ZIPPTORK
Bolting Technology
Torque Control、Bolt Load Control

Wireless Rotary-Type Torque Transducer

Patented Anti-Vibration & Shock-Resistant Torque Sensing Technology

External Torque Sensing for Fastening, Monitoring, Control & Verification

Keep the Tool. Add the Intelligence.

White Paper
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Why Smart Fastening Evolved

From Separate Tightening and Verification to Integrated Torque Sensing

① CONVENTIONAL FASTENING

Impact Wrench / Pulse Tool

Clutch-Type / Auto-Shutoff Tool

↓

TIGHTEN

↓

Separate Torque Verification

↓

Manual Marking / Recording

- **Multiple Steps**
- **More Labor**
- **Limited Process Data**

SMART FASTENING EVOLUTION →

Bring Torque Sensing into the Fastening Process

② INTEGRATED SMART FASTENING

Torque Tool

+

Built-In Torque Transducer

+

Control / Data System

↓

TIGHTEN + MEASURE + MONITOR

↓

✓ Torque Control

✓ Process Monitoring

✓ Data Recording

✓ Traceability

Smart fastening emerged by integrating torque sensing, process monitoring, and data recording directly into the fastening operation.

Does Smart Fastening Require Replacing the Tool?

Two Approaches to Adding Torque Sensing and Intelligence to the Fastening Process

① INTEGRATED SMART TOOL APPROACH

Dedicated Smart Torque Tool

Torque Sensing Built into the Tool

↓

Built-In Torque Transducer

↓

Integrated Electronics / Controller

↓

Torque Measurement + Control + Data

✓ Integrated System

✓ Real-Time Torque Feedback

✓ Process Monitoring

✓ Data Collection

Dedicated Transducerized Tool Required

② ZIPPTORK EXTERNAL SENSING APPROACH

Torque Sensing Added Externally

Existing Torque Tool

+

ZIPPTORK Wireless Rotary-Type Torque Transducer

↓

External Real-Time Torque Measurement

↓

Monitoring / Control / Data

✓ Keep Existing Tools

✓ Add Torque Sensing

✓ Wireless Data Transmission

✓ Expandable System Integration

Keep the Tool. Add the Intelligence.

ZIPPTORK separates torque sensing from the tool itself, creating a modular approach to upgrading conventional torque tools for smart fastening.

Why Has Torque Sensing Been Limited in Impact & Pulse Fastening?

Conventional Torque Sensing Technology Was Not Designed for Repeated Shock and High-Vibration Fastening Environments

① CONVENTIONAL TORQUE SENSING

Built-In or External Torque Sensing

↓

Typical Applications

- Clutch / Auto-Shutoff Tools
- DC Nutrunners
- Continuous-Drive Torque Tools

↓

MORE CONTROLLED TORQUE ENVIRONMENT

- Lower Shock
- Lower Vibration
- More Stable Torque Transmission

THE TECHNOLOGY GAP→

② IMPACT / PULSE FASTENING

Impact Wrench / Pulse Tool

↓

REPEATED DYNAMIC LOADING

- Repeated Shock
- High Vibration
- Rapid Torque Peaks
- Intermittent Energy Transfer

↓

SEVERE SENSING ENVIRONMENT

↓

MECHANICAL CHALLENGE	SIGNAL CHALLENGE
Sensor Durability	Measurement Reliability

⇩

TORQUE SENSING GAP

The challenge is not whether torque sensing is internal or external—it is whether the sensing system can survive repeated shock and maintain reliable torque measurement in impact and pulse fastening.

Breaking the Torque Sensing Barrier for Impact & Pulse Tools

ZIPPTORK Patented Double Vibration-Damping Architecture

① IMPACT / PULSE CHALLENGE

Impact Wrench / Pulse Tool

↓

REPEATED DYNAMIC LOADING

- Repeated Shock
- High Vibration
- Rapid Torque Peaks

↓

Mechanical + Electronic Reliability Challenge

② PATENTED DOUBLE DAMPING

PRIMARY VIBRATION ISOLATION

Transmission Body / Shaft

↓

Vibration-Damping Members

↓

Inner Casings

+

SECONDARY VIBRATION PROTECTION

Inner Casings

↓

Vibration-Damping Layers

↓

Circuit Board + Battery Module

U.S. Patent No. 11,150,153 B2

Torque Sensing and Transmitting Device

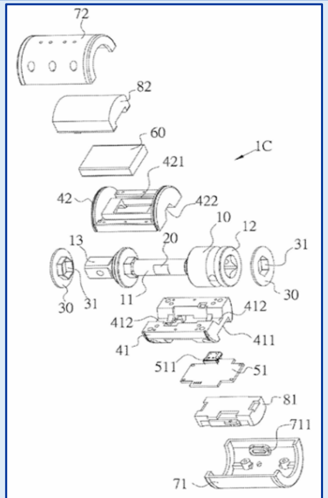


FIG. 4

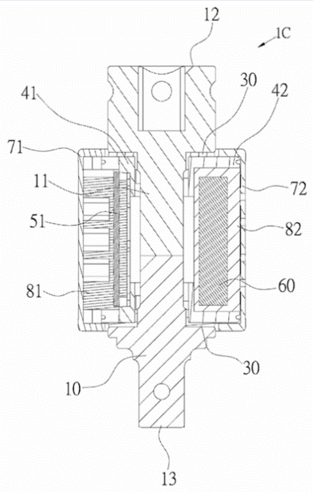


FIG. 5

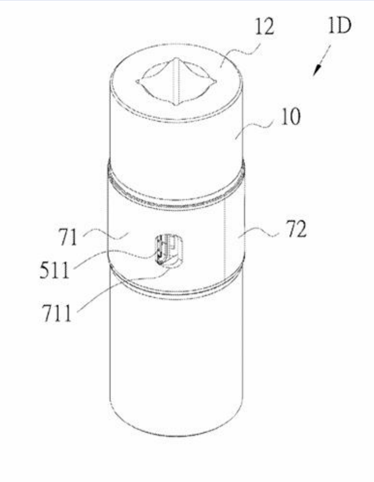


FIG. 7

③ PROTECTED TORQUE SENSING & TRANSMISSION

Strain Gauge Torque Sensing

↓

Signal Amplification / Processing

↓

Torque Value

↓

Wireless Transmission

Reliable Dynamic Torque Data

ZIPPTORK protects the electronic sensing and transmission system through a patented double vibration-damping architecture, enabling torque sensing for severe impact and high-vibration fastening environments.

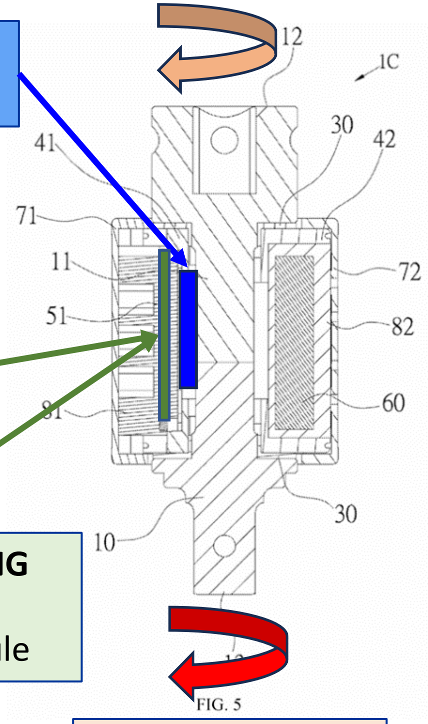
How the Wireless Rotary-Type Torque Transducer Works

From Mechanical Torque Input to Real-Time Wireless Torque Data

② TORQUE SENSING
Shaft Deformation
↓
Strain Gauge
↓
Electrical Signal
→

TORQUE SENSING AREA
Strain Gauge

INPUT
Tool Output



SIGNAL PROCESSING AREA
Circuit Board Module

OUTPUT
Socket / Fastener

① TORQUE INPUT
Torque Tool
↓
Transmission Body / Shaft
←

③ SIGNAL PROCESSING
Signal Amplification
↓
Torque Calculation
↓
Torque Value
→

④ WIRELESS TRANSMISSION
Wireless Torque Data
↓
Controller / Laptop / Tablet

REAL-TIME MEASUREMENT	WIRELESS DATA	SYSTEM INTEGRATION
Applied Torque → Measured Torque Value	Torque Data Without Rotating Cables	Controller • Laptop • Tablet

ZIPPTORK senses mechanical torque at the tool output and converts it into real-time wireless torque data for measurement, monitoring, control, and data collection.

Two Torque Sensing Families for Different Fastening Applications

Static Torque Sensing and Dynamic Torque Sensing Require Different Transducer Configurations

① Static Torque Sensing & Measurement

TTA Family

Static Torque Signal Acquisition

Applicable Tools

- Manual Torque Wrenches
- Click-Type Torque Wrenches
- Torque Multipliers

Measurement

Torque

Torque + Angle

Residual Torque

Applications

- Residual Torque Verification

Data Collection

VERIFY FASTENING RESULTS

TTA — Static Torque Sensing

TTE — Dynamic Torque Sensing

② Dynamic Torque Sensing & Measurement

TTE Family

Dynamic Torque Signal Acquisition

Applicable Tools

- Impact Wrenches
- Pulse Tools
- Clutch-Type Tools
- Auto-Shutoff Tools

Measurement

Real-Time Dynamic Torque

Torque vs. Time

Applications

Torque Monitoring

Real-Time Controller Feedback

Data Collection

MONITOR & CONTROL FASTENING

Static and Dynamic refer to the torque signal acquisition and measurement method—not whether the tool is manual or powered.

Wireless Rotary-Type Torque Transducer Product Platform

Multiple Mechanical Configurations for Different Tool Interfaces and Applications

TTA FAMILY — STATIC

TTAS

Square-Drive Configuration

TTAM

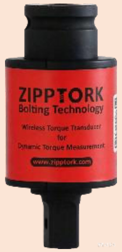
Multiplier Configuration

TTE FAMILY — DYNAMIC

TTEB

Bit-Type Configuration

TTES



Square-Drive Configuration

TTEH

Socket-Type Configuration

A common wireless torque-sensing technology platform supports different tool interfaces and fastening applications.

Selecting the Right Torque Transducer Configuration

Selection Based on Signal Acquisition Method, Tool Interface, and Fastening Application

① SIGNAL ACQUISITION METHOD

STATIC TORQUE SENSING

Verification / Static Measurement

↓

TTA FAMILY

DYNAMIC TORQUE SENSING

Real-Time Fastening Measurement

↓

TTE FAMILY

② TOOL / TRANSDUCER CONFIGURATION

TTA FAMILY

Square-Drive→ **TTAS**

Torque Multiplier → **TTAM**

TTE FAMILY

Bit-Type → **TTEB**

Square-Drive → **TTES**

Socket-Type → **TTEH**

③ APPLICATION OBJECTIVE

VERIFY

Torque

Torque + Angle

Residual Torque

MONITOR

Real-Time Torque

Torque vs. Time

Data Collection

CONTROL

Real-Time Controller Feedback

Fastening Control

Process Traceability

Select the torque-sensing family first, then match the transducer configuration to the tool interface and application objective.

MEASURE — Direct Torque Measurement at the Tool Output

Capturing Torque Data Directly Between the Torque Tool and the Fastener

① STATIC TORQUE MEASUREMENT

TTA FAMILY

Static Torque Signal Acquisition

↓

MEASURED DATA

Torque

Torque + Angle

Residual Torque

↓

TYPICAL USE

Torque Verification

Residual Torque Inspection

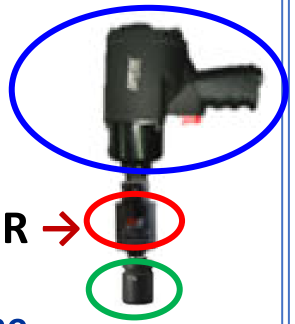
Data Collection

↓

VERIFY THE FASTENING RESULT

TYPICAL MEASUREMENT SETUP

TORQUE TOOL →



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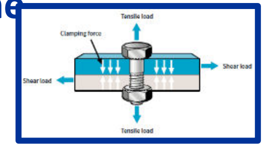
WIRELESS TORQUE TRANSDUCER →

DIRECT TORQUE MEASUREMENT

Torque is measured directly in the torque transmission path



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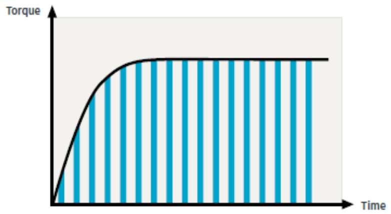
SOCKET / FASTENER



Conceptual Torque vs. Time

Dynamic torque measurement reveals how torque develops throughout the fastening cycle—not only the final value.

② DYNAMIC TORQUE MEASUREMENT

TTE FAMILY

Dynamic Torque Signal Acquisition

↓

MEASURED DATA

Real-Time Torque

Torque vs. Time

Fastening Torque Data

↓

TYPICAL USE

Fastening Monitoring

Real-Time Controller Feedback

Data Collection

↓

MEASURE THE FASTENING PROCESS

ZIPPTORK measures torque directly in the tool-to-fastener transmission path, providing torque data for verification, real-time monitoring, control, and data collection.

MONITOR — Real-Time Fastening Torque Monitoring

Turning Dynamic Torque Data into Fastening Visibility and Traceable Process Information

① CONVENTIONAL FASTENING TOOL

Impact / Pulse
Clutch-Type
Auto-Shutoff

↓

FASTENING

Tool Performs the Fastening

But

No Direct Torque Data from the Tool

② ADD TTE TORQUE SENSING

Conventional Fastening Tool

+

TTE Wireless Torque Transducer

+

Socket

↓

REAL-TIME DYNAMIC TORQUE

↓

Torque vs. Time Chart

③ MONITOR EACH FASTENING CYCLE

Real-Time Torque
Torque vs. Time
Fastening Result

↓

ALGORITHM-BASED ABNORMALITY DETECTION

Misaligned Fastening
Thread Damage
Abnormal Engagement
Re-Fastening / Re-Hit

↓

JUDGE & RECORD

OK / NOK

Fastening Data
Traceable Record

DIGITALIZING EXISTING CLUTCH / AUTO-SHUTOFF TOOLS
Clutch / Auto-Shutoff Mechanism Controls the Fastening Torque
+
TTE Wireless Torque Sensing
Monitors the Fastening Process
↓
Torque Monitoring + Abnormality Detection + Data Collection

ZIPPTORK adds real-time torque monitoring, abnormality detection, and data collection to existing fastening tools without changing their basic fastening mechanism.

CONTROL — Real-Time Torque Feedback for Fastening Control

Using TTE Torque Data as Real-Time Feedback for ZIPPTORK Torque Controllers

① TOOL-CONTROLLED FASTENING

CLUTCH / AUTO-SHUTOFF TOOLS

Clutch / Auto-Shutoff Mechanism

↓

CONTROLS THE FASTENING TORQUE

\+

TTE Wireless Torque Sensing

↓

MONITORS THE FASTENING PROCESS

↓

- Torque Monitoring
- Algorithm-Based Abnormality Detection
- Misaligned Fastening
- Thread Damage
- Abnormal Engagement
- Re-Fastening / Re-Hit
- **OK / NOK**
- Data Collection

TTE complements the original clutch / auto-shutoff control mechanism by adding real-time torque monitoring, abnormality detection, and data collection.

② CONTROLLER-CONTROLLED FASTENING IMPACT / PULSE TOOLS

Wireless Torque Transducer

Measures & Transmits Torque

Impact / Pulse Tool

\+

TTE Wireless Torque Transducer

\+

ZIPPTORK TCA / TCB / TCC Torque Controller

↓

REAL-TIME TORQUE FEEDBACK

↓

ZIPPTORK TORQUE CONTROLLER

↙ ↘

Torque Controller

Executes Fastening Control

TRANSDUCER MODE

TTE Measures Real-Time Torque

↓

Torque Feedback to Controller

↓

Controller Compares with Target Torque

↓

Target Torque Reached

↓

Shut Off Air Supply

↓

CONTROL BY TARGET TORQUE

ACCU MODE

TTE Continuously Monitors Torque

↓

Extended Fastening Time

↓

Torque / Process Monitoring

↓

Defined Fastening Time Reached

↓

Shut Off Air Supply

↓

Torque / Process Within Defined Criteria?

→ **YES — OK**

→ **NO — NOK**

CONTROL BY EXTENDED TIME + TORQUE MONITORING

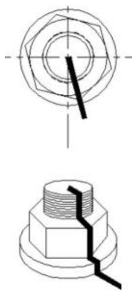
TTE provides the real-time torque feedback; the ZIPPTORK Controller uses that data to monitor, judge, and control the fastening process according to the selected operating mode.

VERIFY — Digital Torque + Angle Residual Torque Verification

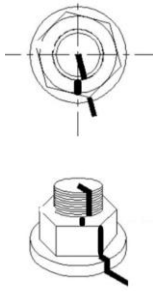
From Visual First-Movement Judgment to Defined, Repeatable Torque + Angle Measurement

CONVENTIONAL FIRST-MOVEMENT METHOD

Mark the Joint → Observe First Movement



Apply Torque Slowly
↓
Visually Detect Reference-Mark Displacement
↓
Read Torque at First Movement



VISUAL / OPERATOR-DEPENDENT JUDGMENT

Movement may already have progressed before it becomes visually detectable.

Additional rotation may further tighten the joint and affect the verification result.

FROM VISUAL JUDGMENT TO DIGITAL FIRST-MOVEMENT DETECTION

↓

Laptop / Tablet

Manual Torque Wrench

TTAS Wireless Torque Transducer

- Torque Wrench Applies Torque
- TTAS Measures Torque + Angle

TTAS DIGITAL FIRST-MOVEMENT METHOD

TORQUE + ANGLE MEASURED SIMULTANEOUSLY
↓
USER-DEFINED FIRST-MOVEMENT THRESHOLD
e.g. 1°
↓
SOFTWARE CAPTURES TORQUE AT THE DEFINED ANGLE
↓
RESIDUAL TORQUE
↓
Target Residual Torque ± Tolerance
↓
OK / NOK + Data Record

DIGITIZING THE FIRST-MOVEMENT METHOD
Defined • Repeatable • Traceable
MINIMIZES VERIFICATION-INDUCED JOINT DISTURBANCE

TTAS digitizes the First-Movement Method by synchronizing torque and angular movement at a defined small rotation threshold—reducing reliance on visual judgment while minimizing additional joint rotation during verification.

VERIFY — High Residual Torque Verification with Torque Multipliers

Extending the Digital First-Movement Method to High-Torque Joints

① WHY POST-FASTENING VERIFICATION?

HIGH-TORQUE TIGHTENING
Torque Multiplier / High-Torque Tool
↓
Rated / Controlled Tightening Output

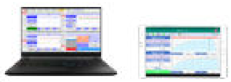
≠

COMPLETED JOINT
Actual Post-Fastening Condition
↓
Independent Verification

Tool accuracy describes the tightening system's output capability; it does not, by itself, verify the residual condition of each completed joint.

TTAS Wireless Torque Transducer

TM-Torque Multiplier



Laptop / Tablet

② ZIPPTORK HIGH-TORQUE VERIFICATION METHOD

Manual / Click Torque Wrench
↓
TTAS Wireless Torque Transducer
↓
Torque Multiplier
↓
Fastener

→

Application Software
GEAR RATIO → TTAS ANGLE
Use TM-Specified Gear Ratio
Defined Fastener Angle × Gear Ratio
= Required TTAS Angular Movement

TORQUE RATIO → RESIDUAL TORQUE
Use TM-Specified Torque Ratio
TTAS Measured Torque × Torque Ratio
= Residual Torque at Fastener

Use the manufacturer-specified Gear Ratio and Torque Ratio.

③ ONE-STAGE TM EXAMPLE

Defined Fastener Angular Movement = 1°
TM-Specified
Gear Ratio = 3:1
Torque Ratio = 2.7:1
ANGLE
Required TTAS Angular Movement =1° × 3 = **3°**
TORQUE
TTAS Measured Torque × 2.7 = **Residual Torque at Fastener**
JUDGMENT
At Required TTAS Angle → Calculated Residual Torque vs. Target ± Tolerance→
OK / NOK →Data Record

④ TWO-STAGE TM EXAMPLE

Defined Fastener Angular Movement = 1°
TM-Specified
Combined Gear Ratio = 5 × 3 = **15:1**
Combined Torque Ratio= **12.3:1**
ANGLE
Required TTAS Angular Movement =1° × 15 = **15°**
TORQUE
TTAS Measured Torque × **12.3** = **Residual Torque at Fastener**
JUDGMENT
At Required TTAS Angle → Calculated Residual Torque vs. Target ± Tolerance→
OK / NOK →Data Record

Application software uses the TM Gear Ratio to determine the required TTAS angular movement and the TM Torque Ratio to calculate residual torque at the fastener, then compares the calculated residual torque with the target ± tolerance for OK / NOK judgment.

TRACE — Fastening Data Recording & Traceability

Turning Torque Measurement and Verification Results into Traceable Fastening Records

① DATA GENERATED

MEASURE • MONITOR • CONTROL • VERIFY

↓

FASTENING / VERIFICATION DATA

Torque Value

Torque vs. Time

Angular Movement

Fastening Time / Cycle Data

OK / NOK Result

Abnormality Result

Date / Time

Torque

Angle

Tool / Transducer ID

Job / Workpiece ID

OK / NOK的 History / Record

② IDENTIFICATION & RECORD

IDENTIFICATION DATA

• Operator ID• Workpiece • Bolt ID

• Barcode • Serial Number• Tool ID

• Transducer ID • TM ID • Timestamp

↓

FASTENING RECORD

WHO

Operator ID

WHAT

Workpiece / Bolt ID

WITH WHAT

Tool ID / **Transducer** ID / TM ID

WHEN

Timestamp

RESULT

Torque / Angle

OK / NOK

Abnormality Result

↓

COMPLETE TRACEABLE RECORD

③ DATA DESTINATION

LOCAL

Controller

Laptop

Tablet

↓

NETWORK / SYSTEM

Wi-Fi / Network

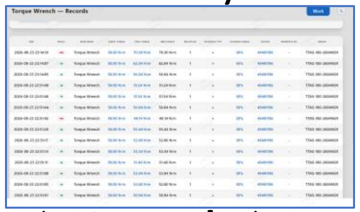
↓

DATABASE / MES INTEGRATION

Production Records

Quality Records

Traceability Data



Local Device → Network → Database / MES

ZIPPTORK combines torque and process data with identification information to create traceable fastening records for local storage, quality documentation, and integration with production systems.

CONNECT — Wireless Torque Data & System Integration

Connecting Torque Sensing, Fastening Control, Data Management, and Production Systems

① WIRELESS TORQUE SENSING

TTA FAMILY — STATIC

- Torque
- Torque + Angle
- Residual Torque

TTE FAMILY — DYNAMIC

- Real-Time Torque
- Torque vs. Time
- Controller Feedback

↓

WIRELESS TORQUE DATA

② TWO DATA PATHS

PATH A — DIRECT DATA CONNECTION

TTA / TTE

↓

Wireless Data

↓

DR-RF Dongle

↓

Laptop / Tablet / PC

↓

Application Software

- Measurement
- Monitoring
- Verification
- Data Collection

PATH B — CONTROLLER INTEGRATION

TTE

↓

Real-Time Wireless Torque Feedback

↓

TCA / TCB / TCC

↓

Fastening Control

Transducer Mode

ACCU Mode

↓

Fastening Result/ Process Data / Data Collection

③ PRODUCTION SYSTEM INTEGRATION

LOCAL DATA

Controller

Laptop / Tablet / PC

↓

NETWORK CONNECTION

Wi-Fi / Ethernet / Network Interface

↓

DATABASE / MES INTEGRATION

- Production Records
- Quality Records
- Traceability Data

↓

CONNECTED FASTENING SYSTEM

One wireless torque-sensing platform connects measurement, monitoring, control, verification, traceability, and production-system integration.

APPLICATION — Where Wireless Torque Sensing Adds Value

Three Application Areas for Upgrading Conventional Fastening and Verification Processes

① IMPACT & PULSE FASTENING

**OVERCOMING
THE TORQUE-SENSING BARRIER**

Impact / Pulse Tool
+
TTE Wireless Torque Transducer

Challenge
Repeated Shock & High Vibration

↓

ZIPPTORK VALUE
Shock-Resistant Dynamic Torque Sensing
Real-Time Torque Monitoring
Controller Feedback
Data Collection

TTE FAMILY

② CLUTCH & AUTO-SHUTOFF ASSEMBLY TOOLS

DIGITALIZING EXISTING ASSEMBLY TOOLS
Low-Torque Screwdriver + **TTEB**
Higher-Torque Angle Nutrunner + **TTES**

**Existing Clutch / Auto-Shutoff Mechanism
Controls the Fastening Torque**
+
TTE Wireless Torque Sensing
Monitors & Judges the Fastening Process
↓

ZIPPTORK VALUE
Real-Time Torque Monitoring
Algorithm-Based Abnormality Detection
OK / NOK
Data Collection & Traceability
TTEB / TTES

③ RESIDUAL TORQUE VERIFICATION

DIGITIZING RESIDUAL TORQUE VERIFICATION
Use TTAS + APPLICATION SOFTWARE

DIRECT VERIFICATION
Manual / Click Torque Wrench + TTAS
↓
Torque + Angle
↓
Digital First-Movement Method
Typically ≤ 500 Nm

HIGH-TORQUE VERIFICATION
**Manual / Click Torque Wrench + TTAS
+ Torque Multiplier**
↓
Same Digital First-Movement Method
Typically > 500 Nm
Gear Ratio → TTAS Angle
Torque Ratio → Residual Torque

One wireless torque-sensing platform addresses impact & pulse torque sensing, conventional assembly-tool digitalization, and residual torque verification across low- to high-torque ranges.

How to Select the Proper Wireless Rotary-Type Torque Transducer

Selecting the Right Torque Capacity Based on Actual Tool Output and Operating Conditions

① SELECT STATIC OR DYNAMIC

STATIC — TTA FAMILY

Applicable Tools

Manual Torque Wrench

Geared Torque Wrench / Torque Multiplier

↓

SELECTION RULE

Rated Torque = Maximum Usable Torque

Example:

TTA-250 → Max. 250 Nm

TTAS / TTAM

DYNAMIC — TTE FAMILY

Applicable Tools

Impact Wrench

Pulse Tool

Clutch / Auto-Shutoff Tool

↓

DO NOT SELECT BY TOOL NAMEPLATE TORQUE ALONE

↓

Determine Actual Tool Output First

② DETERMINE ACTUAL TOOL OUTPUT

TEST UNDER ACTUAL OPERATING CONDITIONS

Actual Tool → TT / TTES + TF Test Setup

Pneumatic Tool

Maximum Working Air Pressure

Electric Tool

Maximum Working Voltage

↓

Use TT or TTES + TF

↓

MEASURE MAXIMUM TOOL OUTPUT TORQUE

Note

Hard Joint:

Maximum output can typically be determined within approximately 1.5–2 seconds.

Soft Joint:

A longer fastening time may be required to reach maximum tool output.

③ SELECT DYNAMIC TTE CAPACITY

DYNAMIC TTE SELECTION RULE

Actual Tool Output × 1.2–1.3

↓

RECOMMENDED TTE CAPACITY

EXAMPLE

Measured Tool Output

140 Nm

↓

20% Margin

140 × 1.2 = 168 Nm→ TTES-180

30% Margin

140 × 1.3 = 182 Nm→ Select Next Higher Capacity: TTES-250

CATALOG TORQUE ≠ ACTUAL APPLICATION OUTPUT

Impact-wrench catalog torque is typically established under specified test conditions.

Actual output varies with the operating and joint conditions.

For dynamic TTE selection, measure the tool's maximum output torque at its maximum working air pressure or voltage using TT or TTES + TF, then select a TTE with approximately 20–30% higher torque capacity.

PRODUCT SPECIFICATIONS — Wireless Rotary-Type Torque Transducers

Static and Dynamic Torque-Sensing Configurations for Different Tool Interfaces and Applications

Specification	TTAS	TTAM
Sensing Method	Static	Static
Typical Tool	Manual / Click Torque Wrench	Torque Multiplier
Configuration / Interface	Square-Drive	Multiplier Configuration
Torque Range / Capacity (Nm)	**10–3000**	**500 – 1000 Nm**
Measurement	Torque / Torque + Angle	Torque / Torque + Angle
Primary Application	Torque Measurement & Residual Torque Verification	High-Torque Measurement & Residual Torque Verification
Wireless Communication	BT / RF	BT / RF
Accuracy	**±1%**	**±1%**

Specification	TTEB	TTES	TTEH
Sensing Method	Dynamic	Dynamic	Dynamic
Typical Tool	Screwdriver / Bit-Type Tool	Impact / Pulse / Nutrunner	Impact / Pulse / Nutrunner
Configuration / Interface	1/4" or 6.35 mm Bit-Type	Square-Drive or Spline-Drive	Socket-Type
Torque Range / Capacity (Nm)	**0.5– 20**	**10– 3,000**	**10– 3,000**
Measurement	Real-Time Torque	Real-Time Torque	Real-Time Torque
Output Data	Torque vs. Time	Torque vs. Time	Torque vs. Time
Primary Application	Monitoring / Abnormality Detection / Data	Monitoring / Control	Monitoring / Control
Wireless Communication	BT / RF	BT / RF	BT / RF
Accuracy	**±1%**	**±1%**	**±1%**

WHY ZIPPTORK — More Than a Wireless Torque Transducer

A Modular Torque-Sensing Platform for Upgrading Conventional Fastening and Verification Processes

① KEEP & UPGRADE

KEEP EXISTING TOOLS

External Wireless Torque Sensing

Conventional Tools
Impact / Pulse
Clutch / Auto-Shutoff

↓

Add Torque Sensing • Monitoring • Data

Keep the Tool. Add the Intelligence.

② SENSE • MONITOR • CONTROL

FROM TORQUE SENSING TO FASTENING INTELLIGENCE

TTA + TTE Families

Static + Dynamic Torque Sensing
Torque + Angle
Real-Time Torque Feedback

↓

Measurement • Monitoring • Judgment • Control

↓

TTE → TCA / TCB / TCC

MEASURE → MONITOR → CONTROL

③ VERIFY • TRACE • CONNECT

FROM VERIFICATION TO TRACEABILITY

Digital First-Movement Method
Residual Torque Verification
Direct + High-Torque Applications

↓

Torque / Angle / Result + Identification Data

↓

OK / NOK • Data Record • Database / MES Integration

VERIFY → TRACE → CONNECT

One modular platform connects torque sensing, fastening control, verification, and traceability.

ZIPPTORK
Bolting Technology
Torque Control 、Bolt Load Control

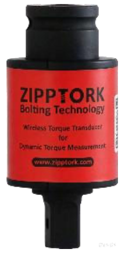
Wireless Rotary-Type Torque Transducer

Patented Anti-Vibration & Shock-Resistant Torque Sensing Technology

TTAS

TTAM

TTEB



TTES

TTEH

KEEP EXISTING TOOLS
ADD WIRELESS TORQUE SENSING
MEASURE • MONITOR • CONTROL • VERIFY • TRACE • CONNECT

Keep the Tool. Add the Intelligence.

U.S. Patent No. 11,150,153 B2 — Torque Sensing and Transmitting Device

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