
ZIPP®
Assembly Technology
ZIPPTORK
Torque Control Series Products
www.zippgroup.com

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.

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 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.

Torque Controller

Model		TCA-1000	TCA-2000
Max. Flow Rate		1000 L/min	2000 L/min
Touch Panel Size		10"	
Power Source		AC 100V~240V /2A	
Wire connector	USB	1	
	RS232	2	
	RJ45	1	
Wireless	RF2.4G	2	
Speaker		1	
Light Tower Output Port		1	
Buzzer		80dB	
Transducer Charger Port		2	
RF Antenna		2	
Flow Rate Detection		V	
Automatic Flow rate Control		V	
Operation Mode	Oil Pulse Wrench	V	
	Air Impact Wrench	V	
	Manual Torque Wrench	V	
	Air Torque Multiplier	V	
	Job Sequence	V	
Control Accuracy	Static Torque (%)	±1% ~ ±5%	
	Dynamic Torque (%)	±5% ~ ±15%	
Thread Size	Inlet	3/8" NPT	1/2" NPT
	Outlet	3/8" NPT	1/2" NPT
Dimensions	Length(L)	370mm	
	Width(W)	214mm	
	High(H)	266mm	
Net Weight		10.5kg±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 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 ASCII 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, MSI/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.

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

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

Optional Transducer Protection Cover:
P/N: TPC-100 for 20/50/100Nm
P/N: TPC-250 for 180/250Nm
P/N: TPC-500 for 500Nm
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.
- 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:

Window system

monitor upto FOUR tools at a time

Android system

	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

■ Torque Transducer Warranty period:

* TTE series: 12 months from purchase date or 200,000 cycles.
* TTA series: 12 months from purchase date or 500,000 cycles.
* TTEB series: 12 months from purchase date or 200,000 cycles.
* Battery: 3 months from purchase date.
* Dongle: 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 series measure dynamic torque, broken / missing seal label, misuse, modification, negligence, abuse or normal wear and tear.

Wireless Torque Transducer

Model	Torque Range (Nm)	Inlet Size	Outlet Size	Profile Dimension O.D. X Length (mm)	Net Weight (kgs)	Battery Capacity
TTES-20-FS3MS3	2~16	3/8"	3/8"	45x83	0.18	DC3.7V/650mAh
TTES-50-FS3MS3	5~40	3/8"	3/8"	45x83	0.2	DC3.7V/650mAh
TTES-100-FS3MS4	10~80	3/8"	1/2"	45x90	0.21	DC3.7V/650mAh
TTES-180-FS4MS4	18~145	1/2"	1/2"	45x97	0.26	DC3.7V/650mAh
TTES-250-FS4MS4	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-F12MS12	300~2400	1-1/2"	1-1/2"	86x166	3.8	DC3.7V/650mAh
TTAS-20-FS3MS3	2~20	3/8"	3/8"	45x83	0.18	DC3.7V/650mAh
TTAS-50-FS3MS3	5~50	3/8"	3/8"	45x83	0.2	DC3.7V/650mAh
TTAS-100-FS3MS4	10~100	3/8"	1/2"	45x90	0.21	DC3.7V/650mAh
TTAS-180-FS4MS4	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-F12MS12	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.

Model	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.

Model	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.

Model	Torque (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

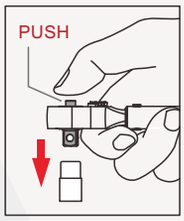
Size
S:SQ. **HM**:Metric Hex. **HI**:Imperial Hex. **HB**:Bit Hex.
F:Female **M**:Male
Size
S:SQ. **HM**:Metric Hex. **HI**:Imperial Hex. **HB**:Bit Hex.
F:Female **M**:Male
Torque Range(**Tnom**)
5:5Nm **10**:10Nm **20**:20Nm **50**:50Nm **100**:100Nm
180:180Nm **250**:250Nm **500**:500Nm **750**:750Nm
1000:1000Nm **1500**:1500Nm **2000**:2000Nm
Output-End Shape
S:Square
H:Hexagon
R:For sequence control, detect the sensing bolts and tagged bolts but without angular movement detection
E:Without angular movement detection
A:For torque wrench mode only, with angular movement detection

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	

Adjustable Torque Wrench, Window Scale Type

ZCW15N & 30N
ZCW150i & 250i

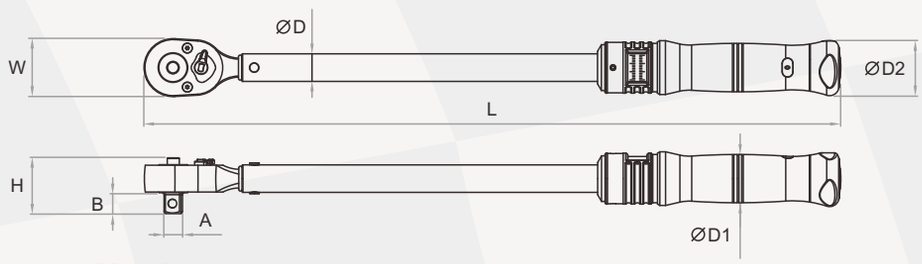
Quick release button design.
Push the button to release socket.

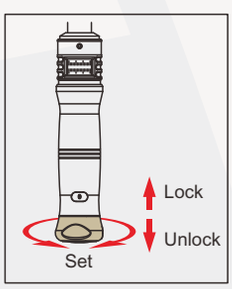


Other series

ZCW1500N & 2000N
ZCW1000F & 1500F

ZCW3000N
ZCW2000F





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"				60.4	30.7						
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"			79.7	66.8	29.8						
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

Unit:mm

Specification **SAE**

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"				60.4	30.7						
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"			79.7	66.8	29.8						
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

Unit:mm

Products Combination for Various Applications

Air Impact / Impact Ratchet / Pulse wrench

Wireless Rotary Torque Transducer

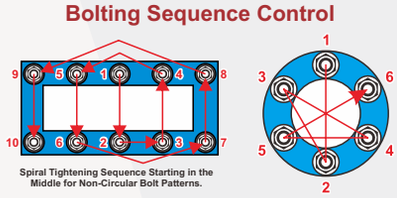
Cloud Networking

Power Torque Tool w/Torque Control Mechanism

Wireless Rotary Torque Transducer

Click Wrench

Bolting Sequence Control



Controller	Torque Tools	Torque Transducer	Media	Data Collection	Applications
TCA	Any Air torque Tool	TTAS/TTES	TF/TS	TCA	Torque Calibration prior to torque
TCA	Any Air torque Tool	TTES	Socket / Bits	TCA	Torque Control during bolting process
TCA/TTT	Manual Torque Wrench	TTAS	Socket / Bits	TCA/TTT	Torque Verification after bolted
TCA/TTT	Manual Torque Wrench	TTAS	TM	TCA/TTT	High Torque Control / Verification
TCA	Any Air torque Tool	TTES/TTEH/TTEB	Socket / Bits	TCA	Job Combination for work station
TCA	Any Air torque Tool	TTER	TB	TCA	Bolt production and bolting data record Bolting Sequence Control
TCA	Any Air torque Tool	TTER	SB	TCA	Bolt production and bolting data record Bolting Sequence Control Bolted joint status Remote Monitoring
TCA	Any Air torque Tool	TTER	SB+TB mixed	TCA	
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

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 & Wireless Rotary Torque Transducer-TTES**, the sensed torque and angle signal will be transmitted from the TTE to TCA 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** 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** 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 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** 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** + **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** + **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** + **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** + **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** + **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

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 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 - 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-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	$T_2 \geq 3 \times T_T$

How to select an air impact wrench

Before bolting, refer to the chart above and consider following factors such as the target torque T_T , how many seconds required to tighten the bolt to target torque, the system air supply capacity, airline condition especially the air hose size and length, coupler sizes, and the hardness of the joint to be fastened etc.

Generally the specified torque capacity of an air impact wrench is measured under 90PSI air pressure with the maximum air flow rate of the tool to tighten a hard joint for 5 or 10 seconds.

For example;
Tighten a bolt to a **hard joint** and reach a target torque - 100NM within 2 seconds, it's recommended to select an air impact wrench with the torque capable to reach 300NM minimum within 5 seconds.

Tighten a bolt to a **soft joint** and reach a target torque - 100NM within 2 seconds, it's recommended to select an air impact wrench with the torque capable to reach 500NM minimum within 5 seconds.

How to select a Torque Transducer

The recommended nominal torque capacity of the Torque Transducer should be 1.5 ~ 2 times of the target torque.

For example, if the target torque is 100NM, the selected Torque Transducer should be with 150 ~ 200NM torque capacity and if the target torque is 750NM, the selected Torque Transducer should be with 1000 ~ 1500NM torque capacity.

How to use the SB & TB +TCA +TTER /TSSR for bolting sequence control

While using the **Torque Controller** and a **wireless Torque Transducer *with* Reader** to do bolting with sequence control, it's required to preload the Sensing Bolt or Tagged Bolt clock-wisely or counter-clock-wisely according to the programmed order、type of **SB** or **TB** and number of the bolts and how many rounds to reach the target as well as the torque percentage of the target torque of each round, etc. in advance.

While the **TTER /TSSR** reading the production record of the **SB** or **TB** ，it will judge if the inputted target torque or clamping force exceeds the specified upper limit.

By means of the **TCA** and **TTER /TSSR** **(wireless Torque Transducer with Reader embedded)** to tighten the **SB/TB** ，do training first with P_L/T_L ~ P_H/T_H calibration (at the moment while the Transducer sensed the first torque, the correspondent clamping force on **SB** will be obtained simultaneously, and then, start bolting, **TCA** will control the tool to the target torque, it will keep the record of the correspondent clamping force of the 1st **SB** as the target clamping force of the following **SB**s and judge if it's OK or NOK according to the pre-determined threshold. Throughout the bolting process, **TCA** mainly control the clamping force and take the bolted torque as a reference only. If **SB** & **TB** are mixed in use，the **TTER /TSSR** will identify and make the difference in between to check if it follows the programmed sequence. The **TB** will still be controlled and recorded with target torque only.

After bolted, **TTER /TSSR** will write relevant bolting data on both type of bolts, such as operator's ID, time of bolting, bolted torque and clamping force, etc. for the traceability afterwards. The **SB** will be installed with a **TC** (Transmitting Cap) after bolted and keep supplying power to the bolt to transmit the sensed strain signal of the **SB** to peripheral devices periodically and alert as soon as the sensed strain signal over the predetermined threshold！

Functions of *ZIPPTORK* Torque Controller

Model	TCA-1000	TCA-2000	ZD
Max. Flow Rate Liter per Minute	1000	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 + TCC + 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 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 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 + TTAS + 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 + TTAS + 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

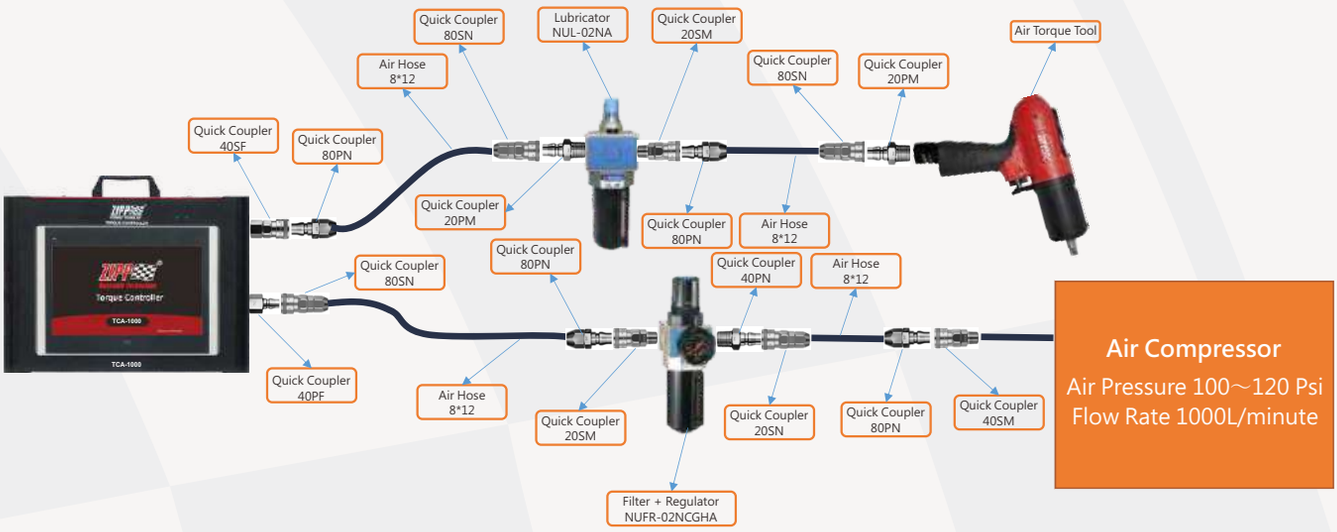
Exemplary Applications of *ZIPPTORK* Torque Control Products
Bolting Technology

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

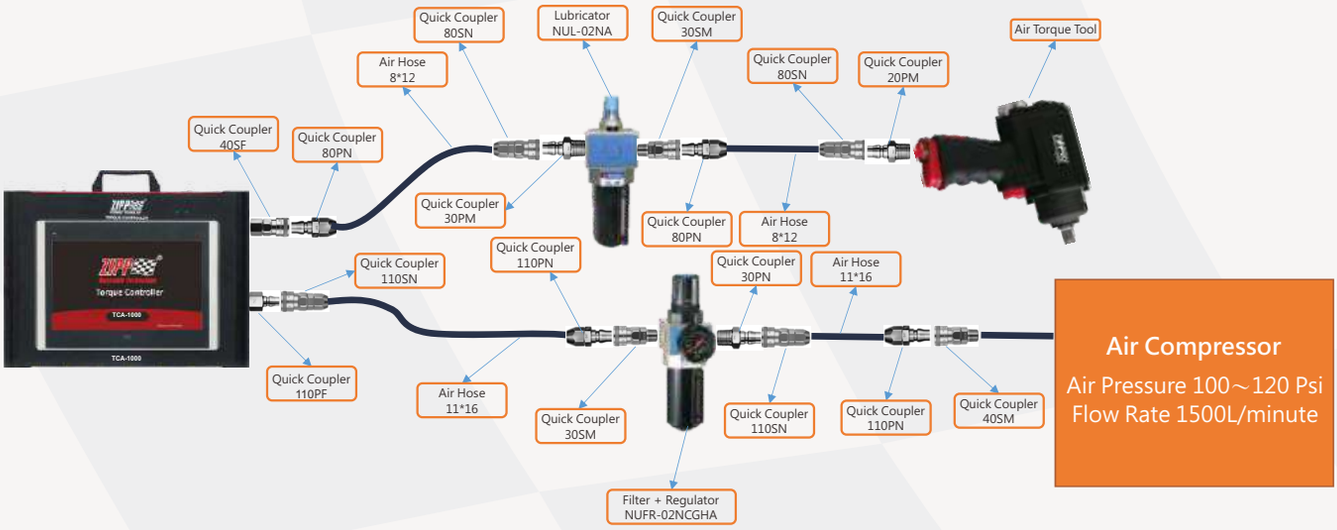
Exemplary Embodiment for the Application of Torque Control Products

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** 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 + 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 + 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.

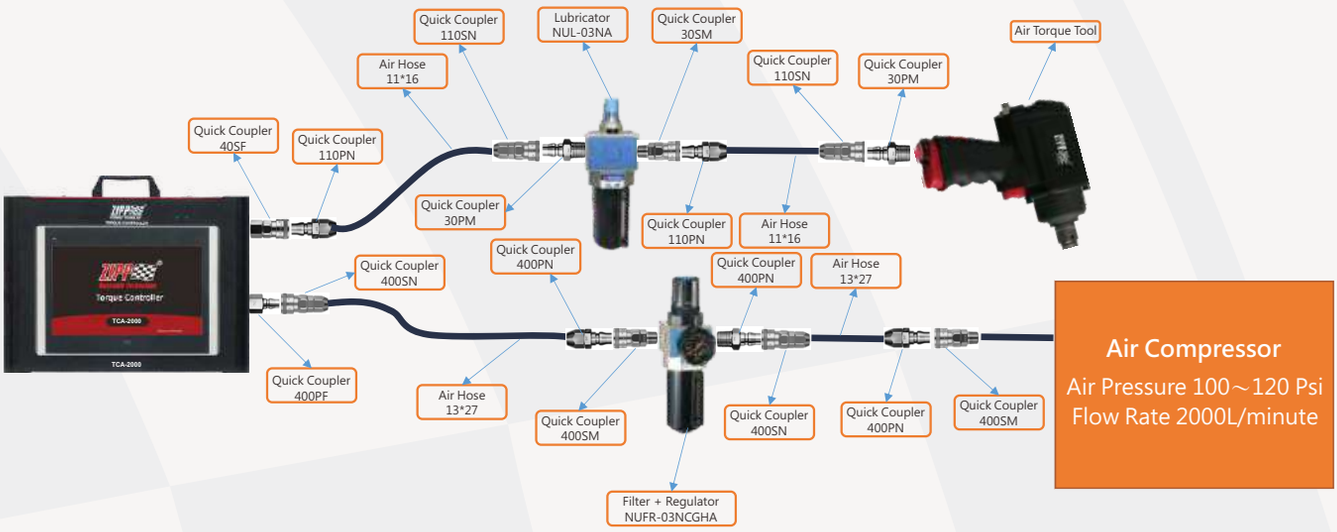
The air line installation guide of TCA-1000 for the tool air consumption under 500L/min



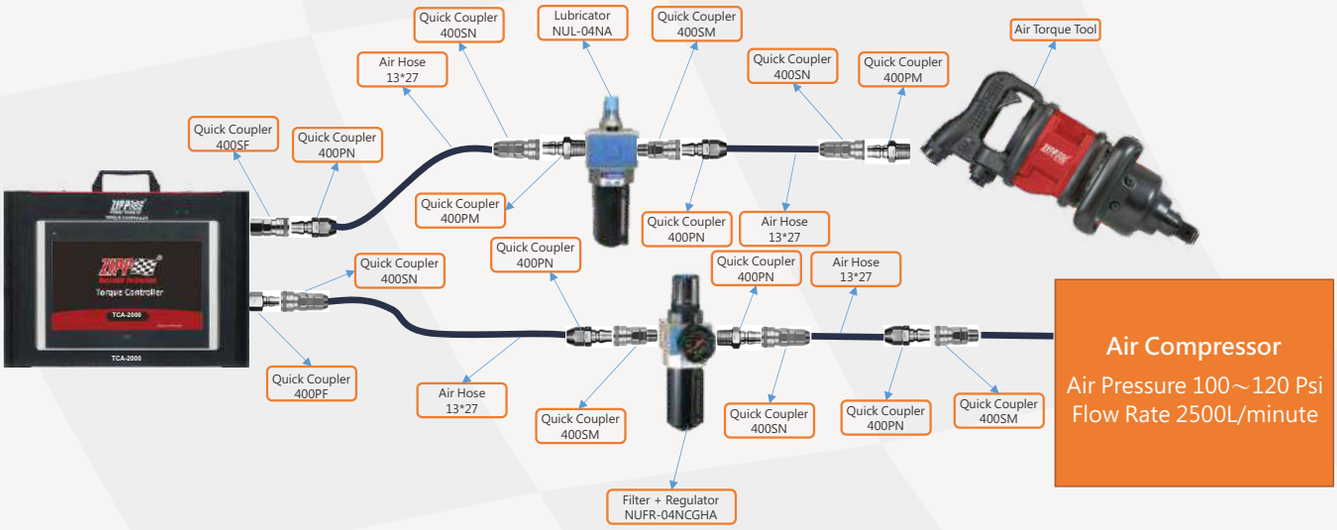
The air line installation guide of TCA-1000 for the tool with air consumption between 500L/min and 900L/min



The air installation guide of TCA-2000
for the tool with air consumption between 900L/min and 1500L/min



The air line installation guide of TCA-2000
for the tool with air consumption between 1500L/min and 2000L/min



 mm	 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/cm^2
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/cm^2:90psi x 0.0703=6.327kg/cm^2
bar>>psi:7bar x 14.5=101.5psi

FLOW RATE			
m^3/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
m^3/min>>cfn:10m^3/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