ZIPPTORK

Bolting Technology

Torque Control、Bolt Load Control

Smart Bolting Technology

Product Portfolio

Passion for Innovation

Your Problem ~Our Inspiration

www.zipptork.com

Content

Overview

ZIPPTORK has been working for decades on the development of various assembly technologies, such as the bolting of thread fasteners, the riveting or squeezing of solid or hollow rivets, the blind riveting of blind rivets or rivet nuts and HUCK type bolts, etc., with an emphasis on the intelligence of the related products.

The bolting control technology is an important development target for **ZIPPTORK**, mainly for torque control of thread fasteners, bolt load (clamping force) control and monitoring of bolted joint status. The portfolio brings together key equipment such as torque testers for the calibration, verification and simulation of tool torque capability before assembly, monitoring or controlling the tightening torque and bolt load (clamping force) during assembly, and residual torque detection after bolted, and continuous monitoring of the bolted joint status, either immediately or periodically, to ensure the highest reliability of the assembled equipment, all under one system with a complete patented layout.

With the advent of the smart factory, **ZIPPTORK** is an essential source of technological and engineering information to help you make Industry 4.0 a reality.

ZIPPTORK Bolting 4.0 - Smart Bolting Solution

Quality, efficiency and flexibility are three drivers of Industry 4.0. Digitalization allows industries to introduce effective processes to mass produce higher-quality products at lower costs. When talking about technologies, the cornerstones that are shaping Industry 4.0 for businesses are cloud computing; the Internet of Things; big data and analytics; additive manufacturing(3D Printing); and autonomous robotics. No wonder most industries are willing to move toward the industry of tomorrow. However, the budget for relevant investments becomes the most significant obstacle. Narrow the problem down to the bolting works popular in most industries. How to do the job faster, safer and more reliably while requiring the production record to be traceable for reliability and assurance of quality.

ZIPPTORK Bolting 4.0 provides innovative, effective, yet economical solutions for various industries in their daily bolting works, such as torque tool calibration, torque simulation before work, bolting control during the process and residual torque verification after bolt, and even the highest requirement to control every bolted joint with the same bolt load. At the same time, keep monitoring the bolted joint status remotely, periodically or continuously. It meets the application requirement of IoT.

You are welcome to visit and browse the website – www.zipptork.com for more information and videos.

ZIPPTORK Bolting Solutions Q & A

Bolting Torque / Bolt Load Control, Bolting Sequence Control, Bolted Joint Status Monitoring, Job Traceability & Data Collection/Logging

1. How to control the bolting torque of air or DC-driven impact wrench or pulse wrench?
   Air torque tools with **TCA/TCB Controller** or DC tool **with built-in ECB Control board** attached with **TTE Torque Transducer** under **Transducer Mode** ~ Torque controllability ±10% ~ ±15% accuracy for impact wrench, ±5% ~ ±10% for oil pulse wrench
   Air torque tools with **TCA/TCB Controller** or DC tool **with built-in ECB Control board** only under **Pressure or Voltage Mode** ~ Torque controllability ±15% ~ ±20% accuracy for impact wrench, ±10% ~ ±15% for oil pulse wrench
2. How to monitor the bolting torque of pulse wrench and clutch type tool?
   Auto shut off type oil pulse wrench or Clutch type wrench ~ Use **TTE Transducer + DR-RF Dongle** + Tablet for torque monitoring and data logging. Accuracy depends on tool quality.
   Non-shut-off type oil pulse wrench ~ Use method and apparatus of 1 mentioned above.
3. How to collect bolting data of a click-type wrench?
   Use Click type wrench + **TTA/STA wireless Torque Transducer + DR-RF Dongle** + Tablet to **make audible "CLICKs" visible and data collectable**.
4. How to measure the residual torque of a bolted joint with 1st movement method?
   Use any manual torque wrench + **TTA/STA wireless Torque Transducer + DR- RF Dongle** + Tablet to obtain the residual torque just at the 1st movement of the bolted joint while keep tightening.
5. How to measure the residual torque of an extremely high torque (over 500NM) bolted joint?
   Use any manual torque wrench + **TTA/STA wireless Torque Transducer + TM(Torque Multiplier ~ up to 3 stacks of TM) + DR-RF Dongle** + Tablet to obtain the residual torque just at the 1st movement of the bolted joint.
6. How to do torque simulation of power-driven torque tools before bolting?
   Use the tool with or without the **TTE Torque Transducer** attached **→TTT/LTT Torque Tension Tester+ DR-RF Dongle**+ Tablet to measure the device's working torque under specific air pressure or voltage to tighten the particular fastener and acquire the working torque with correspondent bolting seconds.

Please refer to the 『appendix』 for the solutions to the following questions!

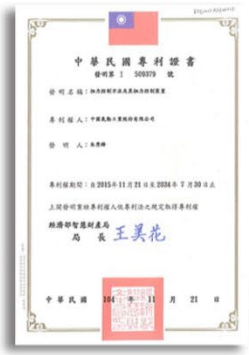
- How to do torque control for car wheel bolting precisely and efficiently?
- Is there any practical alternative for ultrasonic bolting technology?
- How to monitor the bolted joint condition continuously or periodically?
- How to do high torque bolting?
- How to do bolting sequence control?
- What is the most advanced transducerized power-driven torque multiplier?
- What is the ultimate solution of bolting works?

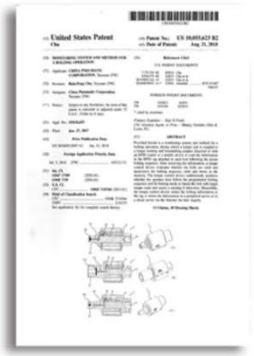
Bolting Technology

Common Issues in the Field

- How to select a proper torque tool? Tool Cost vs Control Accuracy
- How to manage bolting work before, during & after?
- How to do daily or periodic calibration with a record for traceability ?
- How to control the bolting torque of discontinuous drive torque tools such as an impact or pulse wrench?
- How to monitor the bolting torque of a clutch-type screwdriver and obtain relevant bolting data?
- How to monitor the bolting torque of a power torque tool with an auto shutoff mechanism and obtain relevant data?
- How to collect the bolted data once a click wrench checks it?
- How to digitalize an interchangeable head torque wrench and make it accessible with various types of heads from other brands?
- How can digital torque wrenches or transducers simultaneously measure the bolt load?
- How to do high torque bolting by several stages while bolting sequentially?
- How to verify the high residual torque over 500NM effectively & correctly?
- How to make an air motor with servo control?
- How to tighten wheel lug nuts properly with accurate torque control and bolting sequence while recording relevant data?
- How to measure & control the bolt load during the bolting process? Bolt Load Transducer is the answer
- How to control the bolt load of a bolted joint? A sensing Washer or Sensing Bolt will be an effective and economical alternative to ultrasonic bolting technology.
- How to monitor the tightened status of a bolted joint remotely? A sensing Washer or Sensing Bolt is the best choice.

Patents & ISO Certification





Patents Granted for Bolting Technology

Item	Title	Country	Reference	Expiry Date
1	A method of programmable toque controlling for sensing bolt	USA	US 2015/0041162 A1	Feb.12, 2035
2	Anti-Vibration Torque Sensing and Control Device for Tools	USA	US 7,779,704 B1	Aug. 24,2030
3	Apparatus Capable of Controlling, Tracking and Measuring Tightening Torque and Locking Force, and Method for Controlling, Tracking, Measuring and Calibrating Thereof	USA	US 9,026,379 B2	May 5, 2035
4	Apparatus and Control System of Programmable Air Servo Motor	USA	US 10,422,356 B2	Feb. 06, 2038
5	Torque Control System and Torque Control Method for Power Impact Torque Tool	USA	US 10,940,577 B2	Sept. 10, 2038
6	Method of Torque Control and Apparatus Thereof	USA	US 10,564,657 B2	Feb. 18, 2040
7	WIRELESS TORQUE TRANSDUCER	USA	US D887,881 S	Jun.23, 2035
8	Monitoring System and Method for a Bolting Operation	USA	US 10,055,623 B2	Aug. 21,2038
9	扭力制御方法及方法的制御裝置	Japan	特許第 6420848 號	Oct. 19, 2039
10	扭力感知及傳導裝置	Japan	特許第 6871351 號	April 19, 2041
11	Drehmomentverstarker	Germany	Pat. Nr. 10 2017 127 762	15.11.2038
12	Digitales Anzeigegerat fur ein werkzeug zum Anziehen von Befestigungsmitteln	Germany	Pat. Nr. 20 2010 005 469.9	20.05.2030
13	Drehmomentsteteuersystem und Drehmomentsteuerve fahren fur Elektro Schlagwerkzeug mit Einstellbarem drehmoment-有動扭控	Germany	Pat. Nr. 10 2017 119 623	28.08.2037
14	Druckluftsteuerungsmoduleinhelt fur traghare druckluftbetatigte Werkzeuge	Germany	Pat. Nr. 20 2007 007 127.2	04.11.2030
15	Uberwachungssystem und Uberwachungsverfahren zur Schraubenverbindung	Germany	Pat. Nr. 10 2017 104 224	10.12.2040
16	Darstellung 1 von 7 (Wireless Torque Transducer-(無線扭力傳感器外型專利)	Germany	Designs Nr. 402018100941-0001, 0002, 0003	09.18.2043
17	螺栓夾緊力感應墊圈	Taiwan	新型第 M598351 號	2030.04.12
18	動力鎖緊工具之扭矩控制裝置及其控制程序	Taiwan	發明第 I 396609 號	2030.07.13
19	扭力感測與傳輸裝置	Taiwan	發明第 I 703315 號	2039.01.09
20	感應螺栓的電源與訊號傳輸裝置及感應螺栓裝置	Taiwan	發明第 I 664356 號	2037.03.23
21	螺栓分次物固的扭力控制方法及扭力控制裝置	Taiwan	發明第 I 670149 號	2038.06.06
22	可程式氣動伺服馬達	Taiwan	發明第 I 584919 號	2036.05.18
23	螺栓鎖固作業的監控系統及其方法	Taiwan	發明第 I 569923 號	2036.07.04
24	具扭力、角度感測及訊號傳輸功能的套筒	Taiwan	發明第 I 631323 號	2037.10.29
25	電動衝擊式扭力工具的扭力控制系統及其扭控制方法	Taiwan	發明第 I 619582 號	2037.06.08
26	氣動衝擊式扭力工具的扭力控制方法及其扭力控制系統	Taiwan	發明第 I 592778 號	2036.02.01
27	扭矩顯示系統及其方法	Taiwan	發明第 I 435795 號	2031.10.02
28	具有抗振作用之工具扭力感應與控制裝置	Taiwan	發明第 I 342821 號	2029.01.20
29	扭力控制方法及其扭力控制裝置	Taiwan	發明第 I 509379 號	2034.07.30
30	衝擊式氣動扭力板手之扭矩控制裝置	Taiwan	發明第 I 432293 號	2032.01.03
31	可控制與追蹤量測鎖緊扭矩及鎖緊力的裝置及其控制方法、追蹤量測方法與校驗的方法	Taiwan	發明第 I 454346 號	2031.12.29
32	動力鎖緊工具之扭矩控制裝置及其控制程序	Taiwan	發明第 I 396609 號	2030.07.13
33	無線扭力傳感器之部分	Taiwan	設計第 D197509 號	2030.07.13
34	間接耦合之扭矩控制方法及其機構	Taiwan	發明第 I 498196 號	2032.10.04
35	間接耦合的扭矩控制方法及其機構	China	ZL 2012 1 0414390. 8	2035.09.16
36	具有抗振作用的工具扭力感應與控制裝置	China	ZL 2010 1 0101192. 7	2032.02.01
37	扭矩顯示系統及其方法	China	ZL 2011 1 0138293. 6	2033.12.25
38	感應螺栓的電源與訊號傳輸裝置及感應螺栓裝置	China	ZL 2017 1 0181401. 5	2039.11.22
39	電動衝擊式扭力工具的扭力控制系統及其扭控制方法	China	ZL 2017 1 0492652. 5	2037.06.25
40	無線扭力傳感器	China	ZL 2018 3 0512525. 2	2029.01.11
41	扭力控制方法及其扭力控制裝置	China	ZL 2014 1 0371437. 6	2037.06.06
42	可控制與追蹤測量鎖緊扭矩及鎖緊力的裝置及相關方法	China	ZL 2012 1 0011877. 1	2034.02.26
43	可程式氣動伺服馬達的裝置與控制系統	China	ZL 2016 1 0373780. 3	2036.05.29
44	氣動衝擊式扭力工具的扭力控制方法及其扭力控制系統	China	ZL 2016 1 0072863. 9	2039.11.29
45	螺栓鎖固作業的監控方法	China	ZL 2016 1 0527106. 6	2040.01.31
46	螺栓分次物固的扭力控制方法及扭力控制裝置	China	ZL 2018 1 0577911. 9	2038-06-06

申請中的專利～

- → 美國還缺夾緊力傳感器+可擴充倍力板手扭力的裝置
- → 日本還缺夾緊力傳感器+可擴充倍力板手扭力的裝置
- → 德國還缺夾緊力傳感器+可擴充倍力板手扭力的裝置
- → 台灣還缺夾緊力傳感器外型專利+夾緊力傳感器+可擴充倍力板手扭力的裝置
- → 大陸還缺夾緊力傳感器+夾緊力傳感器+可擴充倍力板手扭力的裝置

Bolting Control Products Portfolio

ZIPPTORK Smart Bolting Technology

As technology continues to transform the world of bolting threaded fasteners, more and more industries are exploring the benefits of intelligent bolting over manual or traditional torque tools. With promises of enhanced productivity, increased reliability, controllability and traceability, ***ZIPPTORK*** provides bolting technologies with extraordinary patented designs, control algorithms and devices not only make impact wrenches torque controllable but also make the bolted joint condition such as bolt load, ambient temperature and vibration detection possible for remote monitoring periodically or continuously.

ZIPPTORK **Bolting Technologies** includes two categories, i.e.

1. Torque Control System - consists of

a. **Torque Controller** - For controlling the torque of air or DC-powered impact and pulse wrenches.
b. **Anti-vibration Wireless Rotary Torque Transducer** - For monitoring static or dynamic bolting torque wirelessly.
c. **Wireless Swing Type Torque Transducer** - For monitoring bolting torque of interchangeable head torque wrench.
d. **Torque Tester** - For the test, calibrate torque tool output torque capability.
e. **Torque Tension Tester** - For measuring or simulating the bolt load induced with its equivalent residual torque while tightening specific thread fasteners to form a bolted joint under predetermined operating conditions.

2. Bolt Load Control System - consists of

a. Anti-vibration Sensing Washer – To control the bolt load induced on the bolted joint throughout the process and monitor the bolted joint status remotely, periodically or continuously.

b. Wireless Anti-vibration Bolt Load Transducer - Sensing and controlling the bolt load induced on the threaded fasteners throughout the bolting process.

It's an evolution of torque tool designed for measuring the bolt load instantly during the process.

Torque Control & Bolt Load Control System

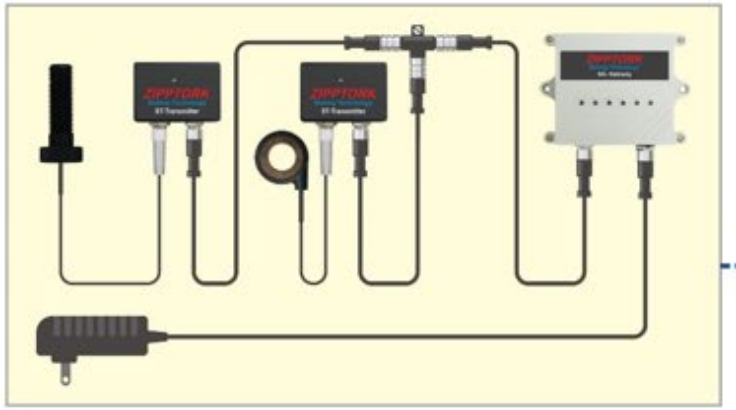
Bolt Load Control System

Applicable To

Control Bolt Load / Control Bolting Sequence

Monitor bolted Joint Status / Bolting Work Record and Uploading

The Ultimate Solution of Bolting Technology



SWC Sensing Bolt / **SBC** Sensing Washer

Granted Patents Anti-vibration wireless Bolt Load Transducer

Anti-vibration Sensing Washer Bolting Sequence Control Method

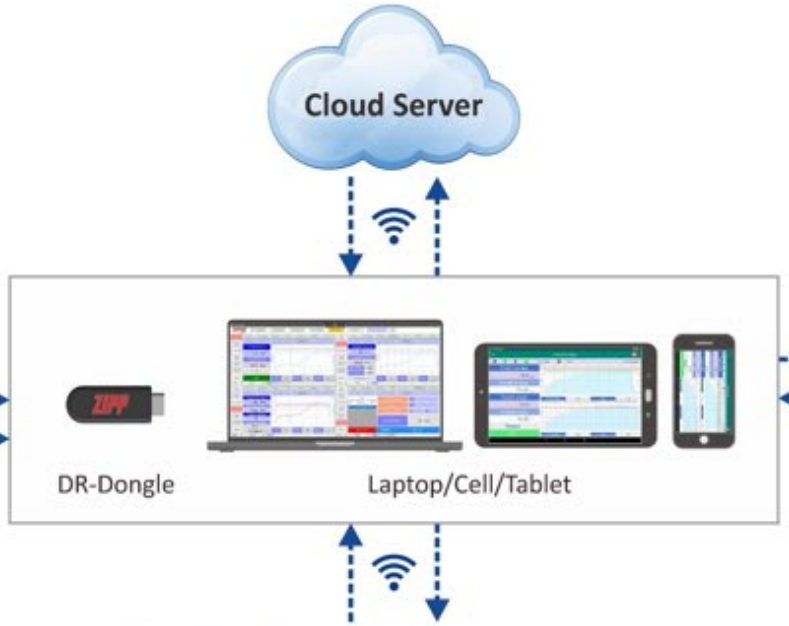
WTT

Wireless Tension Transducer

BLT

Bolt Load Transducer

Can be fastened by any type of manual & air or DC driven impact or pulse wrench of ANY BRAND with ANY TORQUE MECHANISM



The ONLY Torque Controller capable to control

Air or Cordless impact & pulse wrenches in the field

Cordless Wrench with

built-In **ECB Controller**

Torque Control System

Applicable To

Calibrate tool Torque ~ Prior to Work

Monitor/Control Bolting Torque ~ During the Process

Verify Residual Torque ~ After Bolted

With great control accuracy, durability

and complete process record for traceability

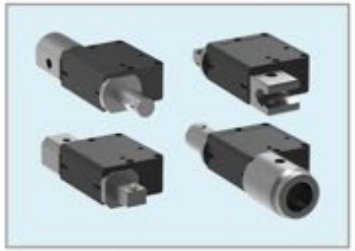
TCA/TCB/TCC Torque Controller

Unique Bolting Torque Controllability

+

Patented & the ONLY wireless anti-vibration

Torque Transducer in the field



STA

Swing Type Torque Transducer

TTAS/TTES/TTEH/TTEB

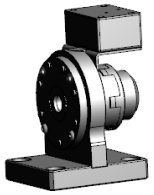
Rotary Type Torque Transducer

Applicable to any type of air & cordless impact or pulse wrench of ANY BRAND with ANY TORQUE MECHANISM

ZIPPTORK Bolting Control Series Products

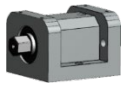
TCA / TCB / TCC
Torque Controller

ETCI / ETCP
Built-In Controller

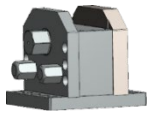


TTT
Torque Tension Tester

LTT
Torque Tension Tester

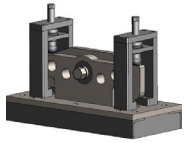


TTS
Torque Tester



TTL
Torque Tester

LTS
Torque Tester



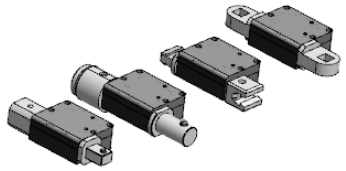
LTL
Torque Tester

TTAS/TTES
Torque Transducer

TTEB
Torque Transducer With bits

TTEH
Torque Transducer
With Socket

TTEH
Torque Transducer
with Reader



STA
Swing Type Torque Transducer

BLT
Bolt Load Transducer

WTE
Wireless Tensioner

SWB
Sensing Washer

SWC
Sensing Washer

SBC
Sensing Bolt

STR/STL
Transmitter

SG
Gateway

TDR
RF Dongle

SG
SW/SB-Gateway

Type No.	Description	Functions
TCA/TCB/TCC	Torque Controller	For any type of air torque tools torque control regardless of type and brand
ETCI / ETCP	Cordless Controller	For torque control of any type of DC Cordless torque tools with built-in Control Board
TTT/LTT	Torque Tension Tester	For measuring or simulating the bolt load induced with its equivalent residual torque while tightening specific thread fasteners to formed a bolted joint under predetermined operation condition.
TTS/TTL	Torque Tester	For test, calibrate torque tool output torque capability TTS - 10 ~ 500NM, TTL-1,000 ~ 5,000NM
LTS/LTL	Torque Tester	For test, calibrate torque tool output torque capability ◦ LTS - 1 ~ 50NM, LTL - 100 ~ 50,000NM
TTAS	Static Transducer	For manual torque tool calibration and residual torque verification with torque and angle.
TF	Test Fixture	Used with TTAS for static torque calibration or measurement.
TTES	Dynamic Transducer	Attached to tool anvil for dynamic torque control or torque monitoring during the bolting process.
TTEH	Dynamic Transducer with Socket in One	TTES built with Socket at output end instead of the square anvil
TTER	Dynamic Transducer with Reader	TTEH with built-In Reader for reading ID of Tagged Bolt or Tag Cell on the bolt end and transmitting to Torque Controller for bolting sequence control
BLT	Bolt Load Transducer	For sensing and controlling the bolt load induced during bolting process with pre-calibrated parameter for each type of specific thread fastener
WTT	Wireless Tensioner	For sensing the tension (load) of the crane , hoist or winch and transmitting wirelessly with functions of overload alert and data collection or uploading
SWB	Sensing Washer-One Piece Type	Designed for fastener size over M20 或 3/4" for bolt load sensing and bolted joint remote monitoring
SWC	Sensing Washer-split Type	Designed for small size under M20 或 3/4" for bolt load sensing and bolted joint remote monitoring
ZG-SW	Gateway-SW	For collecting data and transmitting to peripheral device or cloud server and functions for monitoring bolted joint status
BP	Bolt Positioner	For bolt positioning and pair with Controller during the bolting sequence control
TB	Tagged Bolt	Bolt with RFID Tag embedded on bolt end for identification during bolting sequence control and read by Transducer with Reader
TC	Tag Cell	To be adhered to bolt end for bolt identification during bolting sequence control and read by Transducer with Reader
ZD	Dongle	For transferring sensed torque or bolt load or tension data to cellphone, tablet or laptop

Torque Control Products Portfolio

ZIPPTORK Bolting Technology

Torque Control Series

ZIPPTORK provides a full range of intelligent solutions for bolting works in various industries, including daily calibration of torque tools for bolting operations, torque simulation and adjustment of torque tools before bolting, monitoring or controlling tightening torque during the bolting process and residual torque verification after a run, etc.

Regardless of the brand and type of torque tools used in the production line, almost all torque monitoring, controlling and related data collection and uploading can be achieved.

Through this cost-effective solution, Industry 4.0 can be implemented to improve production with efficiency and industrial competitiveness.

You are welcome to visit and browse the website – www.zipptork.com for more information and videos.

Torque control for discontinuous drive torque tools

To meet the industrial development trend of Industry 4.0, our company has launched a full range of patented products related to bolting technology, providing cost-effective solutions for the industry. Such as torque tool calibration, tool torque simulation & adjustment before work, bolting torque monitor or control during the bolting process, and residual torque verification after bolting; we can fully satisfy the application requirements of the Industrial Internet of Things(**IIoT**).

Wireless Rotary Torque Transducer / Swing Type Torque Transducer

- It is suitable for various types of torque tools output torque calibration or residual torque verification, as well as with various pneumatic or electric impact type, oil pulse type, clutch type torque tools with automatic shutoff mechanism for real-time torque monitoring and data collection of bolting torque.
- With a patented anti-vibration design, it is the only wireless torque transducer in the industry that can be used for high-vibration impact torque tools and torque control.
- Digitalization of "Interchangeable Head Torque Tools" for control & display bolting torque and angular movement in real-time and accessible with “HEADs” from any brand and joint mechanism.

Torque Controller

- Capable of controlling bolting torque of any discrete type air/DC cordless impact wrenches, oil pulse wrenches of any brand and any impact mechanism, and collecting data for uploading in real-time.
- Designed with patented control device and algorithm. It’s the only air/DC driven continuous or discontinuous torque tool controller in the field, Three control modes are available for option, with the following control accuracy;

Pressure/Voltage Mode

Air/DC Impact Wrenches within ±15%～±20% & Air/DC Oil Pulse Wrenches within ±10% ~ ±15%

Transducer Mode

Air/DC Impact Wrenches within ±10%～±15% & Air/DC Oil Pulse Wrenches within ±5%～±10%

Accumulated Mode

Air/DC Impact Wrenches within ±10% ~ ±15% & Air/DC Oil Pulse Wrenches within ±5% ~ ±10%

ZIPPTORK Torque Control Series Products

Smart Series

Torque Controller / Wireless Torque Transducer / Torque Tension Tester / Dongle

Applicable to any Air Impact wrench/ Oil Pulse tool regardless of brand & torque mechanism

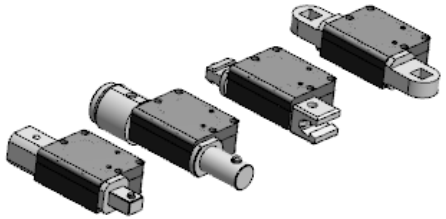
- Patented control device & algorithm
- Cost-Effective Solutions
- Easy set-up in minutes
- Data collection for traceability
- Remote configuration and monitoring with IoT Gateway
- Dynamic Torque Control for discrete type tools

TCA / TCB / TCC

Torque Controller

TTAS/TTES/TTEB/TTEH

Wireless Rotary Torque Transducer

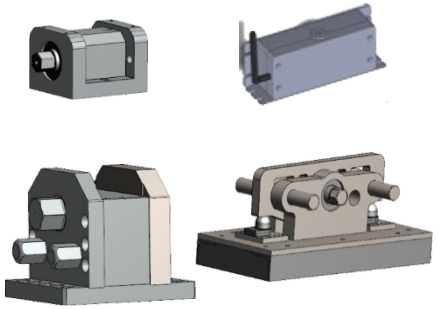


STA

Swing Type Torque Transducer

DR

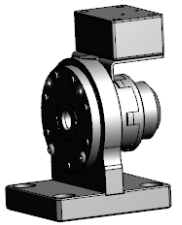
RF Dongle



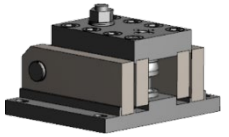
TTS/TTL

LTS/LTL

Torque Tester



TTT



LTT

Torque Tension Tester

ZIPPTORK Bolting Control Series Products

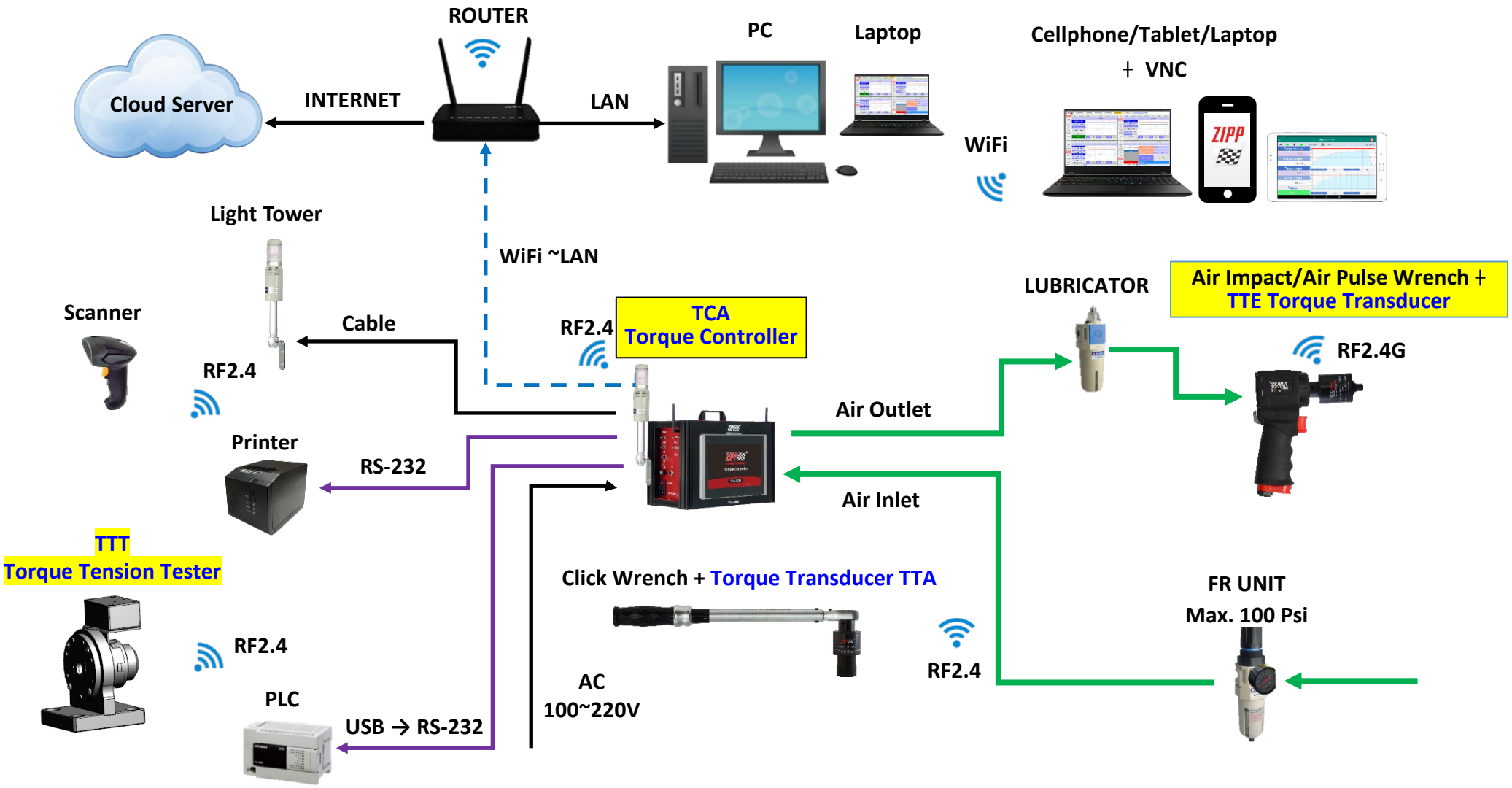
Torque Controller

TCA
Torque Controller

Features

1. Applicable to any brand air-driven continuous or discontinuous torque tool with any mechanism.
2. Patented torque control device and control algorithm.
3. Patented programmable bolting sequence control.
4. Three control modes - Pressure / Transducer / Accumulated
5. Batch count, barcode scanner, light Indicator, OK/NOK alert and record, and various job assemblies are available for ease of operation and user-friendliness.
6. Support POS for printing job result.

Torque Controller Application System Architecture



ZIPPTORK Torque Control Series Products

Torque Controller

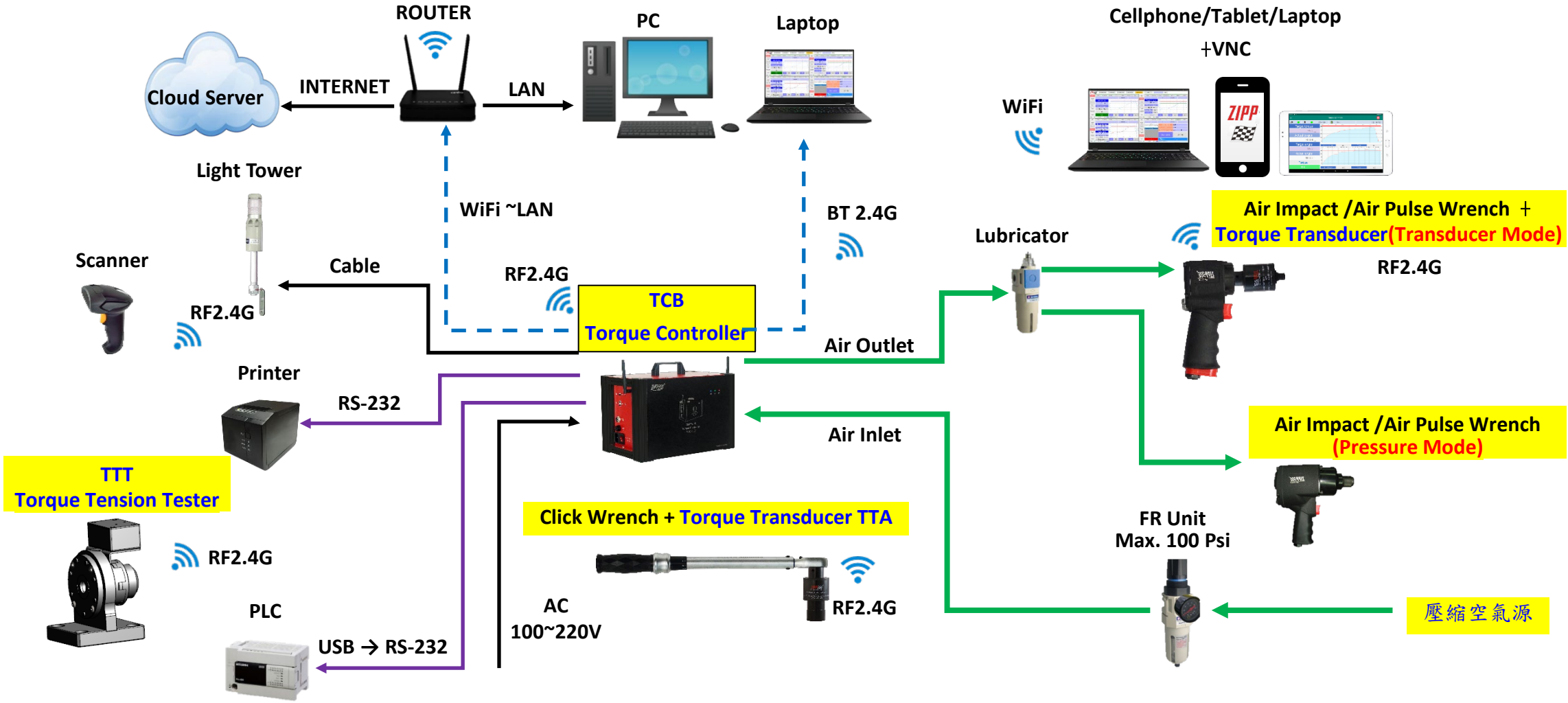
Laptop/Tablet

TCB
Torque Controller

Features

1. Applicable to any brand air discontinuous drive torque tools with any mechanism.
2. The only torque controller for air impact/pulse/torque multiplier wrenches.
3. Patented control algorithm with excellent controllability.
4. Patented control method for bolting sequence control.
5. Three control modes - Pressure / Transducer / Accumulated
6. Batch count, barcode scanner, light Indicator, OK/NOK alert and record and various job assemblies are available for ease of operation and user friendly.
6. Support POS for printing job results.

Torque Controller Application System Architecture



ZIPPTORK Torque Control Series Products

Torque Controller

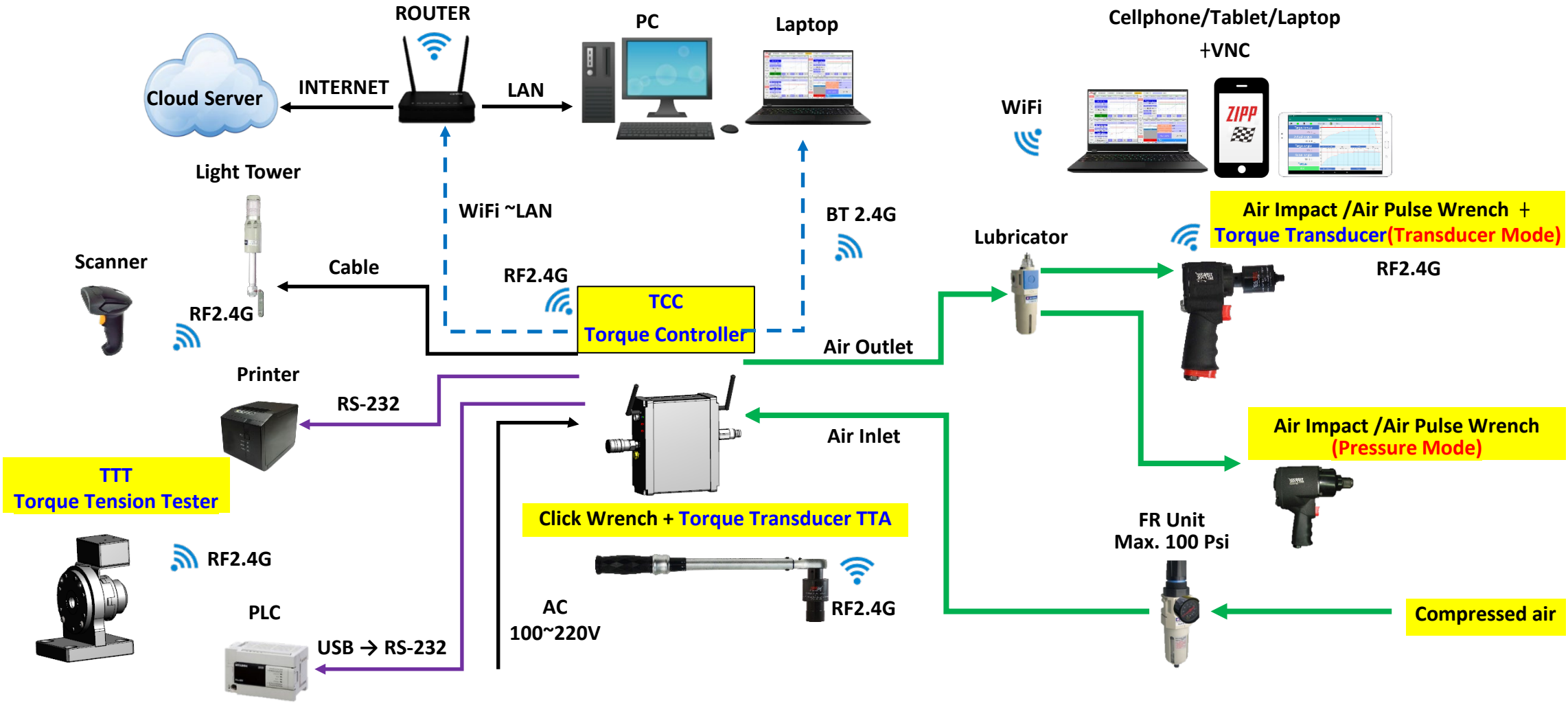
Laptop/Tablet

TCC
Torque Controller

Features

1. Applicable to any brand air discontinuous drive torque tools with any mechanism.
2. The only torque controller for air impact/pulse/torque multiplier wrenches.
3. Patented control algorithm with excellent controllability.
4. Patented control method for bolting sequence control.
5. Three control modes - Pressure / Transducer / Accumulated
6. Batch count, barcode scanner, light Indicator, OK/NOK alert and record and various assemblies are available for ease of operation and user friendly.
1. Support POS for printing job results.

Torque Controller Application System Architecture



ZIPPTORK Torque Control Series Products

Cordless Wrench with built-in Torque Controller

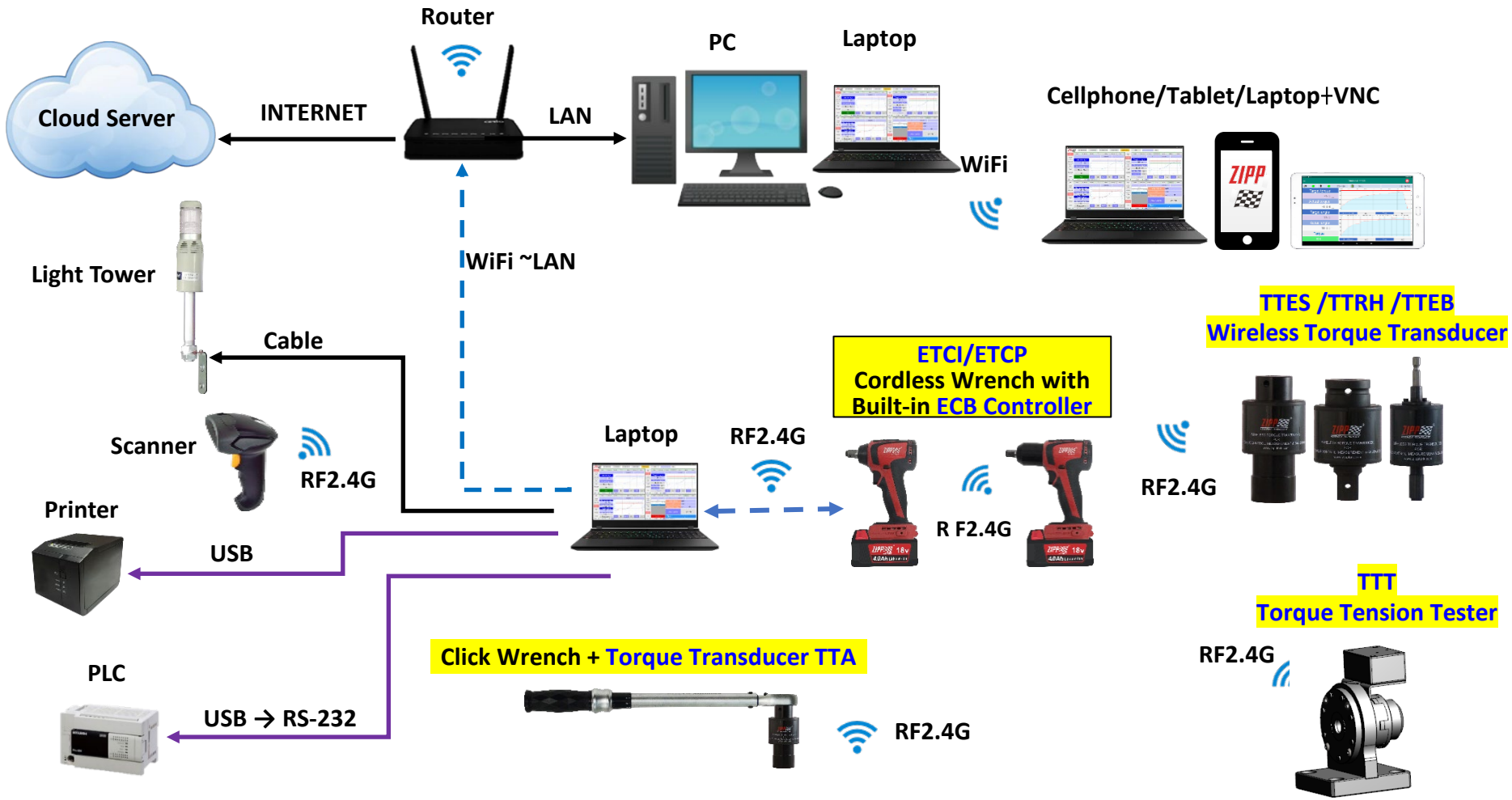
Laptop or Tablet

ETBI/ETBP
Cordless Impact/Pulse Wrench with built-in ECB Torque Controller

Features

1. Patented control board and control algorithm applicable to any continuous or discontinuous types of cordless torque tools.
2. Three control modes ~ Voltage / Transducer / Accumulated
3. Bluetooth communicate with a laptop or tablet for data access and up-loading.
4. Batch count, barcode scanner, light Indicator, OK/NOK alert and record various of job assembly are available the ease of operation and user friendly.
5. Support POS for printing job result.

Cordless Wrench Application System Architecture



ZIPPTORK Torque Control Series Products

Wireless Rotary Torque Transducers

DR-RF DONGLE+ Laptop / Tablet

TTAS/TTES/TTEH/TTEB/TTER
Wireless Rotary Torque Transducers

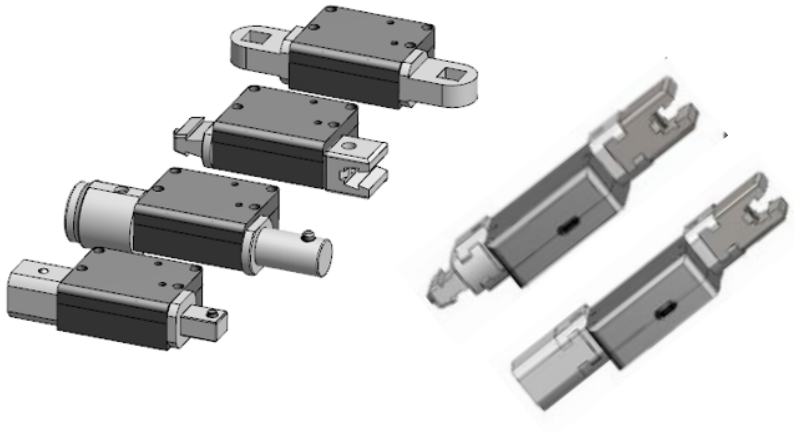
Features

1. Patented anti-vibration design for durability.
2. The only wireless torque transducer applicable to air impact wrenches and Air/DC driven impulse wrenches.
3. Wireless features for the most excellent maneuverability, especially during bolting.
4. For measuring, monitoring and recording torque before, during or after assembly.
5. Designed for torque testing Provide solutions for most torque auditing applications in the manufacturing and quality department.
6. For testing the capability of your power torque tools, verifying the accuracy of your hand tools, monitoring the capability of your fastening process or auditing the quality of your assembled joints.
7. Data logging to peripheral devices or cloud servers for multiple transducers via Gateway.
8. Capacity range from 5NM ~ 3, 000NM.
9. Socket drive type-TTEH can be custom-made.
10. The only durable wireless transducer with a warranty of ONE year or 200 000 times dynamic bolting & 500 000 cycles of static bolting in the field.

ZIPPTORK Torque Control Series Products

Wireless Swing Type Torque Transducers

DR-RF DONGLE+ Laptop / Tablet



STA

Wireless Swing Type Torque Transducers

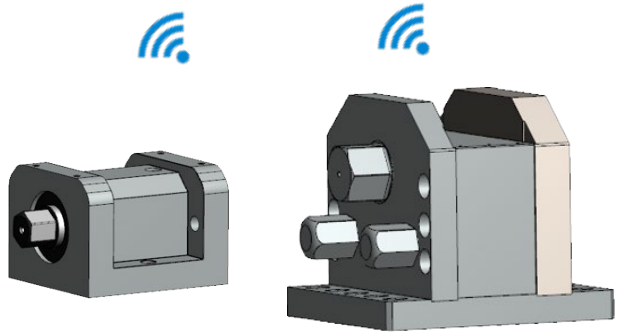
Features

1. Patented design - the only swing-type torque transducer to be mounted & detachable between the “Interchangeable Head Wrench” & “Head”.
2. Wireless design for excellent maneuverability.
3. Digitalize conventional “ Interchangeable Head Wrenches” for torque and angle control throughout the process & residual torque verification after bolting.
4. Head Adaptor design for easy replacing various types of HEADs, increasing the maneuverability and convenience of use.
5. Transmitting data wirelessly via RF2.4G to Gateway and a peripheral device or cloud server.
6. Available torque capacity range from 20NM to 1 000NM.
7. One year or 500 000 cycles warranty.

ZIPPTORK Torque Control Series Products

Torque Tester

DR-RF DONGLE+ Laptop / Tablet



TTS / TTL
Torque Tester

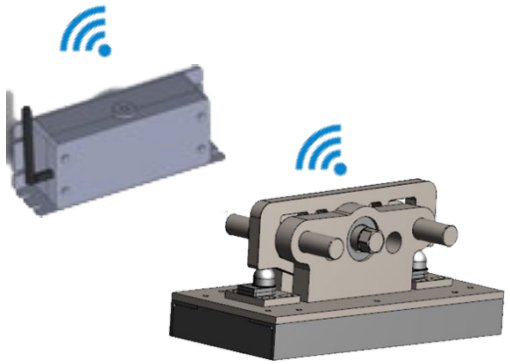
Features

1. Ideal for torque calibration of manual, click, clutch type wrenches and torque multipliers
2. For measuring output torque of discontinuous type torque tools such as air or DC driven impact or impulse type wrenches.
3. Use torque sensor instead of hydraulic fluid to avoid oil leakage
4. Data logging to peripheral devices or cloud servers for multiple transducers via Gateway.
5. TTS series Torque Tester capacity available from 10NM up to 500NM
6. TTL series Torque Tester capacity available from 500NM up to 5, 000NM
7. Free software for self-calibration
8. To be equipped with Dongle & laptop or tablet for display and data collection.
9. One year or 500 000 cycles warranty.

ZIPPTORK Torque Control Series Products

Torque Tester

DR-RF DONGLE+ Laptop/Tablet



LTS / LTL
Torque Tester

Features

1. Robust structure with leverage mechanism as calibration beam design.
2. Ideal for torque calibration of manual, click, clutch type wrenches and torque multipliers
3. For measuring output torque of discontinuous type torque tools such as air or DC driven impact or impulse type wrenches.
4. Use load sensor instead of weights on calibration beam (NORBAR) for compact design and easy operation.
5. Data logging to peripheral devices or cloud servers for multiple transducers.
6. LTS series Torque Tester capacity available from 1NM up to 50NM
7. LTL series Torque Tester capacity available from 100NM up to 50,000NM
8. To be equipped with Dongle & laptop or tablet for display and data collection.
9. One year or 500,000 cycles warranty.

ZIPPTORK Torque Control Series Products

TTA/TTE (Wireless Torque Transducer) + TF (Test Fixture)

DR-RF DONGLE+ Laptop/Tablet

Wireless Torque Transducer
+
Test Fixture

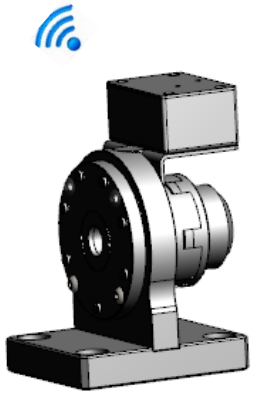
Features

1. Ideal for torque calibration of manual, click, clutch type wrenches and torque multipliers
2. For measuring output torque of discontinuous type torque tools such as air or DC driven impact or impulse type wrenches.
3. Portable for easy operation.
4. Data logging to peripheral devices or cloud servers for multiple transducers.
5. This series Torque Tester capacity is available from 10NM up to 3, 000NM
6. Free software for self-calibration
7. To be equipped with Dongle & laptop or tablet for display and data collection.
8. One-year or 500,000 cycles warranty.

ZIPPTORK Torque Control Series Products

Torque Tension Tester

DR-RF DONGLE+ Laptop/Tablet



TTT
Torque Tension Tester

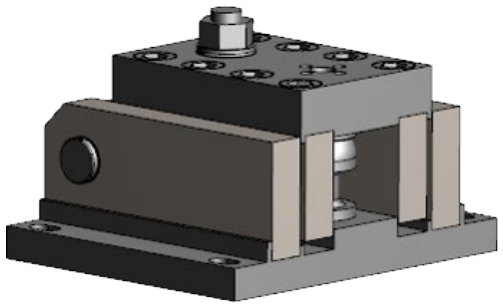
Features

1. Measure bolt load and residual torque equivalent induced after tightening by power-driven impact or pulse-type torque tools to fasten specific sizes of fasteners (bolt/ nut and washer) through the threaded mechanism.
2. Ideal for tool manufacturers to specify the dynamic tool specification accurately.
3. Can be used with hand torque wrenches, air impact/pulse wrenches, electric impact/pulse wrenches and hydraulic wrenches.
4. Good devices for simulating dynamic bolting torque of impact or pulse wrenches.
5. TTT series designed with one tester for replacing two sizes of sensors for fasteners in metric or imperial specifications.
6. 10 NM up to 5, 000NM test capacity ~ special requirement can be custom made.
7. Free software for self-calibration with different specifications of fasteners.
8. Connect Gateway to collect data and upload it to the cloud server.
9. Equipped with Dongle to display the torque and force curve on a tablet or laptop.
10. One year or 500 000 cycles warranty.

ZIPPTORK Torque Control Series Products

Torque Tension Tester

DR- RF DONGLE+ Laptop/Tablet



LTT
Torque Tension Tester

Features

1. Measure bolt load and residual torque equivalent induced after tightening by power-driven impact or pulse-type torque tools to fasten specific sizes of fasteners (bolt/ nut and washer) through the threaded mechanism.
2. Ideal for tool manufacturers to specify the dynamic tool specification accurately.
3. Can be used with hand torque wrenches, air impact/pulse wrenches, electric impact/pulse wrenches and hydraulic wrenches.
4. Good devices for simulating dynamic bolting torque of impact or pulse wrenches.
5. LTT series designed with one tester for replacing four sizes of fasteners in metric and imperial specifications.
6. 10NM up to 5, 000NM test capacity - special requirement can be custom made.
7. Free software for self-calibration with different specifications of fasteners.
8. Connect Gateway to collect data and upload it to the cloud server.
9. Equipped with Dongle to display the torque and force curve on a tablet or laptop.
10. One year or 500 000 cycles warranty.

Data Collection for Manual Torque Wrenches or Click Wrenches

Manual Torque Wrench / Click Wrench + **wireless Torque Transducer TTAS/TTAB** →RF2.4G→ **Dongle** +Tablet / Laptop (APP ~ Android / Windows) → WiFi → peripheral devices or Cloud Server

Torque control accuracy within ± 5% or less, depending on the quality and stability of the tool used and the grip of the tool during operation

Application System Architecture

Demonstration video Link ~ Manual Dial Wrench: https://youtu.be/kuxeFsh8XuA

Demonstration video Link ~ Click Wrench: https://youtu.be/TGKpKfa5MM8

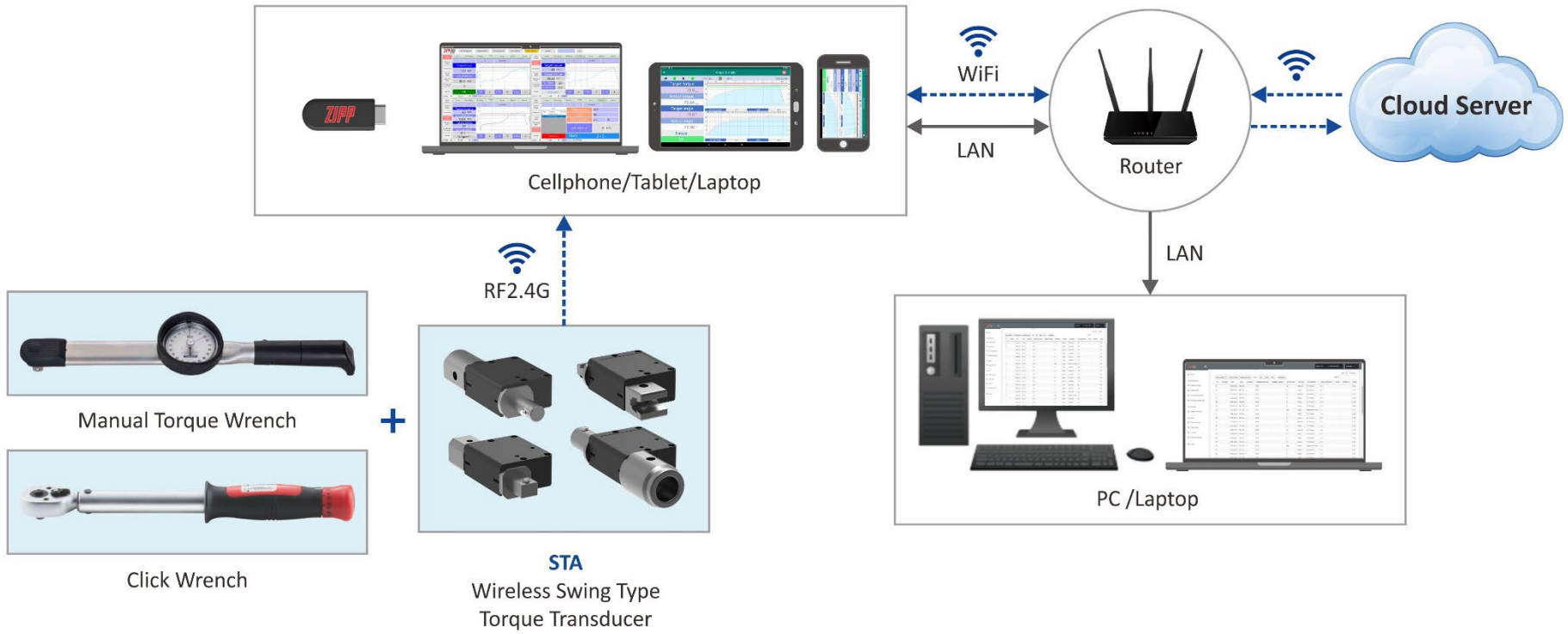
Data Collection for Manual Torque Wrenches or Click Wrenches

Manual Torque Wrench / Click Wrench **+ STA wireless Swing Type Torque Transducer** →RF2.4G
→ **Dongle** +Tablet / Laptop (**APP**~Android/Windows) → WiFi → peripheral devices or Cloud Server

Torque control accuracy within ± 5% or less, depending on the quality and stability of the tool used and the grip of the tool during operation

Video Link ~
Manual Dial Wrench

Video Link ~
Click Wrench

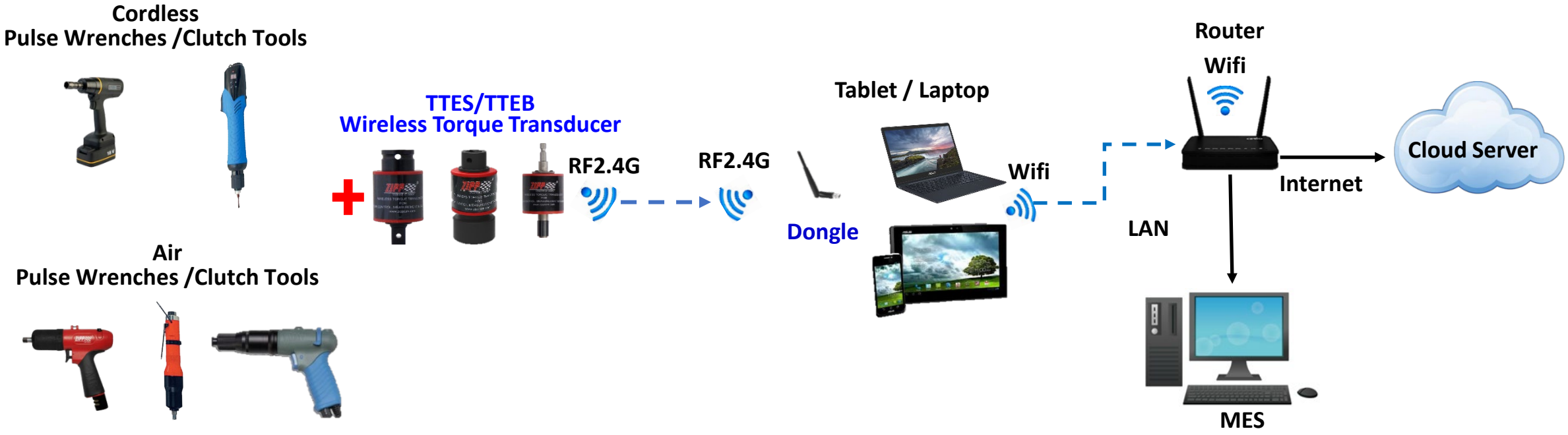


Monitor bolting torque of any torque tool with auto shutoff or clutch mechanism throughout the process～Display/Recording/Uploading

Air or DC driven torque tool with auto shutoff or clutch mechanism + TTES/TTEB wireless Rotary Torque Transducer→RF2.4G→Dongle +Tablet /Laptop (Android / Windows) → WiFi →peripheral devices or cloud server

Torque control accuracy within ±5% or less, depending on the quality and stability of the tool used and the grip of the tool during operation

Application System Architecture



Demonstration video Link ~ https://youtu.be/oZ5SyGbxnbI

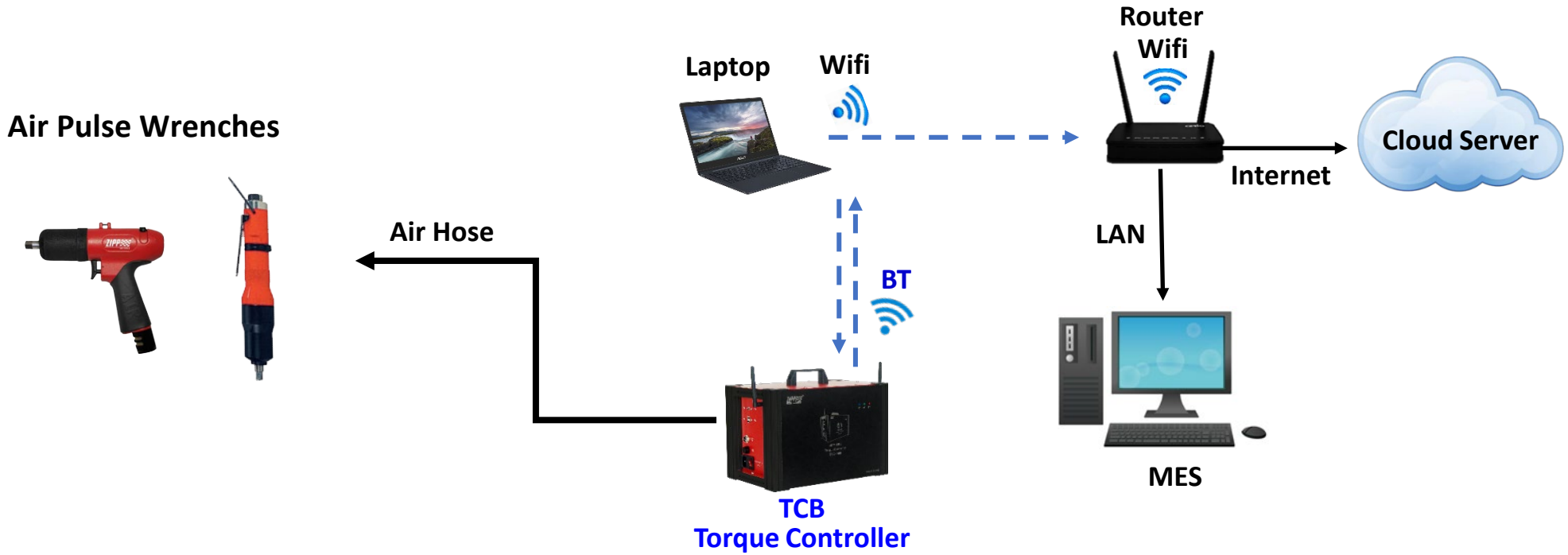
Demonstration video Link ~ https://youtu.be/kuxeFsh8XuA

Air Pulse Wrenches Bolting Torque Control

Air Pulse Wrenches + **TCB Torque Controller** +Laptop，under **Pressure Mode**→ WiFi →peripheral devices or cloud server

Torque control accuracy within **±10% ~ ±15%**

Application System Architecture



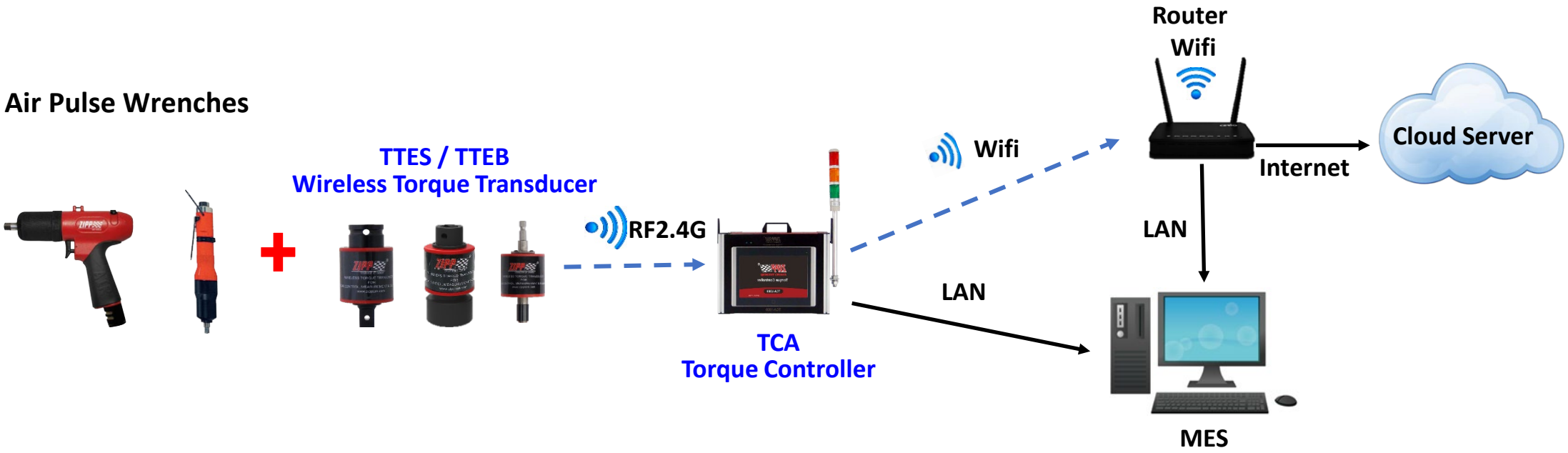
Demonstration video Link ~
https://youtu.be/qbCnCPIpYG4

Air Pulse Wrenches Bolting Torque Control

Air Pulse Wrenches + **TCA Torque Controller** + **TTES wireless Torque Transducer**+ Laptop, under **Transducer Mode**→ WiFi → peripheral devices or cloud server

Torque control accuracy within **±5% ~ ±10%**

Application System Architecture



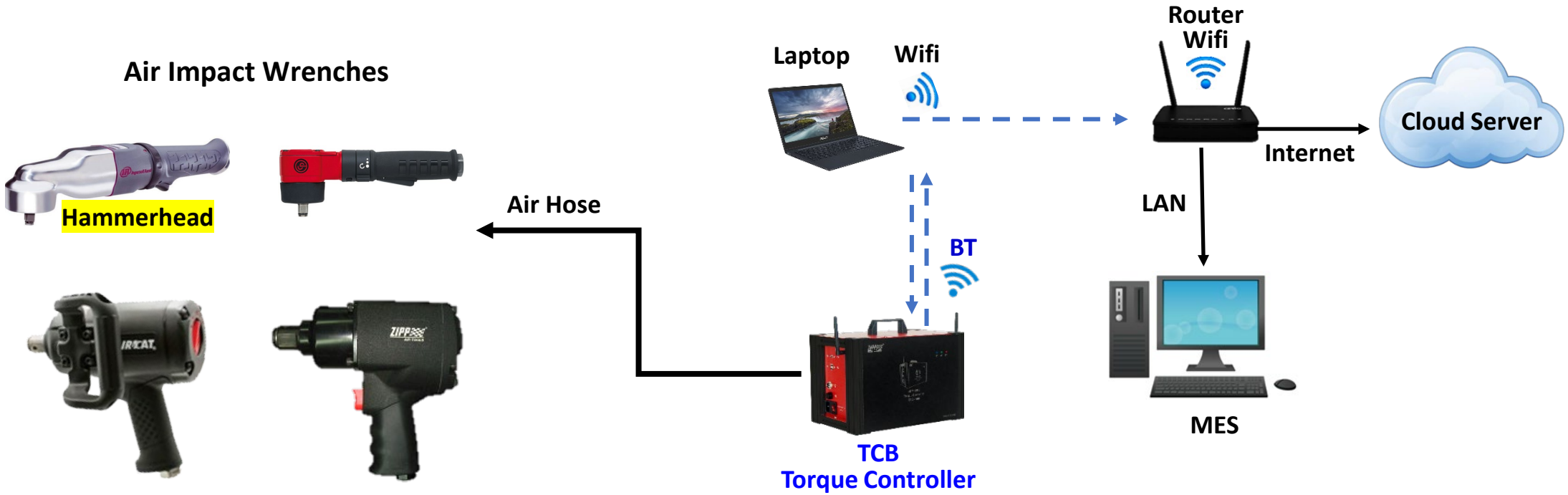
Demonstration video Link ~
https://youtu.be/z8u67jIDkRA

Air Impact Wrenches Bolting Torque Control

Air Impact Wrenches **+ TCB Torque Controller** + Laptop，under **Pressure Mode**→ WiFi →peripheral devices or cloud server

Torque control accuracy within **±15% ~ ±20%**

Application System Architecture



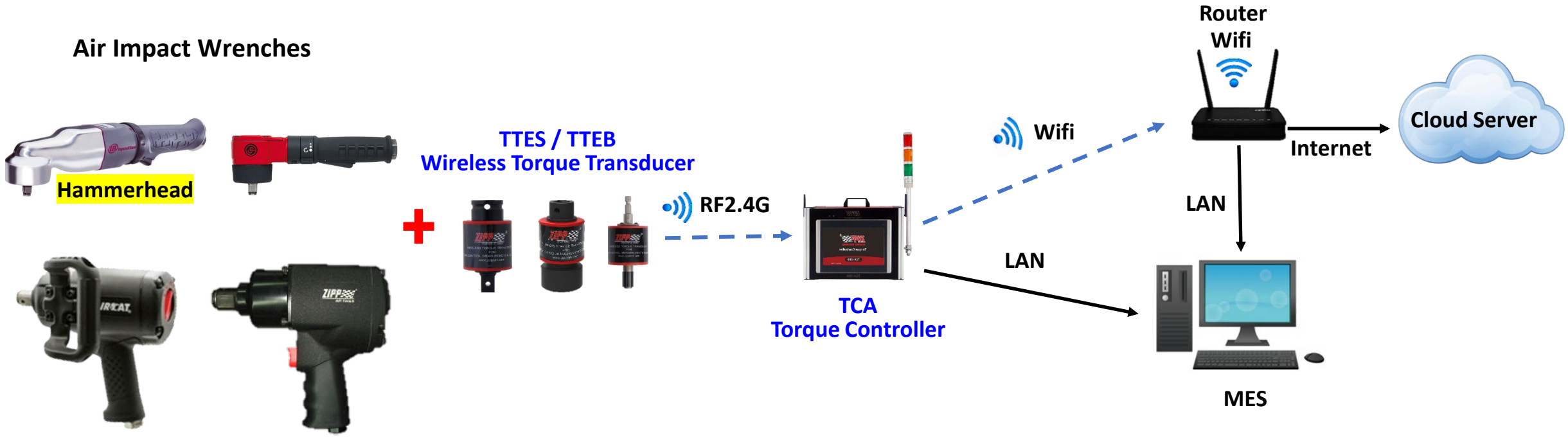
Demonstration video Link ~
https://youtu.be/dZVsEpeSrp4

Air Impact Wrenches Bolting Torque Control

Air Impact Wrenches + **TCA Torque Controller** + **TTES wireless Torque Transducer** + Laptop，under **Transducer Mode**→ WiFi → peripheral devices or cloud server

Torque control accuracy within **±10% ~ ±15%**

Application System Architecture



Demonstration video Link ~
https://youtu.be/ZcE4XDcLGqE

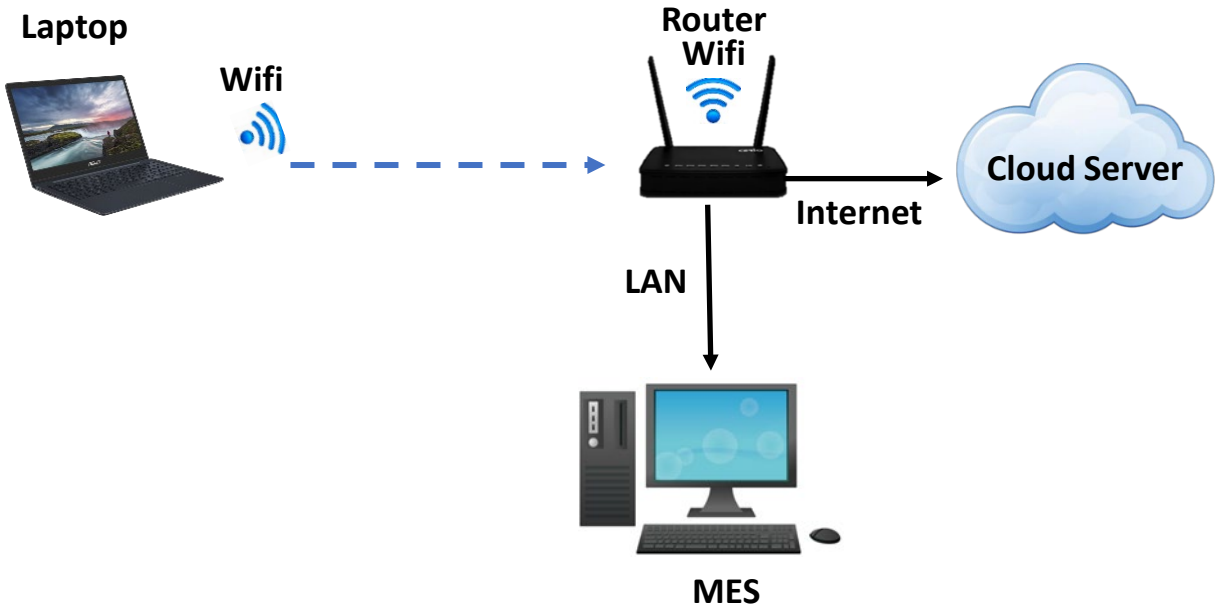
Torque Controllable Cordless Impact Wrench

Cordless Impact Wrenches with **ECB built-in Controller** + Laptop, under **Voltage Mode** → WiFi → peripheral devices or cloud server

Torque control accuracy within **±15% ~ ±20%**

Application System Architecture

Cordless Impact Wrenches With ECB built-in Controller



Demonstration video Link ~
https://youtu.be/-T8psuMo2RU

Bolt Load Control Products Portfolio

ZIPPTORK Bolting Technology

Bolt Load Control Series

ZIPPTORK not only provides a full range of intelligent solutions for bolting operations in various industries but also provides control of bolt load (clamping force) during the bolting process for applications that require precise control of the clamping force of thread fasteners and monitoring the bolted joint status for abnormalities, such as high-pressure vessels, precision transmission or transportation facilities, or high-risk equipment for nuclear power and wind power. It also remotely monitors the bolted joint status after bolting and collecting and uploading relevant data.

It is the best alternative to the ultrasonic bolting technology commonly used in the industry, as it can be used with any brand and different structural designs of torque tools. Through this cost-effective solution, we can help the industry to realise the Industry 4.0 plan and further improve the productivity and competitiveness of the industry.

Bolt Load Control of Threaded Fasteners

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 crucial purpose of bolting works ~ the clamping force applied to the bolted joint, most of the industry can only control the clamping pressure of the bolt load by ultrasonic sensing & bolting technology. Some applications even require monitoring 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 bolt-tightening operations requiring precise clamping force control and monitoring of the bolted joint status at any time. 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, 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 with torque tools. It 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! For more product-related information and operation videos, please visit the following website – **www.zipptork.com**

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 past products or current market products?

Currently, the 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, challenging to achieve wirelessly, and expensive.
- Load cell This inspection method is wired, challenging 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 is 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 research and development of bolting technology for decades. However, in the area of bolting operation, torque control is not the most accurate technology, but bolt load (clamping force) control is the ultimate and most precise 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 has been increasing, and there is an urgent demand for clamping force control in the market. Therefore, our company has spared no effort to innovate and break through in research and development to make the best and ultimate clamping force control and monitoring for thread fasteners.

The Ultimate Solution of Bolting Technology

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

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:

- The **Sensing Washer** is suitable for both wireless communication and wired connection.
- The wireless **Sensing Washer** is ideal for small magnetic field interference fields - such as the automotive industry, oil mining industry, etc.; the wired induction spacer is suitable for large magnetic field interference fields, including the construction and bridge industry, aerospace industry, etc.
- Low production cost and high yield rate
- Anti-loosening design (the sensing bolt itself does not have an anti-loosening plan) - this anti-loosening design is patented.
- In practice, it is easy to carry, install, and operate.
- Higher accuracy and stability than sensing bolts, with dynamic bolt load control accuracy of ±10% and static bolt load control accuracy of±5%.
- No need to use special or custom-made bolts. Use available bolts and sensing washers to achieve the following functions:

During the bolting process:

- The bolting sequence can be controlled with our innovative controller and tag.
- Bolt load control
- Torque equivalent for reference

After bolted, combined with Industry 4.0-IoT:

- Bolted joint (bolt load-clamping force) monitoring
- Torque equivalent display
- Clamping force, torque equivalent abnormal alarm
- Applicable tools: Any brand of manual, pneumatic and electric torque tools (static, impact, hydraulic pulse)
- Application: Construction, oil, mining, automotive, aerospace, etc., where clamping force monitoring is required.
- Applicable environment: High magnetic field interference environment, lightning strike environment...etc.
- 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.

The Ultimate Solution of Bolting Technology

Bolt load **Sensing Washer** features with patented anti-vibration design for loose-proof and functions of remote monitoring the joint status instantly, periodically or continuously

1. What's the difference with compatible products in the field?

   Current bolt load measuring methods, such as:

   (1)Ultrasonic bolting technology—Time-consuming and expensive, no vibration loose-proof after bolting.

   (2)Sensing Bolt—Hard to be built wirelessly and expensive, no vibration loose-proof after bolting.

   (3)Load cells—No vibration loose-proof, only suitable for load testing, not ideal for industrial use.

2. Why use **ZIPPTORK** Sensing Washer?

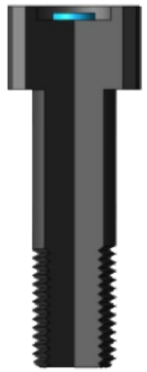
   a. High sensitivity. As accurate as ultrasonic bolting technology.
   b. Patented anti-vibration design for perfect loose-proof and meet DIN65151 standard.
   c. Ideal for high-precision bolting work where clamp load control is critical and remote monitoring is required.
   d. Data collection for the highest traceability to ensure the most excellent safety.
   e. This is the ultimate solution for bolting works to reach the excellence of the bolted joint.

Bolt Load Control Series Products

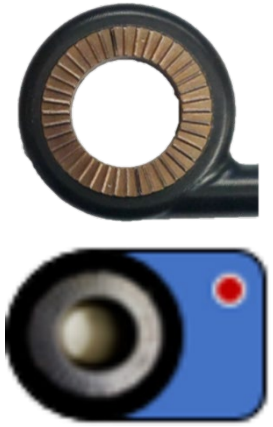
Sensing Bolt / Sensing Washer / Wireless Bolt Load Transducer

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

Precision bolt load control / Patented anti-vibration design / ideal for transmission equipment
Remote monitoring after bolted / The ultimate solution of bolting technology
The most economic & effective alternative of ultrasonic bolting technology



SBC
Sensing Bolt



SWB / SWC
Sensing Washer

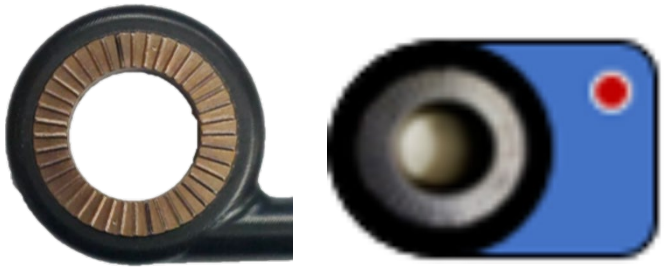
ST
Transmitter

SG
Gateway

BLT
Wireless
Bolt Load Transducer

Anti-vibration Sensing Washer

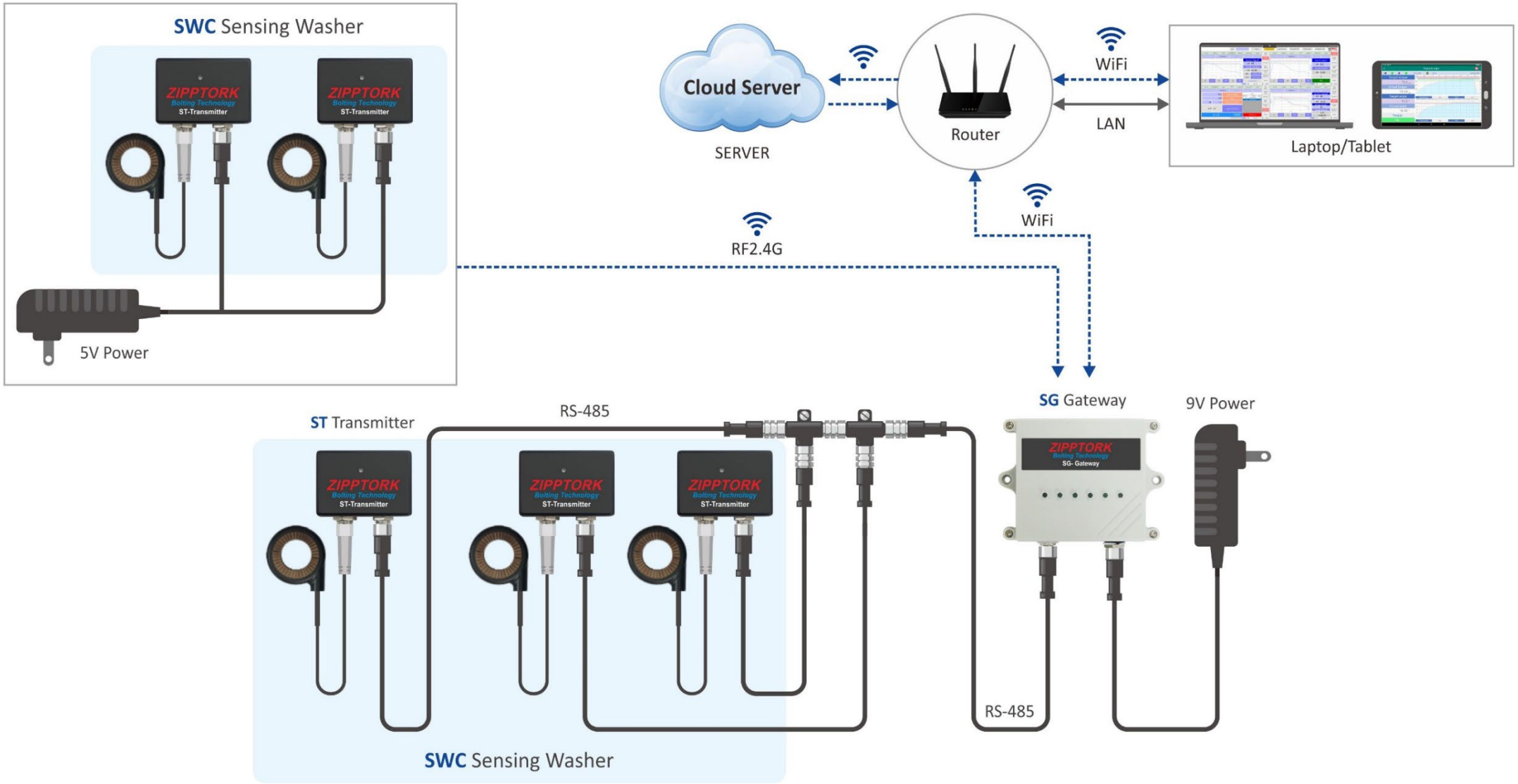
SW Sensing Washer



data link

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

Anti-vibration Sensing Washer Application System Architecture



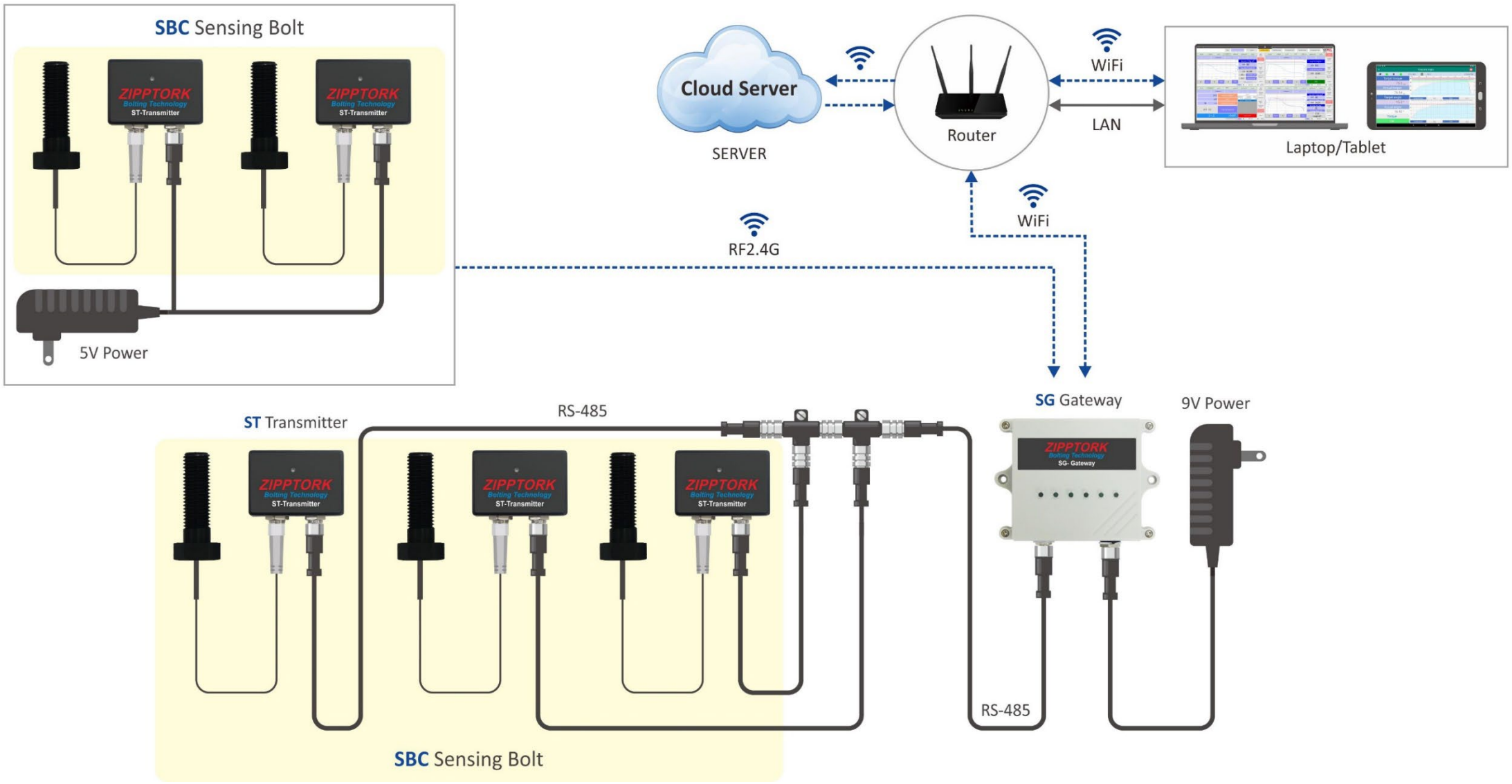
Sensing Bolt

SBC Sensing Bolt

data link

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

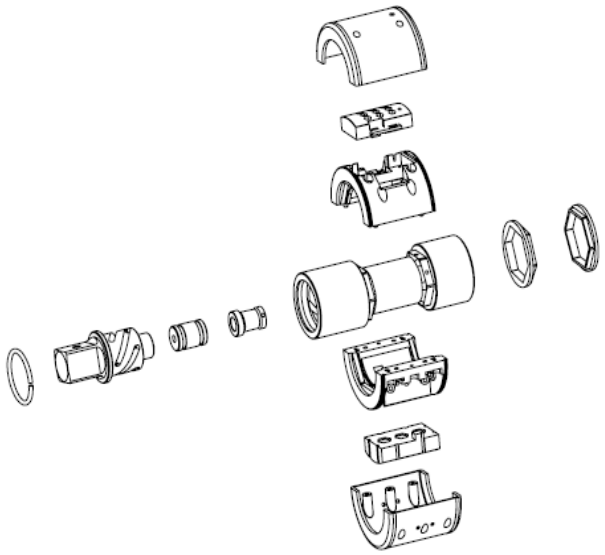
SBC Sensing Bolt Application System Architecture



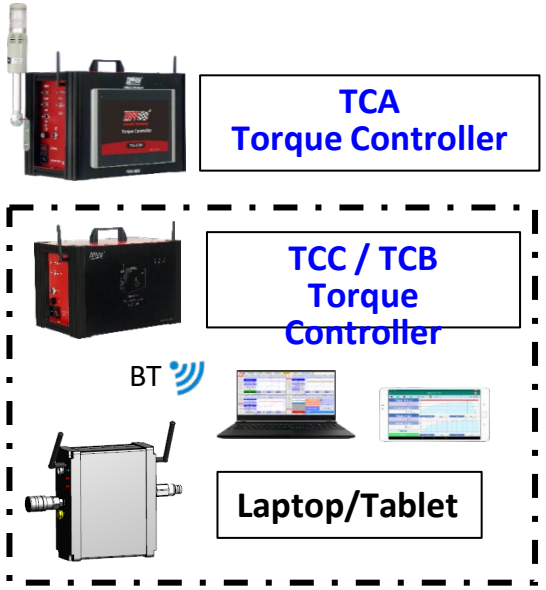
ZIPPTORK Bolt Load Control

Wireless Bolt Load Transducer

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



BLT
Bolt Load Transducer



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