accessory) in use)

Accessory 1. AC Adapter (BA-6)
2. STA Loading device for click type torque screwdriver (LTD, RTD)
3. Standard clamp block

Optional accessories 1. LTA loading device for indicating torque screwdriver (FTD, STC)
2. TDTLA3 for testing small torque wrenches from 2cN·m to 60cN·m with TDT60CN3-G and 20cN·m to 600cN·m with TDT600CN3-G

Loading Devices

MODEL			STA (For LTD/RTD)	LTA (For FTD/STC)	TDTLA3 (For small torque wrench)
APPLICABLE GRIP DIAMETER ϕD [mm]			7～50		–
APPLICABLE GRIP HEIGHT [mm]	STANDARD BIT	H1	105	211	
	BIT S	H2	80	286	
	BIT L	H3	–	154	
INLET DRIVE □a [mm]			–		6.35
MEASURABLE EFFECTIVE LENGTH L [mm]			–		90～220

Alternative model
TCC2-G ····· p.404

Optional equipment
EPP16M3 ····· p.464
Battery pack ····· p.507

Calibration kit
TDTCL ····· p.444

Technical data
Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.1] TDT60CN3-G
[EX.2] TDT600CN3-G +LTA+TDTLA3

TORQUE RANGE[N·m]	TORQUE RANGE[cN·m]
1～1000	20～600

Loading Direction

Digital | Manual Handle | Direct Reading | Tool Management System

9.53 | 19.05 | 6.35 | 12.7 | 25.4

RoHS

TCC2-G Torque Calibrator and Controller

CE

Torque Calibrator with Data Management Software with wide torque range

TCC100N2-G

Application

- Calibration, adjustment, and data management for torque wrenches

Features

- Torque range as wide as that of 2 or more conventional DOTE4-G testers combined.
- Pre-installed data management software simplifies the calibration process. Tool management data transfers easily to PC with included software package.
- User friendly touch screen operation (Language selection for Japanese and English).
- Spindle-rotating loading mechanism keeps the torque wrench in fixed position during testing.

Optional Accessories

·DA down adapter [p.510]

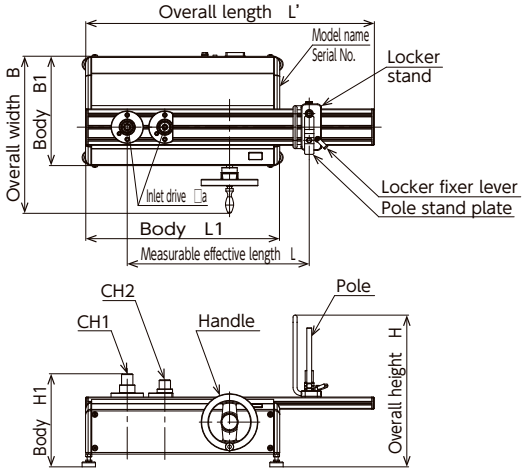
·Hex adapter [p.510]

·Ratchet adapter [p.472]

Common specifications

DISPLAY	10-inch slate PC
TOOL MANAGEMENT SYSTEM FUNCTION	Measurement master data for Torque wrenches and torque screwdrivers (model, serial number, measurement points, count of measurement, accuracy, tester's channels, operator, past record)
MEASUREMENT MODE	Manual/Tool management
ZERO ADJUSTMENT	Automatic (press C key)
OPERATING TEMPERATURE RANGE [℃]	0～40℃ Less than 85% RH no condensation
POWER CONSUMPTION [W]	Less than 80W
POWER AC [V]	100～240 50/60Hz

Dimensions



Specifications

Accuracy ± 1%+1digit

MODEL			TCC100N2-G		TDD100N2-D-G		TCC500N2-G		TCC1000N2-G	
TORQUE RANGE [N·m]		CH	1	2	1	2	1	2	1	2
		MIN.~MAX.	4~100	1~25	4~100	20~600 cN·m	20~500	4~100	50~1000	20~500
		1 DIGIT	0.01	0.002	0.01	0.05 cN·m	0.05	0.01	0.1	0.05
TORQUE RANGE [kgf·cm]		MIN.~MAX.	40~1000	10~250	40~1000	2~60	200~5000	40~1000	500~10000	200~5000
		1 DIGIT	0.1	0.02	0.1	0.005	0.5	0.1	1	0.5
TORQUE RANGE [lbf·in]		MIN.~MAX.	35.5~885	9~220	35.5~885	2~50	180~4400	36~880	445~8800	180~4400
		1 DIGIT	0.1	0.02	0.1	0.005	0.5	0.1	1	0.5
MEASURABLE EFFECTIVE LENGTH L[mm]			575	482	575	482	1035	769	1700	1212
INLET DRIVE □a[mm]			12.7	9.53	12.7	6.35	19.05	12.7	25.4	19.05
DIMENSION [mm]	OVERALL LENGTH	L'	714				1206		1906	
	OVERALL WIDTH	B	387				503		574	
	OVERALL HEIGHT	H	375				430		526	
	BODY	L1	480				710		1000	
		B1	270				355		400	
		H1	230				281		328	
WEIGHT [kg]			35				75		115	
ACCESSORIES [mm]	DOWN ADAPTER SQ. (MALE-FEMALE)		□12.7 - □9.53 □9.53 - □6.35		□12.7 - □9.53		□19.05 - □12.7 □12.7 - □9.53		□25.4 - □19.05 □19.05 - □12.7	
	ADAPTER SQ. (MALE) -HEX (FEMALE)		□12.7 - W10·13·19 □12.7 - W12·14·17				□12.7 - W10·13·19 □12.7 - W12·14·17 □19.05 - W17·22·27 □19.05 - W19·24·30		□19.05 - W17·22·27 □19.05 - W19·24·30 □25.4 - W36·46 □25.4 - W41·50	

Standard Accessories 1. Cradle for display PC 2. AC adapter for display PC 3. power cable
STA Loading device for TCC100N2-D-G
Optional accessories LTA Loading device for FTD/STC2-G drivers.

Alternative model

DOTE4-G ····· p.406
DOTE4-G-MD2 ····· p.410
TF ····· p.414

Optional equipment

RAmk2 ····· p.472

Calibration kit

TCCTCL2 ····· p.444

Technical data

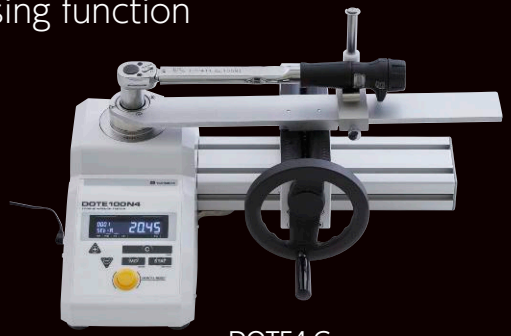
Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] TCC100N2-G

DOTE4-G Digital Torque Wrench Tester

CE

Digital torque wrench tester with data processing function



DOTE4-G

Red: Judgment NG

Blue: Judgment OK

White: standard

Application

- For calibration and adjustment of torque wrenches

Features

- Judgment result appears on the negative type liquid crystal display by blue or red.
- Pole plate is equipped for all models, which helps horizontal setting of torque wrenches.
- Data memory capacity up to 1000 readings. Sample quantity, maximum value (Hi), minimum value (Lo) and mean value can be displayed.
- RS232C is equipped as standard to transmit the data to PC or EPP16M3, Tohnichi printer.
- Power source : AC100V-240V±10%, available for international use.
- CE mark applied for international use including the EU region

Optional Accessories

·DA down adapter [p.510]

·Hex adapter [p.510]

·Connecting cable [p.507]

·AC adapter [p.507]

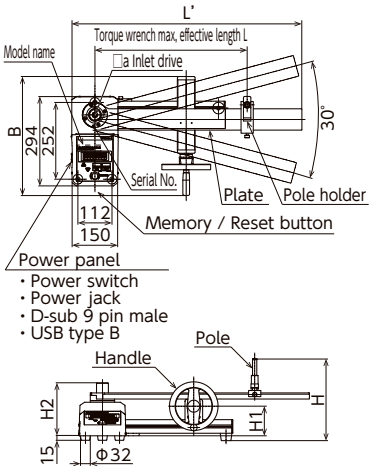
Common specifications

DISPLAY	Black mask LCD (white･red･blue)
DATA MEMORY	1000 data
STATISTICAL PROCESSING	Number of samples/max./min./mean value
UPPER/LOWER VALUE SETTING	10 Settings (A～J)
MEASURING MODE	PEAK / RUN
ZERO ADJUSTMENT	Automatic (press C key)
DATA OUTPUT	RS232C compliant (Factory default: PC output, Printer: key setting)
RESET	Manual/Auto (0.5～5.0 sec. freely changeable by 0.1 sec)
OPERATING TEMPERATURE RANGE [℃]	0～40℃ Less than 85% RH no condensation
POWER CONSUMPTION [W]	Less than 5W
POWER AC[V]	100～240 ±10% 50/60Hz

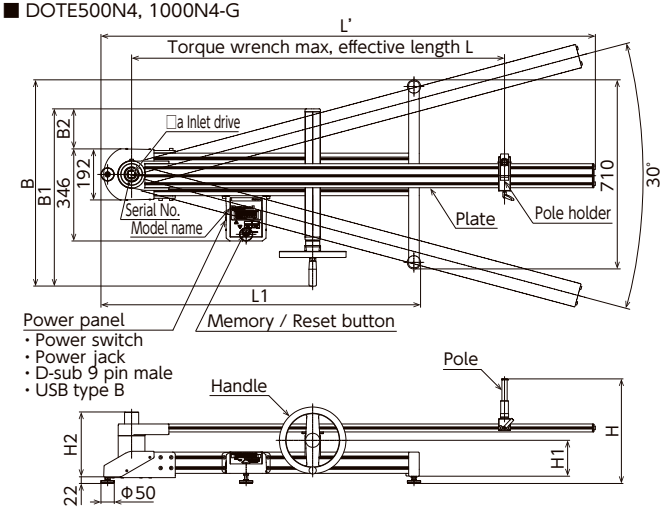
Standard Accessories
1. AC Adapter (BA-6)
2. Socket (not included in DOTE200N3-G, DOTE500N3-G)
3. Hex adapter

Dimensions

■ DOTE20N4～200N4-G



■ DOTE500N4, 1000N4-G



Specifications

Accuracy ± 1%+1digit

MODEL		DOTE20N4-G	DOTE50N4-G	DOTE100N4-G	DOTE200N4-G	DOTE500N4-G	DOTE1000N4-G
TORQUE RANGE [N·m]	MIN.～MAX.	2～20	5～50	10～100	20～200	50～500	100～1000
	1 DIGIT	0.002	0.005	0.01	0.02	0.05	0.1
TORQUE RANGE [kgf·cm/kgf·m]	MIN.～MAX.	kgf·cm 20～200	50～500	100～1000	200～2000	kgf·m 5～50	10～100
	1 DIGIT	kgf·cm 0.02	0.05	0.1	0.2	kgf·m 0.005	0.01
TORQUE RANGE [lbf·in/lbf·ft]	MIN.～MAX.	lbf·in 18～180	44～440	88～880	170～1700	lbf·ft 36.0～36	73～730
	1 DIGIT	lbf·in 0.02	0.05	0.1	0.2	lbf·ft 0.05	lbf·ft 0.1
TORQUE WRENCH MAX. EFFECTIVE LENGTH L [mm]		410			660	1100	1650
INLET DRIVE □a [mm]		9.53		12.7		19.05	25.4
DIMENSIONS [mm]	L	506			756	1276	1856
	B	339			391	710	775
	H	267			269	394	
	L1	–				805	1195
	B1	–				518	666
	B2	–				90	150
	H1	113				162	
	H2	171		169	174	238	247
WEIGHT [kg]		12			13	47	49
ACCESSORIES [mm]	DOWN ADAPTER	DA3-2		277, DA4-3	–	–	DA8-6
	HEX. ADAPTER	10·13·19			17·22·27	22·27·29	34·41
		12·14·17			19·24·30	30·32·36	46·50

Alternative model
TCC2-G ····· p.404
DOT ····· p.408
DOTE4-G-MD2 ····· p.410
TF ····· p.414
DOT-MD ····· p.412

Optional equipment
EPP16M3 ····· p.464
RAmK2 ····· p.472
Battery pack ····· p.507

Calibration kit
DOTCL ····· p.444

Technical data
Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ···· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] DOTE100N4-G

DOT Torque Wrench Tester

Dial indicating torque wrench tester with mechanical loading device

DOT100N

Application

- For calibration and adjustment of torque wrenches

Features

- Manual-operated analog type torque wrench tester
- Easy-to-read large dial face (φ140)
- Since torque wrench is designed to set horizontally, wrench weight correction is not necessary.
- Pole plate available for all models, which helps horizontal setting of torque wrenches.
- Torque wrenches can be calibrated easily by rotating the handle.
- The loading device is designed to apply load accurately against the effective line of torque wrench, which maintains a stable calibration conditions and prevents individual errors.

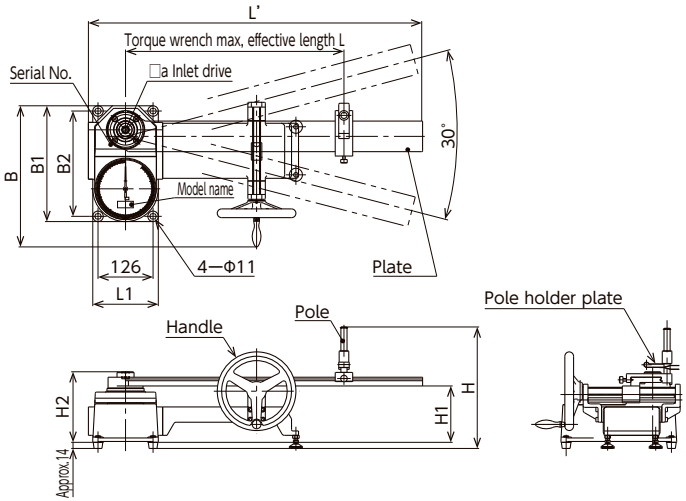
Optional Accessories

·Interchangeable socket [p.504]

·DA down adapter [p.510]

·Hex adapter [p.510]

Dimensions



Specifications

Accuracy ± 2%

S.I. MODEL			DOT35N	DOT50N	DOT100N	DOT300N	DOT700N
TORQUE RANGE [N·m]	MIN.~MAX.		5~35	5~50	10~100	30~300	70~700
	GRAD.		0.1	0.2	0.5	1	2
METRIC MODEL			350DOT	500DOT	1000DOT	3000DOT	7000DOT
TORQUE RANGE [kgf·cm]	MIN.~MAX.		50~350	50~500	100~1000	300~3000	700~7000
	GRAD.		1	2	5	10	20
AMERICAN MODEL			DOT300I	DOT430I	DOT1000I	DOT200F	DOT500F
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.		lbf·in 50~300	50~430	100~1000	lbf·ft 20~200	50~500
	GRAD.		lbf·in 1	2	5	lbf·ft 1	2
TORQUE WRENCH MAX EFFECTIVE LENGTH L[mm]			410			660	1260
INLET DRIVE □a[mm]			9.53		12.7	19.05	
DIMENSION [mm]	OVERALL LENGTH	L'	505			765	1365
	OVERALL WIDTH	B	263			323	394
	OVERALL HEIGHT	H	221			278	305
	BODY	B1	245			265	
		B2	221			241	
		L1	150				
		H1	87			117	139
		H2	142			176.5	201
WEIGHT [kg]			8			10	25
ACCESSORIES [mm]	DOWN ADAPTER SQ. (MALE-FEMALE)		□9.53 - □6.35		□12.7 - □6.35 □12.7 - □9.53	–	–
	ADAPTER SQ. (MALE)-HEX (FEMALE)		□9.53 - W10·13·19 □9.53 - W12·14·17		□12.7 - W10·13·19 □12.7 - W12·14·17	□19.05 - W17·22·27 □19.05 - W19·24·30	□19.05 - W22·27·29 □19.05 - W30·32·36

Alternative model

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOTE4-G-MD2 ····· p.410
TF ····· p.414
DOT-MD ····· p.412

Optional equipment

RAmK2 ····· p.472

Calibration kit

DOTCL ····· p.444

Technical data

Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.] DOT100N

Note

- Measurement applicable for clockwise direction only.
- Special model (counterclockwise measurement model) is supplied upon request.

DOTE4-MD2 Torque Wrench Tester with Motor Driven Loading Device

Torque wrench tester with motor driven loading device

DOTE100N4-G-MD2

Application

- For calibration and adjusting of torque wrenches

Features

- Motor driven operation version of DOTE4-G
- Motor-operated loading is suitable to use in an inspection room where great number of wrenches are to be calibrated and managed
- Measuring speed can be adjusted according to the volume.
- The operation lever enables subtle adjustment of positions when measuring direct-reading torque wrenches such as F. DB models.
- Retrofit motor driven unit is sold separately for existing standard DOTE4-G.

Optional Accessories

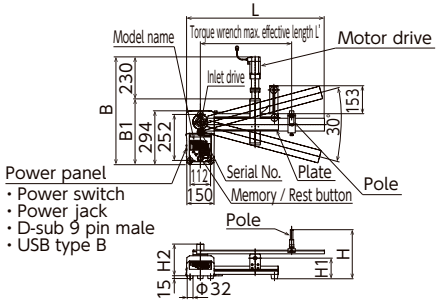
·DA down adapter [p.510]

·Hex adapter [p.510]

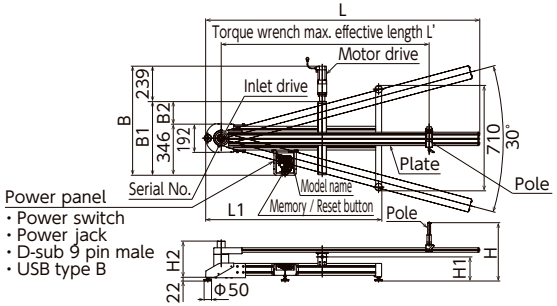
·Connecting cable [p.507]

Dimensions

■ DOTE20N4-G-MD2～200N4-G-MD2



■ DOTE500N4-G-MD2～1000N4-G-MD2



DOTE4-G-MD2 Specifications

MODEL		DOTE20N4-G-MD2	DOTE50N4-G-MD2	DOTE100N4-G-MD2	DOTE200N4-G-MD2	DOTE500N4-G-MD2	DOTE1000N4-G-MD2
TORQUE RANGE [N·m]	MIN.~MAX.	2~20	5~50	10~100	20~200	50~500	100~1000
	1 DIGIT	0.002	0.005	0.01	0.02	0.05	0.1
TORQUE WRENCH MAX. EFFECTIVE LENGTH L [mm]		410			660	1100	1650
INLET DRIVE □a [mm]		9.53		12.7		19.05	25.4
DIMENSIONS [mm]	L	506			756	1276	1856
	B	569			589	675	708
	H	267			269	394	
	L1	–				805	1195
	B1	339			359	436	496
	B2	–				90	150
	H1	113				162	
	H2	171		169	174	238	247
WEIGHT [kg]		18.5			20.5	50.5	52.5
ACCESSORIES [mm]	DOWN ADAPTER	DA3-2		277、DA4-3	–	–	DA8-6
	HEX. ADAPTER	10·13·19 12·14·17			17·22·27 19·24·30	22·27·29 30·32·36	34·41 46·50

Accuracy ±1% + 1digit

Common specifications

DISPLAY	Black mask LCD (white·red·blue)
DATA MEMORY	1000 data
STATISTICAL PROCESSING	Number of samples/max./min./mean
UPPER/LOWER VALUE SETTING	10 Settings (A~J)
MEASURING MODE	PEAK / RUN
ZERO ADJUSTMENT	Auto zero
DATA OUTPUT	RS232C compliant, USB type B serial communication
RESET	Manual/Auto 0.1~5.0 sec. selectable
OPERATING TEMPERATURE RANGE [℃]	0~40℃ Less than 85% RH no condensation
POWER AC[V]	AC100~240V±10% 50 / 60Hz

Motor driven unit specifications

APPLICABLE MODELS	DOTE20N4-G~200N4-G-MD2	DOTE500N4, 1000N4-G-MD2
DRIVER BOX	DR-MD2-S	DR-MD2-L
INPUT POWER	AC100V~240V±10% 50/60Hz	
FUSE	3.15A/250V(φ5.2×L20)	
RATED POWER	40W	100W
DRIVER BOX [kg]	2.2kg	
MOTOR UNIT	M-MD2-S	M-MD2-L
MOTOR	Stepping motor	
CONTROLLER	C-MD2	
CONTROLLER [kg]	0.4kg	
CONTROL LEVER	Joy stick, dial	
DIRECTION	CW/CCW	
SPEED CHANGE	Low/High	
ALARM	Loading limiter, error detection (limit switch/motor cable defection, motor/driver defection, joy stick)	
LED	Power (Blue), Alarm #1 (Orange), Alarm #2 (Yellow)	
CABLE	DR-MD2 Motor cable, DR-MD2 Limit cable, AC power cord, C-MD2 controller cable (fixed on the controller)	
OPERATION IN USE [℃]	0~40℃ Less than 85% RH no condensation	

Alternative model
TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
DOT-MD ····· p.412
TF ····· p.414

Optional equipment
EPP16M3 ····· p.464
RAmK2 ····· p.472
Battery pack ····· p.507

Calibration kit
DOTCL ····· p.444

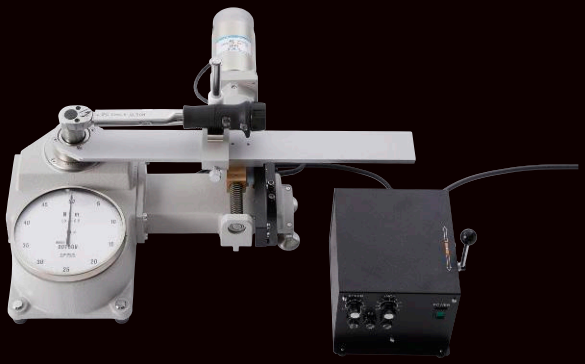
Technical data
Torque unit ····· p.29
Machine erro ····· p.54
Traceability ····· p.81
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] DOTE100N4-G-MD2

Note
- Refer to DOTE4-G specification for other standard accessories.
- Consult to Tohnichi for modification of an existing DOTE4-G tester to motor driven type.

DOT-MD Torque Wrench Tester with Motor Driven Loading Device

Torque wrench tester with motor driven loading device



DOT50N-MD

Application

- For calibration and adjustment of torque wrenches.

Features

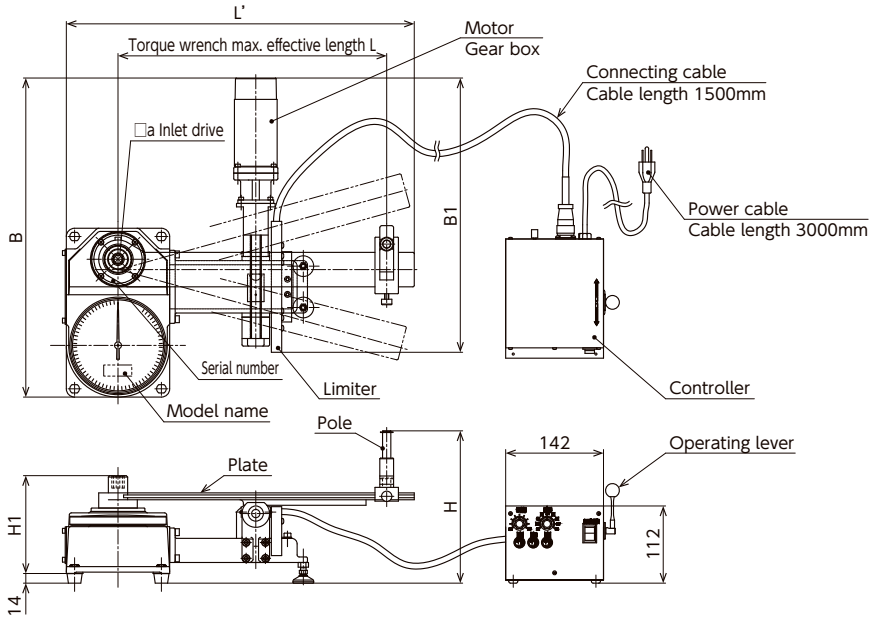
- Motor driven operation version of DOT.
- Motor-operated loading is suitable to use in an inspection room where great number of wrenches are to be calibrated and managed.
- Measuring speed can be adjusted according to the volume.
- The operation lever enables subtle adjustment of positions when measuring direct-reading torque wrenches such as F. DB models.
- Adaptable to standard AC 100V or any other voltage upon request.

Optional Accessories

·DA down adapter [p.510]

·Hex adapter [p.510]

Dimensions



DOT-MD Specifications

Accuracy ± 2%

S.I. MODEL		DOT35N-MD	DOT50N-MD	DOT100N-MD	DOT300N-MD	DOT700N-MD
TORQUE RANGE [N·m]	MIN.~MAX.	5~35	5~50	10~100	30~300	70~700
	GRAD.	0.1	0.2	0.5	1	2
METRIC MODEL		350DOT-MD	500DOT-MD	1000DOT-MD	3000DOT-MD	7000DOT-MD
TORQUE RANGE [kgf·cm]	MIN.~MAX.	50~350	50~500	100~1000	300~3000	700~7000
	GRAD.	1	2	5	10	20
AMERICAN MODEL		DOT300I-MD	DOT430I-MD	DOT1000I-MD	DOT200F-MD	DOT500F-MD
TORQUE RANGE [lbf·in/lbf·ft]	MIN.~MAX.	lbf·in 50~300	50~430	100~1000	lbf·ft 20~200	50~500
	GRAD.	lbf·in 1	2	5	lbf·ft 1	2
TORQUE WRENCH MAX EFFECTIVE LENGTH L[mm]		410			660	1260
INLET DRIVE □a[mm]		9.53		12.7	19.05	
DIMENDION [mm] OVERALL LENGTH	L'	511			771	1365
OVERALL WIDTH	B	263			490	546
OVERALL HEIGHT	H	221			278	304
BODY	B1	398			439	551
	H1	142			162	201
WEIGHT [kg] BODY		8			10	25
CONTROLLER		1.5				
ACCESSORIES [mm] DOWN ADAPTER SQ. (MALE-FEMALE)		□9.53 - □6.35		□12.7 - □6.35 □12.7 - □9.53	–	–
ADAPTER SQ. (MALE)-HEX (FEMALE)		□9.53 - W10·13·19 □9.53 - W12·14·17		□12.7 - W10·13·19 □12.7 - W12·14·17	□19.05 - W17·22·27 □19.05 - W19·24·30	□19.05 - W22·27·29 □19.05 - W30·32·36

Alternative model

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
DOTE4-G-MD2 ····· p.410
TF ····· p.414

Optional equipment

EPP16M3 ····· p.464
RAmK2 ····· p.472
Battery pack ····· p.507

Calibration kit

DOTCL ····· p.444

Technical data

Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.] DOT100N-MD

Note

- Refer to specification of DOT for standard accessories.
- Standard DOT tester can be modified to motor driven style upon request.

TF Fully Automatic Digital Torque Wrench Tester

Centrally controlled torque tool management system features: automatic measuring and judgment with data processing

TF2000N

Application

- For calibration and adjustment of torque wrenches

Features

- View measurement information via computer monitor
- TF tester automatically calibrate the torque wrenches automatically according to the wrench information registered in advance.
- Peripheral equipment can be attached easily.

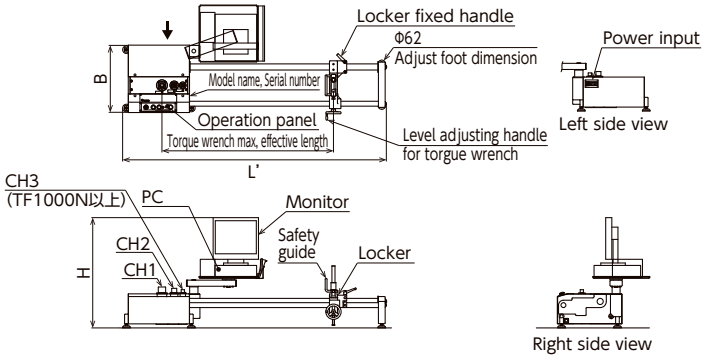
Optional Accessories

·DA down adapter [p.510]

·Hex adapter [p.510]

·RAmK2 [p.472]

Dimensions



Specifications

Accuracy ± 1%+1digit

MODEL			TF200N		TF500N		TF1000N			TF2000N			TF3000N		
TORQUE RANGE [N·m]		CH	1	2	1	2	1	2	3	1	2	3	1	2	3
		MIN.~MAX.	5~200	0.5~20	20~500	2~50	25~1000	5~200	0.5~20	100~2100	20~500	2~50	200~3000	100~2100	20~500
		1 DIGIT	0.05	0.005	0.2	0.02	0.25	0.05	0.005	1	0.2	0.02	1	1	0.2
TORQUE RANGE [kgf·m]		MIN.~MAX.	0.5~20	0.05~2	2~50	0.2~5	2.5~100	0.5~20	0.05~2	10~210	2~50	0.2~5	20~300	10~210	2~50
		1 DIGIT	0.005	0.0005	0.02	0.002	0.025	0.005	0.0005	0.1	0.02	0.002	0.1	0.1	0.02
TORQUE RANGE [lbf·ft]		MIN.~MAX.	5~140	0.5~14	20~370	2~37	25~700	5~140	0.5~14	100~1500	20~370	2~37	200~2000	100~1500	20~370
		1 DIGIT	0.05	0.005	0.2	0.02	0.25	0.05	0.005	1	0.2	0.02	1	1	0.2
TORQUE WRENCH MAX. EFFECTIVE LENGTH L[mm]			1550	1480	1550	1480	1650	1550	1480	2150	1550	1480	2650	2150	1550
INLET DRIVE □a[mm]			12.7	9.53	19.05	9.53	25.4	12.7	9.53	25.4	19.05	9.53	38.1	25.4	19.05
DIMENSION [mm]	OVERALL LENGTH	L'	1853				2153			2653			3153		
	OVERALL WIDTH	B	550												
	OVERALL HEIGHT	H	930												
WEIGHT [kg]			240				250			315			380		
ACCESSORIES [mm]	RATCHET ADAPTER SQ. (MALE-FEMALE)		□12.7 □9.53		□19.05 □9.53		□25.4 □12.7 □9.53			□25.4 □19.05 □9.53			□38.1 □25.4 □19.05		
	DOWN ADAPTER SQ. (MALE-FEMALE)		□12.7 - □9.53 □9.53 - □6.35		□19.05 - □12.7 □9.53 - □6.35		□25.4 - □19.05 □12.7 - □9.53 □9.53 - □6.35			□25.4 - □19.05 □19.05 - □12.7 □9.53 - □6.35			□38.1 - □25.4 □25.4 - □19.05 □19.05 - □12.7		
	ADAPTER SQ. (MALE)-HEX (FEMALE)		□12.7 - W17·22·27 □12.7 - W19·24·30 □9.53 - W10·13·19 □9.53 - W12·14·17		□19.05 - W17·22·27 □19.05 - W19·24·30 □9.53 - W10·13·19 □9.53 - W12·14·17		□25.4 - W36·46 □25.4 - W41·50 □12.7 - W17·22·27 □12.7 - W19·24·30 □9.53 - W10·13·19 □9.53 - W12·14·17			□25.4 - W36·46 □25.4 - W41·50 □19.05 - W22·27·29 □19.05 - W30·32·36 □9.53 - W10·13·19 □9.53 - W12·14·17			□12.7 - W10·13·19 □12.7 - W12·14·17 □25.4 - W36·46 □25.4 - W41·50 □19.05 - W22·27·29 □19.05 - W30·32·36		

Alternative model

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOTE4-G-MD2 ····· p.410

Optional equipment

RAmK2 ····· p.472

Calibration kit

TFTCL ····· p.444

Technical data

Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.
Specify Model name
[EX.] TF1000N

LC3-G Line Checker

CE

For quick daily inspection of torque wrenches

LC200N3-G

LC1000N3-G

Application

- Check torque wrench accuracy near the assembly line prior to use

Features

- 3 different colored LCD display visibly notices judgment results.
- Wide measurement range, reasonably priced, compact and high accuracy
- Capable of reading the torque at the time of toggle activated.
- Combination adapters come with as standard option.
- Power source AC100V-240V±10% to cover international use. Battery pack is available as an option.
- CE mark applied for international use including the EU region

Optional Accessories

·Socket adapter [p.504]

·Hex adapter [p.510]

·Connecting cable [p.507]

·AC adapter [p.507]

·Hexagon head adapter [p.510]

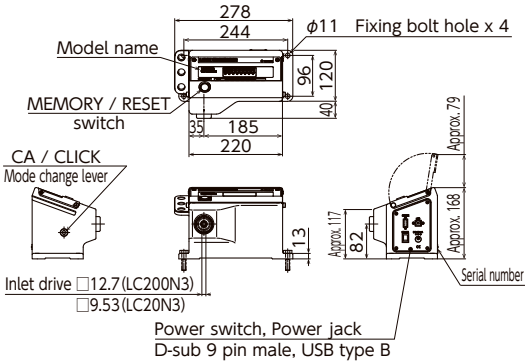
Common specifications

DISPLAY	Black mask LCD (white·red·blue)
DISPLAY DIGITS	3-digit (PEAK)/5-digit (RUN)
DATA MEMORY	1000 data (Counter, Time, Torque Date)
MEASUREMENT MODE	PEAK/RUN
ZERO ADJUSTMENT	C key, Auto zero by Power OFF/ON
UPPER/LOWER LIMIT VALUE SETTING	10 settings
DATE OUTPUT	RS232C-compliant and USB (B-type) connectors for serial communication
MEMORY/RESET	Manual/Auto [Changeable in the range from 0.1 to 5.0 sec.]
OPERATING TEMPERATURE RANGE [℃]	0～40℃ Less than 85% RH no condensation
POWER CONSUMPTION [W]	Less than 5W
POWER AC[V]	100～240V±10% 50/60Hz

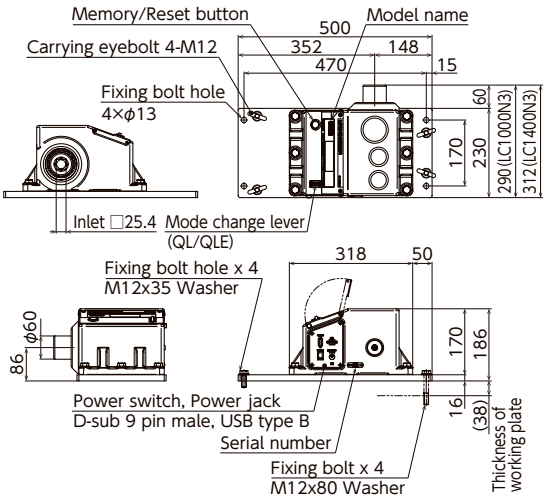
Note: LC1000N3/1400N3-G come with 2 kinds of sockets adapter. Hex. adapter is not included. Parts #272 etc, indicates Tohnichi catalog number for separately purchasing.
Accessories: 1. AC adapter (BA-6) 2. Adapter 3. Supporting board (for LC1000N3-G, LC1400N3-G)

Dimensions

■ LC20N3-G, LC200N3-G



■ LC1000N3-G, LC14000N3-G



Specifications

Accuracy ± 1%+1digit

MODEL		LC20N3-G			LC200N3-G			LC1000N3-G		LC1400N3-G		
TORQUE RANGE [N·m]	PEAK	0.500~0.998	1.00~9.99	10.0~20.0	5.00~9.98	10.0~99.9	100~200	50.0~99.9	100~1000	100~999	1000~1400	—
	1 DIGIT	0.002	0.01	0.1	0.02	0.1	1	0.1	1	1	10	—
	RUN	0.500~20.000			5.00~200.00			50.0~1000.0		100.0~1400.0		—
	1 DIGIT	0.002			0.02			0.1		0.2		—
TORQUE RANGE [kgf·cm/kgf·m]	PEAK	kgf·cm 5.0~9.98	10.0~99.9	100~200	50.0~99.8	100~999	1000~2000	kgf·m 5.0~9.99	10.0~100.0	10.0~99.9	100~140	—
	1 DIGIT	kgf·cm 0.02	0.1	1	0.2	1	10	kgf·m 0.01	0.1	0.1	1	—
	RUN	kgf·cm 5.0~200.0			50.0~2000.0			kgf·m 5.0~100.0		10.0~140.0		—
	1 DIGIT	kgf·cm 0.02			0.2			kgf·m 0.01		0.02		—
TORQUE RANGE [lbf·in/lbf·ft]	PEAK	5.0~9.98	10.0~99.9	100~174	50.0~99.8	100~999	1000~1740	36.8~99.9	100~735	75.0~99.8	100~1000	—
	1 DIGIT	0.02	0.1	1	0.2	1	10	0.1	1	0.2	1	—
	RUN	lbf·in 5.0~174.0			50.0~1740.0			lbf·ft 36.8~735.0		lbf·ft 75.0~1000.0		
	1 DIGIT	lbf·in 0.02			0.2			lbf·ft 0.1		lbf·ft 0.2		
INLET DRIVE □a[mm]		9.53			12.7			25.4				
DIMENSION [mm]	OVERALL LENGTH	278						500				
	OVEALL WIDTH	160						290		312		
	OVERALL HEIGHT	167						186				
WEIGHT [kg]		10.5						34		39		
ACCESSORIES [mm]	SOCKET ADAPTER	□9.5(MALE) - □6.35(FEMALE) No.270			□12.7(MALE) - □9.53(FEMALE) No.272			□19.05(MALE) - □12.7(FEMALE) No.274 □25.4(MALE) - □19.05(FEMALE) No.276				
	HEXAGON HEAD ADAPTER	□9.53 - W6.35 (For torque driver) □9.53 - W8,10,12,13,14,17 No.282			□12.7 - 8,10,12,13,14,17,19,22 No.280			—				

Alternative model

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
DOTE4-G-MD2 ····· p.410
TF ····· p.414
DOT-MD ····· p.412

Optional equipment

EPP16M3 ····· p.464
Battery pack ····· p.507

Calibration kit

TCL ····· p.445

Technical data

Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.] LC20N3-G

Note

·For accuracy checking of LC2 tester, TCL calibration set is recommended.

ST3-G(-BT) SPINTORK ST3-G: CE ST3-G-BT: CE FC

World' s smallest torque checker. High accuracy and easy operation, suitable for nut runner torque checking

ST15N3-6.35-G [L'=107mm]

ST50N3-1/2-G [L'=75mm]

ST1000N3-G-BT [L'=135mm]

Application

- Torque checking for multi-spindle nut runners and angle type pneumatic tools

Features

- Wireless rechargeable rotary torque meter (PATENTED)
- Capable of multi-spindle tightening and torque check simultaneously with combination use of optional extension bar.
- Since ST3-G will be in alignment with tightening equipment and the measurement object, it enables to capture accurate torque.
- Capable of torque and angle monitoring.
- Buetooth® model ST3-G-BT transfers data to an external device.
- Bluetooth® model can output torque data by every 1 degree of angular rotation for plotting torque and angle by PC.
- CE mark applied for international use including the EU region

Optional Accessories

·Interchangeable socket [p.504]

·Quick Battery Changer [p.506]

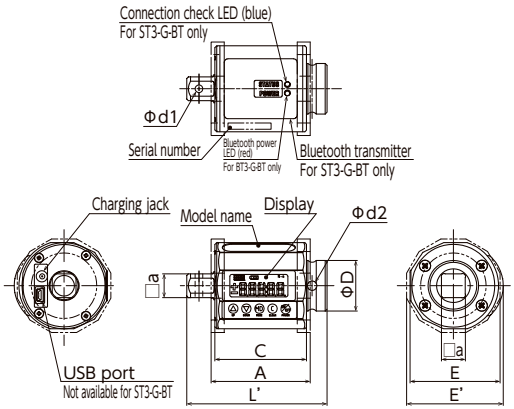
·ST Extension bar [p.511]

Common specifications

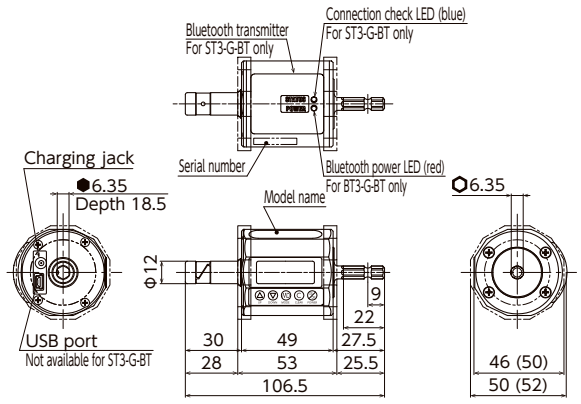
ANGLE MEASUREMENT RANGE	0～±999°
ANGLE 1 DIGIT	1°
ANGLE ACCURACY	±2° +1digit * Rotated by 90° at 30° /sec. to 600° /sec.
DIRECTION	Clockwise and Counter Clockwise
DISPLAY	7-seg. LED 3-digit, 3mm hight: torque unit, battery level gauge, direction, memory counter 4-digit, 7mm hight: Torque, angle
MODE	PEAK/RUN
DATA MEMORY	999 data * 1 data only at waveform output mode of ST3-G-BT
ARTHMETIC FUNCTION	Number o sample, maximum, minimum, mean
POWER	Ni-MH (Nickel hydrogen) battery pack
BATTERY LIFE	Bluetooth on: 8 hours, off: 10 hours
CHARGER	Input AC100V～240V ±10% (PSE, CE compliant)
CHARGING TIME	2 hours
OPERATION TEMPERATURE RANGE	0～40℃ Less than 85% RH no condensation

Dimensions

■ ST10N3-G～1000N3-G(-BT)



■ ST15N3-6.35-G(-BT)



Specifications

Accuracy ± 1%+1digit

MODEL		ST10N3-G	ST15N3-6.35-G	ST20N3-G	ST50N3-3/8-G	ST50N3-1/2-G	ST100N3-G	ST200N3-G	ST500N3-G	ST1000N3-G
	Bluetooth® VERSION	ST10N3-G-BT	ST15N3-6.35-G-BT	ST20N3-G-BT	ST50N3-3/8-G-BT	ST50N3-1/2-G-BT	ST100N3-G-BT	ST200N3-G-BT	ST500N3-G-BT	ST1000N3-G-BT
TORQUE RANGE [N•m]	MIN.～MAX.	(0.50) 2～10	(1.00) 4～15	(1.00) 4～20	(2.50) 10～50		(5.0) 20～100	(10.0) 40～200	(25.0) 100～500	(50) 200～1000
	1 DIGIT	0.01	0.02		0.05		0.1	0.2	0.5	1
TORQUE RANGE [kgf•cm/kgf•m]	MIN.～MAX.	kgf•cm 20～100	40～150	40～200	100～500		200～1000	400～2000	kgf•m 10～50	20～100
	1 DIGIT	kgf•cm 0.1	0.2		0.5		1	2	kgf•m 0.05	0.1
TORQUE RANGE [lbf•in/lbf•ft]	MIN.～MAX.	lbf•in 1.5～7.3	3～11	3～14.5	90～440		lbf•ft 15～73	30～145	75～365	150～735
	1 DIGIT	lbf•in 0.01	0.02		0.05		lbf•ft 0.1	0.2	0.5	1
DIMENSIONS [mm]	L'	75	107	75					120	135
	E	46 (50) *2							68.5	
	C	49							73	
	ΦD	13	–	18		27			38	51
	□a	6.35	–	9.53		12.7			19.05	25.4
	Φd1	2.1	–	3.1		4.1			6	6.5
	Φd2	2.1	–	5					6	6.5
	A	53							78	
	E'	50 (52) *2							71	
WEIGHT [kg]		0.25							1.3	

Note. 1. The values in ( ) indicate minimum sung torque. Accuracy is not guaranteed below the operative torque range. 2. Dimension shows in ( ) is ST3-G-BT.
3. Not available for impact/pulse toots.
Standard accessories: Charger BC-4-2, Built in battery, USB cable, Carrying case.

ST3-G-BT Communication Specifications

Note. Bluetooth® is a registered trade mark of Bluetooth SIG, Inc.

COMMUNICATION METHOD	Bluetooth® Version 3.0
DISTANCE	10 m
BATTERY LIFE	BT off: 10 hours BT on: 8 hours

Alternative model

TCR ····· p.440

Calibration kit

TCL ····· p.445

Technical data

Torque unit ····· p.29
Machine error ····· p.54
Traceability ····· p.81
ISO 9000 related documents ··· p.90
Tool control ····· p.103
Overseas Wireless Standards ··· p.143

How to order.

Specify Model name

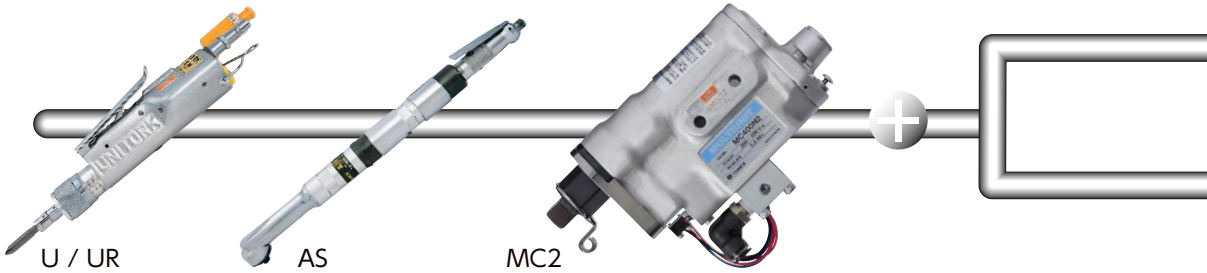
[EX.1] ST100N3-G

[EX.2] ST500N3-G-BT

Torque Tool Control System using a Personal Computer

Conventional system set up

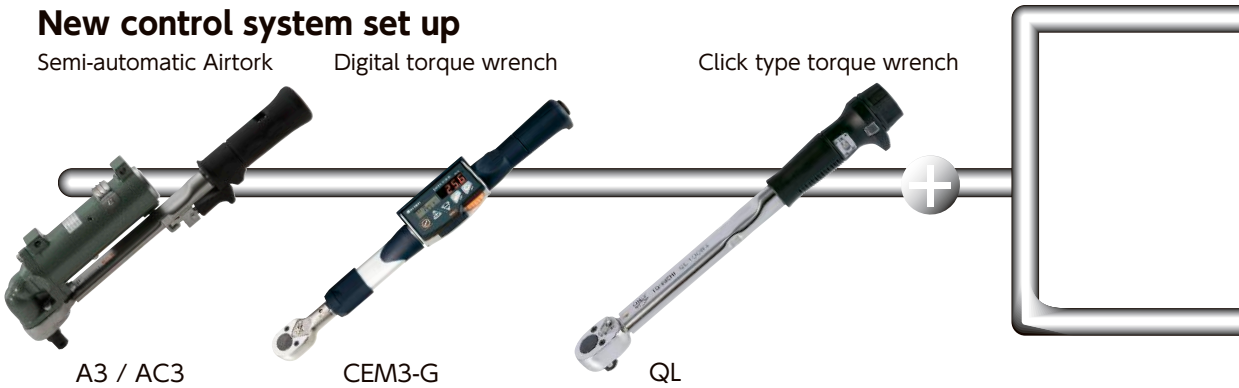
Uni-Screwdriver | Fully automatic Airtork | Multiple Unit



U / UR | AS | MC2

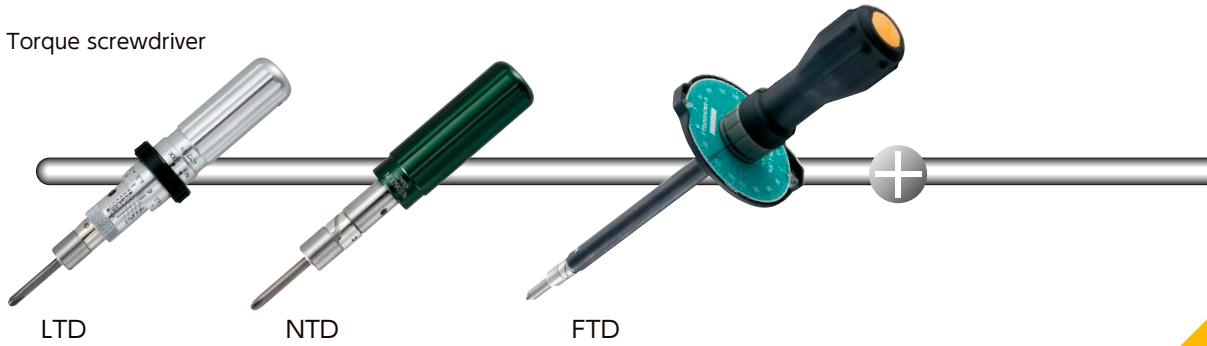
New control system set up

Semi-automatic Airtork | Digital torque wrench | Click type torque wrench

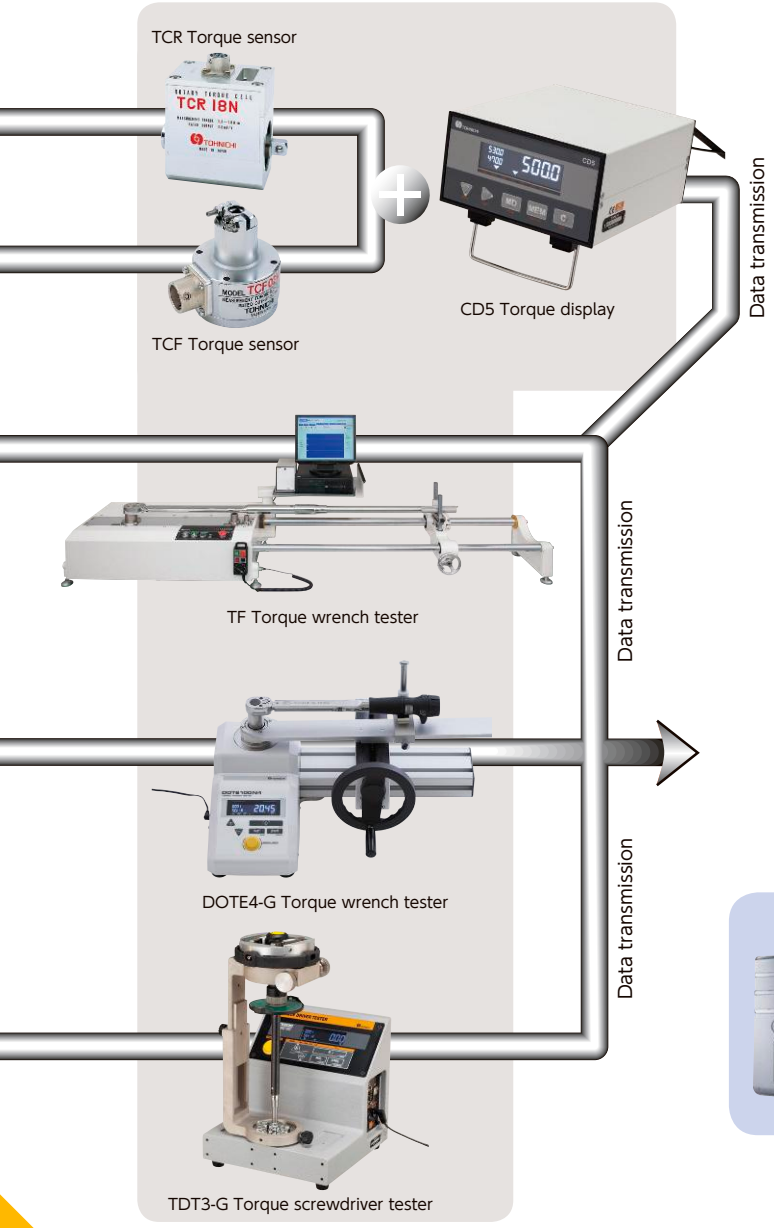


A3 / AC3 | CEM3-G | QL

Torque screwdriver



LTD | NTD | FTD



Torque Tool Control System

Up-to-date torque tool control system using a personal computer

- Torque wrench records from acceptance to disposal
- Memorizing of work site codes
- Periodical check and regular interval control
- Number of repairs and regular interval control
- Measurement data OK/NG judgment control

Calibration certificate issuing system

- Accuracy control and calibration certificate issuing based on serial numbers
- Data control by each serial number

● Measurement data print out
(Ex. Inspection sheets are printed out to feed back the data to the work site.)

● Issuing all kinds of lists
(Ex. Issuing of an inspection omission list, a measurement NG list)

Personal computer

EPP16M3 Printer

TORQUE METER

Your Torque Partner TOHNICHI

Torque Gauge

ATGE-G
P.426
0.1~20[cN·m]
Digital torque gauge for precise torque check.

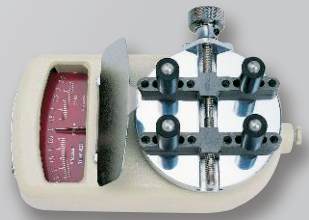
BTGE-G
P.428
2~200[cN·m]
Digital torque gauge for precise torque check.

ATG / BTG (-S)
P.430
0.05~150[cN·m]
For measurement of very small torque used for torque check of variety of small products.

Torque Meter

TME2
P.432
2~2000[cN·m]
Digital torque meter ideal for cap testing, etc.

TM
P.434
1~750[cN·m]
Analog type torque meter ideal for cap testing, etc.



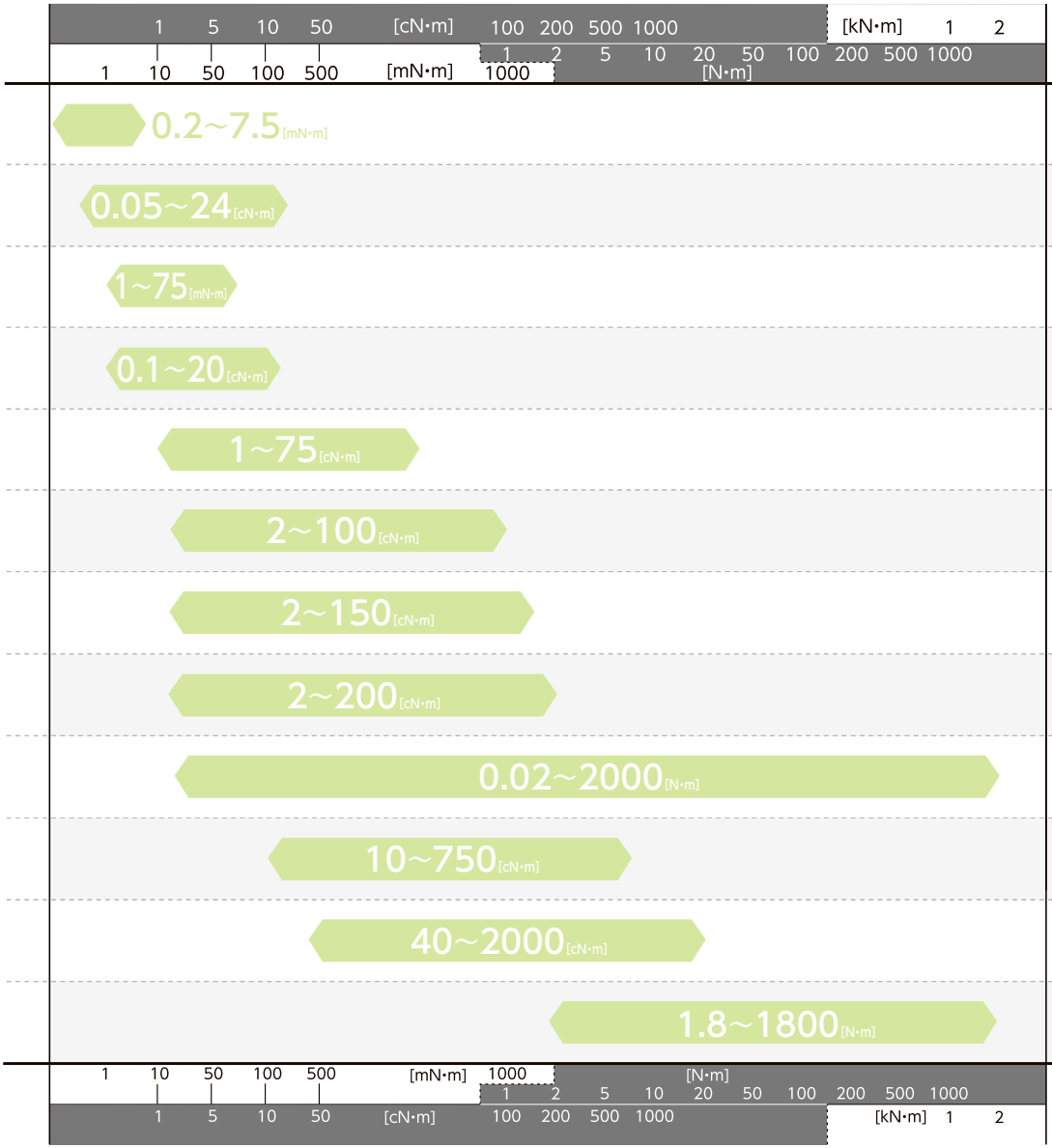
5TM
P.436
0.2~7.5[mN·m]
Designed to inspect very low torque range (below 7.5mN·m).

Torque Sensor

TCF
P.438
0.02~2000[N·m]
Torque sensor for precise checking of various torque device.

TCR
P.440
1.8~1800[N·m]
Rotary torque sensors capable of measuring rotating objects.

TORQUE RANGE INDEX



MODEL・TYPE				PAGE
	5TM	Torque Meter	Low Capacity / Analog	436
	ATG	Torque Gauge	Analog	430
	4TM	Torque Meter	Analog	434
	ATGE-G	Torque Gauge	Digital	426
	3TM	Torque Meter	Analog	434
	3TME2	Torque Meter	Digital	432
	BTG	Torque Gauge	Analog	430
	BTGE-G	Torque Gauge	Digital	428
	TCF	Torque Sensor	Fixed Type / Digital	438
	2TM	Torque Meter	Analog	434
	2TME2	Torque Meter	Digital	432
	TCR	Torque Sensor	Rotary Type / Digital	440

TORQUE RANGE [cN·m]	TORQUE RANGE [mN·m]
0.1～20	1～200

Loading Direction

Digital | 3-jaw Chuck | Direct Reading | Battery | RoHS

ATGE-G Digital Torque Gauge

CE

Torque Range, 0.1～20cN·m / 1～200mN·m
10～2000gf·cm / 0.15～28ozf·in

ATGE-G body

ATGE-G body table top style with display on the side

Application

- Measurement, inspection and tightening of very small torque.

Features

- Tohnichi ATGE-G body series torque gauge for very small torque.
- 3way configuration: Hand-held, Table top, or as a Torque meter with testing fixture.
- Digital indicator prevents reading mistake for inspected data.
- Ideal for torque measurement for rotating torque, click torque of precision machinery, electronic devices, and various assembly components.
- Physical stopper prevents accidental over-loading.
- Max 999 readings can be saved with computing function to display max/min/meantime values.
- Coin-type lithium battery (CR2450) allows 10-hour continuous operation.
- USB cable can be used for data transfer to PC.
- Applicable for international use including the EU region. CE mark applied.

Optional Accessories

·Connecting Cable [p.507]

·Measurement Stand [p.511]

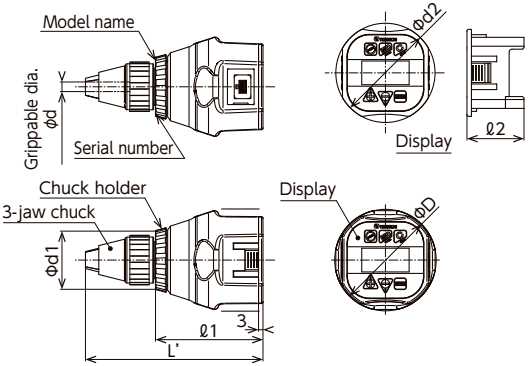
·Testing Fixture [p.511]

·Calibration Adapter [p.511]

·Chuck [p.511]

·AC Adapter [p.507]

Dimensions



For calibration, use ATGTCL calibration kit.
※Part #806 (Adaper for ATGE-G) is required.

Specifications

MODEL			ATGE05CN-G	ATGE1CN-G	ATGE2CN-G	ATGE5CN-G	ATGE10CN-G	ATGE20CN-G
TORQUE RANGE [cN•m] [mN•m]	MIN.~MAX.		cN•m 0.1~0.5	0.2~1	0.4~2	1~5	2~10	4~20
	1 DIGIT		cN•m 0.001		0.002	0.005	0.01	0.02
	MIN.~MAX.		mN•m (1~5)	(2~10)	(4~20)	(10~50)	(20~100)	(40~200)
	1 DIGIT		mN•m (0.01)		(0.02)	(0.05)	(0.1)	(0.2)
TORQUE RANGE [gf•cm]	MIN.~MAX.		10~50	20~100	40~200	100~500	200~1000	400~2000
	1 DIGIT		0.1		0.2	0.5	1	2
TORQUE RANGE [ozf•in]	MIN.~MAX.		0.15~0.7	0.3~1.4	0.6~2.8	1.5~7	3~14	6~28
	1 DIGIT		0.001		0.002	0.005	0.01	0.02
DIMENSION [mm]	OVERALL LENGTH	L'	120					
	DIAMETER	φD	69					
	CHUCK GRIP	φd	1~6.5					
	BODY	ℓ1	73					
	HOLDER DIA.	φd1	40					
	DISPLAY	φd2	67					
	DISPLAY	ℓ2	38.5					
WEIGHT [kg]			0.305					

※ The value shows in ( ) is converted value from cN・m to mN・m.
※ Aluminum cover and steel chuck are standard for ATGE-G models.
※ Note. To chuck a measurement object, the gripping part required length 10 mm or more.

Accuracy ± 2% + 1digit

Common Specifications

Measurement Direction	Bi-directional
Display	7-segment LCD Counter: 3 digit 3mm height character, Torque Value: 4 digit 7mm height character Torque unit, Battery life, Measuring direction
Measurement Mode	PEAK/RUN
Memory	Max. 999 readings
Statistical Processing	Sample q'ty, max value, min value, mean value

Data Output	USB output (USB mini B connector)
Power Source	Coin-type lithium Battery (CR2450)
Continuous Use	10 hours with a coin-type battery
Other Functions	Auto power off (3 min.), Auto memory reset (0.5-5sec.) Auto zero adjustment, residual battery indicator (4 steps), Buzzer ON/OFF
Operative Temperature Range	0~40℃ less than 85% RH, no condensation

Note When use a calibration kit ATGTCL for ATGE-G calibration, optional adapter part # 806 for ATGE-G is required.
Standard Accessories 1. Coin-type lithium battery, 2. Carrying case

Alternative model
ATG/BTG(-S)····· p.430
BTGE-G····· p.428

Calibration kit
ATGTCL····· p.445

Technical data
Torque unit····· p.29
Human error····· p.57
Tool selection····· p.72
ISO 9000 related documents···p.90
Tool control····· p.103

How to order.
Specify Model name
[EX.] ATGE05CN-G

BTGE-G Digital Torque Gauge

CE

Torque range 2～200cN・m / 0.2～20kgf・cm
3～280ozf・in / 0.2～17lbf・in

BTGE-G body

BTGE-G body table top style

Application

- Measurement, inspection and tightening of very small torque.
- Can be used for checking accuracy of torque screw drivers.

Features

- Handheld digital small torque gauge combined with flip-up digital display.
- Flip-up display can be adjusted for optimal reading and accommodates various testing positions.
- Built-in display gives user-friendliness and convenience of use.
- Ideal for torque measurement for precision machinery, electronic devices, and various assembly components.
- Physical stopper prevents accidental over-loading.
- Max 999 readings can be saved with computing function to display max./min./meantime values.
- Coin-type lithium battery (CR2450) allows 10-hour continuous operation.
- USB cable can be used for data transfer to PC.
- Applicable for international use including the EU region. CE mark applied.

Optional Accessories

・Connecting Cable [p.507]

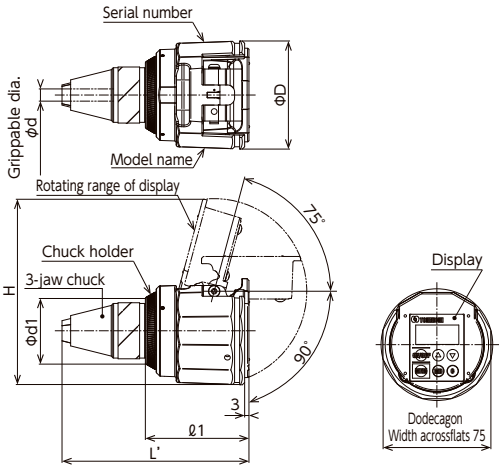
・Measurement Stand [p.511]

・Testing Fixture [p.511]

・Calibration Adapter [p.511]

・AC Adapter [p.507]

Dimensions



For calibration, use BTGTCL calibration kit.
※Part #807 (Adaper for BTGE-G) is required.

Specifications

MODEL			BTGE10CN-G	BTGE20CN-G	BTGE50CN-G	BTGE100CN-G	BTGE200CN-G
Torque Range [cN•m]	MIN.~MAX.		2~10	4~20	10~50	20~100	40~200
	1 DIGIT		0.01	0.02	0.05	0.1	0.2
Torque Range [kgf•cm]	MIN.~MAX.		0.2~1	0.4~2	1~5	2~10	4~20
	1 DIGIT		0.001	0.002	0.005	0.01	0.02
Torque Range [ozf•in]	MIN.~MAX.		3~14	6~28	15~70	30~140	60~280
	1 DIGIT		0.01	0.02	0.05	0.1	0.2
Torque Range [lbf•in]	MIN.~MAX.		0.2~0.88	0.4~1.7	1~4.4	2~8.8	4~17
	1 DIGIT		0.001	0.002	0.005	0.01	0.02
DIMENSION [mm]	OVERALL LENGTH	L'	130				
	HEIGHT	H	130				
	CHUCK GRIP	φd	1~8.5				
	DIAMETER	φD	78				
	BODY	ℓ1	72				
	HOLDER DIA.	φd1	46				
WEIGHT [kg]			0.65				

Note. To chuck a measurement object, the gripping part required length 10 mm or more.

Accuracy±2% + 1digit

Common Specifications

Measurement Direction	Bi-directional
Display	7-segment LCD Counter: 3 digit 3mm height character, Torque Value: 4 digit 7mm height character Torque unit, Battery life, Measuring direction
Measurement Mode	PEAK/RUN
Memory	Max. 999 readings
Statistical Processing	Sample q'ty, max value, min value, mean value
Data Output	USB output (USB mini B connector)
Power Source	Coin-type lithium Battery (CR2450)

Continuous Use	10 hours with a coin-type battery
Other Functions	Auto power off (3 min.), Auto memory reset (0.5-5sec.) Auto zero adjustment, residual battery indicator (4 steps), Buzzer ON/OFF
Operation Temperature	0~40℃ less than 85% RH, no condensation
Display Adjustable Range	0~165°

Note When use a calibration kit BTGTCL for BTGE-G calibration, optional adapter part # 807 for BTGE-G is required.
Standard Accessories 1. Coin-type lithium battery 2. Carrying case

Alternative model

ATG/BTG(-S) ····· p.430
ATGE-G ····· p.426

Calibration kit

BTGTCL ····· p.445

Technical data

Torque unit ····· p.29
Tool selection ····· p.72
Traceability ····· p.81
ISO 9000 related documents ··· p.90
Tool control ····· p.103

How to order.

Specify Model name
[EX.] BTGE200CN

ATG/ BTG(-S) Analog Torque Gauge

Torque gauge series designed to measure low torque.

ATG6CN [L'=89mm]

BTG36CN [L'=119mm]

Application

- For measurement and tightening of low torque.

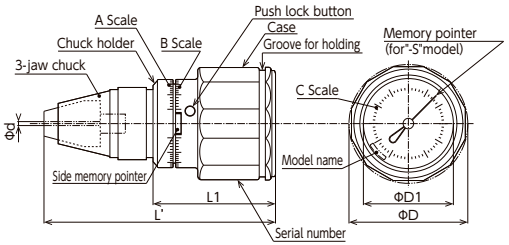
Features

- Bi-directional operation handy type torque gauge.
- Three-jaw clamp designed to hold the measuring object and "push lock button" helps to fix the clamp easily.
- The dial is scaled by 270 degrees with a stopper which prevents over-loading.
- The side scale memory pointer, captureing the peak torque comes with standard and one another memory pointer can be attached on the front dial scale as option (excluding ATG045CN, 45ATG and ATG06Z).
- For calibration, ATGTCL is available for ATG, and BTGTCL for BTG.

Chuck for ATG

Part #
322 (RESIN)
321 (STEEL)

Dimensions



ATG Specifications

S. I. MODEL		ATG045CN	ATG09CN	ATG1.5CN	ATG3CN	ATG6CN	ATG12CN	ATG24CN
	WITH TOP MEMORY POINTER	—	ATG09CN-S	ATG1.5CN-S	ATG3CN-S	ATG6CN-S	ATG12CN-S	ATG24CN-S
TORQUE RANGE [cN·m]	MIN.~MAX.	0.05~0.45	0.1~0.9	0.2~1.5	0.3~3	0.6~6	1~12	3~24
	GRAD.	0.01	0.02		0.05	0.1	0.2	0.5
METRIC MODEL		45ATG	90ATG	150ATG	300ATG	600ATG	1200ATG	2400ATG
	WITH TOP MEMORY POINTER	—	90ATG-S	150ATG-S	300ATG-S	600ATG-S	1200ATG-S	2400ATG-S
TORQUE RANGE [gf·cm]	MIN.~MAX.	5~45	10~90	20~150	30~300	60~600	100~1200	300~2400
	GRAD.	1	2		5	10	20	50
AMERICAN MODEL		ATG06Z	—	—	—	—	—	—
	WITH TOP MEMORY POINTER	—	ATG1.5Z-S	ATG2.4Z-S	ATG4.5Z-S	ATG9Z-S	ATG18Z-S	ATG36Z-S
TORQUE RANGE [ozf·in]	MIN.~MAX.	0.06~0.6	0.2~1.5	0.3~2.4	0.5~4.5	1~9	2~18	4~36
	GRAD.	0.01	0.02	0.05	0.1	0.2	0.5	
MEMORY POINTER	TOP	—	Optional					
	SIDE	—	Standard					
DIMENSION [mm] OVERALL LENGTH	L'	98						
DIAMETER	D	44						
CHUCK GRIP	Φd	1~6.5						
SCALE DIA.	D1	35						
BODY	L1	51						
WEIGHT [kg]		0.18						

BTG Specifications

S. I. MODEL				BTG15CN	BTG24CN	BTG36CN	BTG60CN	BTG90CN	BTG150CN
	WITH TOP MEMORY POINTER			BTG15CN-S	BTG24CN-S	BTG36CN-S	BTG60CN-S	BTG90CN-S	BTG150CN-S
TORQUE RANGE [cN·m]	MIN.~MAX.			2~15	3~24	4~36	6~60	10~90	20~150
	GRAD.			0.2	0.5		1		2
METRIC MODEL		—	—	1.5BTG	2.4BTG	3.6BTG	6BTG	9BTG	15BTG
	WITH TOP MEMORY POINTER	—	—	1.5BTG-S	2.4BTG-S	3.6BTG-S	6BTG-S	9BTG-S	15BTG-S
TORQUE RANGE [gf·cm]	MIN.~MAX.	—	—	0.2~1.5	0.3~2.4	0.4~3.6	0.6~6	1~9	2~15
	GRAD.	—	—	0.02	0.05		0.1		0.2
AMERICAN MODEL		—	—	—	—	—	—	—	—
	WITH TOP MEMORY POINTER	BTG60Z-S	BTG120Z-S	1.5BTG-A-S	2.4BTG-A-S	3.6BTG-A-S	6BTG-A-S	9BTG-A-S	15BTG-A-S
TORQUE RANGE [ozf·in]	MIN.~MAX.	ozf·in 6~60	10~120	lbf·in 0.1~1.5	0.3~2.4	0.4~3.6	0.6~6	1~9	2~15
	GRAD.	ozf·in 1	2	lbf·in 0.02		0.05	0.1		0.2
MEMORY POINTER	TOP	Optional							
	SIDE	Standard							
DIMENSION [mm] OVERALL LENGTH	L'	127							
DIAMETER	D	64							
CHUCK GRIP	Φd	1~8.5							
SCALE DIA.	D1	53							
BODY	L1	67							
WEIGHT [kg]		0.52							

Note 1. ATG045CN, 45ATG and ATG06Z are provided without side or top memory pointer due to very low torque value. Accuracy ±2%
2. Aluminum cover and steel chuck are standard for both ATG and BTG models. Resin cover and chuck are available as option.
3. To chuck a measurement object, the gripping part required length 10 mm or more.
4. Continuously repeating a back and forth CW and CCW movement may cause damage to the internal spring.

Calibration kit

ATGTCL ····· p.445
BTGTCL ····· p.445

Alternative model

ATGE-G ····· p.426
BTGE-G ····· p.428

Technical data

Torque unit ····· p.29
Traceability ····· p.81
ISO 9000 related documents ····· p.90
Tool control ····· p.103

How to order.

Specify Model name

[EX.1] ATG09CN

[EX.2] ATG09CN-S

Note

- Memory pointer on the side scale is equipped as standard (excluding ATG045CN, 45ATG and ATG06Z).
- Model without memory pointer are available. Remove -S on the model. [EX.1]

TME2 Digital Torque Meter

CE

Digital torque meter with data processing function.

2TME500CN2

Application

- For checking torque on bottle caps, starting torque test, strength test, and twisting test, etc.

Features

- Equipped with 4 poles that can change positions according to the object's shape and hold it firmly during testing.
- Data can be saved up to 99 readings in the internal memory.
- Saved data can be transferred to PC or printer though RS232C output (equipped as standard).
- Analog output terminal (approx.±4V) allows connection to recorder, etc.
- Angle-adjustable display with a large fluorescent indicator panel gives greater visibility.
- CE marking applied for international use including the EU region.

Optional Accessories

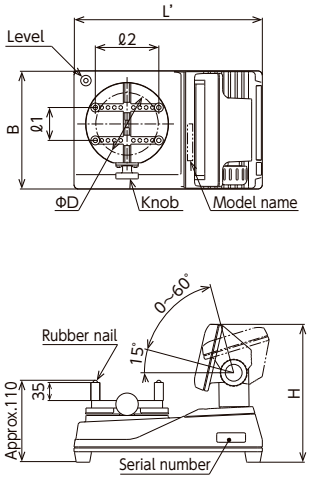
・Connecting Cable [p.507]

・AC Adapter [p.507]

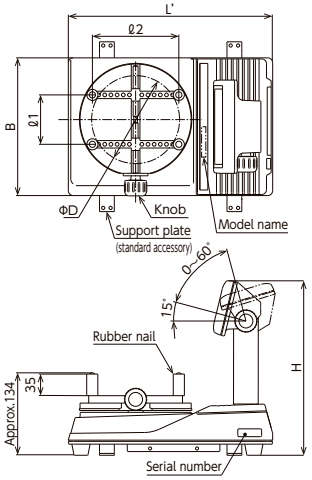
・Battery Pack [p.507]

Dimensions

■ 3TME2



■ 2TME2



Specifications

S.I. MODEL			3TME10CN2	3TME20CN2	3TME50CN2	3TME100CN2	2TME200CN2	2TME500CN2	2TME1000CN2	2TME2000CN2
TORQUE RANGE [cN·m]		MIN.~MAX.	2~10	4~20	10~50	20~100	40~200	100~500	200~1000	400~2000
		1 DIGIT	0.01	0.02	0.05	0.1	0.2	0.5	1	2
METRIC MODEL			3TME10CN2-M	3TME20CN2-M	3TME50CN2-M	3TME100CN2-M	2TME100CN2-M	2TME500CN2-M	2TME1000CN2-M	2TME2000CN2-M
TORQUE RANGE [gf·cm/kgf·cm]		MIN.~MAX.	gf·cm 200~1000	400~2000	1000~5000	kgf·cm 2~10	4~20	10~50	20~100	40~200
		1 DIGIT	gf·cm 1	2	5	kgf·cm 0.01	0.02	0.05	0.1	0.2
AMERICAN MODEL			3TME10CN2-Z	3TME20CN2-Z	3TME50CN2-Z	3TME100CN2-Z	2TME100CN2-I	2TME500CN2-I	2TME1000CN2-I	2TME2000CN2-I
TORQUE RANGE [ozf·in/lbf·in]		MIN.~MAX.	ozf·in 2.8~14	5.6~28	14~70	28~140	lbf·in 3.5~17	8.8~44	17.6~88	35~175
		1 DIGIT	ozf·in 0.01	0.02	0.05	0.1	lbf·in 0.02	0.05	0.1	0.2
DIMENSION [mm]	OVERALL LENGTH	L'	252				331			
	WIDTH	B	158				223			
	HEIGHT	H	185				283			
	CHUCK GRIP	ΦD	14~110				18~190			
	CHUCK	ℓ1	14~90				20~154			
	PART	ℓ2	17~85				20~140			
WEIGHT [kg]			3.5				12			

Accuracy±1% + 1digit

Common Specifications

Data Memory	99 data
Statisitical Processing	Sampling, maximum. Minimum. Means variation range. Standard deviation
Measurement Mode	PEAK / RUN
Zero Adjustment	Auto zero
Reset	Manual / Auto (0.5-5.0 sec. freely changeable by 0.1 sec.)
Data Output	RS232C compliant
Operating Temperature [℃]	0~40℃ less than 85% RH, no condensation
Power AC [V]	100~240 ±10% 50 / 60 Hz auto shift
Power Consumption [W]	Less than 5

Note TME2 is also abailable to check a torque screwdrivers.
Standard Accessories 1. AC Adapter model BA-4, 2. Rubber Nail, 3. Support Plate (for 2TME2 only).

Alternative model
TM ····· p.434

Optional equipment
EPP16M3 ····· p.464
BP-100-4 ····· p.474

Calibration kit
TMTCL ····· p.445

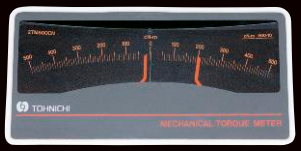
Technical data
Torque unit ····· p.29
Traceability ····· p.81
ISO 9000 related documents ··· p.90

How to order.
Specify Model name
[EX.] 2TME200CN2

TM Analog Torque Meter

Analog torque meter for measuring bottle cap tightening, spring force, etc.

2TM400CN



※Two orange color needles are as memory pointer.

Application

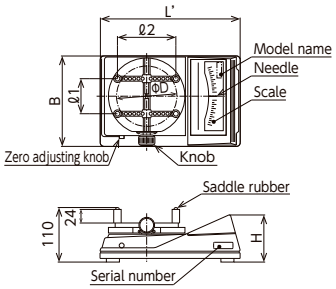
- For checking torque on bottle caps, starting torque test, strength test, and twisting test, etc.

Features

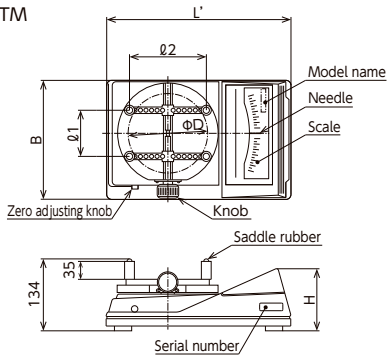
- Bi-directional.
- Equipped with 4 poles that can change positions according to the object's shape and hold it firmly during testing.
- No need to fix the tester on the table with bolts, which gives greater portability.
- Models with "-S" is equipped with a memory pointer, which captures and indicates the peak torque.
- With the optional calibration equipment, the torque tester can be calibrated at the customer side.
- Designed based on TUD (Tohnichi Unified Design) considering individual color vision regardless of individual differences.

Dimensions

■3・4TM



■2TM



4TM・3TM Specifications

S.I. MODEL	STANDARD	4TM10MN	4TM15MN	4TM25MN	4TM50MN	4TM75MN	3TM10CN	3TM15CN	3TM25CN	3TM50CN	3TM75CN
	W/MEMORY POINTER	4TM10MN-S	4TM15MN-S	4TM25MN-S	4TM50MN-S	4TM75MN-S	3TM10CN-S	3TM15CN-S	3TM25CN-S	3TM50CN-S	3TM75CN-S
TORQUE RANGE [mN·m/cN·m]	MIN.~MAX.	1~10[mN·m]	1.5~15	2.5~25	5~50	8~75	1~10[cN·m]	1.5~15	2.5~25	5~50	8~75
	GRAD.	0.2[mN·m]	0.5		1	2	0.2[cN·m]	0.5		1	2
AMERICAN MODEL	W/MEMORY POINTER	4-TM100-A-S	4-TM150-A-S	4-TM250-A-S	4-TM500-A-S	4-TM750-A-S	3-TM1-A-S	3-TM1.5-A-S	3-TM2.5-A-S	3-TM5-A-S	3-TM7.5-A-S
TORQUE RANGE [lbf·in]	MIN.~MAX.	0.01~0.086	0.02~0.13	0.025~0.215	0.05~0.43	0.08~0.65	0.1~0.86	0.15~1.3	0.25~2.15	0.5~4.3	0.8~6.5
	GRAD.	0.002	0.005		0.01	0.02		0.05		0.1	0.2
TORQUE RANGE [gf·cm/kgf·cm]	MIN.~MAX.	gf·cm 10~100	15~150	25~250	50~500	80~750	kgf·cm 0.1~1	0.15~1.5	0.25~2.5	0.5~5	0.8~7.5
	GRAD.	gf·cm 2	5		10	20	kgf·cm 0.02	0.05		0.1	0.2
DIMENSION [mm] OVERALL LENGTH	L'	252									
WIDTH	B	158									
HEIGHT	H	100									
CHUCK GRIP	ΦD	14~110									
CHUCK	ø1	14~90									
PART	ø2	17~85									
WEIGHT [kg]		3									

2TM Specifications

S.I. MODEL	STANDARD	2TM100CN	2TM150CN	2TM200CN	2TM300CN	2TM400CN	2TM500CN	2TM600CN	2TM750CN
	W/MEMORY POINTER	2TM100CN-S	2TM150CN-S	2TM200CN-S	2TM300CN-S	2TM400CN-S	2TM500CN-S	2TM600CN-S	2TM750CN-S
TORQUE RANGE [mN·m/cN·m]	MIN.~MAX.	10~100	20~150	30~200	30~300	40~400	50~500	60~600	80~750
	GRAD.	2		5			10		
AMERICAN MODEL	W/MEMORY POINTER	2-TM10-A-S	2-TM15-A-S	2-TM20-A-S	2-TM30-A-S	2-TM40-A-S	2-TM50-A-S	2-TM60-A-S	2-TM75-A-S
TORQUE RANGE [lbf·in]	MIN.~MAX.	1~8.6	2~13	3~17	3~26	3.5~35	4~43	5~50	7~65
	GRAD.	0.2		0.5			1		
TORQUE RANGE [kgf·cm]	MIN.~MAX.	1~10	2~15	3~20	3~30	4~40	5~50	6~60	8~75
	GRAD.	0.2		0.5			1		
DIMENSION [mm] OVERALL LENGTH	L'	331							
WIDTH	B	223							
HEIGHT	H	133.5							
CHUCK GRIP	ΦD	18~190							
CHUCK	ø1	20~154							
PART	ø2	20~140							
WEIGHT [kg]		10.5							

Note 1. "-S" model is provided with a memory pointer.
2. Continuously repeating a back and forth CW and CCW movement may cause damage to the internal spring.

Accuracy±2%

Alternative model

TME2 ····· p.432
5TM ····· p.436

Calibration kit

TMTCL ····· p.445

Technical data

Torque unit ····· p.29
Traceability ····· p.81
ISO 9000 related documents ··· p.90

How to order.

Specify Model name

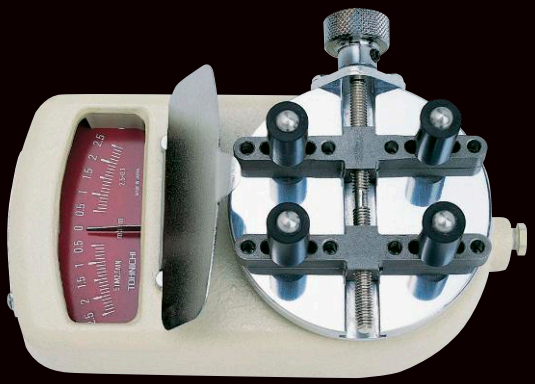
[EX.1] 2TM100CN
[EX.2] 2TM100CN-S

Note
・Add "-S" for the model with a memory pointer [EX.2].

Loading Direction Pole Clamping Direct Reading RoHS

5TM Low Capacity Analog Torque Meter

Torque meter for low torque



5TM2.5MN

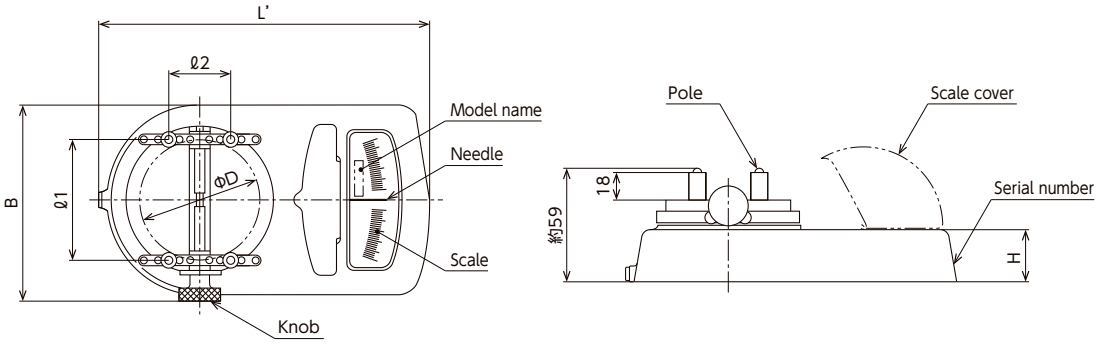
Application

- For measuring rotary resistances of precision instruments and tightening torque.

Features

- Same features as TM designed for measuring low torque. Bi-directional operation.
- Can measure rotary resistances of precision instruments and tightening torque.
- Equipped with 4 poles that can change positions according to the object's shape and hold it firmly during testing.
- No need to fix the tester on the table with bolts, which gives greater portability.

Dimensions



Specifications

S.I. MODEL			5TM1MN	5TM1.5MN	5TM2.5MN	5TM5MN	5TM7.5MN
TORQUE RANGE [mN•m]	MIX.~MAX.		0.2~1	0.2~1.5	0.5~2.5	1~5	1~7.5
	GRAD.		0.05		0.1	0.2	
METRIC MODEL			5-TM10	5-TM15	5-TM25	5-TM50	5-TM75
TORQUE RANGE [gf•cm]	MIX.~MAX.		2~10	2~15	5~25	10~50	10~75
	GRAD.		0.5		1	2	
AMERICAN MODEL			5TM015Z	5TM020Z	5TM035Z	5TM070Z	5TM1Z
TORQUE RANGE [ozf•in]	MIX.~MAX.		0.02~0.15	0.04~0.2	0.05~0.35	0.3~0.7	0.2~1
	GRAD.		0.005	0.01		0.02	0.05
DIMENSION [mm]	OVERALL LENGTH	L'	122				
	WIDTH	B	76.5				
	HEIGHT	H	23.5				
	CHUCK GRIP	ϕD	6~58				
	CHUCK PART	ℓ1	10~46				
		ℓ2	14~50				
WEIGHT [kg]			0.3				

Accuracy±2%

Technical data

Torque unit ····· p.29
Traceability ····· p.81
ISO 9000 related documents ····· p.90

How to order.

Specify Model name

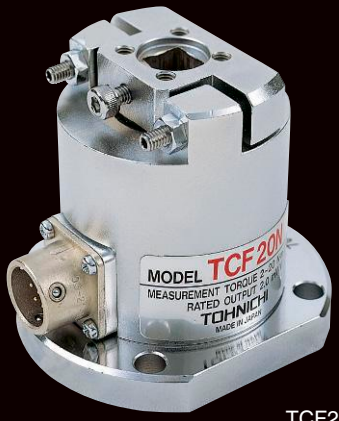
[EX.] 5TM1MN

Note

- 5TM is not equipped with a memory pointer.
- Calibration device for 5TM is not available in the local market. Consult TOHNICHI for calibration services.

TCF Fixed Type Torque Sensor

Static torque sensor to detect precise torque of variety of devices.



TCF20N

※Standard Accessory,
Connecting Cable

TCF02N

Application

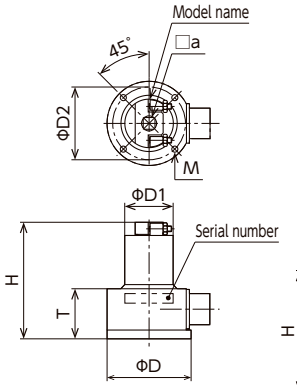
- Inspection for torque tools and nut runners.

Features

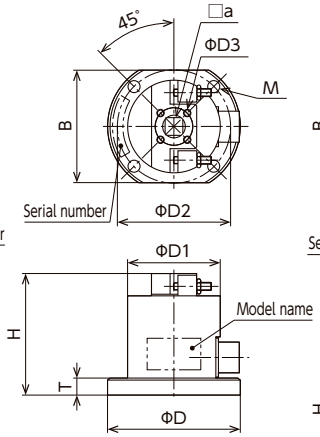
- Bench top mounted stationary torque sensor.
- TCF itself is in fixed position and detects the torque transferred from the torque tools by the reaction force.
- Operation with TP, test piece provides high-accuracy measurement.
- Possible to be installed into special device as preload detector.
- Stopper is equipped to prevent over-torque.
- Applicable for variety of use in combination with optional attachments, DTF, TTF and ATF.

Dimensions

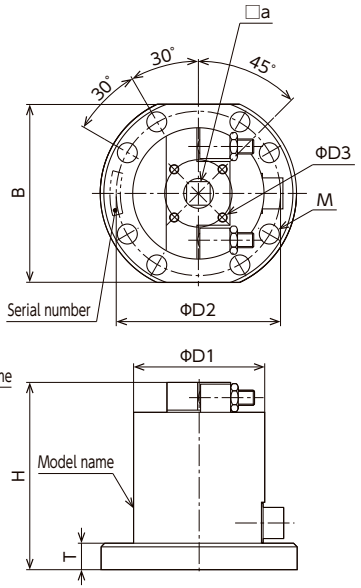
■ TCF02N~4N



■ TCF10N~40N



■ TCF100N~2000N



Specifications

S.I. Model		TCF02N	TCF04N	TCF1N	TCF2N	TCF4N	TCF10N	TCF20N	TCF40N	TCF100N	TCF200N	TCF400N	TCF1000N	TCF2000N
TORQUE RANGE [N•m]	MIN.~MAX.	0.02~0.2	0.04~0.4	0.1~1	0.2~2	0.4~4	1~10	2~20	4~40	10~100	20~200	40~400	100~1000	200~2000
METRIC MODEL		TCF1.8	—	—	TCF18	—	—	TCF180	—	—	TCF1800	—	—	TCF18000
TORQUE RANGE [kgf•cm]	MIN.~MAX.	0.18~1.8	—	—	1.8~18	—	—	18~180	—	—	180~1800	—	—	1800~18000
AMERICAN MODEL		TCF1.8l	TCF3.5l	TCF9l	TCF18l	TCF35l	TCF90l	TCF180l	TCF350l	TCF75F	TCF150F	TCF300F	TCF750F	TCF1500F
TORQUE RANGE [lbf•in/lbf•ft]	MIN.~MAX.	lbf•in 0.18~1.8	0.35~3.5	0.9~9.0	1.8~18	3.5~35	9.0~90	18~180	38~350	lbf•ft 7.5~75	15~150	30~300	75~750	150~1500
OVER TORQUE CAPACITY [%]		150												
RATED OUTPUT [mV/V]		2												
RESISTANCE [Ω]		350												
APPLIED VOLTAGE [V]		5												
DIMENSION [mm]	H	56			62.5			65		100		135	180	
	B	—						60		95		128	160	
	D	45						70		105		140	178	
	ϕD1	22			26			49		70		95	120	
	ϕD2	39						60		88		118	148	
	ϕD3	—						20		36		45	55	
	M	4×ϕ3.2						4×ϕ6.5		8×ϕ10.5		8×ϕ12.5	8×ϕ16.5	
	T	28						9		14		16	20	
INLET SQ.	□a	6.35						9.53		12.7		19.05	25.4	
WEIGHT [kg]		0.45			0.5			0.6		2.5		6	12	

Standard Accessory Connecting cable

Optional equipment

TP/ DTF/ TTF+ATF ··· p.450
CD5 ··· p.460

Calibration kit

TCL ··· p.445

Technical data

Torque unit ··· p.29
Joint coefficient ··· p.56
Tool control ··· p.103

How to order.

Specify Model name

[EX 1] TCF100N

[EX 2] TCF100N with CD5

Note

•Not available for inspection of impact wrench.

TCR Rotary Type Torque Sensor

Rotary torque sensors capable of measuring rotating objects.

TCR18N

※Standard Accessory, Connecting Cable

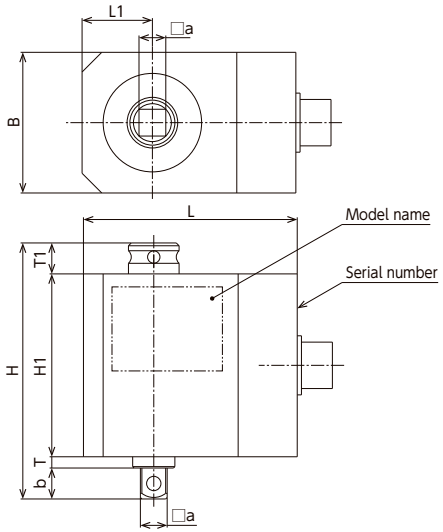
Application

- For measuring torque of rotating objects.

Features

- Rotary torque sensors.
- The outer case of TCR does not rotate because of slip ring mechanism.
- Operation for auditing tightening torque.
- Calibration can be executed by equivalent input or actual loading.

Dimensions



Specifications

S.I. Model		TCR18N	TCR180N	TCR700N	TCR1800N
TORQUE RANGE [N·m] MIN.~MAX.		1.8~18	18~180	70~700	180~1800
METRIC MODEL		TCR180	TCR1800	TCR7000	TCR18000
TORQUE RANGE [kgf·cm] MIN.~MAX.		18~180	180~1800	700~7000	1800~18000
AMERICAN MODEL		TCR180-A	TCR1800-A	TCR7000-A	TCR18000-A
TORQUE RANGE [lbf·in/lbf·ft] MIN.~MAX.		lbf·in 16~160	lbf·ft 13~130	50~500	130~1300
OVER TORQUE CAPACITY [%]		150		125	
RATED OUTPUT [mV/V]		1.8		1.4	1.8
RESISTANCE [Ω]		350			
APPLIED VOLTAGE [V]		5			
ROTATION CAPACITY [r.p.m]		2000		1000	
DIMENSION [mm]	H	90.5	104	118.5	138.5
	H1	69	76	80	85
	B	50	68	75	96
	L	76	83	95	110
	L1	25	34	40	45
	T	2.5		2	
	T1	8	12	16	25
SQ. DRIVE	□a	9.53	12.7	19.05	25.4
	b	11	14	20.5	26.5
WEIGHT [kg]		0.9	1.3	2	3.6

Standard Accessory Connecting cable

Alternative model
ST3-G ····· p.418

Calibration kit
TCL ····· p.445

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Tool control ····· p.103

Optional equipment
CD5 ····· p.460

How to order.
Specify Model name
[EX 1] TCR180N
[EX 2] TCR180N with CD5

Note
- Not available for inspection of impact wrench.
- Refer specification details for inlet and outlet square drive.

Usage Example of Torque Meter

Torque Meter is used for measuring of familiar products in daily life.

●Checking torque on a bottle cap of PET bottle by 2TME model.

●Checking torque on a bottle cap of cosmetic bottle by 3TME model.

●Checking torque of a water tap by 3TME model.

●Checking torque of a valve by 3TME model.

Usage Example of Torque Gauge

Torque gauge is used for small torque measuring and capable of daily inspection for low capacity torque drivers.

●Checking torque of a rotary switch by ATGE-G model with a table attachment and measuring board.

●Checking torque of a torque screwdriver AMRD model by ATGE-G model with a measuring board.

●Checking torque of a rotary switch by BTGE-G model with a measuring board.

●Checking torque of a torque screwdriver BMRD model by BTGE-G model with a measuring board.

Calibration Kit

Weights are not included in calibration kit. Provide weights at your side or place an order to TOHNICHI. For required weight description for each tester/checker, ask TOHNICHI or nearest distributors.

Calibration Kit for TDT3-G RoHS

MODEL	TDTCL60CN	TDTCL600CN
DESCRIPTION	Scale pan(100g), Scale Holder(1kg), Calibration Lever, Wire x 2, Calibration roller, Bolt x 2	
APPLICABLE MODELS	TDT60CN3-G	TDT600CN3-G

Calibration Kit for DOT/DOTE3/DOTE4-G RoHS

MODEL	DOTCL-S1	DOTCL-S2	DOTCL-S3	DOTCL-S4	DOTCL-L1	DOTCL-L2	DOTCL-L3	DOTCL-L4
DESCRIPTION	Calibration Lever, Wire, Stand, Reaction Unit, Scale Holder (0.5kg)	Calibration Lever, Wire, Stand, Reaction Unit, Scale Holder (1kg)		Calibration Lever, Wire, Stand, Reaction Unit, Scale Holder (5kg)				
APPLICABLE MODELS	DOT35N,50N DOTE20N3/4-G DOTE50N3/4-G	DOT100N DOTE100N3/4-G	DOTE200N3/4-G	DOT300N	DOT700N DOTE500N3-G	DOTE1000N3-G	DOTE500N3/4-G	DOTE1000N4-G

Calibration Kit for TCC2-G RoHS

MODEL		TCCTCL-S1	TCCTCL-S2	TCCTCL-L1	TCCTCL-L2
DESCRIPTION	CALIBRATION LEVER	Calibration Lever x 2, Adaper x 1	Calibration Lever x 2, Calibration Parts x 1	Calibration Lever x 2, Joint Rod x 1	Calibration Lever x 2, Joint Rod x 1
	STAND	1 Unit for S1 and S2		1 Unit for L1 and L2	
	WIRE	Wire x 2	Wire x 3	Wire x 4	Wire x 2
	REACTION UNIT	1 Unit for S1 and S2		1 Unit for L1	1 Unit for L2
	SCALE HOLDER /SCALE PAN	Scale Pan (100g x 1) Scale Holder (1kg x 1)		Scale Holder (0.5kg x 1, 1kg x 1, 1.5kg x 1)	Scale Holder (1kg x 1, 1.5kg x 1)
APPLICABLE MODELS		TCC100N2-G	TCC100N2-D-G	TCC500N2-G	TCC1000N2-G

Note: Consult Tohnichi in case you have DOTCL

Calibration Kit for TF RoHS

MODEL		TFTCL200N	TFTCL500N	TFTCL1000N	TFTCL2000N	TFTCL3000N
DESCRIPTION	CALIBRATION LEVER/ADAPTER	Lever X2, Adapter X2		Lever X3, Adapter X2		Lever X3, Adapter X1
	STAND	1 set				
	WIRE	Wire x 4			Wire x 6	
APPLICABLE MODELS		TF200N	TF500N	TF1000N	TF2000N	TF3000N

Note: Supplied upon request

Calibration Kit for TG/TGE RoHS

MODEL	ATGTCL24CN	BTGTCL150CN
DESCRIPTION	Main Unit, Calibration Pulley, Wire x 2, Scale pan (5g x 1, 100g x 1), Hex key	Main Unit, Calibration Pulley, Wire x 3, Scale pan (5g x 1, 100g x 1), Hex key
APPLICABLE MODELS	ATG/ATGE-G	BTG/BTGE-G

NOTE Adapter #806 is required when calibrating ATGE-G models
Adapter #807 is required when calibrating BTGE-G models

Calibration Kit for TM/TME2 RoHS

MODEL	2TMTCL	3TMTCL
DESCRIPTION	Wire x 1, Roller x 1, Calibration frame x 1, Bolt x 2, Scale holder (1kg) x 1, Scale pan(100g x 1)	Wire x 2, Roller x 1, Calibration frame x 1, Bolt x 2, Scale pan (5g x 1, 100g x 1)
APPLICABLE MODELS	2TM/2TME2	3TM/3TME2/4TM

Calibration Kit for TCL RoHS

MODEL	TCL50N	TCL200N	TCL800N	TCL1000N	TCL2000N
DESCRIPTION	Calibration Lever, Wire , Scale Holder (1kg), Scale pan (100g)	Calibration Lever, Wire, Scale Holder (1kg)	Calibration Lever, Wire, Scale Holder (1kg, 10kg)	Calibration Lever, Wire, Scale Holder (5kg)	Calibration Lever, Wire, Scale Holder (10kg)
APPLICABLE MODELS	TCF10N~40N, TCR18N, LC20N3-G, ST10N3~50N3-G	TCF100N~200N, TCR180N, LC200N3-G, ST100N3~200N3-G	TCF400N, TCR700N, ST500N3	TCF1000N, LC1000N3-G, ST1000N3-G	TCF2000N, TCR1800N, LC1400N3-G

NOTE TCL1000N and 2000N is supplied upon request.
#271 is required when calibrating ST10N3-G.
#272 is required when calibrating ST50N3-1/2-G
TCL50N are unable to use ST15N3-6.35-G. Consult to Tohnichi for details.

Weight RoHS

MODEL	WP-TCL5	WP-TCL2	WP-TCL1	WS-TCL2
DESCRIPTION	5kg	2kg	1kg	2kg(set)

NOTE 1. The dead-weight can be sold from 1 piece.
2. Calibration certificate for dead weight is available on request.

Torque Measuring System

Thread tightening testing machine BTT1220

Outline

This testing machine measures the tightening torque during thread tightening, axial tension, and the torque on the thread part to analyze the features of tightening from various aspects.

Specifications

1. Applicable bolt and nut sizes

The applicable hexagonal bolt and hexagonal nut sizes for this machine are shown in Table 1.

Screw size	M8	M10	M12
Width across flat on hexagonal part [mm]	13	17	19
Min. tightening length [mm]	23	28	33
Max. bolt length below head [mm]	86	90	94
Max. bolt overall length [mm]	120		

The tightening length is set by the thickness of the spacer provided.
Ex.: In case of M10
Because the minimum tightening length is 23mm, by inserting a 10mm spacer the total tightening length would becomes 33mm.

2. Contents of measurement

Table 2. Shows the measurement contents.
A torque strain gauge type converter measures the total torque value, threaded portion torque and axial tension of Table 2, while the rotation angle is measured with an encoder. The converters for measuring the axial tension and the thread portion torque are based on a common structure of the strain generating part.

Table 2 Measurement contents of BTT1220

Item	Measurement range[2)]	Permissible overload overload of converter
Torque	①All torque Max. 200N·m (CW, CCW) ②Threaded portion torque Max. 150N·m (CW, CCW)	120% FS
Axial tension	Max,150kN	
Rotation angle	Max,1080° (CW, CCW, 3 rotations of output shaft)	—

3. Calibration

Calibration is not possible while the converters are installed in the thread tightening tester.Take out the total torque converter and axial tension/screw torque converter from the machine and calibrate using each converter separately.
As the rotation angle and rotation speed for the tightening drive are obtained by counting the pulses from the encoder, calibration of the rotation angle and rotation speed is not possible.

4. Tightening drive unit

Table 3 shows the setting conditions of the drive part of the tester.

Table 3 Condition of driving part

	Rotation speed setting [rpm]
Tightness loosening speed during the test	2～20
Manual inching speed	

Final drive preload automatic adjustment machine

Outline

This adjustment machine fixes the companion flange of the medium sized pinion final assembly in the work fixture, tightens the lock nut at the same time, and detects the preload torque. When the set preload torque value or tightening torque value is reached, the machine automatically stops the lock nut tightening, rotates the work, verifies the change of preload torque, and respectively judges whether the preload torque value and tightening torque value is OK or NG. During verification, if the preload torque value is judged as LO-NG, the machine automatically tightens the lock nut one more time and carries out the above operation.

Composition

1) Electric Nutrunner
2) Power supply
3) Power part with torque sensor
4) Sensor for preload measurement
5) Torque display unit
6) Control panel
7) Operation panel
8) Area sensor part
9) Work set fixture
10) Stand part

OPTIONAL EQUIPMENT

SERIES INDEX

Torque Verification Equipment

CNA-4mk3
P.452
Count checker to prevent missed tightening.

SB-FH256
P.454
Wireless setting device for FH256MC wireless torque wrench.

I / O-FH256
P.456
Connected to R-FH256 receiver, max 4 contacts can be utilized for output.

R-BT
P.458
Receive tightening complication signal or torque data via Bluetooth® signal.

Data Processing Equipment

TPC
P.462
Convert Tohnichi interface devices to other protocols.

EPP16M3
P.464
Printer specially designed for digital torque meters and instruments.

R-DT999
P.466
Receives data from digital torque wrenches by infrared and transfer to PC for data management.

TDMS / TDMSHT
P.468
Package Software, helps torque management and early error detection.

Attachment for TCF

TP / DTF / TTF+ATF
P.450
0.25~1800[N·m] ※TP
Attachments for TCF to support precise tightening/checking.

Torque Attachment

DECA
P.470
90~18000[N·m]
Multiplies input torque by 10 times.

RAmk2/RA
P.472
Torque wrench is easily positioned on tester with smooth 3.75° gear action.

Compact Display

CD5
P.460
Digital torque indicator to display measured values.

Battery pack

BP-100-4
P.474
Battery pack for Tohnichi Digital Torque Equipment.

Conical Spring(TP) 3-jaw Chuck(DTF) Pole clamp RoHS

TP/DTF/ TTF+ATF Test Piece/Drill Chuck/Table Chuck and Attachment

Attachments to help achieve precise torque measurement.

TP18N+TCF20N

DTF5-2+TCF20N

TTF11+ATF18+TCF20N

Application

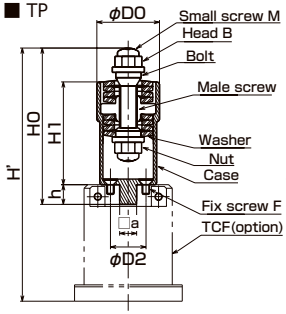
- Attachments for TCF torque sensor.

Features

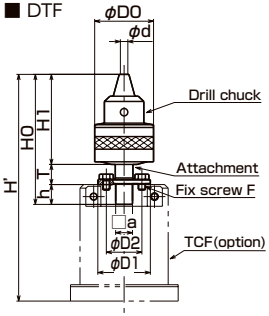
- Model TP can set joint coefficient by changing the combination of disc springs, so it can be used with the actual bolt of the pneumatic tool.
- Three-jaw clamp of DTF is designed to adapt to varied shape of measuring objects.
- TTF uses the same table as TM torque meter with adjustable 4 poles to clamp and hold object of any shape.

Dimensions

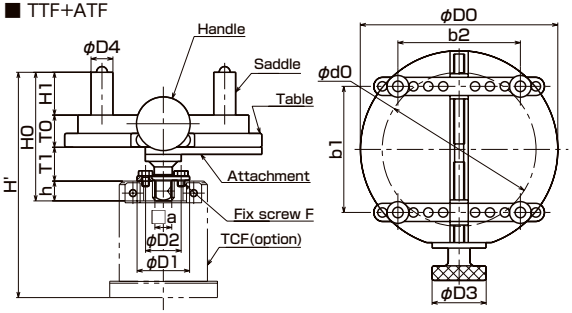
■ TP



■ DTF



■ TTF+ATF



TP Specifications

MODEL			TP2.5N		TP18N	TP180N	TP1800N
S.I. RANGE [N·m]	MIN.~MAX.		0.25~2.5		1.8~18	18~180	180~1800
METRIC RANGE [kgf·cm]	MIN.~MAX.		2.5~25		18~180	180~1800	1800~18000
APPLICABLE TCF MODELS			TCF02N, 04N	TCF1N~4N	TCF10N, 20N	TCF40N~200N	TCF400N~2000N
INLET IN	HEAD B OPPOSITE SIZE		8		13	24	50
	SMALL SCREW M		M4		M6	—	
IDLE RUNNING		[rev]	6		4		
DIMENSION [mm]	SQ. DRIVE	□a	6.35		9.53	12.7	25.4
		h	7.5		11	14	26.5
		H0	58		87	148	297.5
		H1	36		57	108	220
		H'	106.5	113	141	234 (221※1)	451 (454※2)
		ΦD0	18		35	65	140
		ΦD2	—		20	36	55
WEIGHT		[kg]	0.08		0.27	1.9	16.8

Note 1. Adapter 4H-3 (catalog No.273) is required when use TP180N with TCF40N.
2. Adapter 8P-6 (catalog No.295) is required when use TP1800N with TCF400N.

DTF Specifications

MODEL			DTF5-3		DTF5-2
CONNECTABLE TCF MODELS			TCF02N, 04N	TCF1N~4N	TCF10N~40N
CHUCK GRIP [mm]		Φd	Max5		
DIMENSION [mm]	SQ. DRIVE	□a	6.35		9.53
		h	7.5		11
		H0	66.5		70
		H1	48		
		H'	115	121.5	124
		ΦD0	32		
		ΦD1	15		30
		ΦD2	—		20
		T	11		

TTF Specifications

MODEL	TABLE		TTF7		TTF11			TTF19	
	ATTACHMENT		ATF18-2		ATF18-2		ATF18	ATF18-2	ATF18
CONNECTABLE TCF MODELS			TCF02N, 04N	TCF1N~4N	TCF02N, 04N	TCF1N~4N	TCF10N~40N	TCF1N~4N	TCF10N~40N
CHUCK GRIP [mm]		Φd0	10~70		14~110			18~190	
		b1	12~53		14~90			20~154	
		b2	16~60		17~85			20~140	
TABLE [mm]		Φd1	10		12			18	
		ΦD0	70		110			180	
		T0	15		18			24	
DIMENSION [mm]	SQ. DRIVE	□a	6.35				9.53	6.35	9.53
		h	7.5				11	7.5	11
		H0	51.5		58.5		72	75.5	89
		H1	20		24			35	
		H'	100	106.5	107	113.5	126	130.5	143
		ΦD1	15				29	15	29
		ΦD2	—				20	—	20
		ΦD3	20		30			40	
		T1	9				19	9	19

Note TTF table is set on ATF attachment, and ATF is set on TCF.

Optional equipment
TCF ····· p.438
CD5 ····· p.460

Technical data
Torque unit ····· p.29
Joint coefficient ····· p.56
Tool control ····· p.103

How to order.
Specify Model name
[EX.1] TP2.5N
[EX.2] TTF11 + ATF18

CNA-4mk3 Count Checker

CE

Count verification unit (Pokayoke) to prevent human error of tightening.

EX) Combined with QLLS100N4

Application

- For tightening count verification, and production management.

Features

- Can be connected to LS (Limit Switch) torque wrenches for count management.
- Max. 4 LS torque wrenches can be connected, and each can be set with different number of bolts to tighten.
- Bolt counting can be set 0-99pcs for each torque wrench, and count down upon receiving a signal.
- OK/NG judgement signal can be transferred to external device through relay output.
- Connected with LS type torque wrenches (sold separately), CNA4-mk3 establishes error-proofing system.
- Capable to increase the buzzer sound by installing an optional big volume buzzer "CNA-BZ".

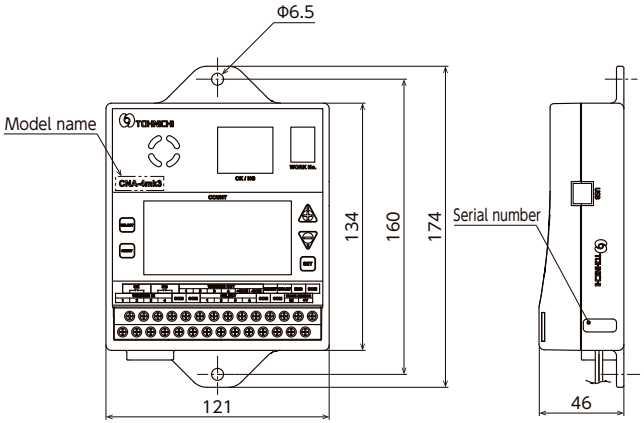
Optional Accessories

·Connector for LS
[p.508]

■ Big volume buzzer

Model	CNA-BZ

Dimensions



Specifications

COUNT DISPLAY	16×32 dot-matrix LEDs
OK/NG JUDGEMENT DISPLAY	30×25 square display lamp (commonly used for OK/NG) OK:Blue lamp turned on NG:Red lamp blinking+Buzzer sounds(4 patterns)
WORK NO. SELECTION DISPLAY	1-digit 7-segment LED
COUNT INPUT	No voltage contact input x 4 via wire or wireless* (* In case R-FH256 and I/O-FH256 used)
MAX. TIGHTENING NUMBER OF BOLTS	99 counts
MAX. NUMBER OF WORKS	8 sets
OK/NG JUDGEMENT SETTING	Preset judgement END input judgement Automatic judgement (0 to 300 seconds in steps of 1 second)
OUTPUT FUNCTION	OK/NG output (Relay contact output rating: 30 V DC, 1 A, 125 V AC, 0.3A)
INPUT FUNCTION	SELECT input×4 START input END input RESET input WORK SENSOR input
TIMER FUNCTION SETTING	Double count prevention timer (0 to 10 seconds in steps of 0.1 second) Automatic reset timer (0 to 60 seconds in steps of 1 second) Interval warning timer (0 to 99 seconds in steps of 1 second)
SETTING METHOD	Special-purpose application software (USB communication), key operation
WORKING TEMPERATURE RANGE	0～40℃ Less than 85% RH non condensation
ELECTRICITY CONSUMPTION [W]	Less than 10W
POWER SUPPLY AC [V]	100～240V±10% 50/60Hz
WEIGHT [kg]	0.4

Optional equipment

RTDLS ····· p.192
RTDFH ····· p.194
QLLS/PQLLS ····· p.276
QSPLS/SP2LS ····· p.282
FH256MC ····· p.286
BLA/BLE ····· p.284

Technical data

Human error ····· p.57

How to order.

Specify Model name

[EX.] CNA-4mk3

Note

• R-FH256 receiver board cannot be built into CNA-4mk3.

RS232C Data Input | RS232C Data Output | Wireless | RoHS

SB-FH256 Wireless Setting Device for FH Transmitter and Receiver.

Make/change setting on group channel, ID, etc for FH wireless torque wrenches.

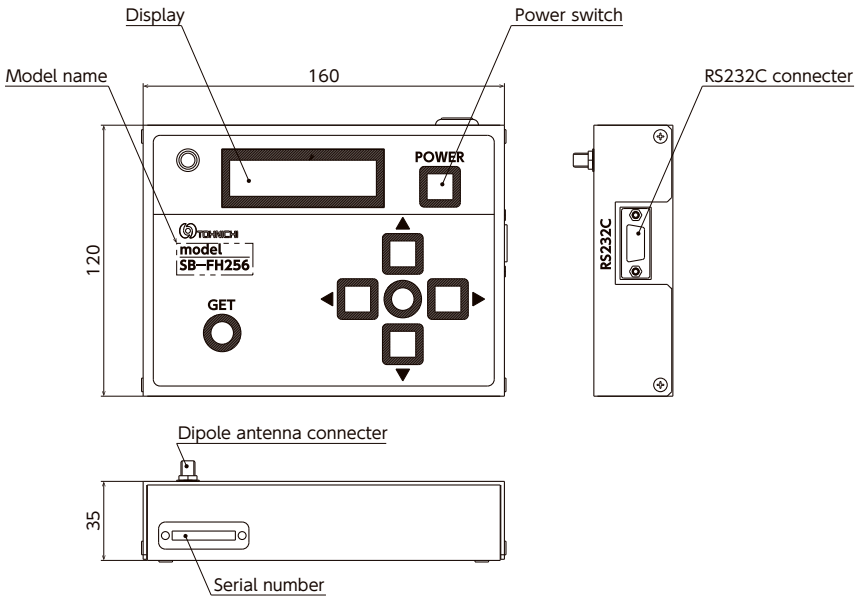
Application

- Make/change setting on group channel, ID setting etc for FH, FD/FDD series.

Features

- Easily make/change various communication settings wirelessly including group channel, judgment code, and ID, etc. for transmitter T-FH256MC, T-FHSLS256, RTDFH and receiver R-FH256 etc.
- Available for FD/FDD series, "T-FD" transmitter and "R-FHD256" receiver of group channel, and ID setting (Ver.V01A or V10 or later).
- Capable of using to Upper/Lower tightening torque setting of FD/FDD with connecting PC and the dedicated parameter setting software.

Dimensions



Specifications

FREQUENCY BAND	2.4GHz
COMMUNICATION SYSTEM	Spread Spectrum (Frequency hopping system)
MODULATION SYSTEM	GFSK
GROUP CHANNEL	256 (000～255)
ID	3-digit (000～999), 7-digit (alphanumeric)
INPUT	RS232C
POWER	DC9V (alkaline battery, approx. 10hr usable)
ANTENNA	Dipole antenna
OPERATING TEMPERATURE RANGE	0～45℃ Less than 85% RH non condensation
TRANSMITTING/RECEIVING DISTANCE	10～20m (The transmitting/receiving distance may be shortened depending on the surrounding radio environment)
WEIGHT [kg]	0.9kg

Note Typical causes of communication error include surrounding noise and blocking object as well as signal clash with reflection by metal or concrete material.
Standard Accessories Dipole antenna

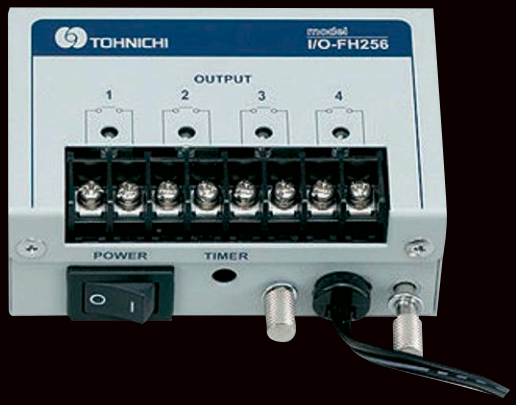
Optional equipment
FH256MC ····· p.286
FD/FDD ····· p.320

Technical data
Overseas wireless standards ····· p.143

How to order.
Specify Model name
[EX.] SB-FH256

I/O-FH256 Multi I/O Box for FH

Manage 4 tightening signals from receiver and output to external device.



I/O-FH256

When connected to R-FH256

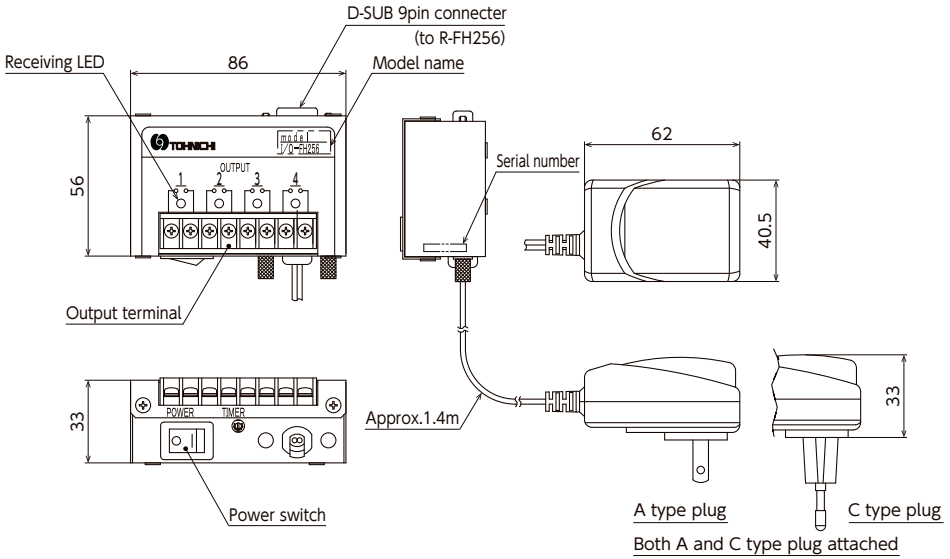
Application

- Maximum 4 contacts selectable from R-FH256.

Features

- Transmitter (T-FH256MC, T-FHSLS256, T-FHP and RTDFH etc.) sends signals with different IDs, which are received by receiver (R-FH256), reordered and output to external device by I/O-FH256. up to 4 different IDs can be managed.
- Can be connected to CNA-4mk3, count checker or PLC to create simple error-proofing system.

Dimensions



Specifications

DATA INPUT	RS232C
DISPLAY	LED×4
APPLICABLE MODEL	R−FH256
DATA OUTPUT	No voltage contact output (1a x 4)
ID	4 set (001～004)
POWER AC [V]	AC100V～240V 50/60Hz
OPERATING TEMPERATURE RANGE	0～45℃ Less than 85% RH non condensation
ELECTRICITY CONSUMPTION [W]	Less than 5W
WEIGHT [kg]	0.3

Optional equipment

FH256MC ····· p.286
CNA-4mk3 ····· p.452
SB-FH256 ····· p.454

Technical data

Human error ····· p.57
Overseas wireless standards
····· p.143

How to order.
Specify Model name
[EX.] I/O-FH256

Bluetooth® RS232C Output Wireless RoHS

R-BT Bluetooth® Receiver

Receive tightening complication signal or torque data via Bluetooth® signal.

Application

- Receive tightening completion signal from HA/HAC series and torque data from Tohnichi Bluetooth® devices.

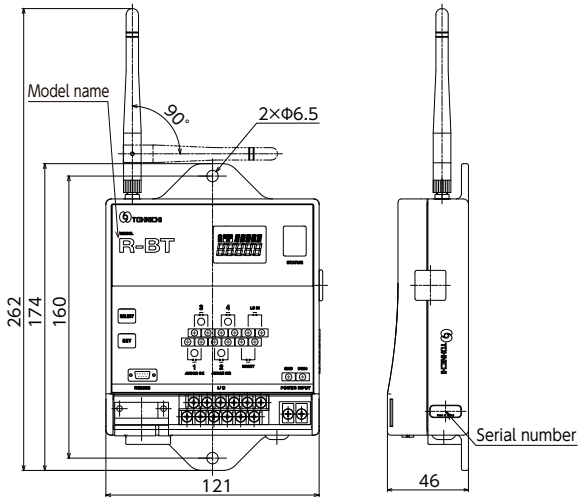
Features

- Capable of establishing Pokayoke system easily with receiving completion signals from semi-automatic battery type torque wrench HA/HAC series and a CNA-4mk3 count checker.
- Up to 4 units of HA/HAC can be managed by one unit.
- Tightening data management system with a data transfer semi-automatic battery type torque wrench "HACQSPDY" model can be established.
- Quick pairing with Tohnichi Bluetooth® devices by key operation or PC software.

Optional Accessories

・AC adapter [p.507]

Dimensions



Specifications

FREQUENCY BAND	2.4 GHz band (Bluetooth® Ver.2.0+EDR)
PARING	By Key operation/PC, ID model: up to 4 units, Data mode: one by one
COMMUNICATION DISTANCE	10m
ID	ID mode: 4-digit (0000 to 9999), Data mode: n/a
INPUT/OUTPUT	No voltage contact output x 4, RS232C output, Reset input x 1, LS input x 1
POWER SUPPLY DC[V]	DC24V(18V～36V)
ELECTRICITY CONSUMPTION [W]	Less than 5W
CASE MATERIAL	Resin
ANTENNA	Die pole antenna * Standard option
DISPLAY	LCD (ID, Torque), Status lamp, Receive LED x 4* * Shared with OK/NG judgment lamp
OPERATING TEMPERATURE RANGE	0～40℃ Less than 85% RH non condensation

Note 1. Communication distance varies depending on radio environment,
Note 2. AC adapter BA-8 is sold separately for AC100V to 240V use.
Note 3. At ID mode, the receiver and the transmitter should be set on the same ID setting.
ID mode can be connect up to 4 transmitter to a receiver but not available for simultaneous transmission.
Data mode is available one to one connection only.

Optional equipment
HA/HAC ····· p.376

Technical data
Overseas wireless standards ····· p.143

How to order.
Specify Model name
[EX.] R-BT

CD5 Compact Display

CE

CD5 compact display is a digital display to show values measured by the strain gauge sensor. Based on judgement results, display changes its color in white/red/blue.

CD5

OK (blue)

NG (red)

Application

- Display for strain gauge sensor.

Features

- Low cost, compact digital display for strain gauge sensor.
- Applicable with Tohnichi TCF, TCR series, and torque wrench with sensor.
- Calibration methods: equivalent input calibration or by the actual weight.
- Measured data can be saved up to 1000.
- AC100V-240V±10% power voltage covers use in almost any place of the world.
- CD5 is equipped with RS232C connector, which allows the data transfer to external devices such as PC, sequencer, and the dedicated printer.

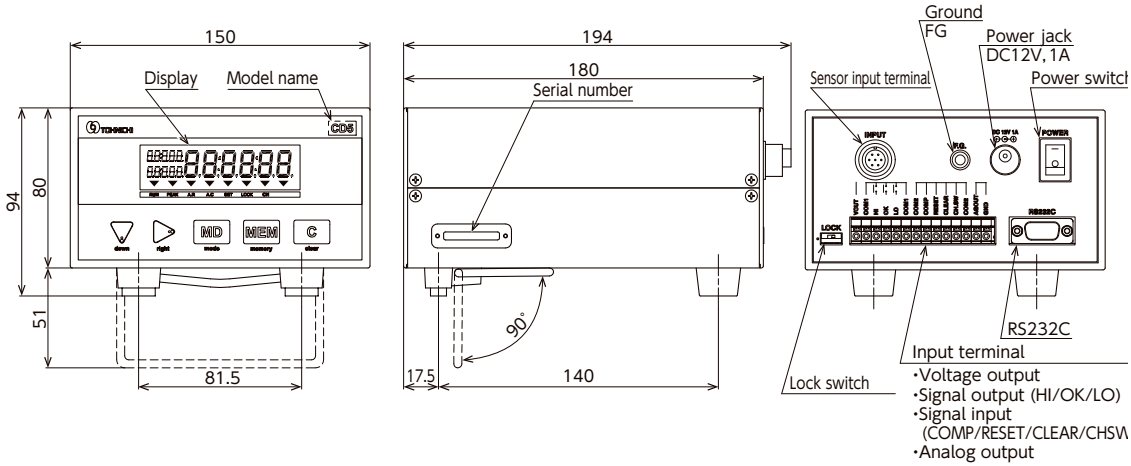
Accessories

·Connecting Cable [p.507]

·AC adapter [p.507]

Dimensions

■ CD5



Specifications

VOLTAGE	DC 5V
SIGNAL INPUT RANGE	-3.0mV/V ～ 3.0mV/V
ANALOG FILTER	150Hz
AD CONVERTER	16bit successive converting style
SAMPLING SPEED	4000 times/sec.
DISPLAY	Negative type liquid crystal white/red/blue Torque part: 13mm 6digits Counter part: 5.2mm 4digits
CALIBRATION METHODS	Equivalent input calibration Calibration by actual weight Calibration using sensor-equipped torque wrench
DATA MEMORY	1000 readings

BASIC FANCTIONALITY	Judgement Auto zero Auto reset Auto judgement
EXTERNAL INPUT	RESET/COMP/CLEAR/CHSW
EXTERNAL OUTPUT	HI/OK/LO Analog output: Max±10V RS232C compliant
POWER AC [V]	AC100-240V±10% 50/60Hz
OPERATING TEMPERATURE RANGE	0~40℃ Less than 85% RH non condensation
ELECTRICITY CONSUMPTION [W]	10W
WEIGHT [kg]	Approx. 1.5

Note: Consult to Tohnichi for sensor type torque wrench connection.

Optional equipment

TCF ····· p.438
TCR ····· p.440
EPP16M3 ····· p.464
CSPLD ····· p.322

Technical data

Machine error ····· p.54
Human error ····· p.57

How to order.

Specify Model name

[EX.] CD5

TPC Protocol Converter

Convert Tohnichi interface device format to other protocols.

TPC

Application

- Convert Tohnichi output data to major nutrunner's protocols.

Features

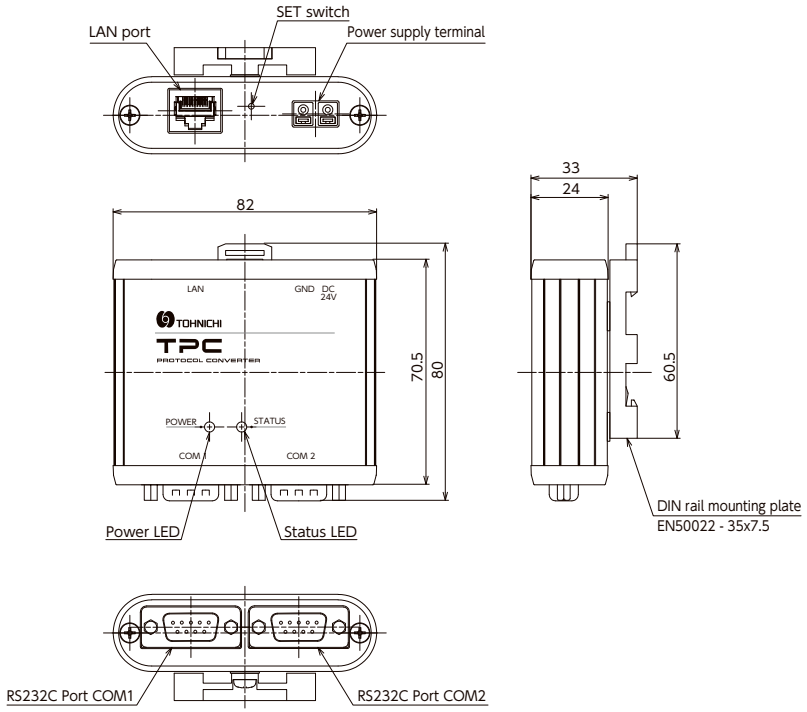
- Convert Tohnichi output format to the nutrunner's protocols for connecting Tohnichi product to existing production line system without any modifications.
- 3 different protocols and 1 custom made protocol space.
- RS232C and Ethernet conversion function.
- Add timestamps to the Tohnichi tightening data format with the built-in clock.
- Capable of Integration the tightening history and VIN by an optional barcode reader.

Optional Accessories

・AC Adapter
[p.507]

Dimensions

■ TPC



Specifications

MODEL	TPC
INPUT/OUTPUT	LAN x 1, RS232C x 2
POWER SOURCE	DC24V 18V-30V, AC100-240V with optional AC adapter
BODY MATERIALS	Body: Aluminum, Panel: Resin
DISPLAY	Power status LED x 1, Communication status LED x 1
OPERATING TEMPARETURE	0 to 40 ℃
AVAILABLE PROTOCOLS	ATLAS COPCO® ACOP Serial/Socket connection, STANLEY®, Custom made

Note 1. ATLAS COPCO® is registered trademark of Atlas Copco Aktiebolag.
Note 2. STANLEY® is registered trademark of Stanley Logistics, LLC.
Note 3. To use custom made protocol function, required prior consult.

Optional equipment

R-FH256 ····· p.286
R-FHD256 ····· p.320
R-BLA/R-BLE ····· p.284
R-BT ····· p.458
CD5 ····· p.460

How to order.
Specify Model name
[EX.] TPC

RS232C Data Input RoHS

EPP16M3 Printer

CE

Printer for TOHNICHI digital torque meters and instruments.

EPP16M3

Application

- Printer for TOHNICHI digital torque meters and instruments.

Features

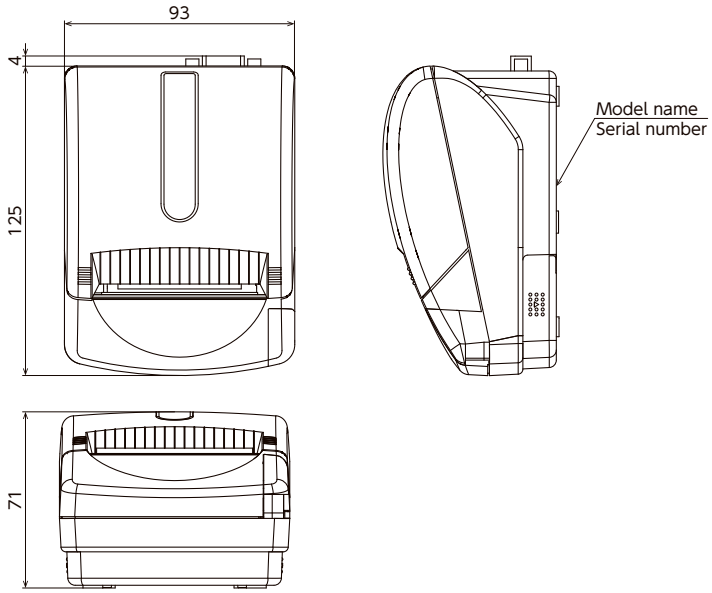
- Printer specially designed for TOHNICHI digital instruments.
- Light weight and simple operation.
- Measured data will be printed out clearly in Thermal Line Dot printing.
- Easy refill the roll paper by the paper-drop-in structure.
- No need to prepare inked ribbon.

Optional Accessories

·Connecting Cable [p.507]

Dimensions

■ EPP16M3



Specifications

PRINTED METHOD	Thermal Line Dot
TOTAL DOT	384 dots
DOTS PER INCH	203dpi (8dot/mm)
PRINTING CAPACITY	32
NUMBER OF DOTS FOR CHARACTER	12 × 24
CHARACTER SIZE [mm]	1.5 × 3.0
PAPER WIDTH/PRINT SPAN [mm]	58 / 48
THERMAL PAPER OUTER DIAMETER [mm]	ϕ50
MAX. PRINTING SPEED [mm/sec]	80
POWER AC [V]	100-240V±10% 50/60Hz
OPERATING TEMPERATURE RANGE	0~40℃ Less than 85% RH non condensation
WEIGHT [kg]	0.27

Consumable parts

PART #	DESCRIPTION
1408	Roll paper

Applicable Models

TORQUE WRENCH	CEM3-G, CTA2-G, CTB2-G
TESTER/CHECKER	DOTE4-G, LC3-G, TDT3-G
TORQUE METER	TME2
RELATED PRODUCTS	CD5, R-DT999

Optional equipment

CTA2-G ····· p.304
CEM3-G ····· p.324
CTB2-G ····· p.330
TDT3-G ····· p.402
DOTE4-G ····· p.406
LC3-G ····· p.416
TME2 ····· p.432
CD5 ····· p.460
R-DT999 ····· p.466

How to order.

Specify Model name

[EX.] EPP16M3

Note

• Cannot be used with TCC2-G and TF tester.

Infrared Input | RS232C Data Output

R-DT999 Data Tank

Data tank to receive infrared data and output to PC or printer.

R-DT999

Application

- Interface for data transfer by infrared.

Features

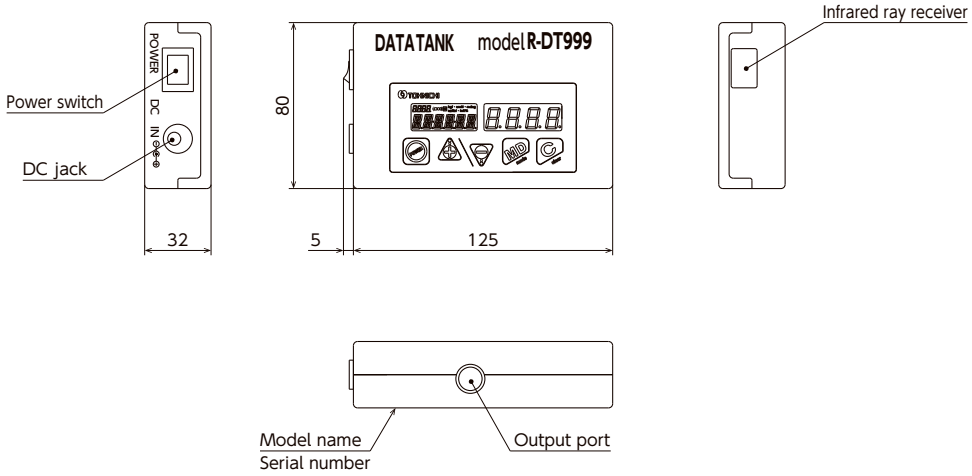
- Data tank receives data by infrared which were sampled on the site by CEM3, CEM2, ST, ST2, STC, CTA and CTB.
- Max. 999 readings can be saved internally (99 readings only when receiving data from CEM2).
- Saved data can be transferred to printer and PC.
- Can be connected to USB connector.

Optional Accessories

·Connecting Cable
[p.507]

Dimensions

■ R-DT999



Specifications

DATA INPUT	Infrared data input (TOHNICHI format only)
DISPLAY	6 lines 14 segments LCD, 4 lines 7 segments LCD, 4 lines 7 segments LED
APPLICABLE MODEL	CEM3, CEM2, ST, ST2, STC, CTA, CTB
DATA OUTPUT	RS232C compliance, USB connector serial output (*USB 1.1)
POWER AC [V]	100～240V±10%　50/60Hz
DIMENSION	W80 x D125 x H32
STANDARD ACCESSORIES	AC adapter
OPERATING TEMPERATURE RANGE	0～40℃　Less than 85% RH non condensation
ELECTRICITY CONSUMPTION [W]	5W
WEIGHT [g]	Approx. 205 (body only)

Note　Optional connecting cable #584 required for USB data communication with PC.

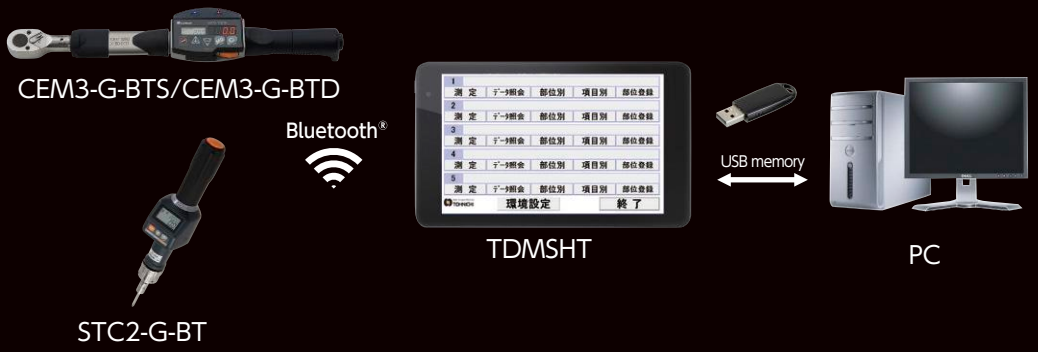
Optional equipment
CEM3-G ····· p.324
EPP16M3 ····· p.464

Technical data
Machine error ····· p.54
Human error ····· p.57

How to order.
Specify Model name
[EX.] R-DT999

TDMS/ TDMSHT Tightening Data Management System

Package software that helps standard values management and early error detection.



Application

- For managing the tigtening and inspection data.

Features

- All data can be managed in a master data file consisting of Excel® and torque data can be easily monitored and stored.
- Tightening work can be conducted with portion master file which can be controlled by Excel®.
- 「N」「X-bar」「σ」「cp」「cpk」 are automatically calculated and stored in an Excel® file.

Specifications

Compatible	OS: Windows® XP, Vista, 7, 8, 8.1, 10

Bluetooth® Communication Specifications

Communication Method	Bluetooth®
Spectrum	2.4GHz
Communication Range	Approx.10m

Work Flow (TDMSHT)

① Create a measured site master by Excel®.
② Resister the master data on the Handy terminal with USB memory.
③ Conduct re-tightening inspection or tightening according by following the displayed instruction on the handy terminal.

①

②USB memory

■ Simplex communication

For re-tightening inspection

EX. CEM3-G-BTS

Counter　Torque display

Bluetooth®

■ Duplex communication

For tightening operation

EX. CEM3-G-BTD

Higher torque　Applied torque

Lower torque　Bluetooth®

Visibly know judgment result at hand by LED lamp
OK: Blue　NG: Red

④ When received non-standard value, buzzor alearts and error message appears.

④ Judgment will be conducted for every spindle.
Change the higher/lower value according to the next tightening spindle.

⑤ Data can be output as a Excel® format, realizing early error detection with「N」「X-bar」「σ」「cp」「cpk」values.

Tightening Data Management System

TDMS	Tigtening Data Management System, software only (Japanese)
TDMS-C	Tigtening Data Management System, software only (Chinese)
TDMS-E	Tigtening Data Management System, software only (English)
TDMSHT	TDMS + Handy terminal (Japanese)
TDMSHT-C	TDMS + Handy terminal (Chinese)
TDMSHT-E	TDMS + Handy terminal (English)

Optional equipment
CEM3-G-BT ····· p.314

Technical data
Machine error ····· p.54
Tohnichi Tightening Assurance System ····· p.64

How to order.
Specify Model name
[EX.1] TDMS
[EX.2] TDMSHT

TORQUE RANGE [N·m]

90～18000

Input 9.53 12.7 19.05 25.4

Output 19.05 25.4 31.75 38.1 50.8 63.5

Straight Rotating RoHS

DECA Multiplier

Multiplier device to increase the tightening torque by 10 times.

DECA450N

DECA450N＋UA450N+QL25N5

Application

- For tightening of large bolts.

Features

- Designed to multiply the output torque by 10 times of the input torque so the operator can work alone even when a large torque is required.
- Tightened bolt inspection can be done by using with direct-reading torque wrenches.
- With the cylinder-shaped compact design, it can be used for tightening work in limited space.
- The quick turning device on input side improves operation efficiency.
- A series ranges from small to large, to cover varied applications.
- The reaction arm (=universal arm, sold separately) adapts to various shapes of applications.

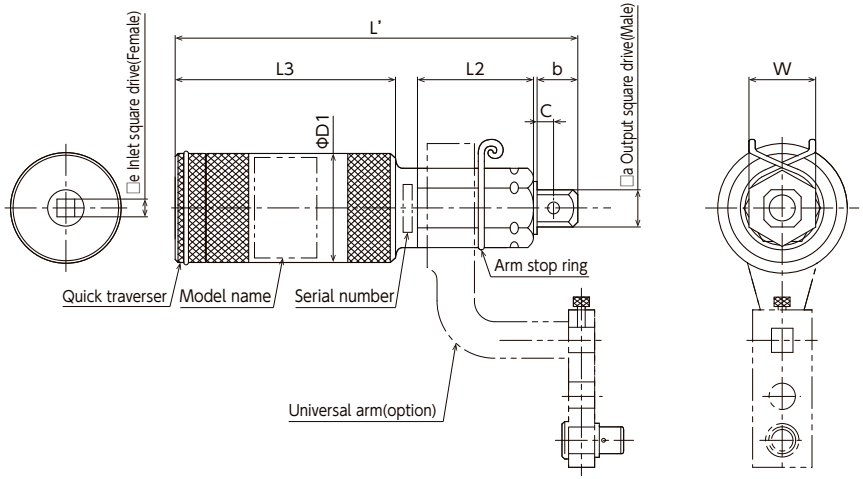
Optional Accessories

·Universal arm [p.506]

·Shell arm [p.506]

·Interchangeable socket [p.504]

Dimensions



Specifications

MODEL			DECA450N	DECA900N	DECA1800N	DECA3000N	DECA4500N	DECA9000N	DECA18000N
S.I. RANGE [N·m]		MIN.~MAX.	90~450	180~900	360~1800	600~3000	900~4500	1800~9000	3600~18000
METRIC RANGE [kgf·m]		MIN.~MAX.	9~45	18~90	36~180	60~300	90~450	180~900	360~1800
AMERICAN RANGE [lbf·ft]		MIN.~MAX.	65~325	130~650	260~1300	434~2170	650~3250	1300~6500	2600~13000
TORQUE RATIO			10 : 1						
GEAR RATIO			12.5 : 1		14.4 : 1	12.5 : 1	14.4 : 1		
DIMENSION [mm]	OVERALL LENGTH	L'	194	241	270	324	367	464	540
	OUTER DIA.	D1	52	63	77.5	95	110	140	172
	HEAD SQ. DRIVE	a	19.05	25.4		31.75	38.1	50.8	63.5
	HEAD	b	20.5	26.5		34	42	56	55.6
	HEAD	C	10.2	15		16	19	25.5	38.1
	INLET SQ. DRIVE	e	9.53	12.7		19.05		25.4	
	BODY	L2	60	75	85	90	100	120	145
	BODY	L3	96.5	120.5	141.5	177.5	199	249	299
	BODY	W	36	41	50	60	70	85	110
WEIGHT [kg]			2	3.4	5.7	10	12.5	34	60

NOTE DECA450N~3000N／Metal Case, DECA4500N and 9000N／Metal Case+Carrying Handle, DECA18000N／Metal Case+Caster.

Accuracy ±5%

Optional equipment

UA ····· p.506
SA ····· p.506

How to order.

Specify Model name + Reaction Arm (UA, SA)

[EX.] DECA450N + UA450N or SA450N

Note

- Reaction arm (UA) must be set to absorb reaction force when using DECA.

RAmk2/ RA Ratchet Adapter

RAmk2/RA helps to set a torque wrench in the proper position on the tester by using a 3.75 degree gear action.

RA3mk2

RA4mk2

RA6mk2

RA8mk2

RA12

Application

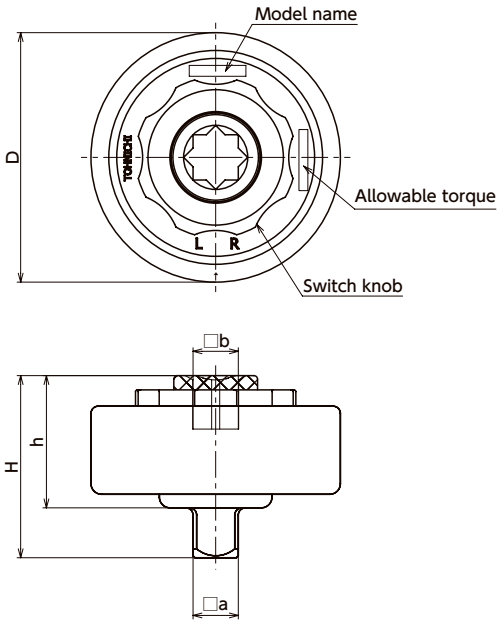
- For torque wrench testers.

Features

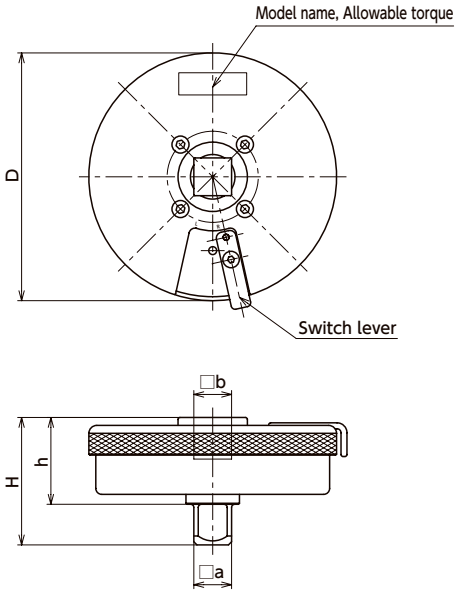
- Makes easy to set a torque wrench on a tester.
- Lever and knob switches for bi-directional use.

Dimensions

■ RAmk2



■ RA



Specifications

MODEL			RA3mk2	RA4mk2	RA6mk2	RA8mk2	RA12
DIMENSION [mm]	SQ.DRIVE	□a	9.53	12.7	19.05	25.4	38.1
		□b					
	HEIGHT	H	37.3	52.5	69.3	92.8	111
	THICKNESS	h	26.3	37.1	47.8	64.3	68.7
	OUTER DIA.	D	55	70	115	161	234
ALLOWABLE TORQUE [N•m]			70	220	850	2100	3000
WEIGHT [kg]			0.3	0.6	2.3	6.3	12.6

Optional equipment

TCC2-G ····· p.404
DOTE4-G ····· p.406
DOT ····· p.408
DOT-MD ····· p.412
DOTE4-G-MD2 ····· p.410
TF ····· p.414

How to order.
Specify Model name
[EX.1] RA4mk2
[EX.2] RA12

Rechargeable RoHS

BP-100-4 Battery Pack

CE

Capable of use Tohnichi digital products in places without AC power source.

BP-100-4

Application

- Portable battery of torque devices for field use or while moving.

Features

- 12V AC power source for Tohnichi digital torque products.
- Ideal as a replacement power source of unstable voltage or much noise conditions.
- Possible to provide electricity to Tohnichi torque product 24 hours in fully charged condition.
- Equipped with Lithium-ion Polymer rechargeable battery.
- Comply with RoHS directive.

12V Exchange Cable

BATTERY PACK SIDE	Input 19V (straight plug)
TORQUE EQUIPMENT SIDE	Output 12V 3A (L-Type Exchange Plug RC5320A EIAJ-4)
PLUG TERMINAL POLARITY	Center Plus

Battery Pack

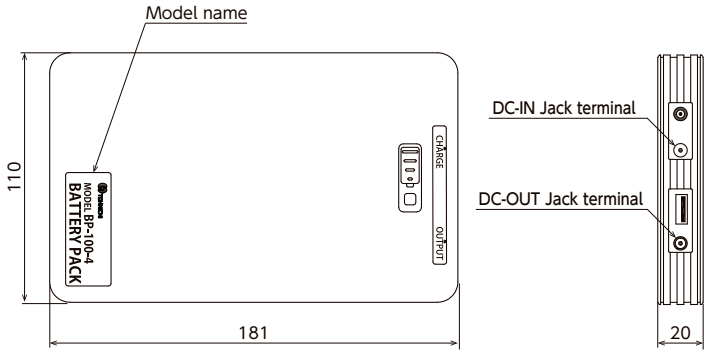
BATTERY	Lithium Ion Polymer Rechargeable Battery
RATED OUTPUT	19V, 2A
BATTERY CAPACITY	18000mAh
CONTINUOUS OF USE	Approx.24hours (on fully charged condition)
OPERATING TEMPERATURE RANGE	0~40℃ Below 85%RH (no condensation)
WEIGHT [g]	470

AC Adapter for Charge

INPUT POWER	AC100~240V 50/60Hz
OUTPUT POWER	DC19V, 3.16A
CHARGING TIME	3 to 4 hours
OUTPUT PLUG TERMINAL POLARITY	Center Plus
OUTPUT CABLE LENGTH	1.8m
TEMPERATURE IN USE [℃]	0~40

• Applicable to Tohnichi Torque Digital Tester/Checker/Meter/Digital Display. DOTE3-G/DOTE4-G, LC3-G, TDT3-G, TME2 and CD5.

Dimensions



Optional equipment

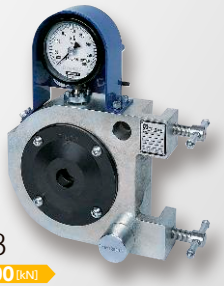
TDT3-G ····· p.402
DOTE4-G ····· p.406
LC3-G ····· p.416
TME2 ····· p.432
CD5 ····· p.460

How to order.
Specify Model name
[Ex.]Tohnichi BP-100-4

FORCE MEASUREMENT INSTRUMENT

SERIES INDEX

Tension Meter



BTM
P.478
40~400[kN]
Directly measures the bolt tension and determines appropriate tension level.

B-BTM
P.478
1.2~400[kN]
Directly measures the bolt tension and determines appropriate tension level.

TT2000
P.480
Ultrasonic tension meter to monitor bolt tension change.

Bolt Tension Stabilizer

Fcon
P.482
Helps to stabilise bolt tension by applying on the bolt.

Dial Indicating | Direct Reading

BTM/ B-BTM Bolt Tension Meter

Hydraulic bolt tension meter for torque coefficient evaluation or strength test of bolts.

BTM400K

B-BTM13K

Application

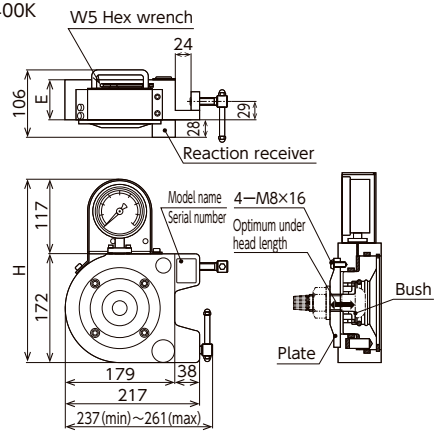
- To define the appropriate torque level.
- Performance test for pneumatic torque tools.
- Strength test of the bolt and work.
- For education of torque tightening method.

Features

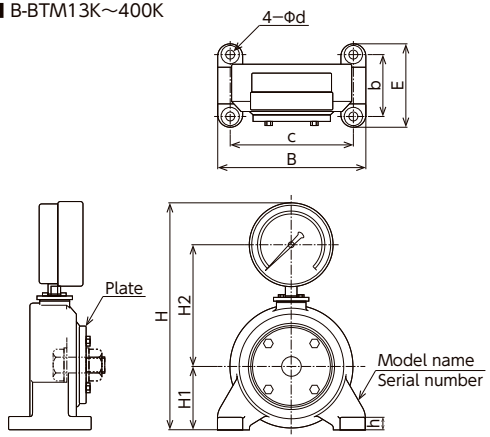
- Standard measuring device to test bolt and tightening characteristics.
- With torque wrenches, bolt strength and torque coefficient of the bolt can be tested for variety of use.
- Hydraulic mechanism is superior in durability, and the internal shock absorber allows for impact wrench use.
- B-BTM provides one set of bush and plate as standard accessory which matches the standard bolt to be measured.
- Compact and lightweight BTM400K can be carried to the worksite such as construction field to check the bolt tension of torsia high tension bolts.

Dimensions

■ BTM400K



■ B-BTM13K~400K



Specifications

Accuracy ± 3%

S.I. MODEL		BTM400K	B-BTM13K	B-BTM40K	B-BTM130K	B-BTM400K
AXIAL TENSTION RANGE [kN]	MIN. - MAX.	50~400	1.2~13	4~40	12~130	40~400
	GRAD.	5	0.2	0.5	2	5
METRIC MODEL		40BTM-2	1.3B-BTM	4B-BTM	13B-BTM	40B-BTM
AXIAL TENSTION RANGE [ton]	MIN. - MAX.	5~40	0.12~1.3	0.4~4	1.2~13	4~40
	GRAD.	0.5	0.02	0.05	0.2	0.5
AMERICAN MODEL		40BTM-2-A	1.3B-BTM-A	4B-BTM-A	13B-BTM-A	40B-BTM-A
AXIAL TENSTION RANGE [lbf]	MIN. - MAX.	23000~90000	300~2800	1000~9000	3000~28000	10000~90000
	GRAD.	1000	50	100	500	1000
APPLICABLE BOLT [mm]	DIAMETER (MINIMUM LENGTH)	HEX BOLT / TORSIA BOLT			STANDARD BOLT	
		M16 | M20 | M22 | M24	M5(20), M6(21), M8(22.5)	M10(29), M12(31), M14(32)	M16(41), M18(43), M20(44), M24(47)	M27(72), M30(74), M36(79), M42(84)
OPTIMUM UNDER HEAD LENGTH [mm]		65~70 | 70~75 | 75~80 | 80~85	—			
DIMENSION [mm]	OVERALL LENGTH (B)	261	106	135	188	280
	OVERALL THICKNESS (E)	62	78	82	106	126
	OVERALL HEIGHT (H)	289	217	241	287	367
	BODY (b)	—	62		78	90
	BODY (c)	—	86	110	156	240
	BODY (h)	—	10	12	16	25
	BODY (d)	—	6	7	12	14
	BODY (H1)	—	46	58	81	124
	BODY (H2)	—	119	131	154	192
WEIGHT [kg]		12.6	7.7	9.8	17.5	31

Note High strength hexagon bolts for friction grip joints are used in the table above.
Standard accessory 1. Plates, Bushings, Spanner for plate, Bolt for plate, Carrying Case, Certificate of calibration.
2. Both plates and bushings of M20 and M22 Torsia type bolts are standard accessories for BTM400K.
3. Plates and bushings of all applicable bolts for each B-BTM models are standard accessories.

Alternative model

TT2000 ····· p.480

Optional equipment

Fcon ····· p.482

Technical data

Torque and friction coefficient ····p.36
Method of determining tightening torque ····p.37
Bolt tightening ····· p.38
Tolerance of tightening torque ····p.42
Tightening reliability ····· p.52
ISO9000 related documents ····· p.90

How to order.

Specify Model name

[EX.] BTM400K

Note

·BTM400K plate and bushing, except for M20 and M22 torsia bolt are sold separately.

TT2000 Ultrasonic Tension Tester

Ultrasonic bolt tension tester capable of visualizing change in bolt tension without breaking bolts.

TT2000

Application

- Bolt tension test.
- To define the optimum torque level for the bolt.
- Bolt aging test, loosening test.

Features

- Simple operation with large color display and dialogue-style data input method.
- Compact and light weight. Portable for use at the work site.
- Portable battery available as option.
- Variety of functions, overlapping wave pattern and wave detection change are available for measurement in high reliability.
- Simplified bolt dimension will be displayed in graphic with input values expressed in red.
- Bi-directional communication with PC for data processing is available for TT2000C and TT2000M.
- Hex-head cap screws can be tested by optional special made sensor.
- English version available for international use.

Optional Accessories

• TT2000 option [p.509]

Connecting personal computer and data control analysis is available.
Special software is available upon request. Only For TT2000C,TT2000M

TT2000C,TT2000M

	APPLYCATION INDUSTRY / USAGE	FUNCTIONS
TT2000	Axial tension, field use / Popular version	Popular version for measurement only
TT2000C	Maintenance / Inspection, PC control	Above + communication function
TT2000M	Tightening study / Manufacture for trial, Experiment, Study	Above + Angle synchronized mode

Specifications

Measurement Range [mm]	5 ～ 10,000(Steel materia)
Applicable Bolt Length [mm]	50 ～ 9000
Applicable Bolt Diameter [mm]	ϕ6 dia or, more
Ultrasonic Wave Frequency [MHz]	0.5 ～ 15
Display Screen	Color 6.4type (640 × 480dots)
Time Axis Resolution [ns]	5
Axial Force Measurement	It is decided by bolt diameter, and lengh (Example) On the measurement (steel) of first base echo Bolt diameter ϕ10 bolt tightening length 50mm ±approx.1.47kN Bolt diameter ϕ20 bolt tightening length 100mm ±approx.2.94kN
Measurement Result	Bolt initial length (mm), bolt axial force (N), stress (Mpa), elogation (mm)
Data Memory Capacity	2000pcs. or time pass measurement 300 items
External Output	8 bit serial interface (RS232C) ＊2 Composit output (NTSC), Alarm output (photo coupler), Encorder input ＊3
Bolt Temperature Correction	Manual input by key, Auto temperature input ＊1
Power Supply	AC85～130[V], AC185～265[V] (50 / 60Hz) or DC12[V] ＊4
Battery	Portable: 2.5h Usage 1.5h Charge Built -in case usage: 8h usage 4.5h charge
Dimensions [mm]	Body: 160×246×60 (H, W, D) Body + Built -in battery : 160×246×246 (H, W, D)
Weight [kg]	Body: 1.2 Body + built -in battery: 4.9
Usable Temperature Range [℃]	0 ～ 45

Note:1. Optional thermometer can be connected to TT2000C and TT2000M for auto temperature adjustment.
Input temperature range is from -40℃ to 200℃ . Measurement over 60℃ requires a sensor specially designed for high temperature.
2. RS232C connector is available only with TT2000C and TT2000M.
3. Composite output, alarm output and encoder input are available only when using a multi connector box of TT2000M or optional built-in battery case.
4. DC12V can be used only when using the optional portable battery or the built-in battery case.

Alternative model
BTM/ B-BTM ····· p.478

Optional equipment
Fcon ····· p.482
Accessories for TT2000 ··· p.509

Technical data
Bolt tightening ····· p.38
ISO9000 related documents ····· p.90

How to order.
Specify Model name
[EX.1] TT2000
[EX.2] TT2000C
Note
・Contact Tohnichi using TT2000 series for the first time.

Bottle RoHS

Fcon

Bolt tension stabilizer creates highly consistent fastener tension.

Fcon

Patent number 5308608

Application

- Stabilizing bolt tension.
- Reduces friction stress on the bolt.

Features

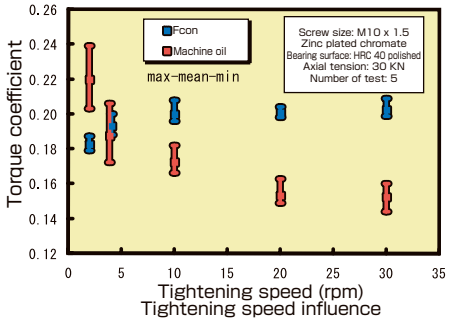
- Simple usage, just apply on the bolt.
- Fcon is designed to control friction on the surface of bolt and work, to stabilize the torque coefficient and to stabilize the internal bolt tension.
- Torque variation coefficient can be reduced up to 1/5 compare to machine oil.
- Less fluctuation of torque coefficient when retightening.
- Stable torque coefficient when temperature change.
- Performance of loosening characteristics is better than machine oil.
- Extremely small fluctuation of torque coefficient to the variation of speed.

Specifications

DENSITY [g/cm³]	VISCOSITY [mPa•s]	FLASH POINT [℃]	THERMAL DECOMPOSITION [℃]	POUR POINT [℃]	TIGHTENING TEMPERATURE [℃]	CONTAINER [mm]	WEIGHT [g]
0.89 (20℃)	APPROX. 15000 (24℃)	210	MORE THAN 150	-9	20±15, Recommendation	φ41×152	NET90 PER BOTTLE

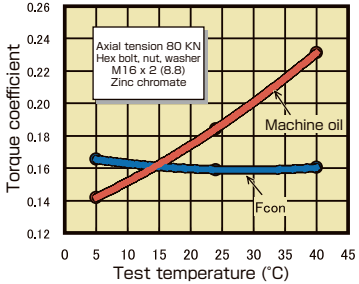
Note When using Fcon, determine bolt torque coefficient with B-BTM or TT2000.

Tightening Influence



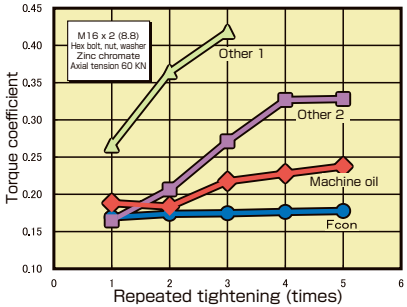
Tightening speed influence

temperature Influence

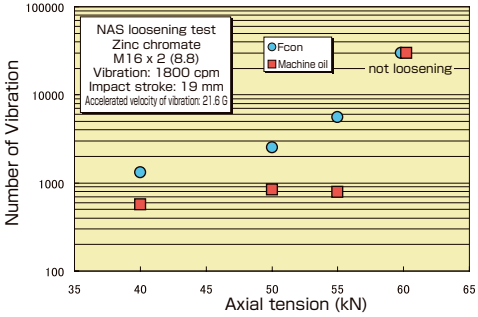


Temperature influence on torque coefficient

Repeated Tightening Influence

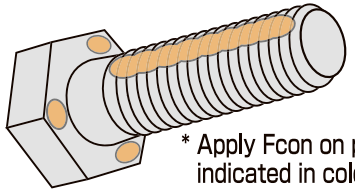


Loosening characteristics



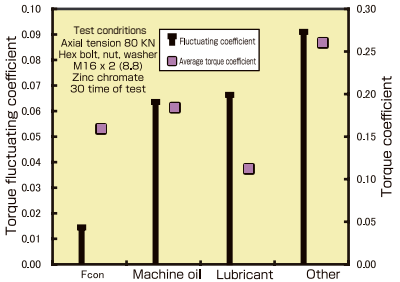
How to apply Fcon on the bolt (in case of M10 bolt)

Follow below illustration. Apply some along the screw thread (2 mm width more or less), and on the bearing surface at 3 different spots evenly. Use appropriate amount depending on the size of the bolt.



* Apply Fcon on part indicated in color.

Axial tension stability characteristics



Characteristic of tension stabilization

Torque coefficient calculated by formula K = t / (d x f)
T = tightening torque, d = nominal size of screw, F = axial tension, Torque fluctuating coefficient = torque coefficient average abmodality / average torque coefficient

Optional equipment

TT2000 ····· p.480
BTM/ B-BTM ····· p.478

How to order.

Specify Model name

[EX.] Fcon

Note

- Sales unit: 10pcs / case
- Content: 90g / bottle

ACCESSORIES

Your Torque Partner TOHNICHI

Color caps

QL2N～25N5 / CL2N～25N5

Interchangeable Head

SH

Suitable for use in confined space where sockets cannot be used. For example, it can be used for flare nut of piping work.

RH

RH head guarantees safe work as the axes of bolt and RH ring head are always aligned and prevent accidental drop of the wrench.

QH

QH ratchet head needs only small swing for tightening and it suits for operation in narrow speaces.

AH15D2

AH head is easy and convenient to use for applications that require different size bolt heads.

HH

To be used with hex. key inserted.

SH-N

The notch creates speed in the tightening process by grasping the side of the fastener without removing the wrench.

RQH

RQH female ratchet head can be used for effective tightening in areas where vertical space is limited.

PH

PH head is suitable for pipes and plumbing applications.

FH

FH head is ideal for bearing locknut applications.

DH

DH head is useful when tightening a large number of matching screws with a common torque wrench. It is recommended to keep one set.

CPQH

Corrosion-Resistant Ratchet Head for water and dust proofing torque wrench CLWP.

EQUIPMENT for Power Tool

To efficiently use TOHNICHI products, a number of auxiliary parts and special tools are available (Some torque tools are provided with the necessary auxiliary parts). We are ready to manufacture custom-made parts and tools to meet your requirements.

One Touch Joint

■ Joint to connect uni-screwdrivers to air hoses

PART #	130	131	132
APPLICABLE MODELS	U30CN~U250CN		
SIZE	Rc(PT)1/4 FEMALE	R(PT)1/4 MALE	ϕ8 HOSE JOINT

Torque-Fix

■ Tool for torque adjustment

PART #	145	146	147
APPLICABLE MODELS	U30CN~120CN, ULR120CN	U250CN, ULR250CN	U500CN/UR

Tool Kit

■ Tool kit to disassemble and assemble

PART #	160	161	162	163
APPLICABLE MODELS	U30CN~120CN, ULR120CN	U250CN, ULR250CN	U500CN/UR	U1000CN

Torque Adjust Key

■ Adjust key for presetting torque

PART #	139	140
APPLICABLE MODELS	ULR120CN. MG	ULR250CN, MF, ME, AS

Spanner Wrench

■ Spanners for AS/MF models to disassemble and assemble

PART #	170
APPLICABLE MODELS	MF, AS

Spare Battery for HA/HAC

MODEL	BP1825	BP1850
APPLICABLE MODELS	HA / HAC	
VOLTAGE [V]	DC18	

Note: Hitachi Koki UC18 series is available.

Battery

Battery charger for BP1825/BP1850

MODEL		BC18YSL3
APPLICABLE MODELS		BP1825, 1850
VOLTAGE [V]	Input	AC100V 50/60Hz 195W
	Output	DC18-14.4V 8A

Note: Hitachi Koki UC18 series is available.

Battery Charger

Balancer for HA/HAC

MODEL	343	344
APPLICABLE MODELS	HAC25N、50N	HAC100N、140N、200N

Balancer

Spare battery for HAT

MODEL	BP-9	BP-12
APPLICABLE MODELS	HAT5N, 12.5N	HAT25N
VOLTAGE [V]	DC9.6	DC12

Battery

Battery charger for BP-9, 12

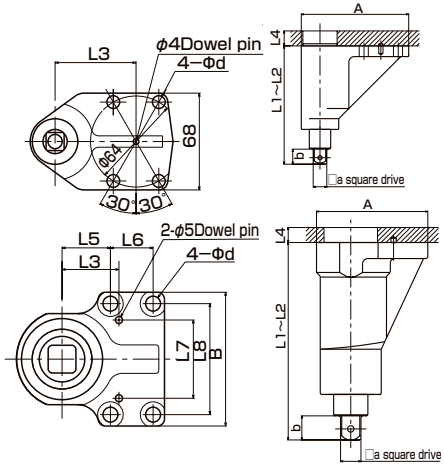
PART #	820
MODEL	BC-1
APPLICABLE MODELS	BP-9, 12
VOLTAGE [V]	AC100

Battery Charger

EQUIPMENT for Multiple Unit

TOHNICHI standardized components help to create multiple units easily.

SLIDE DRIVE



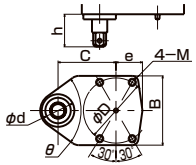
■ Slide mechanism for easy bolt loading and unloading

MODEL		FDME25N	FDME80N	FDME126N	FDMC400N	FDMC1200N
DIMENSION [mm]	L1~L2	107.5~92.5	110.5~95.5		184.5~169.5	217.5~202.5
	L3	46.4	56.9	63.6	40	62
	L4		10		14	19 | *23
	L5	—	—	—	34	46
	L6	—	—	—	30	35
	L7	—	—	—	55	58
	L8	—	—	—	78	90
	□a	9.53	12.7		19.05	25.4
	b	11	14		22.5	26.5
	ϕd	8.5	9		10.5	12.5
	A	86.4	100.4	114.6	104	129
	B	—	—	—	94	108
APPLICABLE MODELS		ME25N	ME45N, 80N	ME126N	MC220N2, 400N2	MC700N2, 1200N2

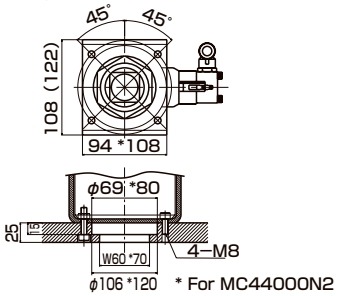
* For MC1200N2

DIMENSION for Multi units Installation

■ ME25N~ME126N

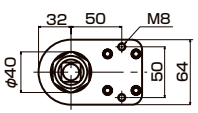


■ MC2200N2, MC4000N2

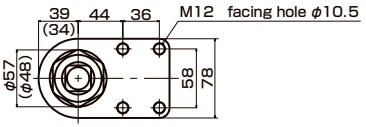


* For MC44000N2

■ MC220N2, MC400N2



■ MC700N2, MC1200N2



( ) shows dimension for MC700N2

MODEL	MG120CN	MG250CN	MF6N	MF12N	ME25N	ME45N	ME80N	ME126N
C	24.4		33		46.4	56.9		63.6
D	36		48		64			
θ	61°		66°		64°	72°		24°
M	M4		M5		M8			
d	12h7		18h7		25h7	32h7		
h	60		68		29	32		
B	37.2		52		68			
e	13.5		20		26			

TORQUE SENSOR

MODEL	TC-ME2	TC-MCA	TC-MCB-2	TC-MCB
APPLICABLE MODELS	ME	MC220N2, 400N2	MC700N2	MC1200N2

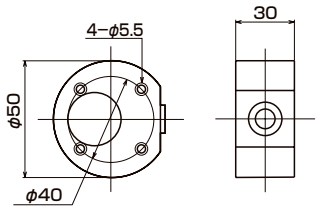
Note Torque sensor can be installed on TOHNICHI multi-units. Its gain adjustment function ensures constant output and provides compatibility between multi-units.

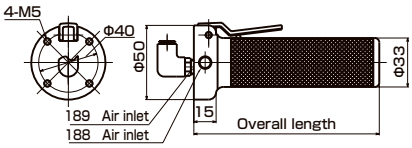
■ Handle with switch for multiple units

SWITCH HANDLE / HANDLE VALVE

PART#	331	332	333	188	189	187
TYPE	Start Switch Handle	Reset Switch Handle	Quick reverse Handle	Handle Valve	Handle Valve	Handle Assist
AIR OUTLET	—			3/8	1/8	—
OVERALL LENGTH [mm]	30			135	125	
APPLICATION	Multi Unit Start Switch	Reset Switch	Emergency Reset Switch	For Direct Connection	Master Valve	For Assist

Note This handle valve is used to operate the starting and master valve of a multi-unit. The handle valve can be connected to multi-unit with up to four axes if an MG is used, two axes if an MF or ME is used, and one axis if an MC2 is used. When the multi-unit is used to tighten more axes, use the master valve together.



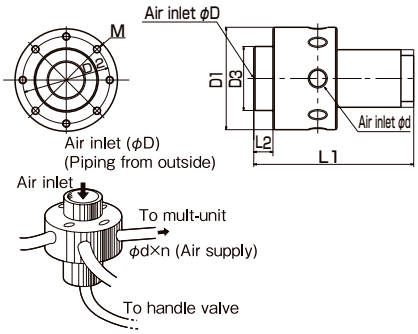


MASTER VALVE

■ Master valve for maltiple units.

PART#		195	196	197	198	199
DIMENSION [mm]	D1	51			80	
	D2	41		43	68	
	D3	30		32	50	
	L1	76		81	125	
	L2	15				
	M	4-M5 Depth6		4-M5 Depth8	8-M6 Depth12	
AIR INLET x AIR SUPPLY x NUMBER (ϕD) x (ϕd) x (n)		1/2×1/4×4	1/2×1/4×6	3/4×3/8×2	1×3/8×4	1×3/8×6
APPLICABLE MODELS		MF	ME	MC2		

Note When the handle valve is operated, this master valve instantly opens wide to send compressed air from the supply port to multi-units simultaneously. The master valve also helps the handle valve to close smoothly.



EQUIPMENT for Torque Driver/Wrench

To facilitate effective and convenient use of TOHNICHI products, a number of auxiliary parts and special tools are available (Some torque tools are provided with the necessary auxiliary parts). We are ready to manufacture custom-made parts and tools to meet your requirements.

RESIN GRIP

ORANGE GRAY GREEN BLUE BLACK RED

PART#	850	851	852	853	854	855
COLOR	ORANGE	GRAY	BLACK	GREEN	RED	BLUE
APPLICABLE MODELS	RTD120C, LTD120CN, RNTD120CN, NTD120CN					

PART#	856	857	858	859	860	861
COLOR	ORANGE	GRAY	BLACK	GREEN	RED	BLUE
APPLICABLE MODELS	RTD260CN, LTD260CN		RNTD260CN, NTD260CN			

ADJUSTING TOOL

■ For adjusting torque of LTD and RTD torque drivers.

PART#	51	46	1046	47	48	49	1050
APPLICABLE MODELS	LTD15CN, 30CN/RTD	LTD60CN/RTD	LTD120CN/RTD	LTD260CN/RTD	LTD500CN/RTD	LTD1000CN	LTD2000CN2

AUXILIARY TOOL

■ For tightening large size LTD easier.

PART#	31	32
APPLICABLE MODELS	LTD500CN/RTD/NTD/RNTD, FTD400CN	LTD1000CN/NTD, FTD8N, 16N

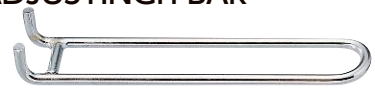
PART#	40	1031
APPLICABLE MODELS	LTD2000CN	RTDLS500CN RNTDLS500CN

PRESET HOOK SPANNER

■ For set torque of mid to large size LTD and RTD drivers.

PART#	52	53	54	55
APPLICABLE MODELS	LTD260CN/RTD MNTD120CN	LTD500CN/RTD MNTD260CN	LTD1000CN MNTD500CN	LTD2000CN

ADJUSTINGH BAR



■ For setting torque of preset type NTD and RNTD drivers.

PART#	42	43	44
APPLICABLE MODELS	NTD15CN~ 60CN/RNTD	NTD120CN~ 260CN/RNTD	NTD500CN/ 1000CN/RNTD

ADJUSTING TOOL

■ For setting torque of large size QLE adjustable wrenches.

PART#	301
APPLICABLE MODELS	QLE550N~2100N/CLE, DQLE, TiEQLE

THRUSTRING TOOL

■ For setting torque of preset type torque wrench SP, RSP, QSP and CSP.

TOOL No.	A-1	A-2	A-3	A-4	A-5	A-6
PART#	310	311	312	313	314	315
APPLICABLE MODELS	QSP1.5N ~6N/CSP	SP2N~19N, QSP12N/CSP QSP25N/CSP, BQSP25N/ BCSP	SP38N,67N, QSP50N~ 140N BQSP50N~ 140N/BCSP	SP120N~ 310N, QSP200N ~280N BQSP200N, 280N/BCSP	QSP420N/CSP BQSP420N /BCSP BQSP400N /BCSP	SP420N, 560N

ADJUSTING TOOL

PART#	931	930
DIMENSION [mm]	2.5X1.5X6	4X2.5X8
APPLICABLE MODELS	QSP25N3(-MH), CSP25N3(-MH) QSP1.5N4~12N4, CSP1.5N4~12N4 SP2N2~19N2, RSP8N2~19N2 SP19N2-N, BQSP10N~20N/BCSP QSPCA6N~12N	QSP50N3(-MH)~280N3(-MH)/CSP3 QSP100N4/200N4 SP38N2~310N2/RSP2 SP38N2-N, SP2-H BQSP40N~300N/BCSP QSPCA30N~70N

CARRYING CASE

PART#	842	843	846	847	844	845
DIMENSION [mm]	H60×W400×D70	H60×W520×D80	H170×W500×D100	H170×W740×D100	H170×W500×D100	H170×W740×D100
WEIGHT [kg]	0.25	0.36	1.0	1.6	1.0	1.6
APPLICABLE MODELS	QL50N(-MH), CL50N(-MH), MTQL40N~70N, PQL50N~100N4 PCL50N~100N QL100N4-MH	QL140N(-MH), CL140N(-MH), QL200N4(-MH), CL200N(-MH), MTQL140N, PQL140N~200N4, PCL140N~200N4	QL140N(-MH) CL200N(-MH) MTQL140N PQL200N4 PCL200N Or smaller	QL280N, QL280N-MH Or smaller CL280NX22D, CL280NX22D-MH Or smaller MTQL140NPQL 280N4 Or smaller	CPT20X10D-G~ CPT100X15D-G	CPT200X19D-G, CPT280X22D-G

(842)

(846)

TOOL SET

■ This set of pliers is used to adjust the torque for dial type torque wrenches and torque checkers.

PART#	316
APPLICABLE MODELS	DB, DBE, CDB-S, T-S, DOT, SCDB-S

EVERTORQUE

Lubricant for repairing torque products

■ For repairing of torque wrenches and torque drivers.

DESCRIPTION		EVERTORQUE	
PART#		830	
APPLICATIONS	APPLICABLE MODELS	Click Type Torque Wrench	Click Type Torque Driver
	APPLICABLE POINT	Thrustring, Steel ball, Scale piece, Adjusting screw, Screw	Main shaft, Toggle seat, Serration part case, Scale piece, Screw

RoHS

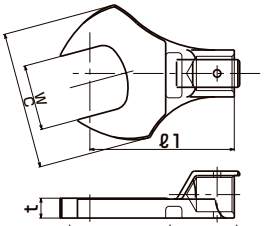
INTERCHANGEABLE HEAD 1

Use Tohnichi interchangeable heads only for Tohnichi torque wrenches.
Our interchangeable heads are designed and manufactured exclusively for our interchangeable type torque wrenches.
Be sure not to use our interchangeable heads with other brand of torque wrenches or any tools, it may cause malfunction or damages.

More than 300 kinds of interchangeable heads are available for various tightening works.

SH Open Spanner Head

RoHS



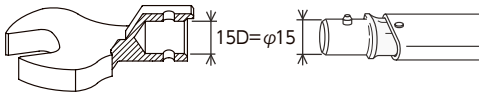
SH type spanner suit for place where socket cannot be used.
For example, it can be used for flare nut of piping work.

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
8D	SH8DX5.5	1.5	13	3	
	SH8DX6	2.5	15	3.5	
	SH8DX7	3.5	17	4	
	SH8DX8	7	20	4.5	
	SH8DX10	14	25	5.5	
	SH8DX11	15	27		
	SH8DX12		29		35
	SH8DX13			6.5	
	SH8DX14		31		
	SH8DX16		32		
	SH8DX17		35		
	SH8DX19		36		
	SH8DX21		37		
	SH8DX22		39		
	SH8DX24				
10D	SH10DX7	20	28	6.5	44
	SH10DX8				
	SH10DX10				
	SH10DX11				
	SH10DX12	25	32		
	SH10DX13				
	SH10DX14		39		
	SH10DX16				
	SH10DX17				
	SH10DX18				
	SH10DX19		43		
	SH10DX21				
	SH10DX22				
	SH10DX24				

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
12D	SH12DX8	7	20	5	53
	SH12DX10	12	24		
	SH12DX11	20.5	28	5.5	
	SH12DX12	29.5	31	6.5	
	SH12DX13		32		
	SH12DX14	59	38	8	
	SH12DX16		40	10	
	SH12DX17				
	SH12DX18	70	41	11	
	SH12DX19				
	SH12DX21		43	13	
	SH12DX22				
	SH12DX24		48		
	SH12DX27		52		
15D	SH15DX12	59	38	8	63
	SH15DX13				
	SH15DX14				
	SH15DX16	140	51	13	
	SH15DX17				
	SH15DX18				
	SH15DX19				
	SH15DX21				
	SH15DX22				
	SH15DX24		60	12	
	SH15DX26				
	SH15DX27				
	SH15DX30				
	SH15DX32				
	SH15DX36		68		
19D	SH19DX17	200	54	13	80
	SH19DX18				
	SH19DX19				
	SH19DX21	180			
	SH19DX22				
	SH19DX24	200	60	15	
	SH19DX27				
	SH19DX30	180			
	SH19DX32	200	76	11	
	SH19DX34				
	SH19DX36				
	SH19DX41	180			

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
22D	SH22DX19	280	63	15	100
	SH22DX22				
	SH22DX24	500	78		
	SH22DX27	420			
	SH22DX30				
	SH22DX32				
	SH22DX34	500	85		
	SH22DX36	420			
	SH22DX41	280			
	SH22DX46				
	SH22DX50	500	103		
	SH22DX55		108		
27D	SH27DX22	255	65	14	125
	SH27DX24	350	72	15	
	SH27DX27	490	82	16	
	SH27DX30	670	88	19	
	SH27DX32	750	92	20	
	SH27DX34	670	90		
	SH27DX36	750	94	21	
	SH27DX41		98	22	
	SH27DX46		100	24	
	SH27DX50		103	26	
32D	SH32DX27	850	105	18	160
	SH32DX30				
	SH32DX32				
	SH32DX34				
	SH32DX36	1200	110	24	
	SH32DX41				
	SH32DX46				
	SH32DX50		120	29	
	SH32DX55				
	SH32DX60				

Interchangeable head wrench and Interchangeable head of the same size can be connected.



How to order.
Specify Model name
[EX.] SH12DX14

Inch Size

Tohnichi Head Size	Model (Body Size × Width)	Width [mm]	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
8D	SH8DX1/4	6.35	2.5	15	3.5	35
	SH8DX5/16	7.94	7	20	4.5	
	SH8DX3/8	9.53	14	25	5.5	
	SH8DX7/16	11.11	15	27		
	SH8DX1/2	12.7		29	6.5	
	SH8DX9/16	14.29				
10D	SH10DX1/4	6.35	20	28	6.5	44
	SH10DX5/16	7.94				
	SH10DX3/8	9.53				
	SH10DX7/16	11.11	25	32		
	SH10DX1/2	12.7				
	SH10DX9/16	14.29		39		
12D	SH12DX3/8	9.53	12	24	5	53
	SH12DX7/16	11.11	20.5	31	6.5	
	SH12DX1/2	12.7	29.5	32		
	SH12DX9/16	14.29	59	40	10	
	SH12DX5/8	15.88				
	SH12DX11/16	17.46	70	41	11	
15D	SH15DX1/2	12.7	59	38	8	63
	SH15DX9/16	14.29		51	13	
	SH15DX5/8	15.88				
	SH15DX11/16	17.46				
	SH15DX3/4	19.05				
	SH15DX13/16	20.64				
	SH15DX7/8	22.23				
	SH15DX15/16	23.81				
	SH15DX1	25.4				
	SH15DX1-1/16	26.99	140	60		
	SH15DX1-1/8	28.58				
	SH15DX1-3/16	30.16			12	
	SH15DX1-1/4	31.75				
	SH15DX1-5/16	33.34		66		
	SH15DX1-3/8	34.93				
	SH15DX1-7/16	36.51		69		
	SH15DX1-1/2	38.1				
19D	SH19DX15/16	23.81	200	60	15	80
	SH19DX1	25.4				
	SH19DX1-1/16	26.99				
	SH19DX1-1/8	28.58		72		
	SH19DX1-3/16	30.16				
	SH19DX1-1/4	31.75				
	SH19DX1-5/16	33.34		76	11	
	SH19DX1-3/8	34.93				
	SH19DX1-7/16	36.51				
	SH19DX1-1/2	38.1				

INTERCHANGEABLE HEAD 2

Use Tohnichi interchangeable heads only for Tohnichi torque wrenches.
Our interchangeable heads are designed and manufactured exclusively for our interchangeable type torque wrenches.
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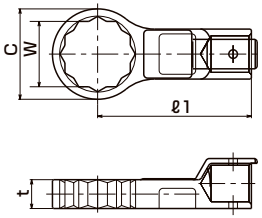
More than 300 kinds of interchangeable heads are available for various tightening works.

RH Ring Head

RoHS



The RH type ring heads guarantee safe work as the axes of bolt and RH ring head are always aligned and prevent accidental drop of the wrench.

How to order.
Specify Model name
[Ex.] RH12DX10

RH8DX5.5, RH8DX6 and RH8X8D are hexagonal type.

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
8D	RH8DX5.5	1.5	10.5	5	35
	RH8DX6	2.4	11		
	RH8DX7	3.6	12	6	
	RH8DX8	7.2	13.5		
	RH8DX10	12.2	15.5		
	RH8DX11	15	17	7	
	RH8DX12		18		
	RH8DX13		19		
10D	RH10DX8	7.2	12.5	6	44
	RH10DX10	12.2	15.5	7	
	RH10DX11	20	17	8	
	RH10DX12	25	18		
	RH10DX13		19		
	RH10DX14		20		
	RH10DX16		22		
	RH10DX17		24		
	RH10DX18		25		
	RH10DX19		26		
	RH10DX21		28		
	RH10DX22		29		
12D	RH12DX8	7.2	15	5	53
	RH12DX10	12.2	16		
	RH12DX11	20	18	5.5	
	RH12DX12	29.5	20	6.5	
	RH12DX13		21		
	RH12DX14	59	20	10	
	RH12DX16		24		

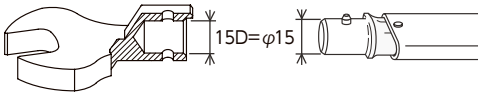
Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
12D	RH12DX17	70	25	12	53
	RH12DX18		26		
	RH12DX19				
	RH12DX21		29	13	
	RH12DX22		30		
15D	RH15DX12	29.5	19	7	63
	RH15DX13				
	RH15DX14	59	22	8	
	RH15DX16		25		
	RH15DX17	100	26	10	
	RH15DX18				
	RH15DX19	140	28	13	
	RH15DX21		31		
	RH15DX22				
	RH15DX24		34		
	RH15DX27		37		
	RH15DX30		41		
19D	RH19DX14	59	22.5	8	80
	RH19DX17	100	27	10	
	RH19DX18		28	11	
	RH19DX19	166	29	13	
	RH19DX21		32		
	RH19DX22	200			
	RH19DX24		35		
	RH19DX27		39	15	
	RH19DX30		41		

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
19D	RH19DX32	200	44	15	80
	RH19DX34		47		
	RH19DX36		49		
	RH19DX41		55		
22D	RH22DX19	166	30	14	100
	RH22DX22	255	34		
	RH22DX24		37	15	
	RH22DX27	490	41	17	
	RH22DX30	500	44		
	RH22DX32		45		
	RH22DX34		49		
	RH22DX36		51		
	RH22DX41		57		
	RH22DX46		62		
27D	RH27DX22	255	38	14	125
	RH27DX24	350		15	
	RH27DX27	490	42	16	
	RH27DX30	670	46	19	
	RH27DX32	750	48	20	
	RH27DX34	670	51		
	RH27DX36	750	52	21	
	RH27DX41		58	22	
	RH27DX46		64	24	
	RH27DX50		69	26	
32D	RH32DX27	490	43	16	160
	RH32DX30	670	46.5	18	
	RH32DX32	860	49		
	RH32DX34		52		
	RH32DX36	1200	53	24	
	RH32DX41		59		
	RH32DX46		65		
	RH32DX50		69	27	
	RH32DX55		75	29	
	RH32DX60		80		

Inch Size

Tohnichi Head Size	Model (Body Size × Width)	Width [mm]	Allowable Torque [N·m]	Outside Width C [mm]	Thickness t [mm]	Length ℓ1 [mm]
8D	RH8DX1/4	6.35	3.6	11	5	35
	RH8DX5/16	7.94	7.2	13.5	6	
	RH8DX3/8	9.53	12.2	15	7	
	RH8DX7/16	11.11	15	17		
10D	RH10DX1/4	6.35	7.2	11	6	44
	RH10DX5/16	7.94		12.5		
	RH10DX3/8	9.53	12.2	15.5	7	
	RH10DX7/16	11.11	25	17		
	RH10DX1/2	12.7		19	8	
	RH10DX9/16	14.29		20		
12D	RH12DX3/8	9.53	12.2	16	5	53
	RH12DX7/16	11.11	20	18	5.5	
	RH12DX1/2	12.7	29.5	21	6.5	
	RH12DX9/16	14.29	59	20	10	
	RH12DX5/8	15.88		24		
15D	RH15DX1/2	12.7	29.5	19	7	63
	RH15DX9/16	14.29	59	22	8	
	RH15DX5/8	15.88		25		
	RH15DX11/16	17.46	100	26	10	
	RH15DX3/4	19.05	140	28	13	

Interchangeable head wrench and Interchangeable head of the same size can be connected.



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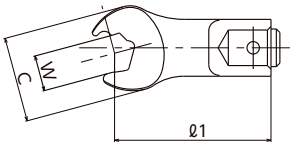
SH-N Open End Head with Notch

RoHS

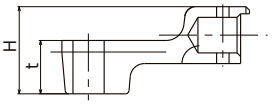
How to order.
Specify Model name
[Ex.] SH10D-1X10N

Tohnichi Head Size	Model (Body Size × Width)	Allowable Torque [N•m]	Outside Width C[mm]	Thickness[mm] H	t	h	Length ℓ1 [mm]
10D	SH10D-1X10N	22.5	24	18.75	12	6	44
	SH10D-3X10N			20.25	15	7.5	
	SH10D-5X10N	19		24.5		—	
	SH10D-4X10N	22.5		17.75	10	5	
	SH10D-9X10N			18.75	15	6	
	SH10DX11N				12		
	SH10DX12N	25	32	16	6.5	—	
12D	SH12D-1X12N	30	32	21	12	6	53
	SH12D-3X12N			22.5	15	7.5	
	SH12D-5X12N			26		—	
	SH12D-4X12N			20	10	5	
	SH12D-1X14N	40	35	21	12	6	
	SH12D-3X14N			22.5	15	7.5	
	SH12D-5X14N			26		—	
	SH12D-4X14N			20	10	5	
	SH12D-1X17N	50	38	21	12	6	
	SH12D-3X17N			22.5	15	7.5	
	SH12D-5X17N			26		—	
	SH12D-4X17N			20	10	5	

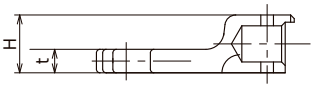
The notch creates speed in the tightening process by grasping the side of the fastener without removing the wrench. Ideal for brake line assembly.



SH-N models
※Except for SH10D-5×10N
and SH12D-5×12N (14N,17N)



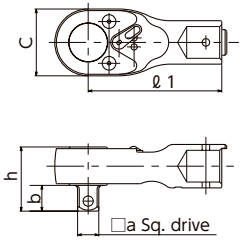
SH10D-5×10N
SH12D-5×12N (14N,17N)



SH10D×12N
SH12DX12N (14N, 17N)

CPQH Corrosion-Resistant Ratchet Head

9.53 sq. 12.7 sq.



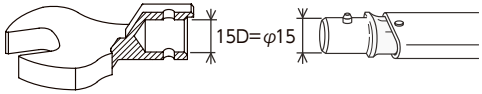
Tohnichi Head Size	Model	a [mm]	C [mm]	h [mm]	b [mm]	ℓ1 [mm]
10D	CPQH10D	9.53	26	22	11	44
12D	CPQH12D		32	25.6		53
15D	CPQH15D	12.7	37.5	33.5	14	63
19D	CPQH19D		40	38.4	15.4	80

Corrosion-Resistant Ratchet Head is ideal to use with water and dust proofing torque wrench CLWP, Page 302.

How to order.
Specify Model name
[Ex.] CPQH10D

For square drive dimension, refer to P.501

Interchangeable head wrench and Interchangeable head of the same size can be connected.

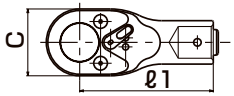


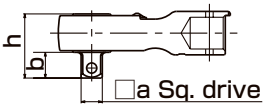
QH Ratchet Head

RoHS

6.35 sq. 9.53 sq. 12.7 sq. 19.05 sq. 25.4 sq.

Tohnichi Head Size	Model	a [mm]	C [mm]	h [mm]	b [mm]	ℓ1 [mm]
8D	QH8D	6.35	23	17.5	7.5	35
10D	QH10D-1/4		26	18.5		44
	QH10D			22		
12D	QH12D	9.53	32	25.6	11	53
15D	QH15D-3/8		37.5	30.5		63
	QH15D			33.5	14	
19D	QH19D	12.7	40	38.4	15.4	80
22D	QH22D-1/2		51	41.5	15.5	100
	QH22D			46.5	20.5	
27D	QH27D	19.05	70	49.7	21.5	125
32D	QH32D	25.4	74	55.7	26.5	160





How to order.
Specify Model name
[Ex.] QH10D

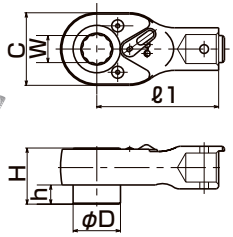
As the QH type ratchet heads need only small swing for tightening, they suit for operation in narrow speaces.

For square drive dimension, refer to P.501

RQH Female Ratchet Head

RoHS

Tohnichi Head Size	Model (Body Size × Width)	D [mm]	C [mm]	H [mm]	h [mm]	ℓ1 [mm]
12D	RQH12DX12	20.5	32	24.1		53
	RQH12DX14					
15D	RQH15DX14	24.5	37.5	29		63
	RQH15DX17					
19D	RQH19DX17				10	
	RQH19DX19	31	45	28		80
	RQH19DX22					
22D	RQH22DX22	35.2	51	35		100
	RQH22DX24					



How to order.
Specify Model name
[Ex.] RQH15DX14

As the RQH type ratchet heads need only small swing for tightening, they suit for operation in narrow and low ceiling spaces.

INTERCHANGEABLE HEAD 4

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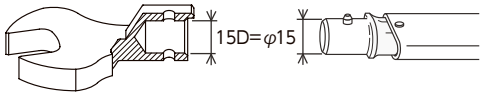
Interchangeable head wrench and Interchangeable head of the same size can be connected.

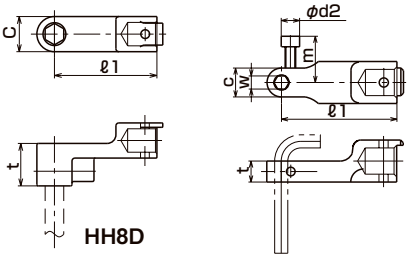


HH Hex Head

RoHS

HH8D

How to order.
Specify Model name
[Ex.] HH15DX10



Tohnichi Head Size	Model (Body Size × Width)	Dimension[mm]				
		c	t	m	φd2	ℓ1
8D	HH8D Select interchangeable bit	12	14.5	—	—	35
10D	HH10DX5	11	8			44
	HH10DX6	12				
	HH10DX8	15				
12D	HH12DX5	11	10	19	7	53
	HH12DX6	14				
	HH12DX8	15				
	HH12DX10	17				

Tohnichi Head Size	Model (Body Size × Width)	Dimension[mm]				
		c	t	m	φd2	ℓ1
15D	HH15DX8	14	13	21	8.5	63
	HH15DX10	17				
	HH15DX12	20				
	HH15DX14	21.5				
19D	HH19DX10	17		23		80
	HH19DX12	21.5				
	HH19DX14	23				
	HH19DX17	27				
	HH19DX19	29				
22D	HH22DX12	19.5	17	26	10	100
	HH22DX14	27				
	HH22DX17	30				
	HH22DX19	32				
	HH22DX22	35				

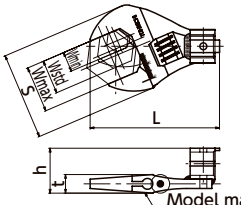
Note 1.To be used with hex. key inserted. 2.HH8D is not used with hex. key but interchangeable bit.

AH2 Adjustable Open End Head

RoHS

Tohnichi Head Size	Model	Allowable Torque Tmax [N·m]	MIN. Inner width Wmin [mm]	STD. Inner width Wstd [mm]	MAX. Inner width Wmax [mm]	S [mm]	L [mm]	t [mm]	h [mm]
10D	AH10DX13	25	3	8	13	36	57	9	23
	AH10DX26		7	17	26	49	62	11	25
12D	AH12DX13	30	3	8	13	36	66	9	23
	AH12DX26	50	7	17	26	49	71	11	26
	AH12DX36		8	22	36	65	78	13	27
15D	AH15D2X26		10	18	26	50	77	11	31
	AH15D2X30	100	13	22	30	60	84	12	32
	AH15D2X36	140		24	36	65	87	13	33

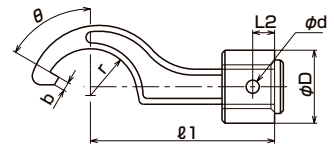
AH is easy and convenient to use for applications that require different size bolt heads.
Note Use with a click type torque wrench.

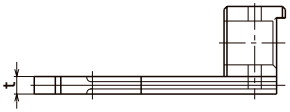


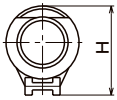
How to order.
Specify Model name
[Ex.] AH15D2X30

FH Hook Head

RoHS







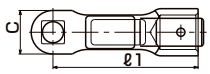
How to order.
Specify Model name
[Ex.] FH15DX30

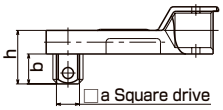
Tohnichi Head Size	Model	Applicable Size of Nut Outside Diameter[mm]	Nominal Size of Screw	Dimension[mm]								
				ℓ1	r	θ°	b	t	H	D	L2	d
15D	FH15DX30	30～38	M20,M25	63	16	60	3	6	30	25	7.5	4.5
	FH15DX38	38～45	M25,M30		20							
	FH15DX45	45～52	M30,M35		24		3.5	7	30.5			
	FH15DX52	52～58	M35,M40		27							
	FH15DX58	58～65	M40,M45		31		4.5	8	31.5			
19D	FH19DX65	65～75	M45, M55	80	35.5				35.5	29	9.5	
22D	FH22DX75	75～85	M55, M65	100	39		5		38.5	32	11	5.5
	FH22DX85	85～98	M65, M75		45.5	45		10	40			

DH Square Drive Head

9.53 sq. 12.7 sq. 19.05 sq. 25.4 sq.

RoHS





How to order.
Specify Model name
[Ex.] DH22D

Tohnichi Head Size	Model	Dimension[mm]				
		a	C	h	b	ℓ1
10D	DH10D	9.53	18	22.5	13	44
12D	DH12D			23		53
15D	DH15D	12.7	22	29.5	16.5	63
19D	DH19D		24			80
22D	DH22D	19.05	34	43.3	23.5	100
27D	DH27D		42	44.5		125
32D	DH32D	25.4	50	58.5	26.5	160

INTERCHANGEABLE HEAD 5

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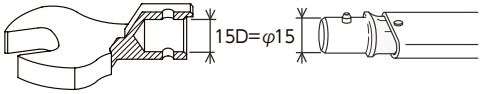
Interchangeable head wrench and Interchangeable head of the same size can be connected.

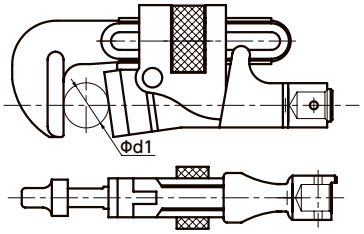


PH Pipe Wrench Head

RoHS

Tohnichi Head Size	Model (Body Size × Width)	Pipe Wrench Head Max. Length [mm]	Applicable Pipe Diameter [mm]	Standard Pipe Diameter d1 [mm]
15D	PH15DX350	350	13～38	25.5
19D	PH19DX350			
22D	PH22DX350			
	PH22DX450	450	26～52	39

Note 1. When ordering with CSP, please specify PH model name and required set torque.
2. In case of using graduated torque wrench, order PHL models.



How to order.
Specify Model name
[Ex.] PH15DX350

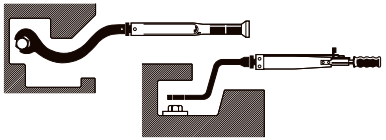
The PH heads suit for use with pipes and plumbing applications.

Special heads

Special heads can be connected to standard interchangeable head torque wrenches for special applications.

Caution: Strictly observe the dimension "ℓ1" when ordering special original heads for CSP, CL, CF, YCL and CEM type tools. If the "ℓ1" length is not correct, you will not be able to obtain the correct torque value. When the "ℓ1" length required is longer than the standard, use CSP exclusively for the application. Using CL, CF, YCL and CEM tools will produce a torque different from the one indicated on the graduation.

Interchangeable head torque wrenches and special heads

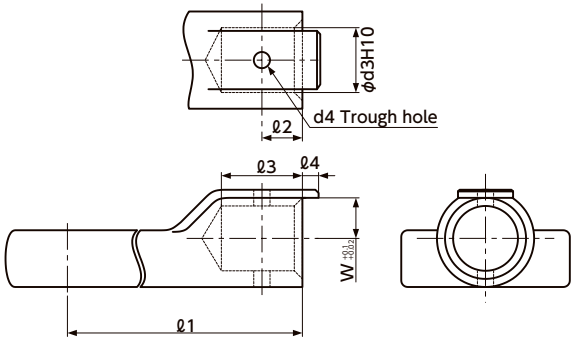


Connecting dimensions for interchangeable heads

Model	ℓ1	ℓ2	ℓ3	ℓ4	d3	d4	w
SH8D, RH,QH, HH	35	4	10	2	8	3	4.5
SH10D, RH, QH, HH, DH, SH-N	44	5	12	2.5	10	3.5	6
SH12D, RH, QH,HH,DH,RQH	53	6	14	3	12		7
SH15D,RH, QH, HH, DH, RQH, FH	63	7.5	17		15	4.5	8.5
SH19D, RH, QH, HH, DH, RQH, FH	80	9.5	21		19		10.5
SH22D, RH, QH, HH, DH, RQH, FH	100	11	24	3.5	22	5.5	12
SH27D, RH,QH	125	13.5	29	5	27	6.5	15
SH32D, RH,QH	160	16	34	7	32		17.5

※For other dimensions. see p.492

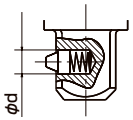
See the method for lengthening on p.356



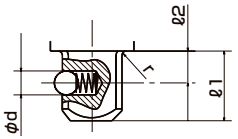
SQUARE DRIVE DIMENSION

NOMINAL SIZE			6.35	9.53	12.7	19.05	25.4	31.75	38.1	44.45	50.8	63.5
DIMENSIONS [mm]	S	MIN.~MAX.	6.260~6.350	9.435~9.525	12.590~12.700	18.920~19.050	25.270~25.400	31.620~31.750	37.970~38.100	44.250~44.450	50.610~50.800	63.380~63.500
	ℓ1		7.5	11.0	15.5	23.0	28.0	34.0	42.0	46.0	56.0	55.6
	ℓ2		4.0±0.18	5.5±0.18	8.0±0.22	10.2±0.27	15.0±0.27	16.0±0.27	19.0±0.27	21.0±0.27	25.5±0.39	38.1±0.39
	e		8.0~8.4	12.2~12.7	16.3~16.9	24.4~25.4	32.4~34.0	39.7~39.9	49.7~49.9	54.7~54.9	59.8~60.0	79.7~79.9
	r		0.5	0.6	0.8	1.2	1.6	2.0			4.0	
	d	THROUGH HOLL	—	3.1	4.1	6	6.5	7	8		9	10
		BALL	3	5	6	7	5 (plunger)	—	10 (plunger)		—	—

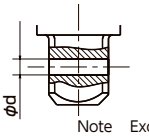
〈Plunger type〉

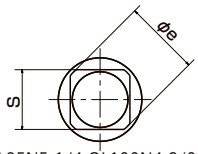


〈Ball type〉



〈Through hole type〉





Note Except for QL25N5-1/4,QL100N4-3/8,QL280N-1/2, QSP25N-1/4,QSP100N4-3/8,QSP280N-1/2, DB25N-1/4S,DB100N-3/8,DB280N-1/2

Protective Head Cover for QL/PQL/QSP/QH or RQH heads.

Part #	870	871	872	873	874
Applicable Models	QL2N~15N(-MH) PQL2N~15N QSP1.5N4~12N4 QH8D	QL25N5(-MH) PQL25N QSP25N3 QH10D	QL50N(-MH) PQL50N QSP50N3 QH12D, RQH12D	QL100N4(-MH) PQL100N4 QSP100N4(-MH)	QL140N(-MH) PQL140N QSP140N3(-MH) QH15D, RQH15D

Part #	875	876	877	878
Applicable Models	QL200N4(-MH) PQL200N4 QSP200N4 DQL200N4 QH19D	RQH19D	QL280N(-MH) PQL280N QSP280N3 DQL280N	QL420N PQL420N QSP420N QH22D, RQH22D

OPTIONAL COLOR CAPS

Part #	879	880	881	882
color	RED	BLUE	GREEN	BLACK
Applicable Models	QL2N~15N, QL25N5-1/4, QL25N5 CL2N~15NX8D, CL25N5X10D			

QL10N (EX. BLACK No.882 standard cap)

879 880 881

EX. Red No.879 EX. Blue No.880 EX. Green No.881

INTERCHANGEABLE BIT

RoHS

How to select bits

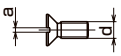
After determining the torque tool, select a bit according to the following instructions:

1.Select root shape from A to H.

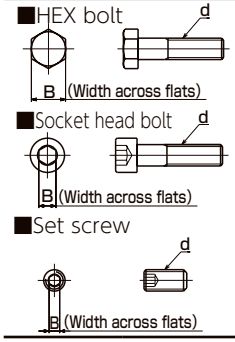
2.Select bit point shape and decide bit model.

Ex.] If you select RTD120CN with the root shape C and the point shape plus bit #1, then, you should choose 106.

※Root shape A, D, E, F, G are TOHNICHI original bits, B, C and H are available in the local market.



BOLT HEAD SHAPE(REF.)



NOMINAL SIZE (d)	WIDTH ACROSS FLATS OF HEX BIT (B)	WIDTH ACROSS FLATS OF SOCKET HEAD BOLT (B)	WIDTH ACROSS FLATS OF SET SCREW (B)
M2.5	5	2	1.27
M3	5.5	2.5	1.5
(M3.5)	6	—	—
M4	7	3	2
(M4.5)	8	—	—
M5		4	2.5
M6	10	5	3
(M7)	11	—	—
M8	13	6	4
M10	16 17	8	5
JIS	JISB1180	JISB1176	JISB1177

⊕ BIT SIZE TABLE A [mm]

No. OF CROSS NOMINAL SIZE OF SCREW	HOLE No.	REMARK
M1.6,M2	#0(S-0)	PAN HEAD SCREW, FLAT HEAD SCREW, PAN FLAT SCREW, BIND SCREW 【 [M3], #1 is bind small screw only 】 【 [M2], #1 is not compliant with ISO 】
[M2],(M2.2) M2.5,[M3]	#1(H-1)	
M3,(M3.5) M4,(M4.5),M5	#2(H-2)	
M6	#3(H-3)	
M8,M10	#4(H-4)	

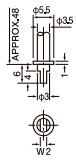
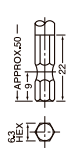
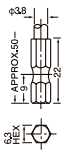
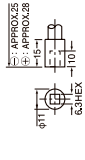
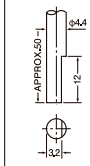
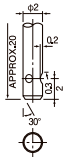
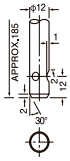
FLAT HEAD SCREW [mm]

NOMINAL SIZE(a)		M1	M1.2	(M1.4)	M1.6	(M1.7)	M2	(M2.2)	M2.3	M2.5	(M2.6)	M3	(M3.5)	M4	(M4.5)	M5	M6	M8	M10
Screw groove width(a)	ISO SCREWS				0.4		0.5			0.6		0.8	1	1.2		1.2	1.6	2	2.5
	NON-ISO SCREWS	0.32			0.4		0.6				0.8		1			1.2		1.6	

POINT SHAPE

POINT SHAPE														
PLUS		MINUS		SQUARE		BOX		HEX		HEXALOBULAR			
SIGN	SIZE	SIGN	SIZE	SIGN	SIZE	SIGN	SIZE	SIGN	SIZE	SIGN	FLAT HEAD	SOCKET HEAD	SET SCREW
0	#0(S-0)	10	0.15×1	□2	□6.35(1/4)	W5.5	5.5	W1.27	1.27	T5	M2		M2.5
1	#1(H-1)	11	0.2×1.5	□3	□9.53(3/8)	W6	6	W1.5	1.5	T6	M2		M3
2	#2(H-2)	12	0.3×2			W7	7	W2	2	T7			M3.5
3	#3(H-3)	13	0.4×2.4			W8	8	W2.5	2.5	T8	M2.5	M2.5	M4
4	#4(H-4)	14	0.6×3.8			W10	10	W3	3	T9			M4.5
		15	0.7×7					W4	4	T10	M3	M3	M5
		16	0.9×7					W5	5	T15	M3.5	M3.5	
		17	1×10					W6	6	T20	M4	M4/M4.5	M6
		18	1×12					W8	8				
		19	1.2×17										
		20	1.6×10										
		21	1.2×8										

ROOT SHAPE

		MANUAL (HAND TOOL)	–	RTD/RTDZ BMRD BMLD FTD50CN～400CN, FTD2CN-S～400CN2-S STC2		FTD8N2-S～FTD16N2-S, old model (FTD8N～16N)	old model (02FTD～2FTD)	AMRD AMLD MTD	LTD2000CN*	–
		PNEUMATIC	U30CN	U (except U30CN)		–	–	–	–	AUR5N
		ROOT SHAPE AND DIMENSIONS								
		SIGN	A	B	C	D	E	F	G	H
BIT POINT	SIGN	SIZE SCREW	TOHNICHI EXCLUSIVE	COMMON (STANDARD)		TOHNICHI EXCLUSIVE	TOHNICHI EXCLUSIVE	TOHNICHI EXCLUSIVE	TOHNICHI EXCLUSIVE	COMMON (STANDARD)
plus	0	#0 (S-0) See Table A	104		109			115		
	1	#1 (H-1) See Table A		85	106	84	70	116		
	2	#2 (H-2) See Table A		86	107	80				
	3	#3 (H-3) See Table A		87		81			35	700
	4	#4 (H-4) See Table A							36	
minus	10	0.15 × 1						111		
	11	0.2 × 1.5						112		
	12	0.3 × 2						113		
	13	0.4 × 2.4	105							
	14	0.6 × 3.8			108		71			
	15	0.7 × 7		88						
	16	0.9 × 7		89						
	17	1 ×10							37	
	18	1 ×12							38	
	19	1.2 ×17							39	
	20	1.6 ×10				82				
	21	1.2 × 8				83				
box		HEX BOLT	BOX HEIGHT	* LTD2000CN2 is sq drive type (□9.53mm).						
	W 5.5	5.5 M3	4mm	91						
	W 6	6 (M3.5)	4mm	95						
	W 7	7 M4	5mm	92						
	W 8	8 (M4.5)M5	5.5mm	93						
	W10	10 M6	6mm	94						
hex		CAP SCREW / SET SCREW								
	W 1.27	1.27 / M 2.5		56						
	W 1.5	1.5 / M 3		57						
	W 2	2 / M 2.5 / M 4		58						
	W 2.5	2.5 / M 3 / M 5		59						
	W 3	3 / M 4 / M 6		60						
	W 4	4 / M 5 / M 8		61						
	W 5	5 / M 6 / M10		62						
	W 6	6 / M 8 / M12(M14)		63						
	W 8	8 / M10 / M16(M18)		64						
SQ.	□ 2	□6.35 (1/4)		90					33	
	□ 3	□9.53 (3/8)							34	
hexalobular		FLAT HEAD / SOCKET HEAD / SET SCREWS								
	T 5	M2 / M2.5			470					
	T 6	M2 / M3			471					
	T 7	/ M3.5								
	T 8	M2.5 / M2.5 / M4			472					

How to order

Indicate model name and Part #

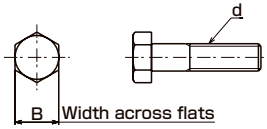
[Ex.] ⊕Bit B - 1 85

Root Shape Sign — Point Shape Sign — Part #

INTERCHANGEABLE SOCKET

RoHS

TOHNICHI torque tools normally tighten bolts through a socket. Select a socket that matches the torque tool. Dimensions of the torque tool square drives are given in the specification column on each page.



WIDTH ACROSS FLATS OF THE BOLT (REF.)

NOMINAL SIZE (d)	HEX HEAD BOLT (B)	SMALL HEX HEAD BOLT (B)	HIGH STRENGTH HEX BOLT FOR FRICTION GRIP JOINT (B)	HEX SOCKET HEAD CAP SCREW (B)	HEX SOCKET SET SCREW (B)
M2.5	5	—	—	2	1.3
M3	5.5	—	—	2.5	1.5
(M3.5)	6	—	—	—	—
M4	7	—	—	3	2
(M4.5)	8	—	—	—	—
M5	8	—	—	4	2.5
M6	10	—	—	5	3
(M7)	11	—	—	—	—
M8	13	12	—	6	4
M10	16 17	14	—	8	5
M12	18 19	17	22	10	6
(M14)	21 22	19	—	12	
M16	24	22	27	14	8
(M18)	27	24	—		
M20	30	27	32	17	10
(M22)	32 34	30	36		—
M24	36	32	41	19	12
(M27)	41	36	46		—
M30	46	41	50	22	—
(M33)	50	46	—	24	—
M36	55	50	—	27	—
(M39)	60	55	—		—
M42	65	—	—	32	—
JIS	JIS B1180	JIS B1180	JIS B1186	JIS B1176	JIS B1177

How to order(Air Tools)

SOCKET

Indicate model name and Part #

[Ex.] SOCKET 3P-10 250

- Socket Inlet sign
- Purpose sign
- Width across flats
- Part #

ADAPTER

Indicate model name and Part #

[Ex.] ADAPTER 3P-2 290

- Inlet Sign (Female)
- Purpose sign
- Inlet sign (Male)
- Part #

How to order(Hand Tools)

SOCKET

Indicate model name and Part #

[Ex.] SOCKET 2H-10 202

- Socket Inlet sign
- Purpose sign
- Width across flats
- Part #

ADAPTER

Indicate model name and Part #

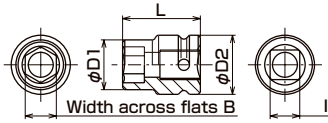
[Ex.] ADAPTER 2H-3 270

- Inlet Sign (Female)
- Purpose sign
- Inlet sign (Male)
- Part #

INTERNAL DRIVE

SIGN	INLET a_1 [mm]	SIGN	APPLICATION
2	□6.35(1/4')	P	For Power tools
3	□9.53(3/8')		
4	□12.7(1/2')	H	For Hand tools
6	□19.05(3/4')		
8	□25.4(1')	C	Convertible

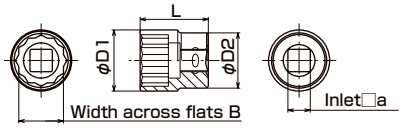
SOCKET for PNEUMATIC TOOL



TYPE	PART #	DIMENSIONS [mm]				
		a	B	D1	D2	L
SOCKET3P-10	250	9.53	10	16	19	25
SOCKET3P-12	251		12	19		
SOCKET3P-13	252		13	20	20	27
SOCKET3P-14	253		14	21.5		
SOCKET3P-16	255		16	24		
SOCKET3P-17	254		17	25.5		
SOCKET4P-14	260	12.7	14	23	27	38
SOCKET4P-16	264		16	25.5		
SOCKET4P-17	261		17	27		
SOCKET4P-18	265		18	28	28	40
SOCKET4P-19	262		19	30		
SOCKET4P-21	266		21	33		
SOCKET4P-22	263		22	34		43

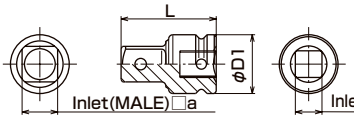
Note 1. O-ring and pin are not included.
2. Use Part # when ordering.

SOCKET for HAND TOOL



TYPE	PART #	DIMENSIONS [mm]				
		a	B	D1	D2	L
SOCKET2H-8	201	6.35	8	11.5	11.5	22
SOCKET2H-10	202		10	14	13	
SOCKET2H-12	203		12	16.5	15	
SOCKET2H-13	204		13	17.5	15	
SOCKET3H-10	210	9.53	10	14.5	17.5	27
SOCKET3H-12	211		12	17.5		
SOCKET3H-13	212		13	18.5		
SOCKET3H-14	213		14	19.5	18.5	
SOCKET3H-16	216		16	22	20	
SOCKET3H-17	214		17	23	21	28
SOCKET3H-18	217		18	25	23	29
SOCKET3H-19	215		19	26	23.5	
SOCKET4H-14	220	12.7	14	20	22	37
SOCKET4H-16	227		16	23	23	
SOCKET4H-17	221		17	24	24	
SOCKET4H-18	228		18	25	25	38
SOCKET4H-19	222		19		24	
SOCKET4H-21	229		21	29	26	
SOCKET4H-22	223		22	30	27	40
SOCKET4H-24	224		24	32.5	28.5	
SOCKET4H-27	225		27	35.9	31	42
SOCKET4H-30	226		30	31.8	34	44
SOCKET6H-21	237	19.05	21	31	34	50
SOCKET6H-22	230		22	32		
SOCKET6H-24	231		24	35	35	
SOCKET6H-27	232		27	38	36	52
SOCKET6H-30	233		30	43	40	55
SOCKET6H-32	234		32	45	42	
SOCKET6H-34	236		34	48	45	58
SOCKET6H-36	235		36	51	46	

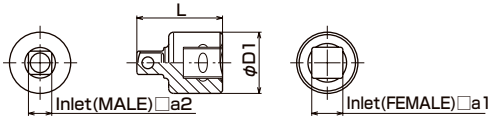
ADAPTER for PNEUMATIC TOOL



TYPE	PART #	DIMENSIONS [mm]			
		a1	a2	D1	L
ADAPTER3P-4	290	9.53	12.7	21	34
ADAPTER4P-3	291	12.7	9.53	25	36
ADAPTER4P-6	292		19.05	23	47
ADAPTER6P-4	293	19.05	12.7	36	50
ADAPTER6P-8	294		25.4	40	61
ADAPTER8P-6	295	25.4	19.05	48	64

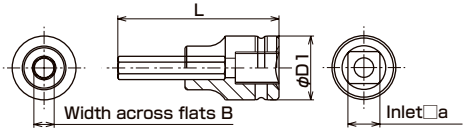
Note 1. O-ring and pin are not included.
2. Use Part # when ordering.

ADAPTER for HAND TOOL



TYPE	PART #	DIMENSIONS [mm]			
		a1	a2	D1	L
ADAPTER2H-3	270	6.35	9.53	12	23
ADAPTER3H-2	271	9.53	6.35	19	25
ADAPTER3H-4	272		12.7	21	34
ADAPTER4H-3	273	12.7	9.53	25	35
ADAPTER4H-6	274		19.05	28	47
ADAPTER6H-4	275	19.05	12.7	36	50
ADAPTER6H-8	276		25.4	35	60

SOCKET for HEX HEAD CAP SCREWS

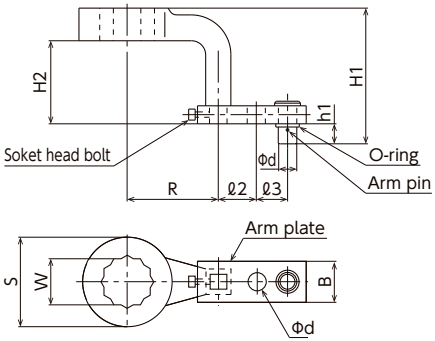


TYPE	PART #	DIMENSIONS [mm]			
		a	B	D1	L
SOCKET2C-2.5	430	6.35	2.5	13	42
SOCKET2C-3	431		3		
SOCKET2C-4	432		4		
SOCKET3C-3	440	9.53	3	19	48
SOCKET3C-4	441		4		
SOCKET3C-5	442		5		
SOCKET3C-6	443		6		
SOCKET4C-6	450	12.7	6	25	54
SOCKET4C-8	451		8		58
SOCKET4C-10	452		10		62
SOCKET4C-12	453		12		67
SOCKET4C-14	454		14		78
SOCKET6C-14	460	19.05	14	44	100
SOCKET6C-17	461		17		
SOCKET6C-19	462		19		

OPTION 1

UNIVERSAL ARM

RoHS

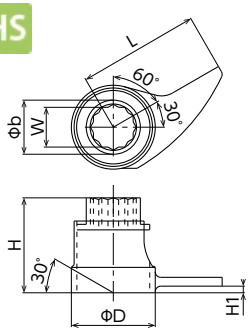


■ Universal type reaction arm for AP2, DECA

MODEL		UA450N	UA900N	UA1800N	UA3000N	UA4500N	UA9000N	UA18000N
MAX. TORQUE [N·m]		450	900	1800	3000	4500	9000	18000
DIMENSIONS [mm]	S	58	71	90	110	128	168	200
	W	36	41	50	60	70	85	110
	B	32	38	50	60	70	85	110
	H1	121	150	165	185	205	255	305
	H2	75	95	100	107	115	150	170
	R	80	102.5	115		127.5	182.5	215
	h1	16	20	25	30	35	45	50
	ℓ2	40	52	65	78	90	110	145
	ℓ3	32	40	50	60	70	85	110
	d	16	20	25	32	38	45	53
WEIGHT[kg]		1.2	2.6	4	7.2	10.9	18	—

SHELL ARM

RoHS



■ Light weight type reaction arm for AP2, DECA

MODEL		SA400N	SA700N	SA1200N
MAX. TORQUE [N·m]		400	700	1200
DIMENSIONS [mm]	W	36	41	50
	ΦD	76	86	96
	Φb	49	56	68
	H	86	108	114
	H1	6		
	L	110	120	130
STANDARD SOCKET LENGTH[mm]		50	62	62

QUICK CHARGER

BC-3-G

BC-4-2

QUICK CHARGER

RoHS

MODEL	BC-3-G	BC-4-2
APPLICABLE MODELS	CEM3-G series, CTA2-G, CTB2-G	ST2-G/ST3-G(-BT)

BATTERY PACK

BP-5

BP-7

BATTERY PACK RoHS

MODEL	BP-3	BP-5	BP-7	BP-100-4
APPLICABLE MODELS	CEM2, CTA, CTB	CEM3-G(-BT, -WF), CEM3-P, CTA2-G, CTB2-G	STC2-G(-BT)	DOTE3/4-G, LC2/3-G, TDT2/3-G, TME2, CD5

Note BP-3 and BP-100 are not in compliance with RoHS

AC ADAPTER RoHS

BA-4

BA-5

BA-6

BA-7

BA-8

AC ADAPTER

MODEL	BA-4	BA-5	BA-6	BA-7	BA-8	US300520
APPLICABLE MODELS	TME2	ATGE-G, BTGE-G	DOTE3/4-G, LC2/3-G, TDT2/3-G, CD5	STC2-G	R-BT, R-FM, R-BLA/BLE	R-DT999

CONNETCTING CABLE RoHS

CONNECTING CABLE

PART#	378	379	380	382	383	384
APPLICABLE MODELS	CTA, CTB→ EPP16M2	CEM2, CEM3-G, CEM3-P, CTA2-G, CTB2-G, R-DT999→ EPP16M2	CD42, TCC→ EPP16M2	DOTE3-G, LC2, LC3-G, TDT2, TDT3-G, TME2→ EPP16M2	DOTE3-G, DOTE4-G, LC2, LC3-G, TDT2, TDT3-G, TME2, CD5→ EPP16M3 (D-SUB 9 Pin FEMALE)	ST2, ST3, STC2-G, ATGE-G, BTGE-G (USB mini B) → PC (USB A TYPE)

PART#	385	561	575	579	584	585
APPLICABLE MODELS	DOTE4-G, LC3-G, TDT3-G→ PC (USB A TYPE)	CD42, TCC→ PC, EPP16M3 (D-SUB 9pin FEMALE)	CEM2, CEM3-G, CEM3-P, CTA2-G, CTB2-G, R-DT999→ PC, EPP16M3 (D-SUB 9pin FEMALE)	CTA, CTB→ PC (D-SUB 9pin FEMALE)	CEM2, CEM3-G/ CEM3(-P), CTA2-G, CTB2-G, R-DT999→ PC(USB A type)	CPT-G→ PC (D-SUB 9pin FEMALE)

Note ( ) shows the pin shape.

OPTION 2

ANTENNA EXTENSION CORD

FH-COD

ANTENNA EXTENSION CORD

RoHS

MODEL	FH-COD
APPLICABLE MODEL / SPEC	R-FH256, R-FHD256 (Length 9.5m)

Extends antenna from R-FH256/R-FHD256 receivers to improve communication conditions.

MAGNETIC ANTENNA HOLDER

FH-MHD

MAGNETIC ANTENNA HOLDER

RoHS

MODEL	FH-MHD
APPLICABLE MODEL / SPEC	R-FH256, R-FHD256 (Length 1.5m)

Use this to fix the position of extended antenna.

PROTECTIVE COVER

PROTECTIVE COVER

MODEL	FH-PCV	FHSLS-PCV	BL-PCV
APPLICABLE MODEL / SPEC	T-FH256MC, T-FH256MC-LS／MATERIAL: Silicon	T-FHSLS256, T-FMA／MATERIAL: Silicon	T-BL, T-BLA, T-BLE／MATERIAL: NBR

Put it on the transmitter (T-FH256) to protect from physical damage.

FH-PCV

FH-PCV set on QLFH100N4

BL-PCV

LS CONNECTOR

WA5219K

WF6215

LS CONNECTOR

RoHS

MODEL	WA5219K	WF6215
DESCRIPTION	FEMALE CONNECTOR	MALE CONNECTOR

LS CORD

500

LS CORD

RoHS

PART #	500	501
DESCRIPTION	CURL CORD with LIMIT SWITCH	CURL CORD with MICRO SWITCH

ACCESORIES for TT2000

ULTRASONIC SENSOR

MODEL	APPLICABLE BOLT
5C6.4N	More than M8
5C12.7N	More than M14

BATTERY BOX

Above image shows Body+Battery box

Specification	8h USAGE, 4.5h CHARGE
Dimensions	H160×W246×D246mm
Weight	4.9kg

AXIAL FORCE CALIBRATOR AFC-20G

Measurement Bolt	Under Φ20 mm, Stem length 80 ～ 300 mm
Maximun Tension	200kN
WEIGHT	37kg
Dimension	H435×W300×D270㎜
1 digit	0.1kN

PORTABLE BATTERY

Specification	2.5h USAGE, 1.5h CHARGE
Dimensions	H191×W102×D33mm
Weight	0.6kg

Torque Wrench Tester/Checker and Torque Gauge Optional Accessories

In order to make the torque wrench/driver measurement more effective and easier, we prepare various optional accessories. Also as per your request, we'll make special ordered accessories just for you.

TDT Option

Hex Adapter
■ For calibration of small size torque wrench with TDTLA.

PART#	480	481	482	483	484
SQ. DRIVE	6.35				
HEX SIZE	W5.5・8・12	W6・10・13	W7・11・14	W16・19・22	W17・21・24
APPLICABLE MODEL	TDTLA				

Loading Device Connecting Adapter for TDT/TDT2
■ For attaching new loading device on the old TDT models.

PART#	485	486
DESCRIPTION	Loading devise adapter	Loading devise adapter set
COMPONENTS	Adapter, screw × 3	Adapter, screw × 3, Fixing knob, clamping tool, bit × 2
APPLICABLE MODEL	TDT/TDT2	

Note No.485 is for TDT/TDT2 models to use TDTLA3
No.486 is for TDT/TDT2 models to use STA/LTA

DOTE・DOT・TCC・TF・LC Option

RoHS

DA Down Adapter
■ For downsizing square drive.

MODEL		DA3-2	DA4-3	DA6-4	DA8-6	DA12-8
PART#		296	297	298	299	300
DIMENSIONS [mm]	INLET DRIVE (MALE)	9.53	12.7	19.05	25.4	38.1
	INLET DRIVE (FEMALE)	6.35	9.53	12.7	19.05	25.4
	HEIGHT	12	15	19	26	44
	DIAMETER	13	18	28	35	55
ALLOWABLE TORQUE [N・m]		14	70	220	750	2100
WEIGHT APPROX [g]		5	11	34	66	320
APPLICABLE MODEL		DOTE、DOT、TCC、T F 、LC				

Note Do not use two down adapters at a same time. (EX: Insert DA3-2 in the DA4-3)

Hex Adapter
■For calibration of SP/RSP with testers.

PART#	285	286	287	288
SQ. DRIVE	9.53	12.7		
HEX SIZE	W7・8・9	W16・18・21	W17・22・27	W19・24・30
APPLICABLE MODEL	DOTE4-G、DOT、TCC2-G、T F			

Hex Adapter for LC
■ Hexagonal size combination Fee Adapter

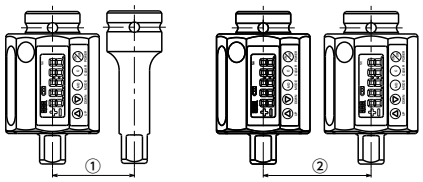
PART#	282	280
SQ. DRIVE	9.53	12.7
HEX SIZE	W8、10、12、13、14、17	W8、10、12、13、14、19、22
APPLICABLE MODEL	LC20N2/3-G	LC200N2/3-G

Note Use three different HEX size in combination.

ST Option

Extension bar for ST3-G
■ It makes easy to check multiaxis machine tools.

PART#		283	281	247	248	249
APPLICABLE MODEL		ST10N3-G (-BT)	ST20N3-G (-BT)	ST50N3-G (-BT) ST100N3-G (-BT) ST200N3-G (-BT)	ST500N3-G (-BT)	ST1000N3-G (-BT)
MINIMUM WHEEL BASE [mm]	①	40			55	60
	②	50			70	



ATG•ATGE/BTGE Option

Measurement stand for ATGE-G/BTGE-G
■ To firmly fix ATGE-G/BTGE-G to use as table top configuration.

PART#	808	809
APPLICABLE MODEL	ATGE-G	BTGE-G

Table Attachment for ATGE-G/BTGE-G
■ 4 poles are designed to clamp objects of any shape (chucking diameter ϕ10- ϕ58)

PART#	800
APPLICABLE MODEL	ATGE-G/BTGE-G

Calibration adapter for ATGE-G/BTGE-G
■ Adapter for calibration devices (ATGTCL/BTGTCL) to mount on ATGE-G/BTGE-G

PART#	806	807
APPLICABLE MODEL	ATGE-G	BTGE-G

Battery Pack
■ 2 AA batteries: MAX 50hr. continuous use.

PART#	BP-C1
APPLICABLE MODEL	ATGE-G/BTGE-G

Resin Chuck
■ For fragile objects.

PART#	322
APPLICABLE MODEL	ATG/ATGE-G

ATGE-G with table attachment and measurement stand.

BTGE-G with measurement stand.

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Click Type Torque Wrench P.202~309

Ratchet Head Adjustable

QL P.212 0.4~420 [N·m]

QLE2 P.216 100~2800 [N·m]

QL-MH P.218 0.4~280 [N·m]

MTQL P.222 5~140 [N·m]

DQL / DQLE2 P.224 40~1000 [N·m]

Ratchet Head Pre-Lock

PQL P.220 2~420 [N·m]

TiQL / TiLQL / TiEQL(E) P.246 40~1400 [N·m]

PQLZ P.248 5~100 [N·m]

Interchangeable Pre-Lock

PCL P.240 2~200 [N·m]

Multiplier Click Type

TW2 P.226 350~1000 [N·m]

Interchangeable Adjustable

CL P.230 0.4~420 [N·m]

CLE2 P.234 100~1200 [N·m]

CL-MH P.236 0.4~280 [N·m]

SCL P.238 5~200 [N·m]

YCL2 P.242 5~180 [N·m]

Pipe-Wrench Head

PHL / PHLE2 P.228 10~1300 [N·m]

Preset

SP P.266 90~560 [N·m]

SP2 P.268 0.4~310 [N·m]

SP2-MH P.270 0.4~310 [N·m]

RSP2 / RSP2-MH P.272 2~310 [N·m]

QSP / QSP-MH P.250 0.3~420 [N·m]

QRSP P.264 10~45 [N·m]

CSP / CSP-MH P.254 0.3~420 [N·m]

BQSP P.258 5~420 [N·m]

BCSP P.260 5~420 [N·m]

QSPZ P.262 5~100 [N·m]

SP2-H / SP2-H-MH P.274 8~120 [N·m]

NSP P.278 50~100 [cN·m]

SP2-N / SP2-N-MH P.276 3.5~38 [N·m]

QSPCA P.252 2~70 [N·m]

SCSP P.256 5~200 [N·m]

Moto Tork

MT70N P.244 10~70 [N·m]

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Power Torque Tool P.360~387

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U / UR P.368 10~1000[cN·m]

Electric Straight
DU P.370 10~250[cN·m]

Battery Type Pistol
HAT P.366 10~25[N·m]

Airtork Angle
A3 P.372 3~180[N·m]
AC3 P.374 5~180[N·m]
AS P.380 6~120[N·m]

Battery Type Angle
HA/HAC P.376 5~200[N·m]

Airtork Pistol
AP2 P.378 100~4000[N·m]

Multiple Unit P.388~399

Multiple Unit Straight
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MF P.392 3~12[N·m]
ME P.394 10~126[N·m]
MC2 P.394 100~4000[N·m]

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P.456

R-BT
P.458

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EPP16M3
P.464

R-DT999
P.466

TDMS / TDMSHT
P.468

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TP / DTF / TTF+ATF
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0.25~1800[N·m] ※TP

Torque Attachment

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90~18000[N·m]

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MEMO

TORQUE HANDBOOK vol. 9

Your Torque Partner
TOHNICHI

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UD FONT

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