ZIPPTORK
Bolting Technology

Torque Control Series Products

Introduction

ZIPP Assembly Technology presents fastening solutions for the industrial assembly market in bolting threaded fasteners, squeezing solid rivets, riveting blind rivets and rivet nuts, and fastening lock bolts, etc.

This system takes advantage of our combined patented control device, control algorithm, and wireless rotary torque transducer, with the best practice on IoT (Internet of Things), making the controllability and traceability of fastener assembly, fastening processes, and fastening records possible and accessible.

An Innovative Revolution of Impact Wrench Torque Control

Making the torque control easy and affordable

No more precision and costly torque-controlled tools required,

regardless of air tool brand, manufacturer, design, and grade.

Applicable to

Any Air Driven Continuous & Discontinuous Torque Tools

Air Clutch Tools

Air Impact Driver

Air Impact Ratchet

Air Pulse Wrenches

Air Impact Wrenches

Geared Wrench / Torque Multipliers

&

Electrical / Cordless Tool with auto-shut off Torque Control Mechanism

ZIPPTORK Bolting Torque Control Solution

Real Time Monitoring / Data Logging / Intelligent Control / Auto Compensation

◀ **Applications**

ZIPPTORK **Wireless Torque Transducer and Torque Controller are applicable to most of power torque tools for bolting intelligently with excellent torque control accuracy and data collection.**

- **Prior to Assembly**: For checking the torque tool capability and calibrating the torque setting.
- **During Assembly**: For controlling and recording the torque being applied to the bolted joint instantly and wirelessly.
- **After Assembly**: For effectively verifying the residual torque accuracy with angle / torque mode.

◀ **Wireless Torque Transducer**

- Patented anti-vibration mechanism, designed for tolerating violent vibration of discontinuous torque tools during assembly.
- Ideal for
  1. dynamic toque control of air impact wrenches, oil pulse wrenches to do closed loop torque control.
  2. oil pulse wrench or clutch type torque tool or the torque tool equipped with built-in torque mechanism to do torque calibration prior to work and real time torque monitoring during assembly while display the data in the tablet instantly via a Dongle and APP for further transmitting to peripheral devices or cloud server.
  3. click wrench to collect torque data as soon as it clicks to make audible click visible.

◀ **Torque Controller**

- With patented control algorithm and device for controlling the output torque of all continuous and discontinuous air driven torque tools especially air impact wrenches, air ratchet wrenches, air oil pulse wrenches as well as geared torque multipliers, regardless of tool brand and its designed mechanism with proven satisfactory control accuracy and durability.
- Programmable function of bolting sequence control while applying with the tagged bolt or sensing bolt.
- Solves problems of torque loss that may be caused by the variation of the joint hardness, the rise of temperature of hydraulic fluid in pulse tools or the posture of holding the tool during continuous operation and compensate the dynamic torque loss automatically within its allowable working torque range.

Cloud Server

Torque Controller

- **Standard Packaging**:

  Controller, Power cable, Air Hose Coupler, Antenna x 2.,

  TCA-IPC01 Controller Inlet – 2M hose+coupler + F.R unit -10kg/cm2 max.,

  & **TCA-OPC01** Controller Outlet – 3M hose+coupler.
- **Optional Accessories**:

  1. 24V Tri-color light pole w/ Buzzer

  2. Barcode Scanner

  3. Printer.

Optional:
ZTPAMB6-73ROG
24V Tri-color light pole w/ Buzzer

Software & Functions

- **Pulse Wrench**

  - Transducer mode (Work with transducer)

  - Pressure mode (Without transducer)

  - Track mode (For soft joint)
- **Torque wrench**

  - Torque

  - Torque + Angle

  - Click wrench track mode

  - Click wrench inspection mode

- **Impact Wrench**

  - Transducer mode (Work with transducer)

  - Pressure mode (Work without transducer)

  - Track mode (For soft joint)
- **Job sequence**
- **Geared Wrench (Opt. mode)**
- **Torque Tester (Opt. mode)**
- **Torque multiplier (Opt. mode)**

- Signal Source: Torque Transducer, Air Pressure Sensor, Sensing Bolt or Tagged Bolt.
- Torque Revise: Deviation & Replacement.
- Tool Torque Capacity Calibration: Easy set-up **TH** & **TL** within operable working air pressure range in minutes.
- Target Torque Setting: Any target torque value can be selected and inputted within the calibrated torque range.
- Working air pressure : Automatic adjusted to correspondent target torque (Inlet Air Pressure between 100~120psi is recommended).
- Air flow rate: Only **TCA**/**TCB** equipped with digital flow meter. Turn the tool air flow regulator to maximum, the system will regulate the proper flow rate to correspondent target torque automatically.
- Bolting in stages: Preset the bolting stages and percentage of target torque for each stage from 1 to 4 stages as required. The system will regulate the air pressure and flow rate correspondently.
- Number of bolts: Preset the number of bolts to be fastened. Only when all bolts of each stage fastened, the system will switch to next stage and regulate the air pressure and flow rate correspondently and automatically.
- Torque Compensation: The system will compensate the torque loss that may be caused by the variation in the bolted joint hardness or the rise in temperature of hydraulic fluid of pulse wrench or the posture of operator to hold the tool during the process automatically within its allowable working air pressure range.
- Remote monitoring: Via Internet or Ethernet with **VNC** to monitor data on cell phone, tablet and PC, or to do parameter setting on the torque controller.
- Operation Management: Constraints Via permission setting to access the operable functions such as logging the operator's ID and duration of operation.
- Torque Control Accuracy: ±5%~±15%.
- Job Sequence: Support 10 sets of torque tool preset available for bolting sequentially.
- Production Record: Traceable through USB, Ethernet or exported to the cloud server through wired or wireless connections.
- Torque Controller Warranty period:

  * 12 months from purchase date.

  * Manufacturer will repair or replace, any defects due to faulty materials or workmanship. This Warranty does not cover part failure due to broken / missing seal label, misuse, modification, negligence, abuse or normal wear and tear.

TCA/TCB Torque Controller

TCA-2000

- Blue: Tightening Process
- Green: Transducer Connected

266 mm

370 mm

214 mm

RS232 Port
RF2.4G Antenna
USB Update Port
USB Charger Port

RJ45 Port
Speaker
Buzzer

Light Tower Port
Power Switch
Power Inlet

Fuse
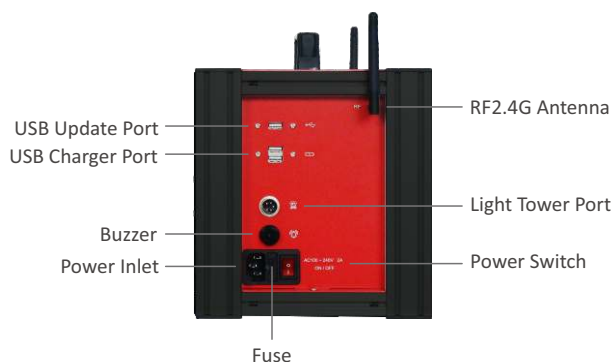
RF2.4G Antenna
Air Outlet

Air Inlet
Air Exhaust

TCB-2000

- Green: Tightening Process
- Blue: RF Connected
- Red: Bluetooth Connected

210 mm

320 mm

217 mm

USB Update Port
USB Charger Port
RF2.4G Antenna

Buzzer
Light Tower Port

Power Inlet
Power Switch

Fuse

BT Antenna
Air Outlet

Air Inlet
Air Exhaust

Products and specifications subject to change without prior notice

TCA/TCB Torque Controller

Model		TCA-2000	TCB-2000
Max. Flow Rate		2000 L/min	2000 L/min
Touch Panel Size		10" Touch Panel	NB / Tablet
Power Source		AC 100V~240V /2A	AC 100V~240V /2A
Connection Port	USB	1	1
	RS232	2	1
	RJ45	1	N/A
Wireless Antenna	RF2.4G	2	1
BT Antenna		Yes	1
Speaker		1	1
Light Tower Output Port		1	1
Buzzer		80dB	80dB
USB Charger Port		2	1
Flow Rate Detection		Yes	No
Automatic Flow rate Control		Yes	No
Operation Mode	Oil Pulse Wrench	Yes	Yes
	Air Impact Wrench	Yes	Yes
	Manual Torque Wrench	Yes	Yes
	Air Torque Multiplier	Yes	Yes
	Job Sequence	Yes	Yes
Control Accuracy	Static Torque (%)	±1%~±5%	±1%~±5%
	Dynamic Torque (%)	±5%~±15%	±5%~±15%
Thread Size	Inlet	1/2" NPT	1/2" NPT
	Outlet	1/2" NPT	1/2" NPT
Language		Simplified Chinese, Traditional Chinese, English, Japanese & Espanyol	Traditional Chinese, English & Espanyol
System Parameter		Yes	Yes
Static Torque		Yes	Yes (torque & angle)
Dynamic Torque		Yes	Yes
Multi-stage training		No	Yes
Job Sequence (Dynamic & Stastic)		Dynamic	Dynamic + Stastic
Tyre Assembly System		No	Yes
Display		HMI on-board	On-board or Separate display
Job Data		Total number of bolts	Single day report, Single job report & bolts counting
Cloud		FTB	WEB
Job Data Export		All data in Excel format	Can choose of date to export in Excel, PDF or CSV format
Job Data Memory		150K	No Limit
Torque Curve Display		No	Yes
Dimensions	Length(L)	370mm	320mm
	Width(W)	214mm	217mm
	High(H)	266mm	210mm
Net Weight		10.5kg±0.5kg	6kg±0.5kg

ZBSC-BT-421 BT

Bluetooth Barcode Scanner
for use on Android PAD or Window PC / Laptop

ZBSC-N-421 RF 2.4G

RF 2.4G Barcode Scanner
for use on TCA/TCB Torque Controller, Android PAD or Window PC / Laptop

	ZBSC-BT-421	ZBSC-N-421
Specification	**Descriptions**	
Communication	Blue tooth Class II, Blue 4.0	RF 2.4G
Memory	2MB	
Main Battery	2000 mAh, Li-ion Battery	
Keys	One Key	
Indicator	Beep and LED	
Interfaces	SPP & HID Interface (Compatible Android, iOS, Windows Mobile)	
Battery Charge Time	Approx. 4-5 hours per full charge	
Scan per full charge	30,000 scans	60,000 scans
Scan Speed	270 Scans/sec.	
Light Source	RED LED (660nm)	
Resolution	0.075mm (3mil)	
PCS value	30% or more	
Scan Angle	45°	
Scan Width	Up to 250mm or more (PCS90%)	
Scan Distance (PCS 90% code 39)	20-600mm (PCS 90%)	
Decodable Capability	Code 39. Full ASCll Code 39, Code 32, Code 128, Code 93, Code 11, Codabar/NW7, All UPC/EAN/JAN code (EAN-13, EAN-8, UPC-A, UPC-E, EAN-128), Interleave 2 of 5, STD 2 of 5, Industrial 2 of 5, matrix 2 of 5, Chinese Postage Code, IATA, MSl/PLESSY, Italian Pharmacy Code, Telepen. RSS-14, RSS Limited, RSS Expanded	
Electrical		
Voltage	5V DC ±5%	
Operation Current	100-120mA	
Stand-by Current	20-30mA	
Environment		
Operating Temperature	32°F to 105°F (O°C to 50°C)	
Storage Temperature	-15°F to +140°F (-26°C to 60°C)	
Humidity	10% to 90% RH	
Drop	Approved by 1.5M drop test on concrete	
Ambient Light Rejection	6000 Lux max. (Fluorescence)	
Safety Approval	CE & RoHS	
Physical		
Case Material	ABS + Rubber	
Dimension	L:166mm W:66mm H:86mm	
Weight	150g	
Standard package	1.Main unit 2.Micro USB cable 3.Quick Guide manual	

ZP-9363 80mm Thermal Receipt Printer with LAN

Specification	Descriptions	
Print	Printing Method	Thermal Line
	Printing Speed	300 mm/sec.
	Resolution	8 dots/mm, 576 dot/line
	Effective Printing Width	72mm
Character	Character Set	ANK, GB18030 (Chinese)
	Print Font	ANK: 12*24.9*17, Chinese: 24*24
	Character per Line	48-font A/64-font B
Paper Spec	Paper Type	Thermal paper
	Paper Width	79.5±0.5mm
	Paper Roll Diameter	Max: 80mm
	Roll Core Inner Diameter	13mm (min)
	Paper thickness	0.06 to 0.07mm
Paper Supply Method		Dorp-in paper load
Reliability	MCBF	60 million line
	Auto Cutter	1,000,000 cuts
	TPH	100km
Barcodes	UPC-A, UPC-E, EAN-13, EAN8, CODE39, ITF, CODEBAR, CODE39, CODE128	
Emulation	ESC/POS	
Driver	Windows 2000/XP/7/Vista/8	
Sensor	Paper Near End Secsor. Paper End Sensor	
Interface	RS-232+USB or USB+LPT1	
Power Supply (Adapter)	AC100-240V (±10%), DC24V, 2.5A	
Auto Cutter	Type	Guillotine
	Life	1,000,000 cuts
Physical	Net Weight	1.12kg
	Printer Dimension (W*L*H)	136*130*179mm
Application	Restaurants, Department Stores, Kitchen, Convenience Stores, Specialy Retail, Super market	

Wireless Torque Transducer

- The only wireless Torque Transducer applicable to impact or oil pulse torque tool for dynamic bolting.
- Designed with unique patent pending anti-vibration mechanism for dynamic bolting torque control under violent impacts.
- Standard Packaging: Torque Transducer, Charging Cable & Magnet Switch.
- Optional Accessories:
  1. Dongle for Android Pad or Window PC/Laptop.
  2. Transducer Protection Cover.

Optional Dongle:
P/N: **DG-CP** for **Android**
P/N: **DG-WIN** for **Window**

Charger	Type-C 5V/1A
IO(1)	USB Type-C *1
IO(2) Wireless	RF 2.4G up-to 20M
Zero Balance	<±0.5% FSD/°C
Static Accuracy	±1% FSD
Temperature	-10°C~60°C
Humidity	10~75% Non-condensing
Charging time	5% to 100%, 2 hours

Optional Transducer
Protection Cover:
P/N: **TPC-100** for **20/50/100Nm**
P/N: **TPC-250** for **180/250Nm**
P/N: **TPC-500** for **500/750Nm**
P/N: **TPC-2000** for **1000/1500/2000Nm**

Software and Functions

- Applicable to:
  Oil Pulse Wrench, Impact Wrench, Geared Wrench, Torque Wrench, Clutch Type, Torque Tool & Click Wrench.
- Measurement: Torque, Angular Movement & Pulse Count.
- RF Working Frequency: 60 channels available to be paired with **TCA**/**TCB**.
- Functions Check: Automatic check the status of power rate, signal quality, torque & angle, etc. when turned on.
- Switch: Use magnet to turn on.
- LED Light:
  Blue/Orange twin color:
  Orange last long~Low Power, Blue last long~RF in communication, Blue twinkling~pairing with Controller, Orange Twinkling~Abnormal.
  Red/Green twin color：Red~In Charging, Green~Full Charge.

Wireless Torque Transducer

- Minimum system requirements:

Dongle

Dongle

Window system

Android system

monitor upto FOUR tools at a time

	Windows	android
Operating system	Windows 10	Android 7.0 or above
Minimum CPU	Core i3	Quad core
Minimum system memory (RAM)	4G	3G
Minimum free storage space:	32GB	32GB

- Warranty period:
  * Torque Controller - 12 months from purchase date.
    Manufacturer will repair or replace, any defects due to faulty materials or workmanship. This Warranty does not cover part failure due to broken / missing seal label, misuse, modification, negligence, abuse or normal wear and tear.
  * Transducer -
    TTE(**H**) series: 12 months from purchase date or 200,000 cycles.
    TTA(**H**) & **TTEB** series: 12 months from purchase date or 500,000 cycles.
    Battery: 3 months from purchase date.
    Signal acquisition board: 12 months from purchase date.
    Manufacturer will repair or replace, any defects due to faulty materials or workmanship. This Warranty does not cover part failure due to over torque, using **TTA**(**H**) series on impact tools or cordless tools, broken /missing seal label, misuse, modification, negligence, abuse or normal wear and tear.
  * Dongle - 12 months from purchase date.

Wireless Torque Transducer

ITEM NO.	Torque Range Nm	Inlet Size	Outlet Size	Profile Dimension O.D. X Length (mm)	Net Weight kgs	Battery Capacity
TTES-20-FS3MS3(B)	2~16	3/8"	3/8"	45x83	0.18	DC3.7V/650mAh
TTES-50-FS3MS3(B)	5~40	3/8"	3/8"	45x83	0.2	DC3.7V/650mAh
TTES-100-FS3MS4(B)	10~80	3/8"	1/2"	45x90	0.21	DC3.7V/650mAh
TTES-180-FS4MS4(B)	18~145	1/2"	1/2"	45x97	0.26	DC3.7V/650mAh
TTES-250-FS4MS4(B)	25~200	1/2"	1/2"	45x97	0.35	DC3.7V/650mAh
TTES-500-FS4MS6	50~400	1/2"	3/4"	57x114	0.7	DC3.7V/650mAh
TTES-750-FS6MS6	75~600	3/4"	3/4"	57x114	0.75	DC3.7V/650mAh
TTES-1000-FS8MS8	100~800	1"	1"	57x127	0.85	DC3.7V/650mAh
TTES-1500-FS8MS8	150~1200	1"	1"	57x134	0.95	DC3.7V/650mAh
TTES-2000-FS8MS12	200~1600	1"	1-1/2"	57x144	1.14	DC3.7V/650mAh
TTES-3000-FS12MS12	300~2400	1-1/2"	1-1/2"	86x166	3.8	DC3.7V/650mAh
TTAS-20-FS3MS3(B)	2~20	3/8"	3/8"	45x83	0.18	DC3.7V/650mAh
TTAS-50-FS3MS3(B)	5~50	3/8"	3/8"	45x83	0.2	DC3.7V/650mAh
TTAS-100-FS3MS4(B)	10~100	3/8"	1/2"	45x90	0.21	DC3.7V/650mAh
TTAS-180-FS4MS4(B)	18~180	1/2"	1/2"	45x97	0.26	DC3.7V/650mAh
TTAS-250-FS4MS6	25~250	1/2"	3/4"	45x104	0.35	DC3.7V/650mAh
TTAS-500-FS6MS6	50~500	3/4"	3/4"	57x114	0.55	DC3.7V/650mAh
TTAS-750-FS6MS8	75~750	3/4"	1"	57x114	0.75	DC3.7V/650mAh
TTAS-1000-FS8MS8	100~1000	1"	1"	57x127	0.85	DC3.7V/650mAh
TTAS-1500-FS8MS8	150~1500	1"	1"	57x134	0.95	DC3.7V/650mAh
TTAS-2000-FS8MS12	200~2000	1"	1-1/2"	57x144	1.14	DC3.7V/650mAh
TTAS-3000-FS12MS12	300~3000	1-1/2"	1-1/2"	86x166	3.8	DC3.7V/650mAh

TTES series are designed for dynamic bolting works while **TTAS** series are for static torque control and measurement.
For transducers above 2000Nm will all be custom made, please contact us for price.
***B** = Detent ball anvil, **w/o B** = Lock pin anvil

ITEM NO.	Torque Range Nm	Inlet Size	Outlet Size	Profile Dimension O.D. X Length (mm)	Net Weight kgs	Battery Capacity
TTEH-180-FS4FH17L	18~145	1/2"	Hex. 17	45x134	0.5	DC3.7V/650mAh
TTEH-180-FS4FH19L	18~145	1/2"	Hex. 19	45x134	0.5	DC3.7V/650mAh
TTEH-180-FS4FH21L	18~145	1/2"	Hex. 21	45x131	0.5	DC3.7V/650mAh
TTEH-250-FS4FH18	25~200	1/2"	Hex. 18	45x94	0.28	DC3.7V/650mAh
TTEH-250-FS4FH24	25~200	1/2"	Hex. 24	45x97	0.34	DC3.7V/650mAh
TTEH-500-FS4FH27	50~400	1/2"	Hex. 27	57x102	0.7	DC3.7V/650mAh
TTEH-500-FS6FH27	50~400	3/4"	Hex. 27	57x111	0.75	DC3.7V/650mAh
TTEH-750-FS6FH46	75~600	3/4"	Hex. 46	57x128	0.8	DC3.7V/650mAh
TTEH-1000-FS8FHM30L	100~800	1"	Hex. 30	57x169	1.65	DC3.7V/650mAh
TTEH-1000-FS8FHM32L	100~800	1"	Hex. 32	57x169	1.6	DC3.7V/650mAh
TTAH-180-FS4FH17L	18~180	1/2"	Hex. 17	45x134	0.5	DC3.7V/650mAh
TTAH-180-FS4FH19L	18~180	1/2"	Hex. 19	45x134	0.5	DC3.7V/650mAh
TTAH-180-FS4FH21L	18~180	1/2"	Hex. 21	45x131	0.5	DC3.7V/650mAh
TTAH-250-FS4FH18	25~250	1/2"	Hex. 18	45x94	0.28	DC3.7V/650mAh
TTAH-250-FS4FH24	25~250	1/2"	Hex. 24	45x97	0.34	DC3.7V/650mAh
TTAH-500-FS4FH27	50~500	1/2"	Hex. 27	57x102	0.7	DC3.7V/650mAh
TTAH-500-FS6FH27	50~500	3/4"	Hex. 27	57x111	0.75	DC3.7V/650mAh
TTAH-750-FS6FH46	75~750	3/4"	Hex. 46	57x128	0.8	DC3.7V/650mAh

This series of Transducer can be custom made with specific size of hexagonal opening for correspondent size of bolt or nut.

ITEM NO.	Torque Range Nm	Inlet Size	Outlet Size	Profile Dimension O.D. X Length (mm)	Net Weight kgs	Battery Capacity
TTEB-5-MHB6FHB6	0.5~5	Hex. 6.35	Hex. 6.35	45x121	0.15	DC3.7V/650mAh
TTEB-10-MHB6FHB6	1~10	Hex. 6.35	Hex. 6.35	45x121	0.15	DC3.7V/650mAh
TTEB-20-MHB6FHB6	2~20	Hex. 6.35	Hex. 6.35	45x121	0.15	DC3.7V/650mAh

TTEB series are designed for screwdrivers with bit holder.

ITEM NO.	Torque Range Nm	Inlet Size	Outlet Size	Profile Dimension O.D. X Length (mm)	Net Weight kgs	Battery Capacity
TTER-1000-FS4FH30	1000	1/2"	Hex. 30	60x118.7	1.3	DC3.7V/650mAh

TTER type Transducer can be custom-made upon request while ordering.

Wireless Rotary Torque Transducer
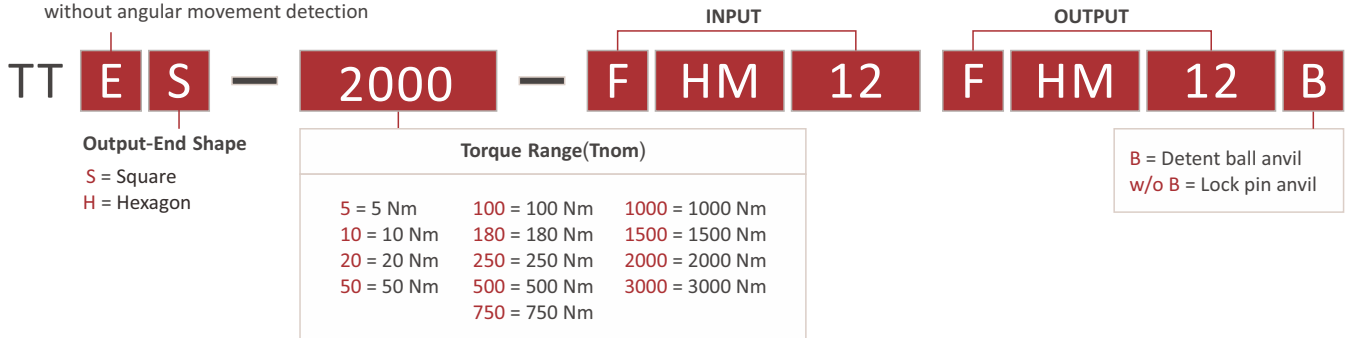
Standard Type / Hybrid Type

E = Without angular movement detection
A = For torque wrench mode only, with angular movement detection
R = For sequence control, detect the sensing bolts and tagged bolts but without angular movement detection

F = Female	S = SQ.	Sizw = 3, 4, 6, 8, 12
M = Male	HM = Metric Hex.	
	HI = Imperial Hex.	
	HB = Bit Hex.	

INPUT   **OUTPUT**

| TT | E | S | — | 2000 | — | F | HM | 12 | F | HM | 12 | B |

Output-End Shape
S = Square
H = Hexagon

B = Detent ball anvil
w/o B = Lock pin anvil

Torque Range(Tnom)

5 = 5 Nm	100 = 100 Nm	1000 = 1000 Nm
10 = 10 Nm	180 = 180 Nm	1500 = 1500 Nm
20 = 20 Nm	250 = 250 Nm	2000 = 2000 Nm
50 = 50 Nm	500 = 500 Nm	3000 = 3000 Nm
	750 = 750 Nm	

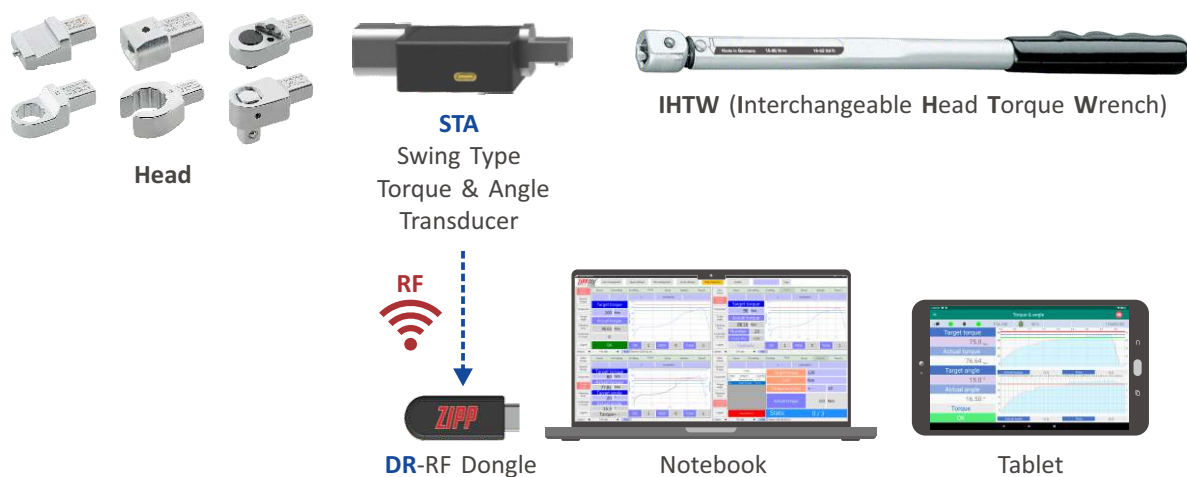| Item		
T_{nom}	50~2000Nm	5~20Nm
Power	DC 3.7V / 650 mAh	DC 3.7V / 650 mAh
Measured Range	10% T_{nom}~100% T_{nom}	10% T_{nom}~100% T_{nom}
Torque Resolution (Nm)	0.1% T_{nom}	0.1% T_{nom}
Accuracy (CW)	±1%	±1%
Accuracy (CCW)	±2%	±2%
Static Measured Angle Range	0°~360°	0°~360°
Angle Resolution (Degree)	0.5°	0.5°
Maximum Torque (Nm)	100% T_{nom}	100% T_{nom}
Wireless communication	RF 2.4GHz	
Cable	USB-Type C	
Charger	USB (5V/1A)	
Operation Temperature (°C)	0°C~50°C	
Storage Temperature (°C)	-10°C~60°C	

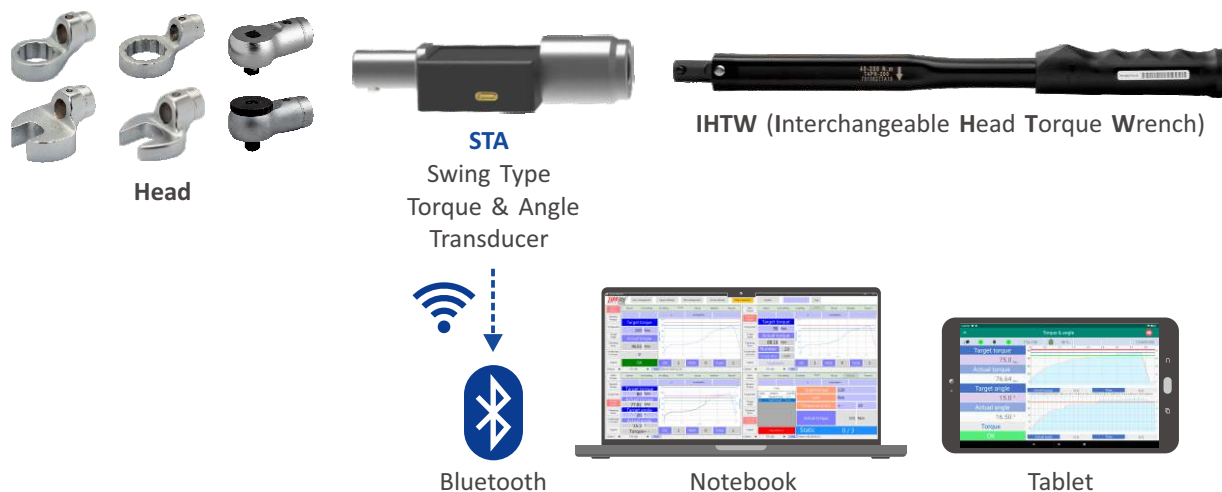# STA Swing Type Torque & Angle Transducer

Features

- Making it possible to control the torque and collect data of any "Interchangeable Head Torque Wrench"

- Flexibility to expand the use of "Interchangeable Head Torque Wrench" with other structure types of heads.

- Patented design with wireless transmission for an easy adapt or upgrade between various types of "Interchangeable Head Torque Wrench" and the heads

- Easy to use torque tester, torque transducer and angle gauge for torque and angle calibration

- Laptop or tablet for setting, torque calibration and data collection

- It's required to do calibration again once any head, the **STA** transducer or the wrench is replaced to ensure the accuracy of torque, angle sensing and control.

- After changing any of the heads, the **STA** or the wrench and re-calibrating it, a new indication is prompted for easy adjustment of the scale while making audible clicks visible and torque data collectable.

- RF or BT wireless transmission versions are available for option.

- RF version requires a **DR**- RF DONGLE signal receiver

- Customized sizes are acceptable.

System Architecture

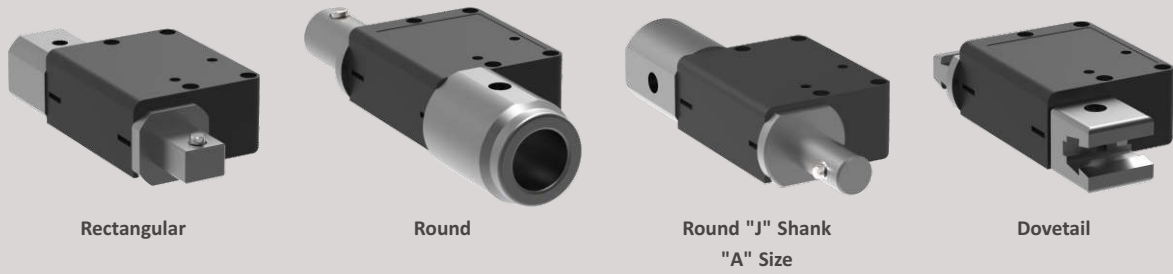### STA- RF version needs to be used with DR- RF DONGLE

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (**I**nterchangeable **H**ead **T**orque **W**rench)

RF

DR-RF Dongle   Notebook   Tablet

STA-BT Version

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (**I**nterchangeable **H**ead **T**orque **W**rench)
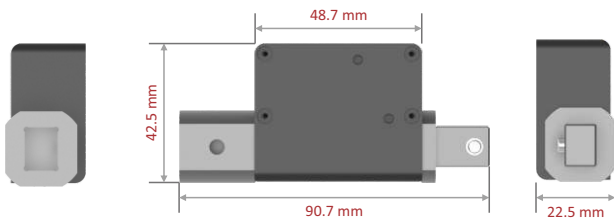
Bluetooth   Notebook   Tablet

STA Type / Size & Photos-Dimensions shown below are for torque capacity under 100 NM only

Standard Type

Rectangular

Round

Round "J" Shank "A" Size
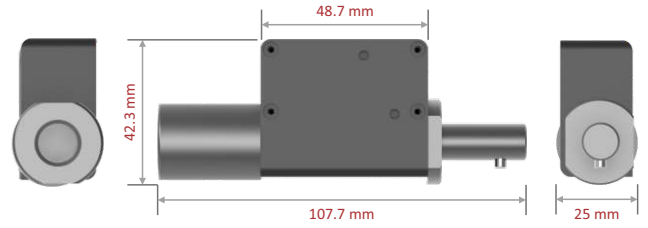
Dovetail

Rectangular- 9 x 12mm

48.7 mm
42.5 mm
90.7 mm
22.5 mm

Round-16mm Dia.

48.7 mm
44 mm
116.7 mm
27.2 mm

Dovetail-S

48.7 mm
42.5 mm
90.2 mm
21.5 mm

Round "J" Shank-0.425"

48.7 mm
42.3 mm
107.7 mm
25 mm
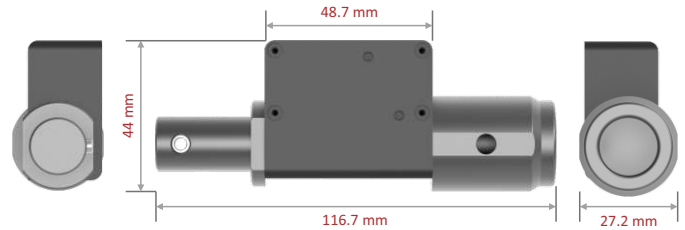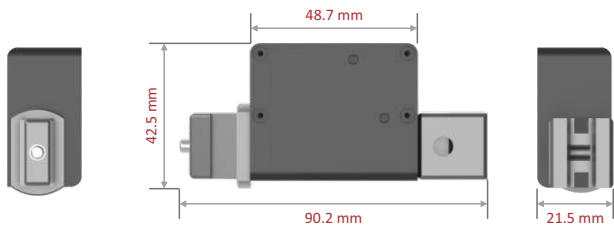
Hybrid Type

Input-Rectangular Male-9 X 12mm

Round-Male Dia.16mm

Dovetail-Male

Round "J" Shank-Female "0.425"

Output

Input-Round Female-Dia.16mm

Rectangular-Female 9 X 12mm

Dovetail-Male

Round "J" Shank-Female "0.425"
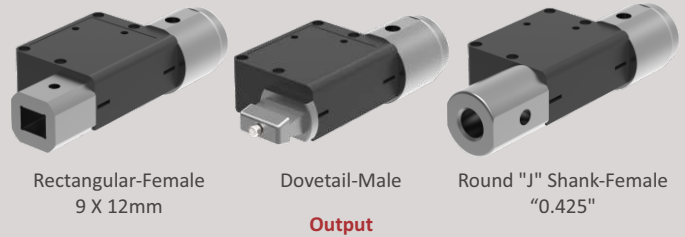
Output

Input-Dovetail Female

Rectangular-Female 9 X 12mm

Round-Male Dia.16mm

Round "J" Shank-Female "0.425"
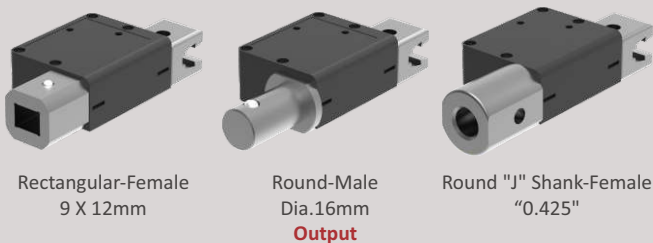
Output

Input-Round "J" Shank Male-0.425"

Rectangular-Female 9 X 12mm

Round-Male Dia.16mm

Dovetail-Male

Output
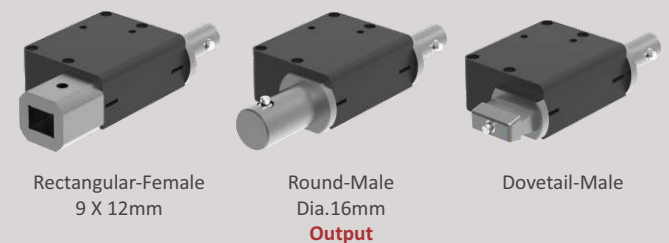
C
48.7 mm
Input
B
A
Output
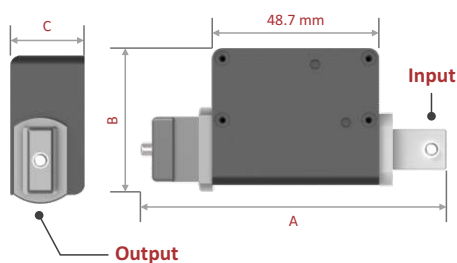
Input-Rectangular Male-9 X 12mm				Input-Round Female Dia.16mm			
Output	A	B	C	Output	A	B	C
Round	100.7mm	42.5mm	22.4mm	Rectangular	100.7mm	44mm	28mm
Dovetail	90.1mm	42mm	22.4mm	Dovetail	100.2mm	44mm	28mm
Round "J" Shank	99.7mm	44mm	27.9mm	Round "J" Shank	108.7mm	44mm	27.9mm
Input-Dovetail Female				Input-Round Male "0.425" "J" Shank			
Output	A	B	C	Output	A	B	C
Rectangular	91.2mm	40mm	21.5mm	Rectangular	99.7mm	42.5mm	22.5mm
Round	101.2mm	42.5mm	22.5mm	Round	109.7mm	42.5mm	22.5mm
Round "J" Shank	99.2mm	44mm	27.9mm	Dovetail	98.2mm	42.5mm	22.5mm

STA Type / Size & Photos-Dimensions shown below are for torque capacity under 100 NM only

Versatile Type-Input End Standard + Output End with Adaptor Head

Rectangular — RFA
Round — DMA / OMA
Dovetail — JFA
Round "J" Shank

Output Head Adaptor

RFA-Rectangular Female

OMA-Round Male

DMA-Dovetail Male

OFA-Round "J" Shank Female

Input RM-Rectangular Male

48.7 mm
40 mm
90.2 mm
22.4 mm

Input OF-Round Female

48.7 mm
43.5 mm
105.2 mm
27.2 mm

Input DF-Dovetail Female

48.7 mm
40 mm
92 mm
22.4 mm

Input OM-Round "J" Shank Male

48.7 mm
42.6 mm
99.2 mm
25 mm

Combo Type- Both Ends with Adaptor Head for adapting Head Adaptors

OFA
RFA
OMA
DFA
JMA
DMA
RMA
JFA

Input
Output

RMA Rectangular
OFA Round
DFA Dovetail
JMA Round "J" Shank

RFA Rectangular
OMA Round
DMA Dovetail
JFA Round "J" Shank

Output End Head Adaptor

RFA-Rectangular
OMA-Round
DMA-Dovetail
JFA-Round "J" Shank

48.7 mm
40.5 mm
82.7 mm
22.5 mm

Input End Head Adaptor

RMA-Rectangular
OFA-Round
DFA-Dovetail
JMA-Round "J" Shank

Products and specifications subject to change without prior notice

STA Coding Principle

Standard Type / Hybrid Type

RM = Rectangular Male
OF = Round Female
JM = Round "J" Shank Male
DF = Dovetail Female

0005 = 0.5~5(Nm)
2000 = 200~2000(Nm)

RF = Rectangular Female
OM = Round Male
JF = Round "J" Shank Female
DM = Dovetail Male

RM — 1 — 0005 — RF — 1

RM / RF Size	OF / OM Size	JM / JF Size	DF / DM Size
1 = 9x12 mm	1 = 16 mm	1 = 0.425"	1 = Small
2 = 14x18 mm	2 = 22 mm	2 = 0.56"	2 = Medium
3 = 24x32 mm	3 = 28 mm	3 = 0.735"	3 = Large
4 = 27x38 mm	4 = 32 mm	4 = 0.99"	

Hybrid Type / Versatile Type

RM = Rectangular Male
OF = Round Female
JM = Round "J" Shank Male
DF = Dovetail Female

0005 = 0.5~5(Nm)
2000 = 200~2000(Nm)

AH-(Adaptor Head)
For adapting correspondent type of Head Adaptor
RFA / OMA / JFA / DMA, etc.

RM — 1 — 0005 — AH

| RM Size	OF Size	JM Size	DF Size
1 = 9x12 mm	1 = 16 mm	1 = 0.425"	1 = Small
2 = 14x18 mm	2 = 22 mm	2 = 0.56"	2 = Medium
3 = 24x32 mm	3 = 28 mm	3 = 0.735"	3 = Large
4 = 27x38 mm	4 = 32 mm	4 = 0.99"	

Combo Type

AH- (Adaptor Head)
For adapting correspondent type of Head Adaptor
RMA / OFA / JMA / DFA, etc.

AH-(Adaptor Head)
For adapting correspondent type of Head Adaptor
RFA / OMA / JFA / DMA, etc.

AH — 0005 — AH

0005 = 0.5~5(Nm)
2000 = 200~2000(Nm)

AH Any input Head Adaptor (RMA / OFA / JMA / DFA) + Sensor Body with Adaptor Head on both ends + Any output Head Adaptor (RFA / OMA / JFA / DMA) + Correspondent type of HEADS
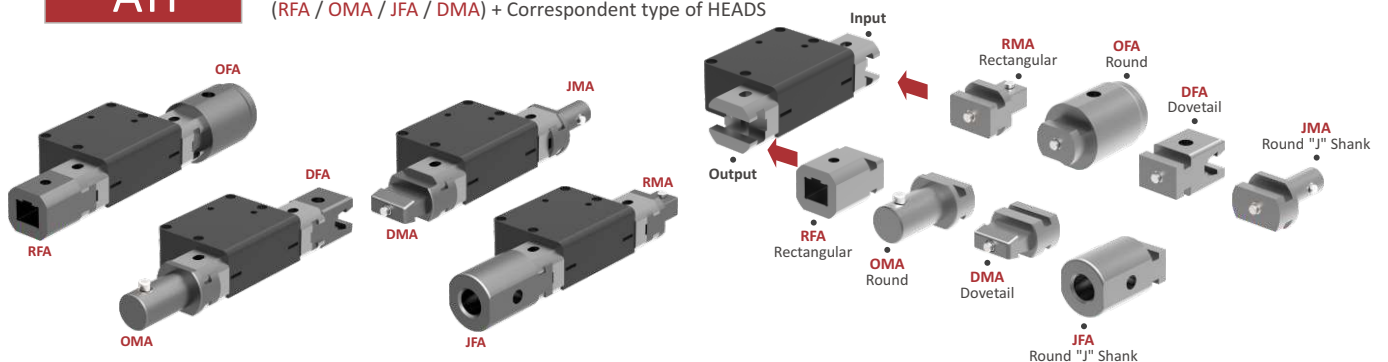
STA (RF version)-Torque & Angle Calibration

What are required

TTA　　　**Head**　　　**STA**
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable **H**ead **T**orque **W**rench**)**

RF

DR-RF Dongle　　　Notebook or Tablet

System Architecture

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable **H**ead **T**orque **W**rench**)**

TTA

RF

RF

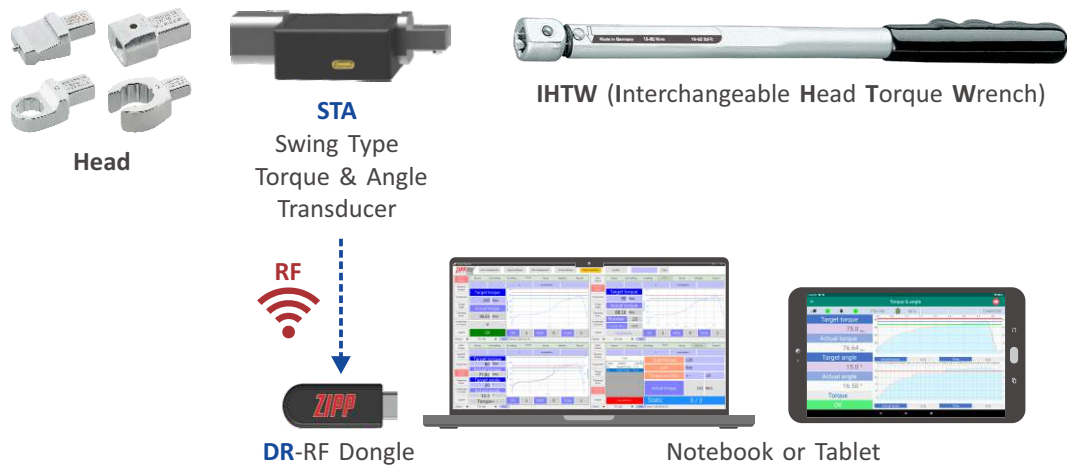**DR**-RF Dongle　　　Notebook or Tablet + **TMS APP**
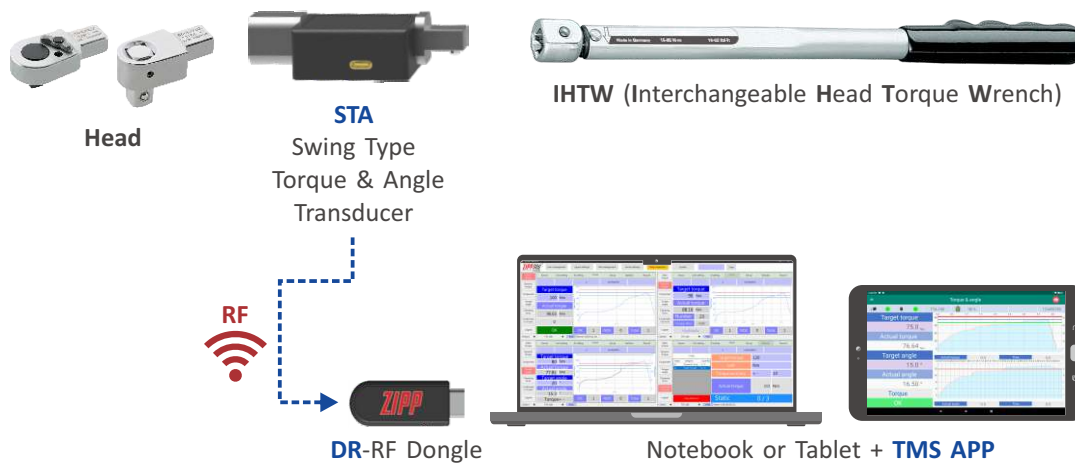
Procedures

1. Assemble the **HEAD** with **STA** & Interchangeable Head Torque Wrench.

2. Insert the two **Dongles** into the NB separately.

3. Open **TMS APP** software.

4. Set up the **TTA Dongle** & **STA Dongle** ports respectively.

5. Complete the pairing of **TTA** and **STA** respectively, after setting, turn on the **TTA** and **STA**.

6. Continue to press the "Torque Correction" button to enter the "Torque Correction" page.

7. Select the **STA** mode in **TMS APP** to enter the setting page and select the **STA** model you want to use.

8. In **TMS APP**, select **STA** mode to enter the setting page and select the **TTA** model you want to use.

9. Press the "Add" button and enter the tool combination number & name, Head number and torque wrench number
   The system automatically catches the **STA** number in the connection.

10. Set the target torque.

11. Insert the assembled **STA** wrench into the **TTA**, then continue to attach the socket and start to tighten the bolt.

12. Stop tightening when the **TTA** indicates that the target torque has been reached.

13. The system automatically fills the static torque value of **TTA** and **STA** into the corresponding form field in the software to complete the torque calibration.

14. After the system completes the correction of the torque value, the operator needs to measure the length of the torque arm and fill in the angle parameter, then press the "Save" button to complete the angle calibration.

STA (RF version)-Torque Control

What are required

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable Head Torque Wrench)

RF

DR-RF Dongle

Notebook or Tablet

System Architecture

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable Head Torque Wrench)

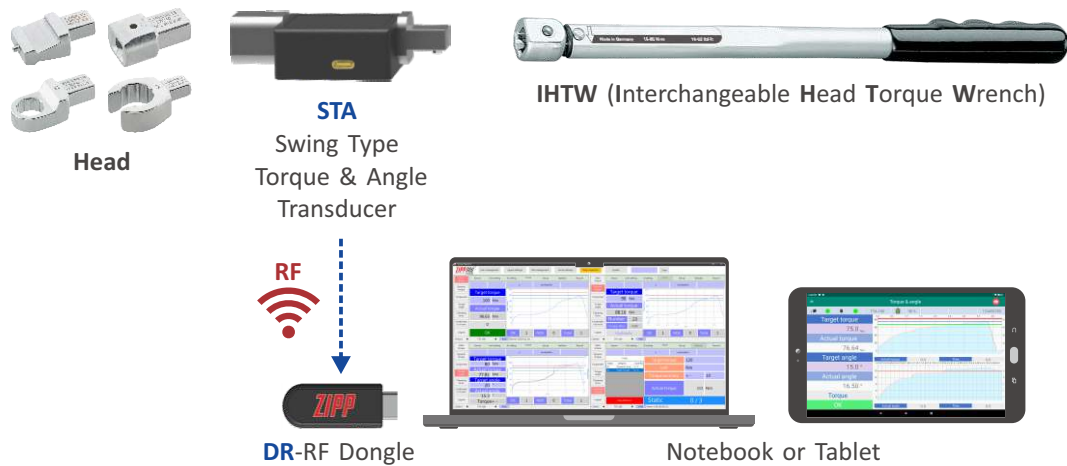**RF**

DR-RF Dongle

Notebook or Tablet + **TMS APP**
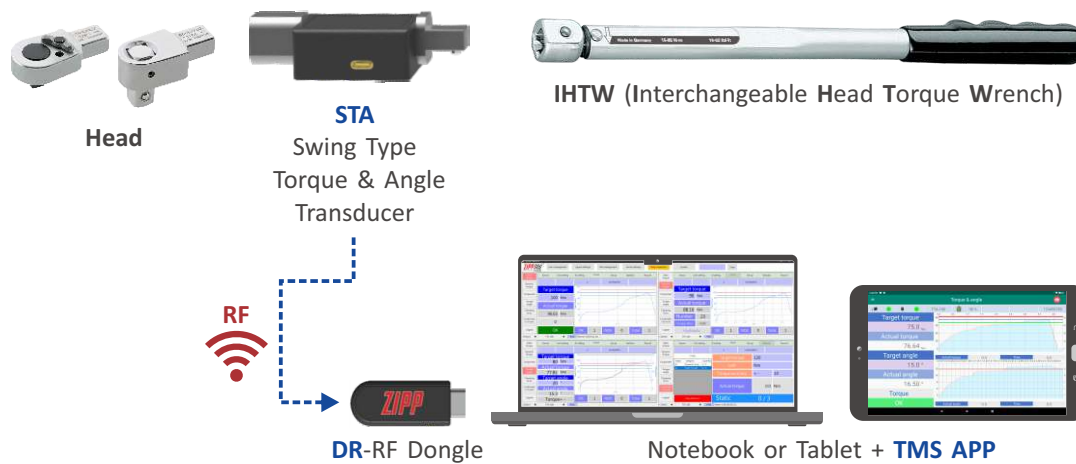
Procedures

1. Insert **Dongle** into Notebook or Tablet.

2. Open the **TMS** software.

3. Set **Dongle** port.

4. Enter the **STA** mode and then press the "Setup" button to enter the "Setup" page.

5. Select the combination code.

6. Please follow the combination shown in the tool combination code to complete the assembly (head with **STA** and interchangeable head wrench) in order.

7. Turn on the **STA** transducer power.

8. Select the **STA** transducer you want to use (should be the same as the tool combination setting).

9. Select the working mode <**torque**>.

10. Set the inspection conditions and accuracy.

11. Return to the work page.

12. Set the final target torque.

13. Start bolting.

14. Release the **STA** after bolting to the target torque prompted by the system.

15. QC judgment.

16. System complete on work record (operator ID, date & time, target torque, actual torque, accuracy and tool combination code).

STA (RF version)-Torque & Angle Control

What are required

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable **H**ead **T**orque **W**rench)

RF

DR-RF Dongle

Notebook or Tablet

System Architecture

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (Interchangeable **H**ead **T**orque **W**rench)

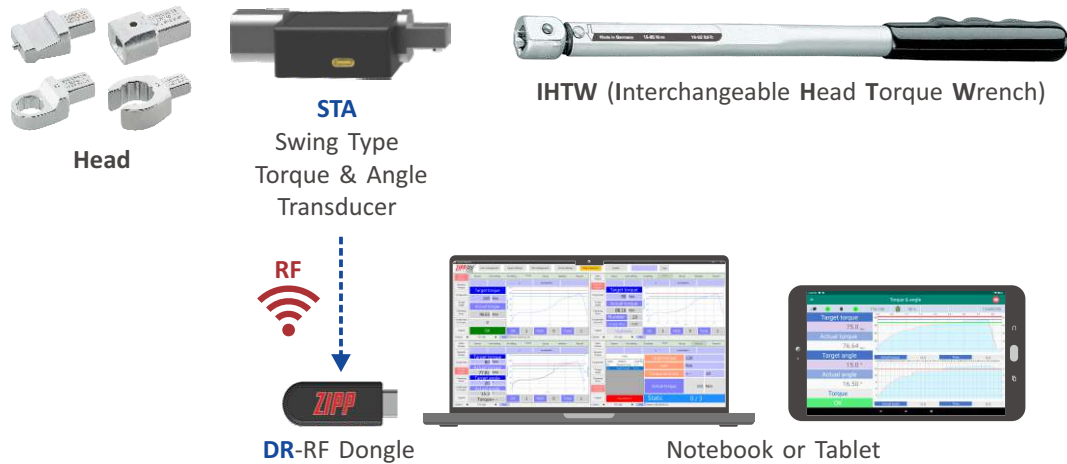**RF**

DR-RF Dongle

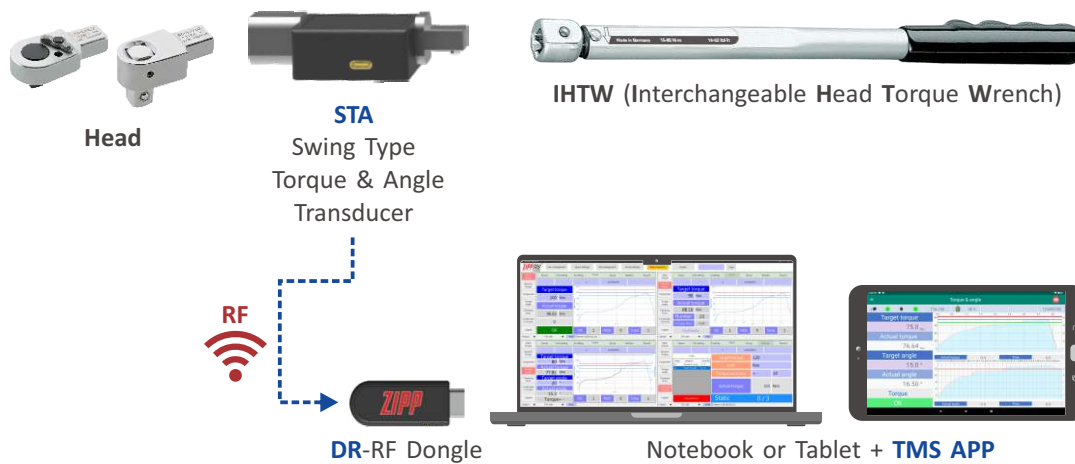Notebook or Tablet + **TMS APP**

Procedures

1. Insert **Dongle** into Notebook or Tablet.
2. Open the **TMS** software.
3. Set **Dongle** port.
4. Enter the **STA** mode and then press the "Setup" button to enter the "Setup" page.
5. Select the combination code.
6. Please follow the combination shown in the tool combination code to complete the tool combination (headset with **STA** and interchangeable head torque wrench) in order.
7. Turn on the **STA** transducer power.
8. Select the **STA** transducer you want to use (the same tool combination setting is required).
9. Select the working mode <**Torque + Angle**>.
10. Set the inspection conditions and accuracy.
11. Return to the work page.
12. Set the initial target torque.
13. Set the final target torque.
14. Set the target angle.
15. Start bolting.
16. Release the **STA** after bolting to the target torque prompted by the system.
17. Start bolting again and release **STA** after reaching the target angle.
18. QC judgment.
19. The system completes the work record (operator ID, date & time, target torque, actual torque, QC result and tool combination code).

STA (RF version)-Residual Torque Verification

What are required

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (**I**nterchangeable **H**ead **T**orque **W**rench)

RF

DR-RF Dongle

Notebook or Tablet

System Architecture

Head

STA
Swing Type
Torque & Angle
Transducer

IHTW (**I**nterchangeable **H**ead **T**orque **W**rench)

RF

DR-RF Dongle

Notebook or Tablet + **TMS APP**

Procedures

1. Insert **Dongle** into NB or Tablet.

2. Open the **TMS** software.

3. Set the **Dongle** port.

4. Enter the **STA** mode and then press the "Setup" button to enter the "Setup" page.

5. Select the combination code.

6. Follow the combination shown in the tool combination code to complete the tool combination (head with **STA** and the wrench)

7. Turn on the **STA** transducer.

8. Select the **STA** transducer you want to use (To be the same tool combination setting).

9. Select the working mode <**Torque Verification**>.

10. Set the inspection conditions and accuracy.

11. Return to work page.

12. Set the target torque.

13. Set the target angle.

14. Start inspection.

15. Loosen the **STA** after tightening to the target angle prompted by the system.

16. QC judgment.

17. System complete with work record (operator ID, date & time target torque, actual torque, inspection conditions & accuracy and tool combination code).
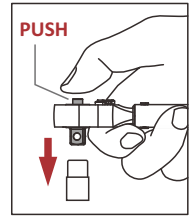
Adjustable Torque Wrench, Window Scale Type

TORQUE 1/4" 3/8" 1/2" 3/4" 1" 1-1/2"

ZCW15N & 30N
ZCW150i & 250i

Main scaie   Graduation scaie

Other series

ZCW1500N & 2000N
ZCW1000F & 1500F

ZCW3000N
ZCW2000F

PUSH
Quick release button design.
Push the button to release socket.

Lock
Unlock
Set
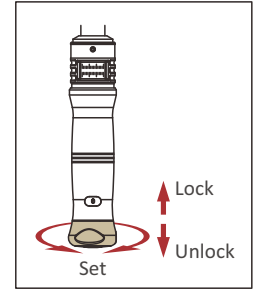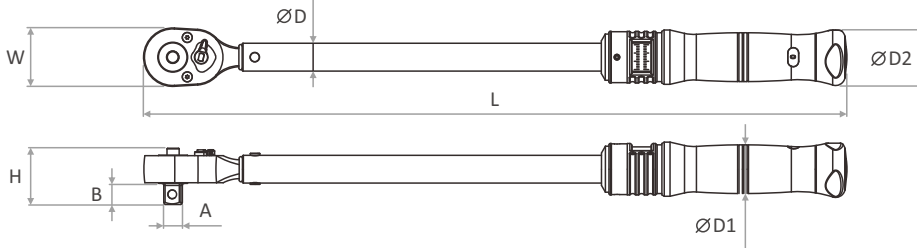
Specification **Metric**

Accuracy : c.w. ±4% / c.c.w. ±6%

ITEM NO.	◯ A	Range	⊞	W	H	B	L	ØD	ØD1	ØD2	KG	Packing
ZCW15N2	1/4"	3-15 Nm	0.4 Nm	28.5	24.0	7.6	202	16.0	25.7	26.2	0.27	30 pcs/CTN
ZCW30N2	1/4"	6-30 Nm	0.4 Nm	28.5	20.2	7.4	300	16.0	21.5	34.1	0.30	20 pcs/CTN
ZCW60N3	3/8"	10-60 Nm	0.5 Nm	36.9	32.3	11.0	420	20.5	38.0	34.1	1.07	10 pcs/CTN
ZCW100N3	3/8"	20-100 Nm	0.5 Nm	36.9	32.3	11.0	460	20.5	38.0	34.1	1.14	10 pcs/CTN
ZCW200N4	1/2"	40-200 Nm	1 Nm	43.9	40.3	15.6	515	20.5	35.5	40.0	1.36	10 pcs/CTN
ZCW320N4	1/2"	60-320 Nm	2 Nm	43.9	40.3	15.2	585	22.0	35.5	40.0	1.69	6 pcs/CTN
ZCW500N6	3/4"	100-500 Nm	4 Nm	64.4	55.0	24.0	820	27.7	35.5	40.0	3.65	4 pcs/CTN
ZCW800N6	3/4"	100-800 Nm	5 Nm	64.4	55.0	24.0	1110	32.1	35.5	40.0	5.48	2 pcs/CTN
ZCW1000N6	3/4"	200-1000 Nm	5 Nm	64.4	54.0	23.1	1334	32.1	35.5	40.0	6.30	1 pcs/CTN
ZCW1000N8	1"	200-1000 Nm	5 Nm	64.4	60.4	30.7	1334	32.1	35.5	40.0	6.30	1 pcs/CTN
ZCW1500N6	3/4"	300-1500 Nm	10 Nm	65.8	57.0	24.6	1704	33.1	35.5	40.0	11.87	1 pcs/CTN
ZCW1500N8	1"	300-1500 Nm	10 Nm	79.7	66.8	29.8	1704	33.1	35.5	40.0	11.87	1 pcs/CTN
ZCW2000N8	1"	400-2000 Nm	10 Nm	79.7	66.8	27.8	2160	38.2	35.5	40.0	13.78	1 pcs/CTN
ZCW3000N9	1-1/2"	600-3000 Nm	20 Nm	68.2	107.9	38.1	3330	33.1	35.5	40.0	23.00	1 pcs/CTN

Specification **SAE**

Unit:mm

ITEM NO.	◯ A	Range	⊞	W	H	B	L	ØD	ØD1	ØD2	KG	Packing
ZCW150i2	1/4"	30-150 in.lb	2 in.lb	28.5	24.0	7.6	202	16.0	25.7	26.2	0.27	30 pcs/CTN
ZCW250i2	1/4"	50-250 in.lb	5 in.lb	28.5	20.2	7.4	300	16.0	21.5	34.1	0.30	20 pcs/CTN
ZCW45F3	3/8"	10-45 ft.lb	0.5 ft.lb	36.9	32.3	11.0	420	20.5	38.0	34.1	1.07	10 pcs/CTN
ZCW75F3	3/8"	15-75 ft.lb	0.5 ft.lb	36.9	32.3	11.0	460	20.5	38.0	34.1	1.14	10 pcs/CTN
ZCW150F4	1/2"	30-150 ft.lb	1 ft.lb	43.9	40.3	15.6	515	20.5	35.5	40.0	1.36	10 pcs/CTN
ZCW230F4	1/2"	50-230 ft.lb	2 ft.lb	43.9	40.3	15.2	585	22.0	35.5	40.0	1.69	6 pcs/CTN
ZCW300F6	3/4"	50-300 ft.lb	2.5 ft.lb	64.4	55.0	24.0	820	27.7	35.5	40.0	3.65	4 pcs/CTN
ZCW600F6	3/4"	100-600 ft.lb	5 ft.lb	64.4	55.0	24.0	1110	32.1	35.5	40.0	5.48	2 pcs/CTN
ZCW700F6	3/4"	100-700 ft.lb	5 ft.lb	64.4	54.0	23.1	1334	32.1	35.5	40.0	6.30	1 pcs/CTN
ZCW700F8	1"	100-700 ft.lb	5 ft.lb	64.4	60.4	30.7	1334	32.1	35.5	40.0	6.30	1 pcs/CTN
ZCW1000F6	3/4"	200-1000 ft.lb	10 ft.lb	65.8	57.0	24.6	1704	33.1	35.5	40.0	11.87	1 pcs/CTN
ZCW1000F8	1"	200-1000 ft.lb	10 ft.lb	79.7	66.8	29.8	1704	33.1	35.5	40.0	11.87	1 pcs/CTN
ZCW1500F8	1"	300-1500 ft.lb	20 ft.lb	79.7	66.8	27.8	2160	38.2	35.5	40.0	13.78	1 pcs/CTN
ZCW2000F9	1-1/2"	400-2000 ft.lb	20 ft.lb	68.2	107.9	38.1	3330	33.1	35.5	40.0	23.00	1 pcs/CTN

Products and specifications subject to change without prior notice

Products Combination for Various Applications

Air Impact / Impact Ratchet / Pulse wrench

TTES

TTEH

TTES

Wireless Rotary Torque Transducer

Cloud Networking

Cloud Server

Torque Controller

TCA/TCB

Gateway

TTEHR

Wireless Rotary Torque Transducer

Dongle

Sensing Bolt

Tagged Bolt

TFM

Torque Controller

Power Torque Tool w/Torque Control Mechanism

TTEB

TTEB

TTEB

TTEB

TTES

TTEB

Wireless Rotary Torque Transducer

Click Wrench

Bolting Sequence Control

9 5 1 4 8
10 6 2 3 7

1
3 6
5 4
2

Spiral Tightening Sequence Starting in the
Middle for Non-Circular Bolt Patterns.
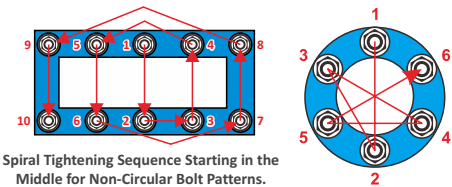
Controller	Torque Tools	Torque Transducer	Media	Data Collection	Applications
TCA/TCB	Any Air torque Tool	TTAS/TTES	TF/TS	TCA/TCB	Torque Calibration prior to torque
TCA/TCB	Any Air torque Tool	TTES	Socket/Bits	TCA/TCB	Torque Control during bolting process
TCA/TCB/TTT	Manual Torque Wrench	TTAS	Socket/Bits	TCA/TCB/TTT	Torque Verification after bolted
TCA/TCB/TTT	Manual Torque Wrench	TTAS	TM	TCA/TCB/TTT	High Torque Control/Verification
TCA/TCB	Any Air torque Tool	TTES/TTEH/TTEB	Socket/Bits	TCA/TCB	Job Combination for work station
TCA/TCB	Any Air torque Tool	TTER	TB	TCA/TCB	Bolt production and bolting data record Bolting Sequence Control
TCA/TCB	Any Air torque Tool	TTER	SB	TCA/TCB	Bolt production and bolting data record Bolting Sequence Control Bolted joint status Remote Monitoring
TCA/TCB	Any Air torque Tool	TTER	SB+TB mixed	TCA/TCB	
Torque Control Mechanism Cordless Wrench	Torque Tool with built-in torque Control Mechanism	TTAS/TTES/TTEB	Socket/Bits /TM	Dongle + TTT Cell Phone/PC	Monitoring bolting status, judge OK/NOK Workpiece and Operator ID Scan Bolted Torque and time recorded for production management, time study and job traceability
Power Torque Tools with Torque Limit Mechanism	Power Torque Tool with Torque Control Mechanism + Click Type Torque Wrench	TTAS	Socket / Bits / TM	Dongle + TTT Cell Phone / PC	Verifying the Tightened Torque, Judge OK /NOK Workpiece and Operator ID Scan Bolted Torque and time recorded for production management,time study and job traceability

Products and specifications subject to change without prior notice

Common problems & solutions of bolting works

Item	Problems	Solutions
1	Hard to control the target torque accuracy due to the hydraulic fluid temperature rise in pulse tool which causes the torque to decline and torque created by uncontrollable air impact wrench mechanism which causes a considerably strong vibration during intermittent operation	Take advantage of **ZIPPTORK** Torque Controller-**TCA**/**TCB** & Wireless Rotary Torque Transducer-**TTES**, the sensed torque and angle signal will be transmitted from the **TTE** to **TCA**/**TCB** simultaneously and wirelessly while controlled by the patented control device and algorithm to effectively control any air driven impact or oil pulse tool with satisfactory control accuracy within ±5%~±15%
2	Bolt joints characteristics - hard or soft joint, cause unstable torque controllability	The patented control algorithm and device on **Torque Controller-TCA**/**TCB** will compensate the dynamic torque loss automatically to allow it to achieve the target torque range
3	The torque control accuracy is always affected by the tool impact mechanism and the posture of how the operator holds the tool during operation	The closed-loop control and patented control algorithm enables the **Torque Controller-TCA**/**TCB** to control the torque accuracy effectively regardless of the tool brand and impact mechanism as well as the holding posture of the operator
4	The operator didn't follow the bolting sequence to fasten the bolts and led to uneven clamping force on the joints	Use the **Torque Controller-TCA**/**TCB** and the **Torque Sensing and Transmitting Socket- TTER**/**TSSR** along with the **Tagged Bolt-TB** or **Sensing Bolt-SB**, the bolting sequence and stage of bolting can be programmed in advance, not only the operator has to obey the bolting sequence, but also the torque can be appropriately controlled at each stage. The bolting data can also be recorded for traceability to verify the responsibility of fastened joints to ensure the highest quality and reliability of bolting
5	The torque controller needs to be paired with specific torque tool	**TCA**/**TCB** applies to any air driven torque tool regardless of the brand and its mechanism

Bolting Issues with Power Torque Tools
Q&A

- **How to control the output torque of an impact wrench?**
  ZIPP's **Torque Controller~TCA/TCB** + **Wireless Rotary Torque Transducer~TTES** with the patented control apparatus and algorithm will enable you to control oil Pulse tools torque within ±5~10%accuracy and ±10~15% for air impact wrenches.

- **How to do the bolting sequence control & tighten the bolt in several runs?**
  With the programmable **Torque Controller~TCA/TCB** + **Wireless Rotary Torque Sensing and Transmitting Socket~TTER** +**Tagged Bolt~TB,** not only the bolting sequence, but also the torque to be applied within several runs can all be programmed in advance.

- **How to control the joint tightness effectively?**
  With the **Torque Controller~TCA/TCB** + **Wireless Rotary Torque Sensing and Transmitting Socket~TTER** + **Sensing Bolt~SB**, it will assure that homogeneous clamping force can be fulfilled.

- **How to control the bolting torque on tire stud and monitor the status of the bolted joint as the function of TPMS?**
  With the **Torque Controller~TCA/TCB** + **Wireless Rotary Torque Sensing and Transmitting Socket~TTER** + **Sensing Bolt~SB** + **Transmitting Cap~TC**, it will not only ensure that the clamping force can be applied evenly on each bolt/stud, but also the joint status can be monitored remotely by the car computer.

- **How to monitor the bolted joint status periodically & remotely?**
  With the **Torque Controller~TCA/TCB** + **Wireless Rotary Torque Sensing and Transmitting Socket~TTER** + **Sensing Bolt~SB** + **Transmitting Cap~TC** + **Gateway~ZG**, the joint status can be monitored remotely and periodically.

- **How to trace the responsibility of the bolting work after bolted?**
  Use the **Wireless Rotary Torque Sensing and Transmitting Socket~TTER** with the features of the **Tagged Bolt~TB** & **Sensing Bolt~SB**, not only the production record of the bolt, but also the bolting process and its result can be recorded in the memory of each bolt for traceability to verify the responsibility and cease the controversy if there is any.

- **How to monitor the bolting status of a power clutch type torque tool?**
  With the **Wireless Rotary Torque Transducer~TTES/TTEB** + **Dongle~ZD** to PC/Tablet/Handset, the bolting status of a power clutch type torque tool either electric or pneumatic can be recorded simultaneously during work. The data can be collected for production control and time study to improve the productivity.

- **How to collect bolted data with the torque tool which has built-in torque limit mechanism?**
  Use the **Wireless Rotary Torque Transducer~TTES/TTEB** with a manual, electric or pneumatic torque tool while bolting, the bolted data can be recorded immediately after bolted and transmitted to the PC/Tablet/Handset via a **Dongle**, then, uploading to other peripheral devices.
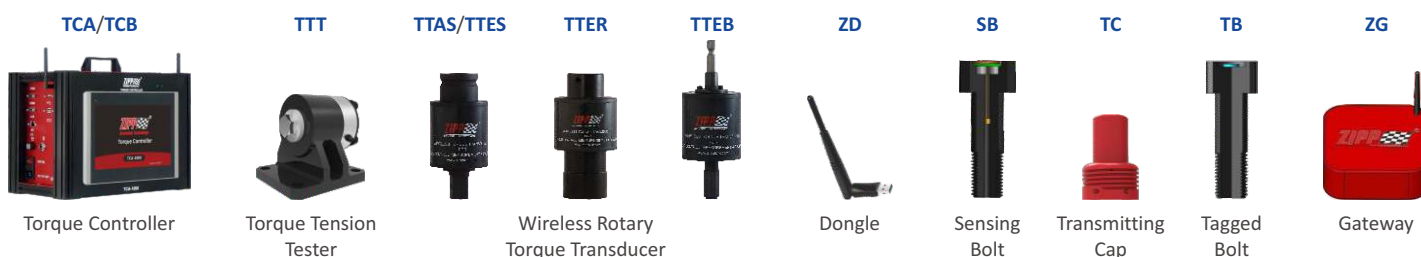
- **How to collect the bolted torque data tightened with a click wrench?**
  Use the **Wireless Rotary Torque Transducer~TTAS** with a click wrench, the audible "CLICK" sound can be detected and become the visible bolted data and transmitted to the PC/Tablet/Handset via a **Dongle** while verifying if it's OK or not. The collected data can be uploaded to peripheral devices for traceability.

- **How to verify the residual torque of a bolted joint?**
  Use the **Wireless Rotary Torque Transducer~TTAS** with a manual torque wrench, the data will be transmitted to the PC/Tablet/Handset via a **Dongle** to verify if it's OK or not. The collected data can be uploaded to peripheral devices for traceability.

Applying the most advanced bolting technology

TCA/TCB	TTT	TTAS/TTES	TTER	TTEB	ZD	SB	TC	TB	ZG
Torque Controller	Torque Tension Tester	Wireless Rotary Torque Transducer			Dongle	Sensing Bolt	Transmitting Cap	Tagged Bolt	Gateway

Products and specifications subject to change without prior notice

How to select *TCA*/*TCB*/*TTES*/*Air Impact Wrench*

- **Factors in consideration**

    1. The target torque vs the capacity of impact wrench or pulse wrench.

    2. The joint condition-Hard or Soft.

    3. The type of torque tool to be used.

    4. Torque tool specification (torque capacity) vs target torque and joint hardness.

    5. **TCA**/**TCB** Controller-Flow Rate and airline condition (Coupler + Hose size, I.D. & length).

    6. **TTAS**-Torque Capacity with angle detection.

    7. **TTES**/**TTEH**-Torque Capacity without angle detection.

    8. **SB** or **TB** to be used.

    9. Bolting sequence control and how many rounds required for tightening the bolt Traceability for verifying job responsibility.

- **Air torque tools**

    Continuous driven clutch type tool such as air screwdriver or pneumatic torque multiplier.

    Discontinuous driven impact type torque tool such as an air impact wrench or oil pulse tool.

- **Torque Controller**

    TCA/**TCB** - programmable for bolting sequence control and tightening within several stages.

- **TTE-Torque Transducers**

    TTAS - with square drive anvil for driving various sizes of impact sockets and capable to measure angular movement of bolt.
      For static torque control and measurement only.

    TTES - with square drive anvil for driving various sizes of impact sockets for dynamic torque measurement.

    TTEH - one piece design with custom size impact socket.

    TTER/**TSSR** - Wireless Torque Transducer with RF and NFC Reader embedded.

Selection Chart for Air Impact Tool/Torque Transducer/ Torque Controller					
Torque Controller Flow Rate	Joint Hardness (Soft /Hard)	Target Torque	Suggested **TTE** Capacity	Tightening time To Target Torque Seconds	Impact Tool Torque Capacity @ 90PSI
TCA/**TCB**-Measured by Digital Flow Meter automatically	**S** (Soft)	T_T	1.5~2 T_T	t- 5 second	$T_5 \geq 2 \times T_T$
				t- 4 s	$T_4 \geq 3 \times T_T$
				t- 3 s	$T_3 \geq 4 \times T_T$
				t- 2 s	$T_2 \geq 5 \times T_T$
	H (Hard)	T_T	1.5~2 T_T	t- 5 s	$T_5 \geq 1.5 \times T_T$
				t- 4 s	$T_4 \geq 2 \times T_T$
				t- 3 s	$T_3 \geq 2.5 \times T_T$
				t- 2 s	$T_2 \geq 3 \times T_T$

Functions of ZIPPTORK Torque Controller

Model	TCA-2000	TCB-2000	ZD
Max. Flow Rate Liter per Minute	2000	2000	
Air Pressure Regulation	Auto	Auto	
Flow Rate Selection	Auto	Auto	
Tool Air Consumption Test	●	●	
Torque Display	●	●	●
Torque Control	●	●	Static
Torque Mea-surement	●	●	●
Job Sequence	●	●	●
Bolting in Several stages	●	●	
Bolting Sequence Control	●	●	
No. of Torque Multiplier can be Attached	3	3	3
Bolt Count	●	●	●
Job Record	●	●	●
Cloud Server	●	●	●
Software Authori-zation	●	●	●
Operation Manage-ment	●	●	●

Brief Exemplary Applications of ZIPPTORK Torque Control Products

Exemplary	Current Method	Improved Solution	What to be used?
1	Use a **Click Wrench** to tighten a bolt or nut to specified target torque	Attached with a **Wireless Torque Transducer** to the **click wrench**, the torque value will be recorded in the **tablet** or **cellphone** via a **Dongle** as soon as it clicks. ~**It makes audible "click" visible**~	**Click Wrench + Wireless Torque Transducer** → **Dongle** + **Tablet** Control Accuracy~±5%
2	Use an **Oil Pulse Wrench** to tighten a bolt or nut to specified target torque	Use a **simplified Controller** and have a **Wireless Torque Transducer** attached to the **oil pulse wrench**, It will shut off the air supply as soon as it reaches the target torque and the torque applied to the bolt will be recorded in the tablet or **cellphone** via a **Dongle** as soon as bolted.	**FR** Unit + **TCB** + **Lubricator** → **Oil Pulse Wrench** + **Wireless Torque Transducer** → **Dongle** + **Tablet** Control Accuracy~±10%
3	Use an **Air Impact Wrench** to tighten a bolt or nut to specified target torque	Use an **Air Impact Wrench** tighten the bolt to maximum 80% of the target torque. Then, Use the **Click Wrench** + **Wireless Torque Transducer** to tighten the bolt till it clicks and the data will be recorded in the **tablet** or **cellphone** via a **Dongle** simultaneously. ~**It makes audible "click" visible**~	**Air Impact Wrench** → **Click Wrench + Wireless Torque Transducer** → **Dongle** + **Tablet** Control Accuracy~±5%
4	Use an **Air Impact Wrench** to tighten a bolt or nut to specified target torque	Use a **Torque Controller** and have the **Air Impact Wrench** attached with a **Wireless Torque Transducer**, to be tightened in 2 rounds under **Transducer Mode**. The tool will be shut off as soon as it reaches the target torque and the data will be recorded in the **Controller** or logging up to peripheral devices.	**FR** Unit+ **Lubricator** → **Air Impact Wrench** + **Wireless Torque Transducer** **TCA**/**TCB** by **Transducer Mode and** to be tightened in 2 rounds Control Accuracy~±15%
5	Use an **Air Impact Wrench** to tighten a bolt or nut to specified target torque	Use a **Torque Controller** and have the **Air Impact Wrench** attached with a **Wireless Torque Transducer**, to be tightened in 2 rounds under **Air Pressure Mode**. The tool will be shut off as soon as it reaches the target torque and the data will be recorded in the **Controller** or logging up to peripheral devices.	**FR** Unit+ **Lubricator** → **Air Impact Wrench** **TCA**/**TCB** by **Air Pressure Mode** and to be tightened in 2 rounds Control Accuracy~±20%
6	Use an **Clutch Type Torque Tool** to tighten a screw, bolt or nut to specified target torque	Attached with a **Wireless Torque Transducer with Bit Holder** to the **Clutch Type Torque Tool**, the torque applied to the bolt will be monitored throughout the process and the data will be recorded in the **tablet** or **cellphone** via a **Dongle** as soon as bolted.	**Clutch Type Torque Tool** + **Wireless Torque Transducer** → **Dongle** + **Tablet** Control Accuracy~±10%

In exemplary applications 4 or 5 above, if use an oil pulse tool instead, the control accuracy can be improved at least ±5%.

Exemplary Applications of ZIPPTORK Torque Control Products Bolting Technology

Type of Work	Embodiment	Description	Control Accuracy
Tyre Shop Works	1	1st Step~Use F/R/L Unit + **Air Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use **Click Wrench** - preset to T_T + **TTAS** (**Wireless Torque Transducer**) + **Dongle** + **Tablet** to Target T_T. ~**It makes audible "click" visible**~	±5%
	2	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** + **TTES**/**TTEH** – Under **Transducer Mode** & Training T_H/T_L, then torque to 50-60 % of T_T. 2nd Step~Torque to Target T_T.	+10% or ±5%
	3	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** – Under **Air Pressure Mode** & Training T_H/T_L, then torque to 50-60 % of T_T. 2nd Step~Torque to Target T_T.	+15%
	4	1st Step~Use **Cordless Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use Click Wrench - preset to T_T + **TTAS** + **Dongle** + **Tablet** to Target T_T. ~**It makes audible "click" visible**~	±5%
	5	Use a **Click Wrench** + **TTAS** (**Wireless Torque Transducer**) + **ZD** (**Dongle**) + **Cell Phone**/**Tablet** to tighten the bolt/nut to verify if the bolted torque is correct. Preset the target angle on the Tablet under Torque Wrench Mode, tighten the bolt/nut slowly until it clicks. The angular movement should exceed the preset angle when it clicks. If it clicks before reaching the target angle, the joint will be judged as over-torqued already and need to be reworked.	Torque control or Verification

Exemplary Applications of ZIPPTORK Torque Control Products Bolting Technology

Type of Work	Embodiment	Description	Control Accuracy
General Assembly Works	1	1st Step~Calibrate the tool torque of **Air Screwdriver** or **Electric Brushless Screwdriver** with the **TTEB** + **Dongle** + **Tablet** to the desired target torque prior to work. 2nd Step~Use the **Air Screwdriver or Electric Brushless Screwdriver** with the **TTEB** to tighten the Screw/Bolt to the target torque. The Tablet will monitor the bolting torque throughout the process and judge the result as **OK** or **NOK**.	±10%~±15%
	2	1st Step~Use F/R/L Unit + **Air Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use **Click Wrench** - preset to T_T + **TTAS** + **Dongle** + **Tablet** to Target T_T. **~It makes audible "click" visible~**	±5%
	3	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** – Under **Air Pressure Mode** & Training T_H/T_L, then torque to 50-60% of T_T. 2nd Step~Torque to Target T_T.	±15%
	4	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** + **TTES**/**TTEH** – Under **Transducer Mode** & Training T_H/T_L, then torque to 50-60% of T_T. 2nd Step~Torque to Target T_T.	+10% or ±5%
	5	1st Step~Use F/R/L Unit + **Oil Pulse tool** + **TTES** + **Dongle** + **Tablet** to calibrate the target torque on **TF** or **Simulator**. 2nd Step~Torque to Target T_T. The **Tablet** will monitor the bolting torque throughout the process and judge the result as **OK** or **NOK**.	±10%
	6	1st Step~Use **Cordless Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use **Click Wrench** - preset to T_T + **TTES** + **Dongle** + **Tablet** to Target T_T. **~It makes audible "click" visible~**	±5%
	7	Use a **Click Wrench** + **TTAS** (**Wireless Torque Transducer**) + **ZD** (**Dongle**) + **Cell Phone/Tablet** to tighten the bolt/nut to verify if the bolted torque is correct. Preset the target angle on the Tablet under Torque Wrench Mode, tighten the bolt/nut slowly until it clicks. The angular movement should exceed the preset angle when it clicks. If it clicks before reaching the target angle, the joint will be judged as over-torqued already and need to be reworked.	Torque control or Verification

Exemplary Applications of ZIPPTORK Torque Control Products Bolting Technology

Type of Work	Embodiment	Description	Control Accuracy
Industrial Bolting Works	1	1st Step~Use F/R/L Unit + **Air Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use Click Wrench - preset to T_T + **TTAS** + **Dongle** + **Tablet** to Target T_T. **~It makes audible "click" visible~**	±5%
	2	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** – Under **Air Pressure Mode** & Training T_H/T_L, then torque to 50-60% of T_T. 2nd Step~Torque to Target T_T.	±15%
	3	1st Step~Use F/R Unit + Lubricator + **Air Impact Wrench** + **TTES**/**TTEH** – Under **Transducer Mode** & Training T_H/T_L, then torque to 50-60 % of T_T. 2nd Step~Torque to Target T_T.	+10% or ±5%
	4	1st Step~Use F/R/L Unit + **Oil Pulse tool** + **TTES** + **Dongle** + **Tablet** to calibrate the target torque on **TF** or **Simulator**. 2nd Step~Torque to Target T_T. The **Tablet** will monitor the bolting torque throughout the process and judge the result as **OK** or **NOK**.	±10%
	5	1st Step~Use **Cordless Impact Wrench**~Torque to 80% maximum of T_T. 2nd Step~Use **Click Wrench** - preset to T_T + **TTES** + **Dongle** + **Tablet** to Target T_T. **~It makes audible "click" visible~**	±5%
	6	Use a **Click Wrench** + **TTAS** (Wireless Torque Transducer) + **ZD** (**Dongle**) + **Cell Phone**/**Tablet** to tighten the bolt/nut to verify if the bolted torque is correct. Preset the target angle on the Tablet under Torque Wrench Mode, tighten the bolt/nut slowly until it clicks. The angular movement should exceed the preset angle when it clicks. If it clicks before reaching the target angle, the joint will be judged as over-torqued already and need to be reworked.	Torque control or Torque Verification

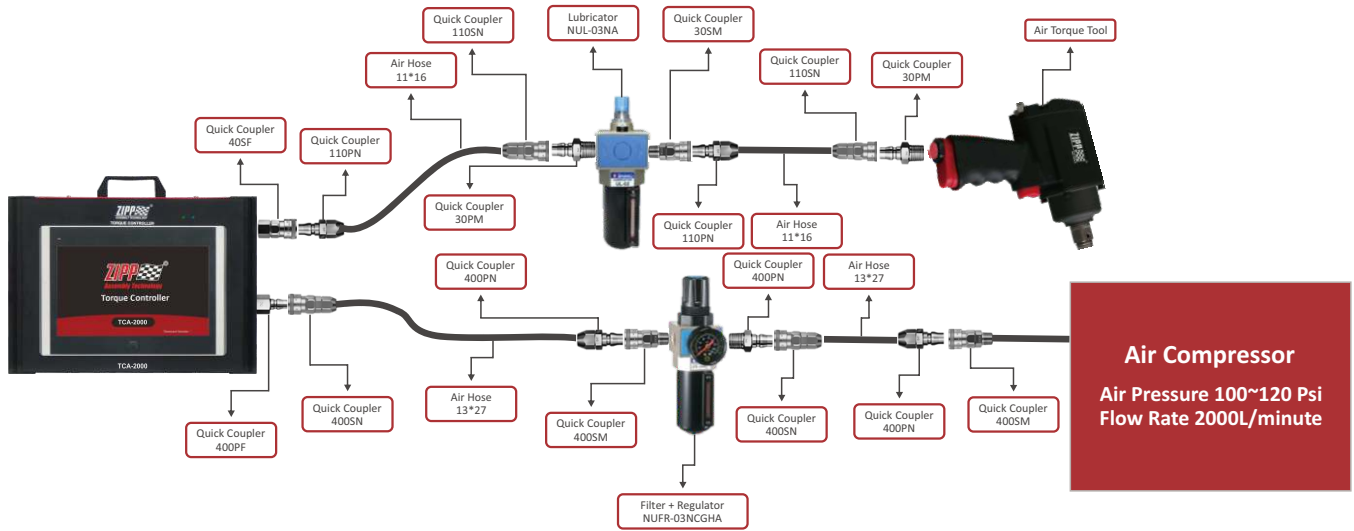# Exemplary Applications of *ZIPPTORK* Torque Control Products Bolting Technology

Type of Work	Embodiment	Description	Control Accuracy
High Torque Bolting Works	1	1st Step~Use F/R/L Unit + **Air Impact Wrench**~Torque to its maximum capacity. 2nd Step~Select **Torque Multiplier Mode** on **Tablet**. Input the target torque and torque ratio of the **TM**, the **Tablet** will show the torque value to be set on **Click Wrench** and the capacity of the **TTAS** to be selected. 3rd Step~Use **Click Wrench** + **TTAS** + **Dongle** + **Tablet** to tighten the bolt until it clicks (reach the Target torque **T$_T$**). ~**It makes audible "click" visible**~	±10%
	2	1st Step~Use **any high torque Wrench**~Torque to its maximum capacity. 2nd Step~Select **Torque Multiplier Mode** on Tablet. Input the target torque and torque ratio of the **TM**, the **Tablet** will show the torque value to be set on **Click Wrench** and the capacity of the **TTAS** to be selected. 3rd Step~Use **Click Wrench** + **TTAS** + **Dongle** + **Tablet** to tighten the bolt until it clicks (reach the Target torque **T$_T$**). ~**It makes audible "click" visible**~	±10%
	3	1st Step~Select **Inspection Mode** under **Torque Multiplier Mode** on **Tablet**. Input the target torque, Target Angle, gear reduction ratio and torque ratio of the **TM**, the Tablet will show the torque value to be set on **Click Wrench** and the capacity of the **TTAS** to be selected. 2nd Step~Use **Click Wrench** + **TTAS** + **Dongle** + **Tablet** to tighten the bolt until it clicks (just the moment to exceed the residual torque on the bolted joint and turn to move). 3rd Step~If it clicks before reaching the target angular movement, it means that it was over-torqued and to be judged as **NOK**.	Torque + Angle control or Torque Verification

Exemplary Embodiment for the Application of Torque Control Products

Type of Torque Tools	Manual Torque Wrench	Manual Click Wrench	Pneumatic / Electric / Cordless Torque Tools
Current Control Method	Use a Digital torque wrench instead	It clicks as soon as it reaches the preset torque	The tool is equipped with built-in torque control mechanism. Auto shut off as soon as it reaches the preset torque.
Advanced Torque Control Method	Use any manual torque wrench with **TTAS** along with a **Dongle** and **APP** to collect torque data and up load the data immediately.	Use the click wrench with **TTAS** along with a **Dongle** and **APP** to collect torque data and up load the data immediately as soon as it clicks.	Use the power torque wrench with **TTES** along with a **Dongle** and **APP** to collect torque data and up load the data immediately as soon as it reaches preset torque and the clutch dis-engaged.
ZIPPTORK products	**TTAS + Dongle + APP**	**TTAS + Dongle + APP**	**TTES + Dongle + APP**
Features of ZIPPTORK Solutions	Detects and records the torque data just at the moment of 0.5o angular movement of the bolt and through a **Dongle** to display the let-go torque simultaneously.	Detects and records the torque data and upload the data immediately as soon as it clicks. ~**Makes audible "clicks" visible**~	Detects and records the torque data and up loaded immediately as soon as it reaches preset torque and the clutch dis-engaged.

Type of Torque Tools	Electric / Cordless Impact Wrench	Air Impact Wrench	Manual Torque Wrench + Torque Multiplier
Current Control Method	The tool is equipped with built-in torque control mechanism. Auto shut off as soon as it reaches the preset torque.	Torque controlled by air pressure and/or airflow rate, or driving a torsion stick	Use digital torque wrench + **TM** (Torque Multiplier)
Advanced Torque Control Method	Use the power torque wrench with **TTES** along with a **Dongle** and **APP** to collect torque data and up load the data immediately as soon as it reaches preset torque and the clutch dis-engaged.	Use the air impact wrench and control the torque by patented control algorithm and device of **TCA**/**TCB** and **TTES** to collect torque data and up-loads the data simultaneously.	Use any manual torque wrench to drive the **TTAS** + a selected size of **TM** and take advantage of the patented control algorithm of **TTAS** to display / verify / record the final torque applied to the joint.
ZIPPTORK products	**TTES + Dongle + APP**	**TCA/TCB + TTES**	**TTAS + TM + Dongle + APP**
Features of ZIPPTORK Solutions	Detects and records the torque data and uploaded immediately as soon as it reaches preset torque and the clutch dis-engaged.	Capable to do Bolting sequence control by **TCA**/**TCB** + **TTES** to tighten the bolts to its target within several rounds, data collection and upload the data.	For high torque bolting, use any impact tool to drive the bolt to certain level and then use any torque wrench along with a **TTAS** + selected **TM** to tighten the bolt to the target torque.

The air installation guide of *TCA-2000/TCB-2000*

for the tool with air consumption between 900L/min and 1500L/min

Quick Coupler 110SN
Lubricator NUL-03NA
Quick Coupler 30SM
Air Hose 11*16
Quick Coupler 110SN
Quick Coupler 30PM
Air Torque Tool
Quick Coupler 40SF
Quick Coupler 110PN
Quick Coupler 30PM
Quick Coupler 110PN
Air Hose 11*16
Quick Coupler 400PN
Quick Coupler 400PN
Air Hose 13*27
Quick Coupler 400SN
Air Hose 13*27
Quick Coupler 400SM
Quick Coupler 400SN
Quick Coupler 400PN
Quick Coupler 400SM
Quick Coupler 400PF
Filter + Regulator NUFR-03NCGHA

Air Compressor
Air Pressure 100~120 Psi
Flow Rate 2000L/minute

for the tool with air consumption between 1500L/min and 2000L/min

Quick Coupler 400SN
Lubricator NUL-04NA
Quick Coupler 400SM
Air Hose 13*27
Quick Coupler 400SN
Quick Coupler 400PM
Air Torque Tool
Quick Coupler 400SF
Quick Coupler 400PN
Quick Coupler 400PM
Quick Coupler 400PN
Air Hose 13*27
Quick Coupler 400PN
Quick Coupler 400PN
Air Hose 13*27
Quick Coupler 400SN
Air Hose 13*27
Quick Coupler 400SM
Quick Coupler 400SN
Quick Coupler 400PN
Quick Coupler 400SM
Quick Coupler 400PF
Filter + Regulator NUFR-04NCGHA

Air Compressor
Air Pressure 100~120 Psi
Flow Rate 2500L/minute

ZIPPTORK *Bolting Technology*

Bolt Load Control of Threaded Fasteners

In order to meet the industrial development trend of Industry 4.0, our company has introduced a full range of patented products related to bolt tightening technology, which provides a cost-effective solution for the industry. Bolting of threaded fasteners is affected by many factors, such as the softness of the material of the fasteners (bolts, nuts and washers) and the surface roughness of the fasteners to be tightened, the influence of bruises or oil contamination on the threads during the process, and the difference in the structure and quality of the tools used, all of which make it difficult to control accurately and effectively.

Furthermore, for the most important purpose of bolting works ~ the clamping force applied to the bolted joint, most of the industry can only control the clamping force of the bolt load by ultrasonic sensing & bolting technology. Some applications even require monitoring of the bolted joint status after bolted and real-time notification when abnormal conditions occur. For this purpose, *ZIPPTORK* has developed a series of bolt load control technologies to provide the ultimate solution for threaded fastener tightening works, fully meeting the requirements of the Industrial Internet of Things(IIoT) applications.

Sensing Bolt & patented anti-vibration Sensing Washer for bolt load control & monitoring

It is ideal for all kinds of bolt tightening operations that require precise control of the clamping force and monitoring the bolted joint status at any time, and the patented anti-loosening design and ease of use make it more advantageous than the conventional ultrasonic sensing & bolting technology in mainstream applications as a great cost-effective alternative.

Patented Bolt Load Transducer

It can be used with any brand and type or design of manual, pneumatic or electric torque tools to directly control and display the corresponding clamping force generated on the bolted joint by the applied torque at the time, and can collect relevant data.

It overturns the traditional method of controlling the bolting torque by torque tools, and directly measures the clamping force induced in the bolted joint instead, effectively improving the quality of bolting operations. A new era of "**Bolt Load Wrench**" is to come!

Ideal for critical bolted joints where bolt load control is important & bolted joint status monitoring is required

SBC Sensing Bolt   **SWC** Sensing Washer
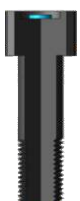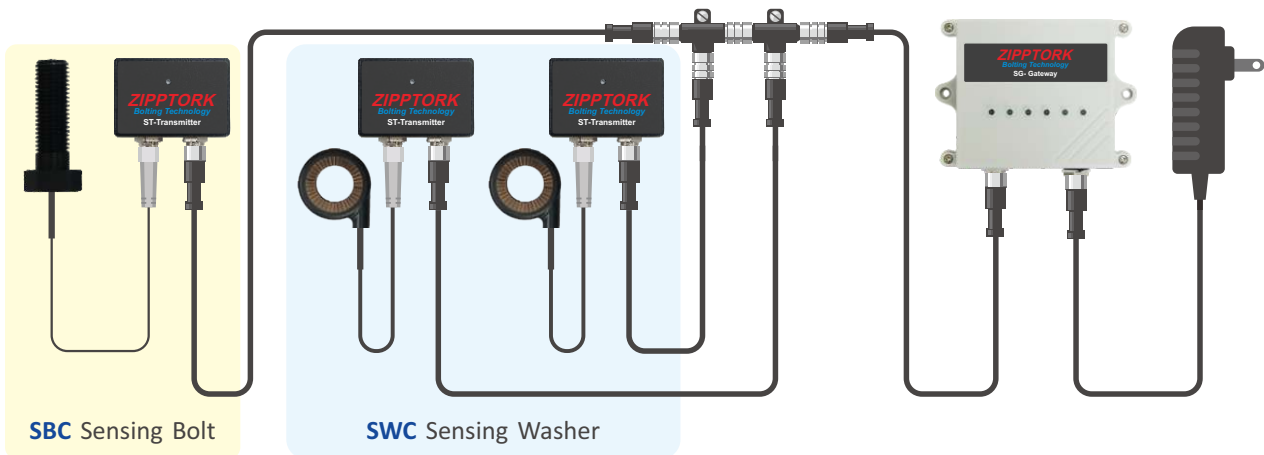
| **SBC** Sensing Bolt | **SWB/SWC** Sensing Washer | **ST** Transmitter | **SG** Gateway | **BLT** Wireless Bolt Load Transducer |

Products and specifications subject to change without prior notice

The Ultimate Solution of Bolting Technology

Sensing Washer with functions of anti-loosening
for controlling bolt load and monitoring the bolted joint status

1. What is different from the past products or current market products?
   Currently, following methods are commonly used to test the clamping force in the market:

   • Ultrasonic inspection method - This inspection method is time-consuming, labor-intensive and expensive.

   • Wired sensor bolt - This test method is wired, difficult to achieve wirelessly, and expensive.

   • Load cell-This inspection method is wired, difficult to achieve wirelessly, and expensive.

   The clamping force control is only for the sensor to connect to the PLC or other display device by wired, the layout of the bolt load sensor of these methods are laborious and time-consuming, and the clamping force sensor does not have any anti-loosening design, and does not have the bolting sequence control function.

2. Our company has been in the field of pneumatic tools for more than 40 years, and has been dedicated to the research and development of bolting technology for decades.

   However, in the field of bolting operation, torque control is not the most accurate technology, but bolt load (clamping force) control is the ultimate and most accurate method; since the bolt load sensor is more expensive than the torque sensor, the market is still dominated by torque control. In recent years, customers' demand for bolting work and data recording is getting higher and higher, and there is an urgent demand for clamping force control in the market, therefore, our company has spared no effort to innovate and breakthrough in research and development in order to make the best and ultimate clamping force control and monitoring for thread fasteners.

3. Due to the difficulty in mass production of the wireless bolt load sensor, the Sensing Bolt developed by our company at the beginning is hard to improve the yield rate and reduce the cost. With our efforts, we have finally developed a new generation of Sensing Washers to replace the Sensing Bolts, which have the following advantages:

   a. The Sensing Washer is suitable for both wireless communication and wired connection. The wireless Sensing Washer is suitable for small magnetic field interference fields - such as automotive industry, oil mining industry, etc.; the wired induction spacer is suitable for large magnetic field interference fields - such as construction and bridge industry, aerospace industry, etc.

   b. Low production cost and high yield rate

   c. Anti-loosening design (the sensing bolt itself does not have an anti-loosening design) - this anti-loosening design is patented. In practice, it is easy to carry, easy to install and easy to operate.

   d. Higher accuracy and stability than sensing bolts, with dynamic bolt load control accuracy of ±10% and static bolt load control accuracy of±5%.

   e. No need to use special or custom-made bolts, just use general bolts and sensing washers to achieve the following functions:

   During bolting process:

   a) The bolting sequence can be controlled with our innovative controller and tag.

   b) Bolt load control

   c) Torque equivalent for reference After bolted,

   combined with Industry 4.0-IoT:

   a) Bolted joint (bolt load-clamping force) monitoring

   b) Torque equivalent display

   c) Clamping force, torque equivalent abnormal alarm

   f. Applicable tools: Any brand of manual, pneumatic and electric torque tools (static, impact, hydraulic pulse)

   g. Application: Construction, oil, mining, automotive, aerospace, etc., where clamping force monitoring is required.

   h. Applicable environment: High magnetic field interference environment, lightning strike environment...etc.

   I. The application can be used not only with our self-developed controller to achieve the clamping force and bolting sequence control, but also as a stand-alone device, the detailed application structure is attached.

ZIPPTORK *Bolt Load Control & Monitoring*

Anti-vibration Sensing Washer

SWB/**SWC** Sensing Washer

- Patented anti-vibration design to ensure the best stability of the bolted joint.
- Bolt axial load control during bolting process by any torque tool.
- Bolt joint status such as bolt load, temperature and vibration variation remote monitoring.
- The best alternative for transmission equipment preventive maintenance work.
- Applicable to any axial load joint status monitoring including HUCK lock bolt.
- Remote monitoring bolted joint periodically or continuously and alert as soon as reach the preset threshold.
- The most economic yet effective alternative of ultrasonic bolting technologies.
- **SWBN**/**SWBR** should be custom-made. Please contact Sales personnel.

Sensing Bolt

SBC Sensing Bolt

- Bolt axial load control during bolting process by any torque tool.
- Bolt joint status such as bolt load, temperature and vibration variation remote monitoring.
- The best alternative for transmission equipment preventive maintenance work.
- Remote monitoring bolted joint periodically or continuously and alert as soon as reach the preset threshold.
- The most economic yet effective alternative of ultrasonic bolting technologies.

ZIPPTORK *Bolt Load Control Technology*

Wireless Bolt Load Transducer

BLT Wireless Bolt Load Transducer

For sensing and controlling bolt load generated in the bolted joint instantly throughout the bolting process

- Patented design for direct sensing the bolt load induced on the joint during the bolting process.
- With functions of data logging and up load to peripheral device or cloud server.
- To be attached to the drive anvil of any type of torque tool for direct bolt load control.
- Patented vibration proof design, also good for impact torque tools.
- RF2.4G wireless transmission and data collection.

BLT Bolt Load Transducer

RF2.4G

TCA Torque Controller

RF2.4G

TCB/**TCC** Torque Controller

Laptop

Bluetooth

Products and specifications subject to change without prior notice
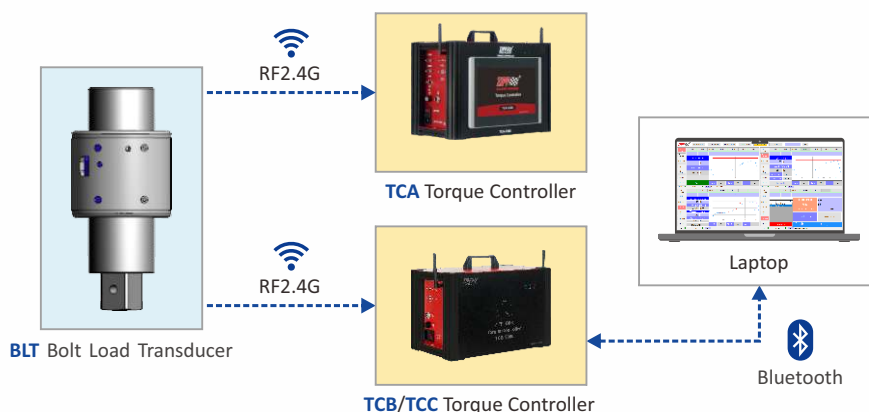
Bolt Load Control Products Application Embodiment

Bolt Load Control During Bolting Process

Support Functions

Tri-Light

USB Flash Drive

Scanner

Printer

Cloud Server

Router

WiFi — LAN

Monitor + APP

Applicable Torque Tools

Air Impact Wrench

Air Clutch Tool

Dial Torque Wrench

Click Wrench

Torque + Bolt Load Mode

+

TTES/TTRH/TTEB Wireless Torque Transducer

RF2.4G

+

Bolt Load Mode

SWB/SWC Sensing Washer

TCA Torque Controller

TCB/TCC Torque Controller

Laptop/Tablet

Bluetooth

RF2.4G

Bolted Joint Status Monitoring

SBC Sensing Bolt

SWC Sensing Washer

ST-Transmitter

ST-Transmitter

5V Power

Cloud Server

SERVER

Router

WiFi — LAN

WiFi

Laptop/Tablet

RF2.4G

WiFi

ST Transmitter

RS-485

SG Gateway

9V Power

ST-Transmitter

ST-Transmitter

ST-Transmitter

SG- Gateway

SBC Sensing Bolt

SWC Sensing Washer

RS-485

Products and specifications subject to change without prior notice

	mm	mm	Bolts and nuts classes (Metric threads, triangular shape, high pitch, 0.15coefficient)					
			4.8 Torque Nm	5.8 Torque Nm	6.8 Torque Nm	8.8 Torque Nm	10.9 Torque Nm	12.9 Torque Nm
M3	5.5	2.5	0.64	0.8	0.91	1.21	1.79	2.09
M4	7	3	1.48	1.83	2.09	2.78	4.09	4.79
M5	8	4	2.93	3.62	4.14	5.5	8.1	9.5
M6	10	5	5	6.2	7.1	9.5	14	16.4
M8	13	6	12.3	15.2	17.4	23	34	40
M10	16	8	24	30	34	46	67	79
M12	18	10	42	52	59	79	116	136
M14	21	12	67	83	95	127	187	219
M16	24	14	105	130	148	198	291	341
M18	27	14	145	179	205	283	402	471
M20	30	17	206	254	291	402	570	667
M22	34	17	283	350	400	552	783	917
M24	36	19	354	438	500	691	981	1148
M27	41	19	525	649	741	1022	1452	1700
M30	46	22	712	880	1005	1387	1969	2305
M33	50	24	968	1195	1366	1884	2676	3132
M36	55	27	1242	1534	1754	2418	3435	4020
M39	60		1614	1994	2279	3139	4463	5223
M42	65	32	1995	2464	2816	3872	5515	6453
M45	70		2497	3085	3525	4847	6903	8079
M48	75	36	3013	3722	4254	5849	8330	9748
M52	80		3882	4795	5480	7535	10731	12558
M56	85	41	4839	5978	6832	9394	13379	15656
M60	90		6013	7428	8490	11673	16625	19455
M64	95	46	7233	8935	10212	14041	19998	23402

1 Nm= 0.738 ft.lb.= 8.85 In.lb.= 0.1 kgf.m= 10.2 kgf.cm

Conversion Table

PRESSURE

Pa	Mpa	bar	psi	Kg/cm²
1,000,000	1	10	145	10.197
100,000	0.1	1	14.5	1.0197
6,890	0.00689	0.0689	1	0.0703
98,070	0.09807	0.9807	14.223	1
620,000	0.62	6.2	90	6.3

psi>>kg/cm²:90psi x 0.0703=6.327kg/cm²
bar>>psi:7bar x 14.5=101.5psi

FLOW RATE

m³/min	cfm	l/min	l/s
1	35.317	1,000	16.668
0.0283	1	28.3168	0.4719
0.001	0.035	1	1.0165
0.061	2.1189	60.606	1

cfm>>l/min:10cfm x 28.3168=283.168 l/min
m³/min>>cfn:10m³/min x 35.317=353.17cfm
Po:PSI
SCFM=CFM*((Po+14.7)/14.7)

WEIGHT OR FORCE

lb	kg	N
1	0.4536	4.4484
2.2046	1	9.807
0.2248	0.102	1

kg>>N:10kg x 9.807=98.07N
N>>kg:10N x 0.102=1.02kg

TORQUE

N-m	Kg-m	Kg-cm	ft-lb	in-lb
1	0.102	10.1972	0.7376	8.8507
9.8067	1	100	7.233	86.77
0.0986	0.01	1	0.0723	0.8677
1.3558	0.1383	13.83	1	12

N-m>>ft-lb:10N-m x 0.7376=7.376 ft-lb
N-m>>kg-m:10N-m x 0.102=1.02 kg-m

LENGTH

mm	m	Inch	ft
1	0.01	0.03941	0.0033
1,000	1	39.37	3.2809
25.4	0.0254	1	0.0833
304.8	0.3048	12	1

mm>>inch:10mm x 0.0394=0.394 inch
Inch>>mm:10inch x 25.4=254mm

POWER

KW	HP
1	1.341
0.746	1

HP>>KW:10HP x 0.746=7.46KW

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