Force Gauge

SCHMIDT control instruments

Edition ACMTS 01.0.E

TAA-ACMTS Series

Model TAA-ACMTS-TB
TAA-ACMTS-Z

Operating Instructions

Valid as of: 01.12.2024 • Please keep the manual for future reference!

CE

Introduction

Thank you for choosing the **IMADA Motorized Torque Stand MTS-Series**. Use in combination with the **IMADA Screw Cap Torque Tester DTXS / DTXA Series (Torque Tester)** for the Torque rotational motion measurements.

In Addition to the simple **Manual Mode** operations, the motorized system allows stable Torque application at a constant Force /Speed for the expected high reproducibility. Large Torque measurements are also possible with automatic operations, enabling the repeated application of a predetermined Torque value and automatic stop settings when completed.

All **Torque Testers** (the Measuring Instruments): The **Precision Instruments** require correct handling. Please follow the individual **Operating Manuals** and the Warranty Certificate supplied with each product for the safe use of the devices.
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This product and all **IMADA** products manufactured and shipped under strict quality control and inspection standards. If any problems found, please contact, and notify the local distributor or us immediately for confirmation.

The **Warning Icons** and **Descriptions**: - the following categories show the danger levels

DANGER	Failure to observe the details in this **Operating Manual** for safe use will result in irreparable damage to the Devices and lead to serious personal injury or loss of life.
WARNING	Failure to observe the details in this **Operating Manual** for safe use may result in irreparable damage to the Devices and lead to serious personal injury or loss of life.
CAUTION	Failure to observe the details in this **Operating Manual** for safe use may damage the Devices and lead to minor or moderate injury.

DANGER

- Do not use this product without protection under anticipated danger such as liquids, debris, or dangerous chemical substances splashing; take measures to **protect** the Operators Eyes and Body and the Measuring Instruments before use.
- The operator must take sufficient safety measures before using the Device.
- Please follow the **safety rules and regulations** of the individual company under the safe operating procedures.

WARNING

- Do not use the Device for any purpose other than Torque measurements.
- The operation must proceed indoors in a clean and dry environment, away from any liquids, dust, or the risks of getting wet.
- The **Torque Tester** and the **Torque Stand,** connected with the dedicated **Cable** included in this Package with the **Automatic Operation Mode**, the **Overload Stop** supported with the **Force-Control** functions. No protection guaranteed against the Instruments' failure from the damage due to Overloading.
- The Overload Stop function of the **Torque Stand** enables proper communication with the **Torque-Tester**. The **Torque-tester** power **ON** for the operation settings.
- Also, to prevent communication interruption from the battery running out, the AC adapter connected, and the **Torque-Tester** set with the off timer to [**OFF** (disabled)] before use.
- Disassembling, dismantling, or remodeling the Device could lead to malfunctioning / damage and dangerous situations.
- All **IMADA Torque Testers** delivered with a dedicated AC Adapter for use exclusively with the Measuring Instruments. Using non-dedicated adapters could fail measurement accuracy and lead to malfunctioning, accidents, and fire.
- Regardless of the **power ON/OFF**, an over-capacity Torque load application malfunctions and damages the Instruments.

CAUTION

Please Handle the Device with Extreme Care
The Torque Stands / Tester / Gauges are the Precision Instruments

CAUTION: Torque Tester OVERLOADING

*(Refer to the individual Operating Manual for the **Torque-Tester** for more details)*

- Regardless of the Power ON / OFF, any Overcapacity Load application damages the Sensor.
- It may cause a breakdown when massive compression or tensile force applied to the **Torque Tester** sensor.
- The Torque sensor may receive damage from large compressive / tensile force applied in the reverse direction to the actual rotating direction.

CAUTION: Torque Tester accuracy Maintenance and Guarantee

- Regular calibrations highly recommended for accuracy and safety maintenance depending on the frequency of use and the total amount of applied Loads.
- The Devices must operate within the set operating temperature and the environment for accurate results.
- Do not disassemble or modify the **Torque Tester**.
- When using the **Torque Tester** with the AC adapter, the Power supply for both Devices must be from the same outlet.

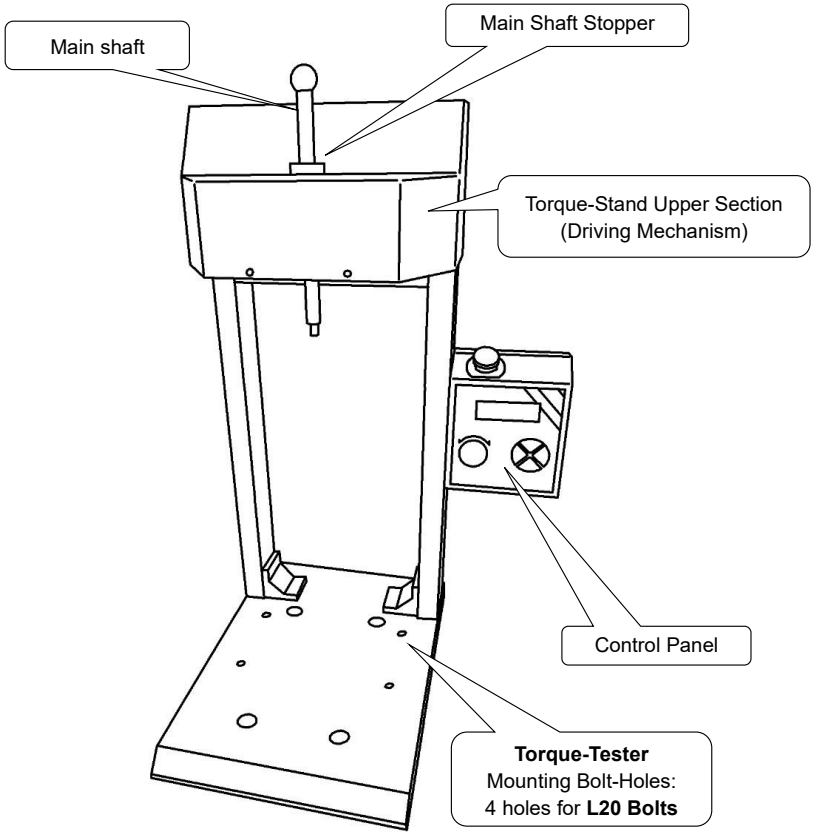
CAUTION: Torque Stand and the Torque Tester STORAGES

- Maintain and store in a clean and stable environment, free from oil, dust, high temperature, and humidity (against rusting), protected to avoid any possibilities of malfunction causes or failure, and on a stable leveled space.
- The Torque-Sensor kept well protected from receiving any Force from any direction, impact / shock / vibrations.
- For surface paint protection, do not use organic solvents such as thinner for cleaning.

TABLE OF CONTENT

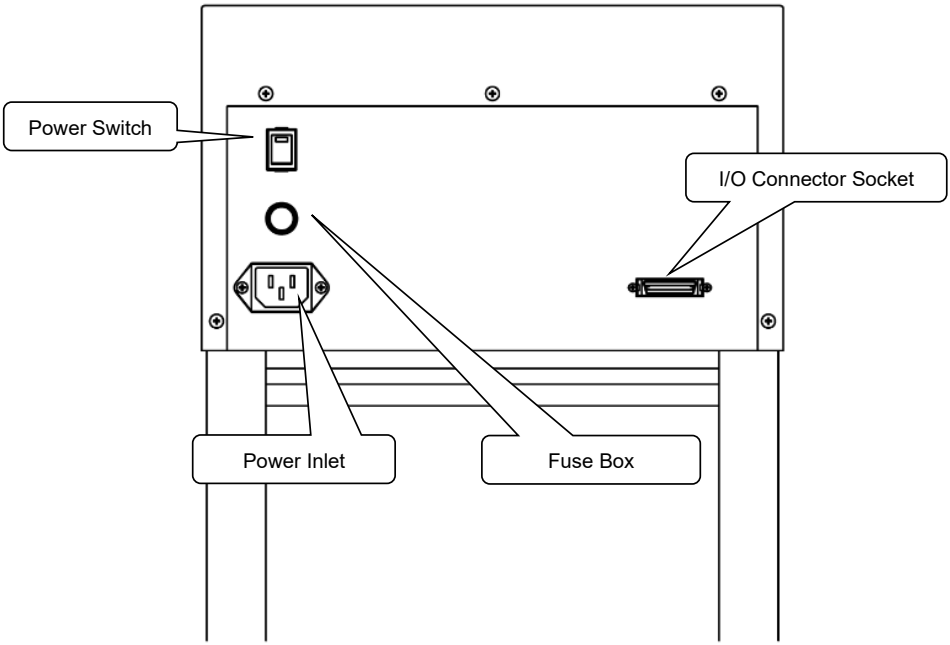
1. Names and Functions of Each Part

1.1. Front



Main-Shaft	A variety of clamping jigs are available for the Torque measurements (**Jigs and Attachment Options available*)
Main-Shaft Stopper	Vertical Positions adjusted (distance to the attached jig) according to the measuring sample heights
Control Panel	Set Operating Conditions Display the Operating Status and the various Settings
Torque Tester Mounting Bolt Holes	4 Bolt Holes for L20 Bolts for Mounting Torque Tester

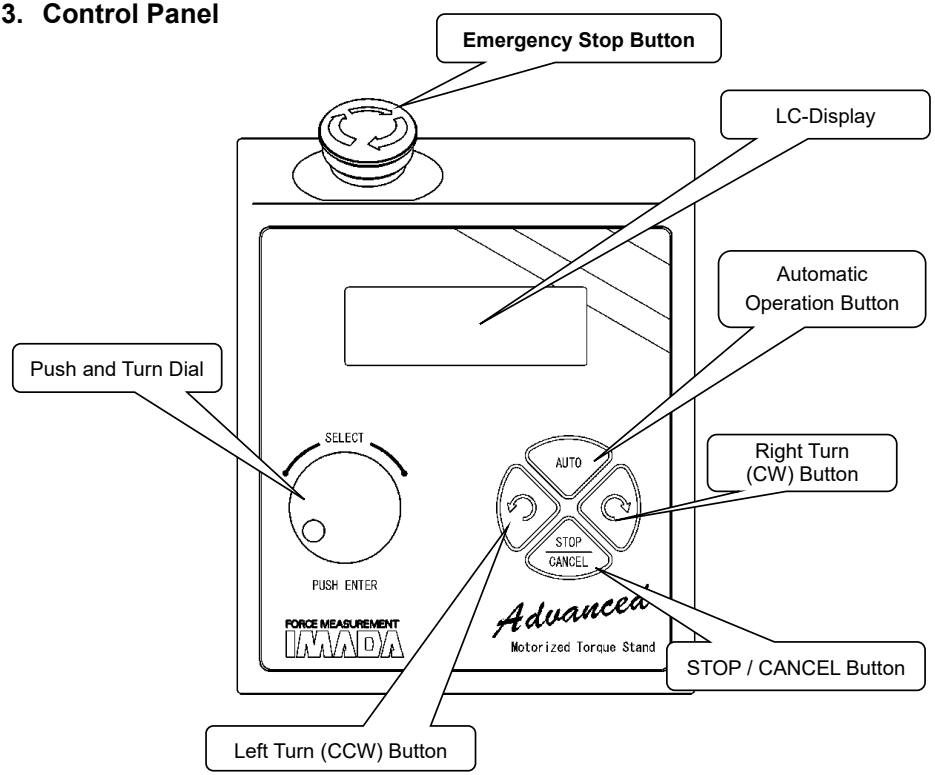
1.2. Back (Rear Panel)



Power Switch	Power Switch for the **Power ON / OFF**
Power Inlet	Power Cable Connecting Socket
Fuse Box	Protective Fuse Inserted
*I/O Connector Socket	Connected with a Torque Tester with the dedicated cable to control the **Auto Operation Mode** and **Overload Stop** functions according to the measured Torque values.

Please refer to the **I/O connector section for the individual signal details*

1.3. Control Panel



Emergency Stop Button	Press for Operation **Compulsorily Stop** Once pressed, locks to **Stop** all operation and movement at once Turn right (the allow direction) to release
Push and Turn Dial	At **Manual Mode:** Speed settings At **JOG Mode:** Fine Movement settings At **Automatic** and **User Setting Mode:** Change and Select Operating Values **Push** to confirm each setting
AUTO Button	**Switch** from **Manual** to **Automatic Mode**
STOP/CANCEL Button	Press to **Stop** the movement during the regular operation In **Settings Mode**, **Cancel** or **Return** to the previous settings
Right Turn (CW) Button	Push to **Rotate the Main-Shaft** in the Clockwise direction (the pointing arrow direction on the button)
Left Turn (CCW) Button	Push to **Rotate the Main-Shaft** in the Counter-Clockwise direction (the pointing arrow direction on the button)
LC-Display	Displays the **Operation Settings** and **Status** proceeding

2. Accessories

The following Accessories included.

Power Cable (with Cable Clamp)	1pc
Connecting **Cable** [Displacement Cable ***CB-728**]	1pc
Main-Shaft	1pc
Jig Connecting Adapter	1pc
Centering Stick	1pc
Spare **Fuse**	1pc
M5 L-Wrench (for M5 Hexagon Socket Head Bolt)	1pc
M6 L-Wrench (for M6 Hexagon Socket Head Bolt)	1pc
M5 Bolt: L20 Hexagon Socket Head Bolt (For **Torque Tester** mounting)	4pcs
The Operating Manual (This Booklet) and the **Warranty Certificate**	1set

* **M5 Bolt: L20 4 pcs -** screwed to the **Torque-Tester** Bolt Holes at the time of shipment

3. Models and Specifications

3.1. Models

Model	Sample Height Ranges
ACMTS-10N	Sample height up to 120mm
ACMTS-10N-2N	Sample height up to 320mm

The applicable sample heights: The height ranges for the Standard fixtures.

3.2. Specifications

Capacity	10N-m
Stroke	*Refer to the **Dimensions***
Weight	Approx. 17kg
Speed Range	0.6-240.0° /sec
Dimensions（mm）	*Refer to the **Dimensions***
Functions	**Manual Mode** **JOG Mode** **Automatic Mode**: CONTINUOUS / ONE WAY (*1) **Overload Stop** (*1)
	Speed Adjustment

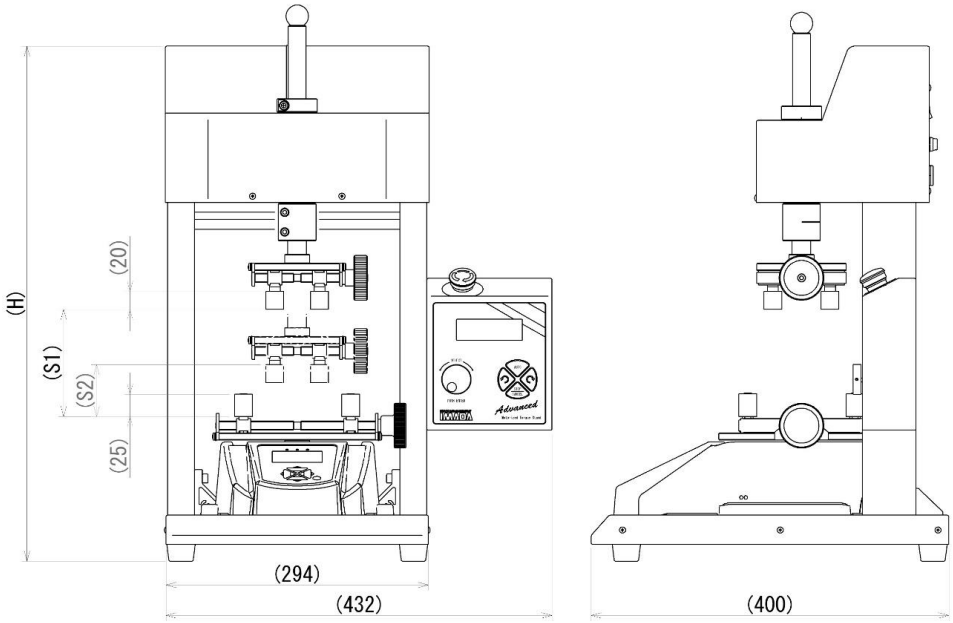
Input Voltage	AC100 - 240V, 50 / 60Hz, max 3A (*2)
Ambient Temperature	0 - 40°C
Relative Humidity	Humidity less than 85%, no condensation

(*1) Use the dedicated **Cable** included in the Package to connect with the **Torque Tester**

(*2) For the use under different voltages, the **Power Cable** changed and replaced.

Fuse Rating	Dimension
250V 3A	Φ5mm / L20mm Glass-tube Fuse, Normal-Blow type

Dimensions



Model Numbers	H	S1	S2
ACMTS-10N	577mm	120mm	58mm
ACMTS-10N-2L	777mm	320mm	158mm

S1 and S2 are the stroke ranges with the **Standard Table** and **Standard Chuck** installed to the **Torque Tester**.

(Standard chuck and Standard Table sold separately: Refer to the catalog or details provided upon request)

4. Settings: Installing Torque Tester

DANGER

- Use only the **dedicated AC Power Cable** included in the individual Packages to connect to the outlet. Using inappropriate Cables would lead to Malfunctioning, Accidents, Fire.
- Do not use other cables as an alternative. Using inappropriate Cables would lead to Malfunctioning, Accidents, Fire.
- To **prevent electric shock** in the event of a failure or electric leakage, connect the **ground wire** from the AC power cord plug. Never connect the ground wire to a tap, gas pipe, telephone ground wire, or lightning rod. Avoid risks of ignition and overcurrent.

CAUTION

- The **Torque Stand** placed on a secure, sufficiently strong, leveled worktop.
- Ideally, with minimum vibration identified affecting the **Torque Stand** during the Operation.
- Prevent electric shocks from the short circuit; the ground wire connected correctly.
- Avoid Overcurrent Accidents, connecting to the tap, gas pipe, telephone ground wire, or a lightning rod strictly prohibited.
- The low-capacity **Torque Tester** with high sensitivity susceptible to vibration: Handle with extra care.
- For using the **Torque Tester** with an AC power supply, the **Torque Stand** power must be supplied from the same outlet.

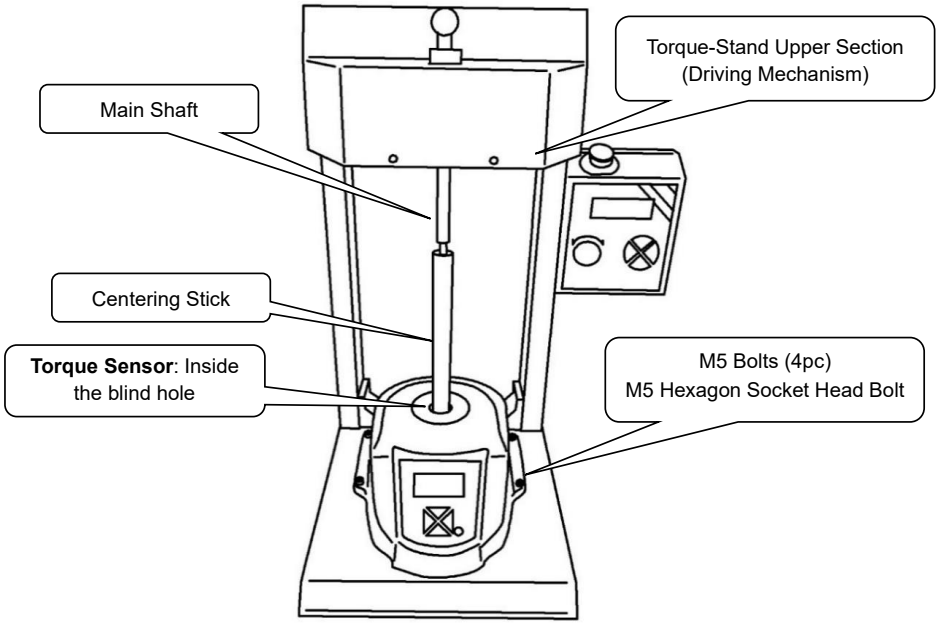
4.1. Power Connector

Use only the dedicated **AC Power Cable** included in this Package to connect to an output.

4.2. Connecting to the Torque Tester

To connect with the Torque tester, use only the dedicated cables included in the **Torque Stand** Package. For protection and safe use of the equipment, the functions Overload Stop and Automatic Mode respond correctly only with the dedicated cable.

4.3. Installing the Torque Tester to the Torque Stand

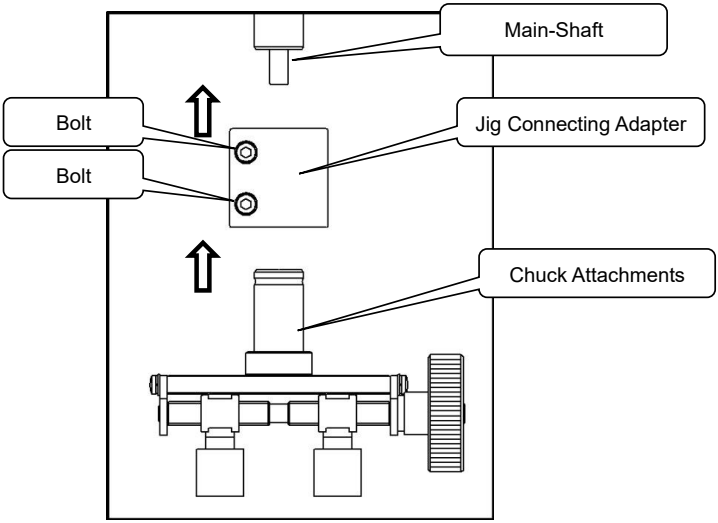


1. Detach the handle from the **Torque Tester**, gently turn it over to unscrew **4pcs** M5 Bolts from the back to detach the **Torque Tester Handles**.
2. Place the **Torque Tester** to the **Torque Stand** as above, temporarily fix the Torque Tester to the **Torque Stand** using the **4pcs** M5 Bolts included in the Package. *(Fix firmly later).*
3. Lift to exchange the **Main-Shaft** of the **Torque Stand**, with the **Centering Stick,** insert the thinner end facing down (as image above).
   Gently insert the Stick End into the blind hole at the center of the **Torque Tester.*
   *Do not apply any ***Stress to the Sensor at the blind hole*** *during the centering process.*
4. The **Main-Shaft** inserted back through the **blind hole** of the Upper section, into the **Centering Stick**. Align the Main Shaft of the **Toque Tester** and the Torque Sensor in a straight line to determine the correct position without resistance. Finally, fully tighten **4 pcs M5 Bolts** to fix firmly.

CAUTION

- Remove the Attachment (The Standard Table) from the Torque Tester before Installation.
- The Centering Stick must be placed gently. Do not apply any extra Load stress to the Torque Tester Sensor.
- When the position finalized, tighten the fixing Bolts firmly to stabilize the **Torque Tester** to the **Torque Stand** to avoid deformation.

4.4. Mounting the Standard Chuck Attachment



Follow the installing procedures for the Optional Attachment to the **Main-Shaft**.

*(**Refer to the Catalog for more options)*

1. Check the **Shaft Keyway** from the **Shaft-Hole** of the **Torque Stand** Top.
2. The **Main-Shaft ridge** properly fitted to the **Torque Stand Shaft keyway dent**.
3. Roll the **O-ring** of the Attachment to a lower position and insert **the Chuck Attachment** to the **Main-Shaft Tip.**
4. The **Attachment** fitted and the **Pin** inserted to secure the **Attachment** from **#3.**
5. Move back the **O-ring** to the original position, over the **Pinhead**.

The ****Shaft Length Extension** available as required for the length adjustments based on the measuring specimens.

Refer to the Catalog, Details provided upon request.

CAUTION

- To detach the Attachment from the Main-Shaft, hold the Attachment securely so that it does not fall (avoid accidents / dropping) onto the Torque Tester. The Sensor is always protected away from any damage.

5. Operation Procedures

5.1. Power ON / OFF

IMPORTANT

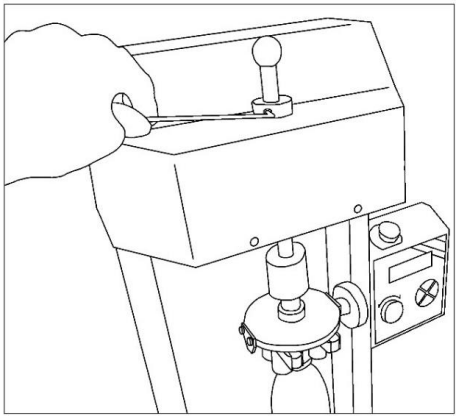
The Torque Stand Power ON first and then the **Torque Tester Power ON to follow**.

Torque Tester **Power OFF** first, and then the **Torque-Stand** Power OFF to follow.

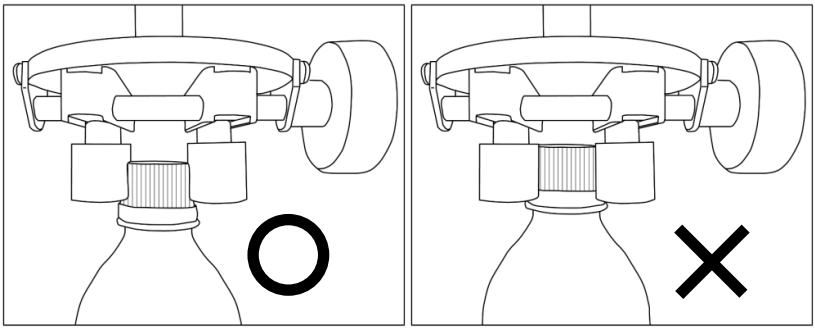
Do not repeat the **Power ON / OFF** actions within a short period, which could lead to malfunctioning and accidents.

5.2. Minor Height Adjusting: The Main-Shaft with the Chuck Attachment

When the sample **mounted** onto the **Torque Tester Table**, loosen the **Main-Shaft** Stopper with a wrench included in the Package, to adjust the **Main-Shaft** position with the Chuck Attachment fitted. Adjust the **Main-Shaft** position from the top and **Shaft Stopper firmly screwed** to stabilize.



When finalizing the sample specimen position, the Testing **Cap section only, correctly gripped with the Chuck Attachment as below: -



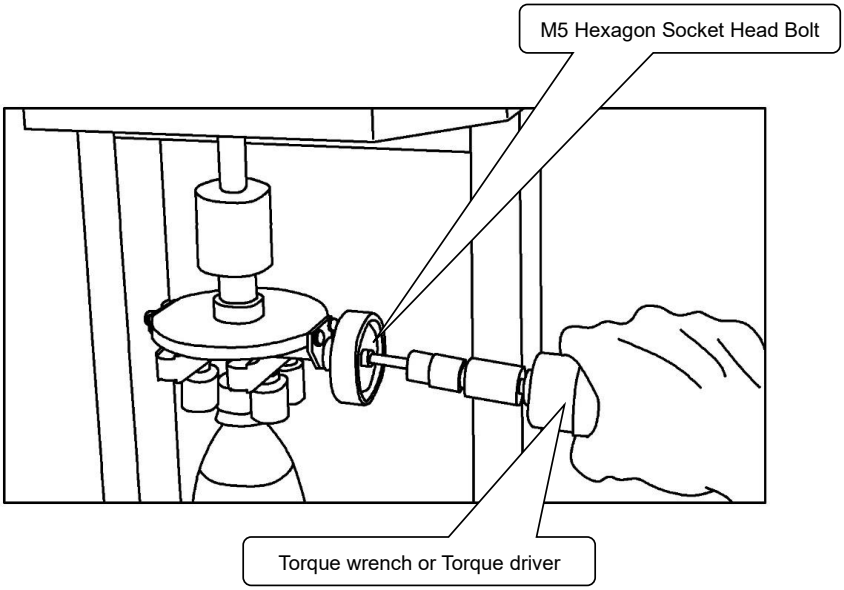
CAUTION

- For the **Main-Shaft** position adjusting vertically, hold the **Main-Shaft** in position first when the Shaft Stopper Screw loosened, avoid the Shaft from shooting down hard, avoid accidents.
- Once the **Main-Shaft** with a Chuck Attachment in the correct position, the fix with the Shaft Stopper firmly to secure a safe and accurate testing condition.

5.3. Fixing the Samples to the Clamping Attachment for measurement

The Fixing procedure EXAMPLE below with the **Standard Chuck Attachment** and the **Standard Table** with the **Standard Pins**.

1. Adjust the **Pin** positions of the **Standard Table** along the **Clamping Bars** of the **Standard Table** based on the Diameters of the Testing Sample.
2. Adjust the **Pin** positions of the **Standard Chuck Attachment** along the **Clamping Bars** and Fix. The **Chuck Attachment Pins** held with **Magnets**.
3. The **Main-Shaft** lifted for clamping the Sample onto the Table between the Pins.
4. Clamp the upper section of the sample (the Bottle Cap) to the **Chuck Attachment.**
   Adjust the clamping strength, for the sample specimen securely fixed with the appropriate force, should not apply unnecessary strain or too strong for it to collapse.
   At the center of the **Chuck** widths adjusting handle [Refer to the diagram], the **M5 Bolt** is fitted to stabilize the clamping strength using a **torque wrench** or the **torque driver**.



CAUTION

- To fix the testing sample, both the Torque Tester and the Torque Stand: Power ON and confirm the Values shown on the Displays during the processes.
- The **M5 Hexagon Cap Head Bolt,** at the center of the Check Attachment handle (the Standard Chuck Attachment) used only for the screw tightening motion, for loosening, turn the Handle manually with a hand.
- When the sample shapes not cylindrical, extra care required to adjust the Chuck and Table Pins to achieve the firm sample gripping.
- For plates / sheet-form samples, the Chuck and Table gripping Pins positioned carefully to recognize the accurate measuring condition.
- Use the **JOG Mode** for the minor angle adjustments of the **Main-Shaft** positions. Avoid toque applications during sample fixing processes.

  ***Refer to [5.6 Minor adjustments with the **JOG Mode**]*.
- In twisting tests using Torque, some flexible samples, such as rope, become shorter in length when firmly twisted. As a result, the upper clamping attachment may come in contact with the lower clamp, causing the lower clamp to lift and detach from the Torque tester. When the twisted specimen firmly clamping the hard twisted sample is disconnected from the tester, the specimen will automatically rewind to unwind itself at high speed, potentially causing the attached clamp to rotate together at high speed, creating a dangerous state. For safety, avoid such measurements.

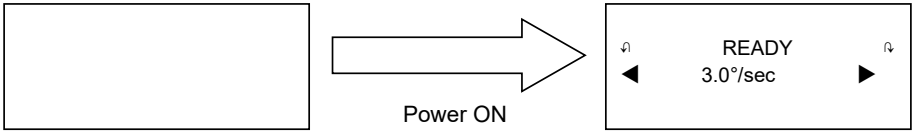
5.4. Operation Mode Selection

The following Operating Modes available.

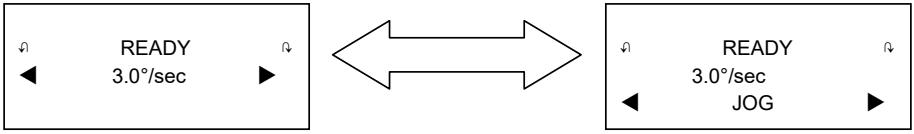
Modes	Descriptions	Details
Manual Mode	The **Main-Shaft** rotates at the set speed with  or  pressed.	*Refer to Page* ***20-21***
JOG Mode	The minor adjusting of the **Main-Shaft** rotation, to the direction, stated on the button pushed.	*Refer to Page* ***21***
Automatic Mode (Automatic Operating Mode)	Automatically repeats the rotating motion based on the Operation Settings. **CONTINUOUS**: When the specified Torque reaches or rotates to the set angle, the Main-Shaft reverses for reciprocating rotation. Suitable for Durability Tests. **ONE WAY:** The test ends when the Main-Shaft rotates in a single direction to a set Torque or to the set angle. Suitable for Opening Torque Tests.	*Refer to Page* ***22-32***
Automatic Mode Settings	Set the repeat rotating conditions for the **Automatic Mode**.	*Refer to Page* ***33-35***
User Mode Settings	Setting Mode for Basic Conditions and Requirements.	*Refer to Page* ***37-38***

Procedures for Modes Selecting

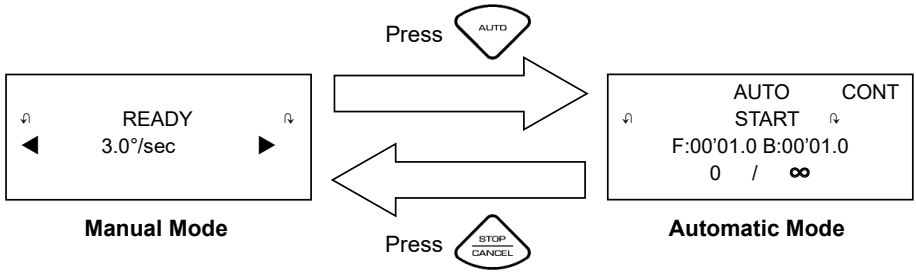
●Turn on the power → **Manual Mode** (The Initial display when the power turned on)



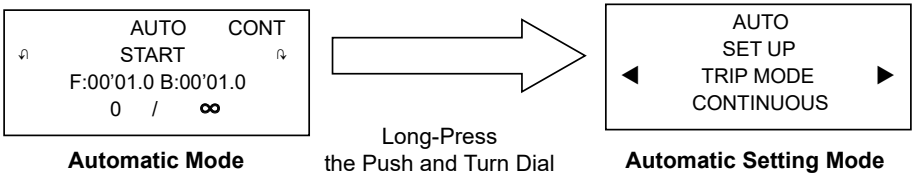
●**Manual Mode ⟷ JOG Mode**



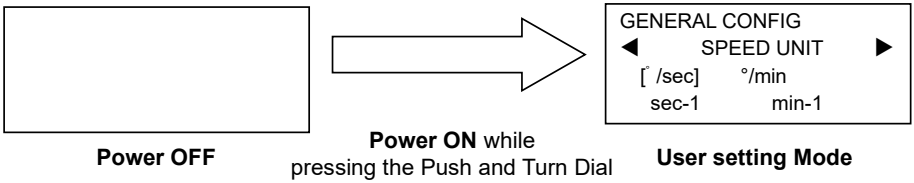
●**Manual Mode ⟷ Automatic Mode**



●**Automatic Mode**→ Setting Mode



●Turn the power → User setting



5.5. Manual Mode

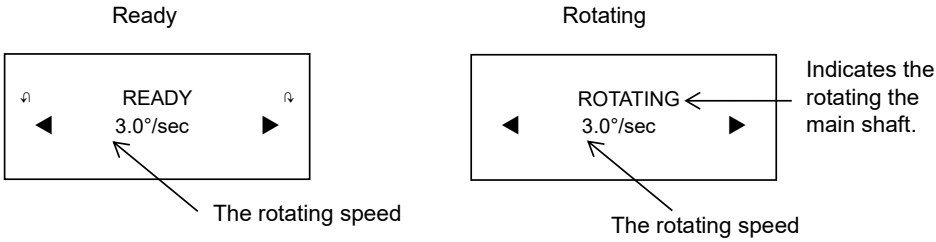
With the **Manual Mode** the **Main-Shaft** rotates at the **Set Speed** while pressing  or  .

Procedure

1. Set the rotating speed by turning the **Push and Turn Dial**.
2. By pressing  or  button, the **Shaft** rotates for the arrow directions on the buttons.

   The rotation continues until the button released.

Display layout



Speed setting steps

The one turn-click of the **Push and Turn Dial = One Unit** and depends on the Unit displayed.
The setting steps for each Display unit as follows: -

Displayed Unit: °/sec

Speed Range	Speed Setting
0.6°/sec -10°/sec	0.1°/sec
10°/sec -100°/sec	0.5°/sec
100°/sec -240°/sec	1.0°/sec

Displayed Unit: °/min

Speed Range	Speed Setting
100°/min~1000°/min	1°/min
100°/min~1000°/min	5°/min
1000°/min~10000°/min	10°/min
10000°/min~14400°/min	500°/min

Displayed Unit: sec-1

Speed range	Speed setting steps
0.0085 sec-1 to 0.0100 sec-1	0.0001 sec-1
0.0100 sec-1 to 0.1000 sec-1	0.0005 sec-1
0.1000 sec-1 to 0.666 sec-1	0.0010 sec-1

Displayed Unit: min-1

Speed range	Speed setting steps
0.10 min-1 to 1.00 min-1	0.01 min-1
1.0 0min-1 to 10.00 min-1	0.05 min-1
10.00 min-1 to 40 min-1	0.1 min-1

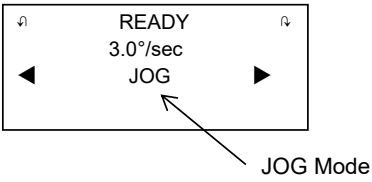
5.6. JOG Mode: Minor Toque Adjustments

With the **JOG Mode**, the **Push and Turn Dial** is turned to rotate the **Main-Shaft** in the direction turned for minor position adjustments. Helpful in positioning of the **Chuck Attachment** at the sample setting.

Procedure

1. **Push** the **Push and Turn Dial** at the **Manual Mode** and change to the **JOG Mode**
2. **Turn** the **Push and Turn Dial** and the **Main-Shaft** turns with a slight gradual turning

Display layout



CAUTION

- The **Continuous** rotational movement of the **Main-Shaft** with the **JOG Mode** inappropriate for the Torque measurements. Turning the **Push-and-Turn Dial** manually does not provide an actual Torque testing environment.

5.7. Automatic Mode

With the **Automatic Mode**, 2 rotation patterns available.

CONTINUOUS:

When the set specified Torque reached or rotates to the set angle, the Main-Shaft reversed for reciprocating rotation.
Suitable for Durability Tests.

**Refer to the [5.7.1. CONTINUOUS Mode] for the operation procedure.*

ONE WAY:

The test ends when the Shaft rotated in a single direction or rotates to the set angle.
Also, when the Torque decreases after exceeding the predetermined Torque and drops below the predetermined Torque.
Useful for Cap Opening Torque Tests.

**Refer to the [5.7.2. ONE WAY Mode] for the operation procedure.*

With the **Automatic Mode** to stop the motion at the specified Torque, the **Torque Stand** and the **Torque Tester** connected with communication active.

When communication inactive or disable, push  or  to Display the **error message**.

**Refer to [7. Error Messages]*

The **Torque Tester** recognizes the comparator signal and stops the rotation, the operation of the **Torque Tester** must start in **Real-Time Measurement Mode**.

In the **Peak Mode**, the **Comparator Signal** for the displayed Peak Value Output would not react adequately.

CAUTION

For the measurement with a stiff sample at high speed, the Torque value increases rapidly with a small amount of twisting; the Torque may stop well above the set Torque value.
In such cases, set a smaller Torque value than desired, check to stop the measurement, and gradually increase the Torque value to check the appropriate stop Torque value. Also, take countermeasures by slowing down the rotation speed, etc.

5.7.1. CONTINUOUS Mode

When the set specified Torque reaches or rotates to the set angle, the Main-Shaft reverses for reciprocating rotation.
Suitable for Endurance Tests.

≪**Rotating Motion**≫

The Shaft rotates at **FORWARD SPEED** and Pauses when the Torque reaches the set angle or when the Toque Tester Comparator Signal changes to **-NG** or **+NG.**

After the **FWD STAY TIME** elapses from the first Pause, the Shaft reverse rotates at the **BACKWARD SPEED**.

The rotation pauses again when it reaches the set angle from the reverse rotation or when the comparator signal of the Torque tester changes (change to +NG if the rotation pauses with -NG, or change to -NG if the rotation pauses with +NG).

The operation to this point is one cycle and repeated until the set number of repeats to complete.

If the set number of repetitions not reached, the cycle starts again after the pause following the **BWD STAY TIME** has elapsed.

Condition Settings

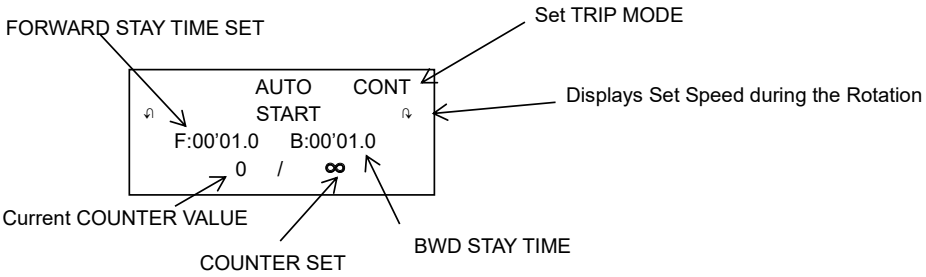
1. The **TRIP MODE** set at **[CONTINUOUS]**. **Refer to the [5.8. **Automatic Mode**].*
   Set the Rotation Speed, Angle and Pause Time, number of repetitions, as required.
2. Set the Toque Tester Comparator's Lower Limit (-NG) and Upper Limit (+NG).
3. Set the Toque Tester Comparator's Lower Limit (-NG) and Upper Limit (+NG).

   Refer to the **Torque Tester **Operating Manual** for the **Comparator setting** / switch to the **Real-Time Mode.***

Procedure

1. Press  in the **Manual Mode** and shift to **Automatic Mode**.
2. Press  or  when the START blinking on the second line. The Main-Shaft starts to rotate in the arrow pointing direction at FORWARD SPEED. and the measurement begins.

Display Layout



Measurement Example of Twisting Board Strength Test

In the Durability test, twisting a circuit board, set the Toque Tester to the Torque Stand as follows: -

Both twisting to a set Torque and angle measurements are possible. The example of each setting as follows: -

≪Operation Example≫

Start the right rotation at a speed of 10°/sec and stop when it exceeds 5Nm. 2 seconds later, start left rotation at a speed of 20°/sec and pause when it exceeds -3Nm. After 5 seconds elapsed, start the following cycle. The measurement ends after 1000 repetitions.

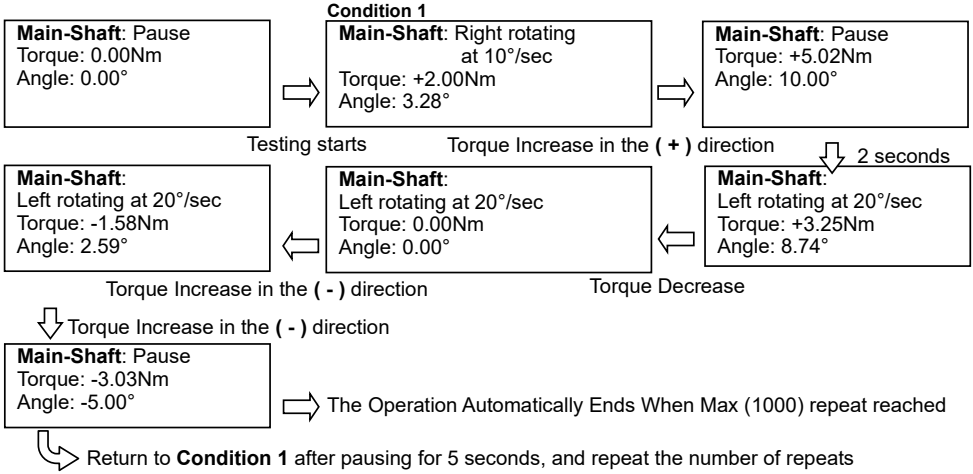
≪Toque Stand Setting Example≫

ANGLE CONTROL: OFF
COMPARATOR: ON
FORWARD SPEED: 10°/sec
BACKWARD SPEED: 20°/sec
FWD STAY TIME: 00”02.0
BWD STAY TIME: 00”05.0
COUNTER: 1000

≪Torque Tester Setting Example≫

Comparator High Value: +5.00Nm
Comparator Low Value: -3.00Nm

Press  at the setting, the measurement commences as follows: -



**The above describes the state during measurement, not what the LC-Display displays.*

Measurement Example of Twisting to a Set Angle

≪Operation Example≫

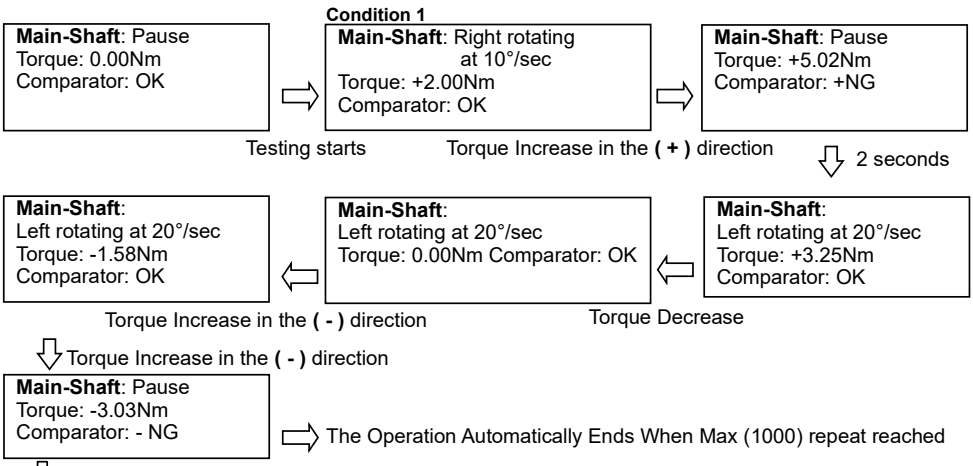
Set to start the **right** rotation at a speed of 10°/sec and pause after rotating to 10° from the position where the auto operation started (0°position).

When 2 seconds elapsed, start **left** rotation at a speed of 20°/sec and pause after twisting to 5° left beyond the starting position (0°position). When 5 seconds elapse, start the **following** cycle. The measurement ends at 1000 repetitions.

≪Toque Stand Setting Example≫

ANGLE CONTROL ：POSITION
COMPARATOR：OFF
FORWARD SPEED：10°/sec
BACKWARD SPEED：20°/sec
FWD STAY TIME：00”02.0
BWD STAY TIME：00”05.0
FORWARD ANGLE ：10°
BACKWARD ANGLE ：5°
COUNTER：1000

Press ⟲ at the setting, the measurement commences as follows: -



**The above describes the state during measurement, not what the LC-Display displays.*

Measurement Example of the Screw Cap Closure / Opening Repeat Test

In the case of durability tests, a PET bottle cap is repeatedly closed and opened.
Set the Toque Tester to the Torque Stand as follows.

≪Operation Example≫

Start the right rotation at a speed of 45°/sec and stop when it exceeds 2Nm. After 1 second, start the left rotation at a speed of 90°/sec and stop at turning to an angle of 120°. The **following** rotation begins immediately and ends after 500 repetitions.

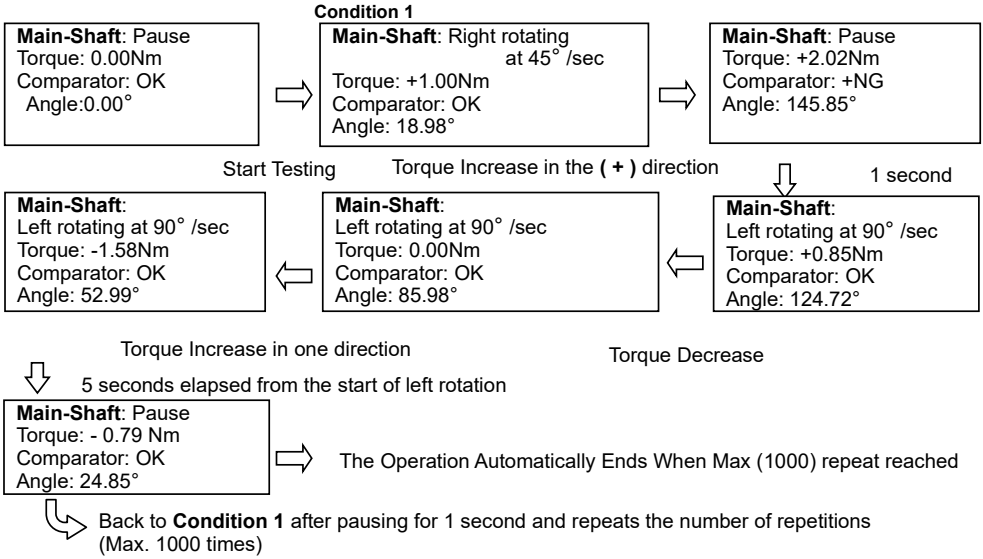
≪Setting example≫

ANGLE CONTROL ：FIXED ANGLE
COMPARATOR：OFF
FORWARD SPEED: 45°/sec
BACKWARD SPEED: 90°/sec
FWD STAY TIME: 00”01.0
BWD STAY TIME: 00”00.0
FORWARD ANGLE ：∞
BACKWARD ANGLE ：120°
COUNTER: 500

≪Torque Stand Setting Example≫

Comparator High value: +2.00Nm
Comparator Low value: -10.00Nm

Press  at the setting, the measurement carries out in following charts.

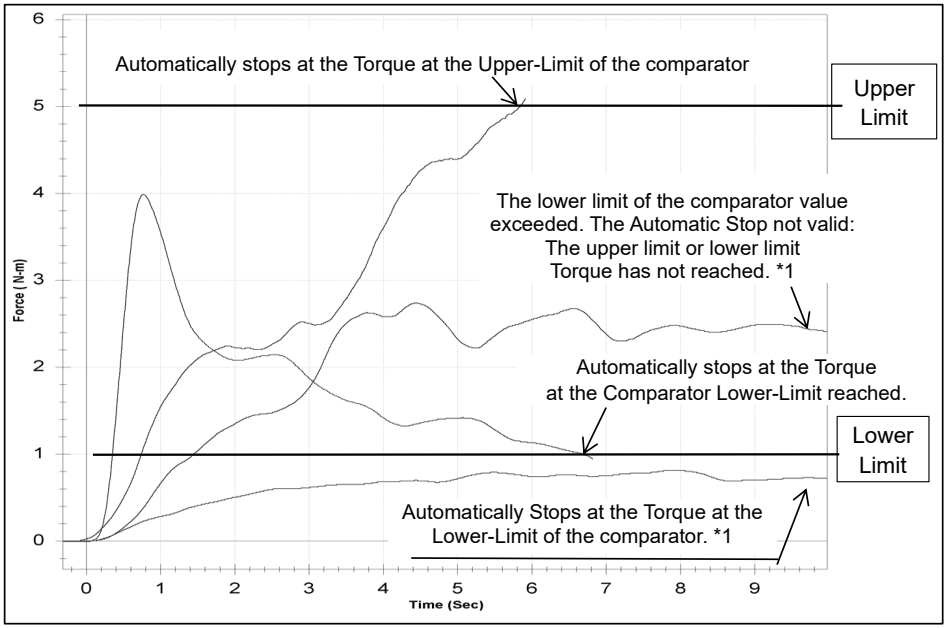


**The above describes the state during measurement, not what the LC-Display displays.*

5.7.2. ONE WAY Mode

The test ends when the **Main-Shaft** rotates in a single direction and the set Torque reached, or when rotates to the set angle.

The test ends when the Torque decreases after exceeding the set torque and then drops below. Useful for the Plug Opening Tests, etc.



1 In case the automatic stop not functioning due to the Torque change, by setting the **ANGLE CONTROL (set other than off), set the **FORWARD ANGLE** stops automatically after turning to the set ANGLE from the start of the rotation.*

≪Rotating Motion≫

The operation completed when the Shaft rotates at **FORWARD SPEED** and the set angle rotates at **FORWARD SPEED** and the set angle rotated or the comparator signal of the Torque Tester changes from OK to -NG or +NG.

Regardless of the **COUNTER** setting, the operation completes only once.

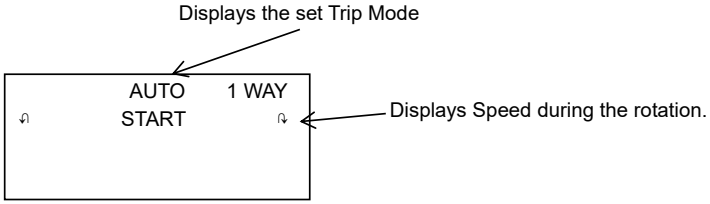
Condition setting

1. Refer to [5.8. **Automatic Mode** setting] and set **TRIP MODE** at [ONE WAY].
   Set the rotating speed if needed.
2. Set the **Torque Tester** Comparator to High value and Low value.
3. Switch the **Torque Tester** Measuring Mode to **Real-Time Mode**.
   Refer to the **Torque Tester Operating Manual** for the Comparator Setting and switching to **Real-Time Mode**.

Procedure

1. Press  and the Mode move from **Manual Mode** to **Automatic Mode**.
2. Press  or  when the START is blinking on the second line. The Main-shaft starts to rotate in *the arrow pointing direction on the button and the measurement begins.
   (**FOWARD direction*)

Display Layout



Measurement Example of Opening Peak Torque

Set this product and the **Torque Tester** as follows when the rotation finishes after measuring the peak Torque in opening PET bottles or others' cap tests.
Start the measurement at **ONE WAY Mode**, and the measurement automatically stops when the Torque reaches a low value after the peak captured.

≪Specific example of operation≫

Starts rotating left at a speed of 10 °/sec, exceeds 1 Nm, then drops below 1 Nm again (cap opened), then stops.

≪This product setting example≫

FORWARD SPEED:10°/sec

≪Torque Tester setting example≫

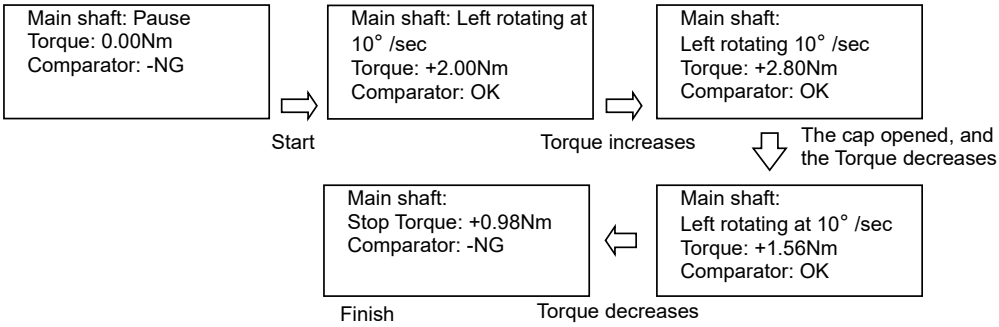
+/- Indicator: Reverse (The setting being positive when the Torque loaded for the opening direction)

Comparator High: 5.00Nm
(Greater than the expected maximum toque)

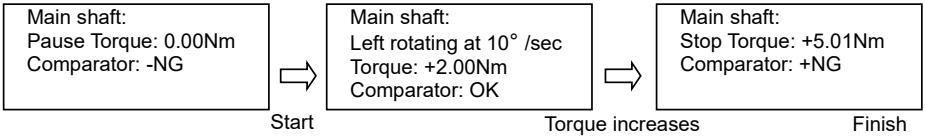
Comparator Low: +1.00Nm
(Stops after the cap opened and the measurement value decreases)

Pressing the  at this setting, Pressing the measurement at this setting proceeded as follows.

When the cap opened at a value less than the Comparator upper limit



When the cap not opened at Comparator High



**The above describes the state during measurement, not what the LC-Display displays.*

5.7.3. End the Automatic Mode

The display changes as below when the **Automatic Mode** ends

AUTO CONT
FINISHED
F:00'01.0 B:00'01.0
2 / 2

Press the **Push and Turn Dial** or 

and switch to **Manual Mode** under the same condition.

When 

pressed, proceed to the **Automatic Mode** at Standby.

5.7.4. The Automatic Mode Interruption

Press 

. Press X during the **Automatic Mode** to switch to the **Manual Mode**.

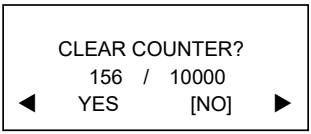
When interrupted, the counter remains and, with re-start, continues to count.

The **Power OFF** to Zero-set the counter.

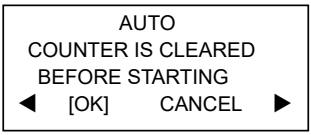
5.7.5. Counter Zero-Set

To **Zero-set** the counter, switch to the **Manual Mode** and press the **Push and Turn Dial**.

Turn the **Push and Turn Dial** to the left and select [Yes]. Push the dial to select.



To start with the **Automatic Mode**, when the current counter value equals or exceeds the set count value, the message is below.



To Zero-set the counter and start the operation again, press the **Push and Turn Dial** and select **[OK]**. To Cancel the operation, the **Push and Turn Dial** turned right (clockwise) and select **[CANCEL]**, then press the **Push and Turn Dial**.

Automatic Mode cancelled, to switch to the **Manual Mode**.

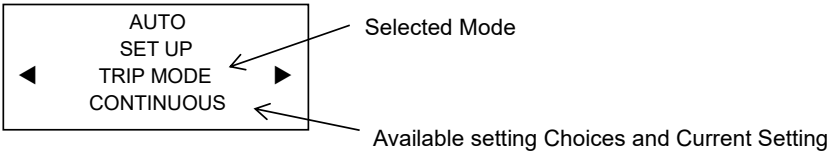
5.8. Auto Operation Mode Settings

The Repeat Operation conditions set, for the **Automatic Mode**.

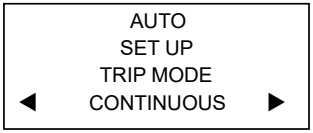
Setting Procedure

1. Change from the Manual to the **Automatic Mode** by pressing 

2. The **Push and Turn Dial** Long pressed while START blinking, to switch to the **Operation Setting Mode**



3. Select and adjust the Items by turning the **Push and Turn Dial**. Push to confirm select.



4. The **Push and Turn Dial** turned to adjust and select the values to set.
   The Values and Options selected varies. Refer to the **Setting Items** on the page 31.
   For Value adjusting, Turning the **Push and Turn Dial** fast for the quick number changes.

5. Selecting items for the setting, push the **Push and Turn Dial** first.
   Pressing 

before pushing the **Push and Turn Dial** cancels the settings.

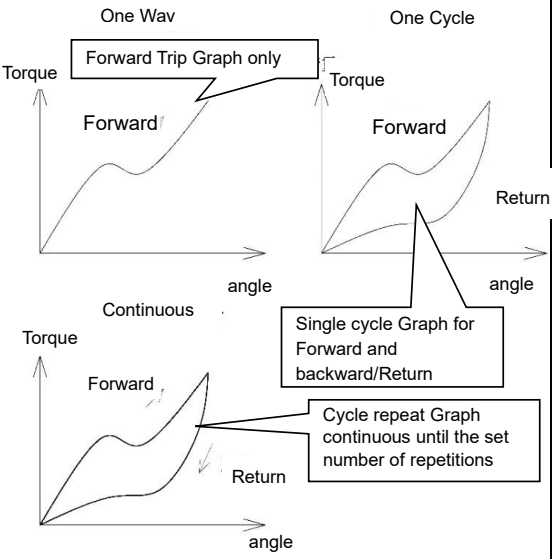
6. When 

pressed, during the Item selection in process,
   PRESS ENTER TO SAVE, and EXIT shown on the display to confirm the selected setting item.
   When the **Push and Turn Dial** pressed the display changes to **PRESS ENTER TO SAVE AND EXIT**, the Mode change applied to the **Automatic Mode** from the **Setting Mode**.
   The settings saved regardless of the **Power ON / OFF.**

Setting Items Descriptions

The Setting Items in the **Automatic Mode** details as follows: -

Setting Items	Selecting Items/ Adjusting Values	Descriptions
TRIP MODE	[CONTINUOUS] / [ONE WAY]	**[CONTINUOUS]** Reciprocating rotation. The **Main-Shaft** reverse rotation starts when the Torque reaches the set Torque. **[ONE WAY]** One-way rotation. The **Main-Shaft** rotates in **One direction**, and the measurement finishes when the Torque Load reaches the set Torque.
FORWARD SPEED	3.0°/SEC~90.0°/SEC	Set the forward rotating speed. The setting steps and the ranges, same as the **Manual Mode** settings.
BACKWARD SPEED *	3.0°/SEC~90.0°/SEC	Set the backward rotating speed. The setting steps and the ranges, same as the **Manual Mode** settings.
FWD ROTATE ANGLE*	[∞] / 0.1 - 3600.0	Set the forward rotating angle. When ANGLE CONTROL set to FIXED ANGLE, If [∞] selected, stop by angle **disable** **Stop by Torque value enable**
BWD ROTATE ANGLE*	[∞] / 0.1 - 3600.0	Set the backward rotating angle. When ANGLE CONTROL set to FIXED ANGLE, If [∞] selected, stop by angle **disable** **Stop by Torque value enable**
FWD STAY TIME*	00”00.0 - 99”59.9	The Pause (Stay) Time set after the forward trip.
BWD STAY TIME*	00”00.0 - 99”59.9	The Pause (Stay) Time set after the return trip.
COUNTER *	[∞] / 1 - 999999	The number of repetitions set. If [∞] selected, the operation continues until interrupted with 

<table>
<tr><td>ZERO ON START</td><td>[OFF] / [ON]</td><td>Select whether to output the ZERO signal from the IO Connector
When ON selected, the ZERO signal output before the start of the forward rotation, and the Torque meter reset to Zero</td></tr>
<tr><td>SEND SIGNAL</td><td>[OFF] / [ON]</td><td>Select whether to output the SEND signal from the IO Connector
When ON selected, the SEND signal output after the return trip stopped, and the measured value stored in the Torque Tester</td></tr>
<tr><td>RECORD TRIGGER</td><td>[OFF]
[ONE WAY]
[ONE CYCLE]
[CONTINUOUS]</td><td>Select if to output the REC signal from the IO connector
<table>
<tr><td>OFF</td><td>No trigger signal output</td></tr>
<tr><td>ONEWAY</td><td>Outputs trigger signal for forward trip only</td></tr>
<tr><td>ONE CYCLE</td><td>Outputs a trigger signal during single cycle operation.</td></tr>
<tr><td>CONTINUOUS</td><td>Trigger Signal output during cycle repeats</td></tr>
</table>
If trigger function of the Graphing Software (sold separately) used, the results as follows: -

</td></tr>
<tr><td>PRESS ENTER TO SAVE AND EXIT</td><td>–</td><td>Push the Push and Turn Dial to Save the setting and Exit from the Setting Mode.</td></tr>
</table>

** The **BACKWARD SPEED** / **FWD STAY TIME** / **BWD STAY TIME** / **COUNTER**: valid only at the **CONTINUOUS MODE**.*

***Forward** = direction of the arrow on the Button.*

***Backward** and **Return** = direction opposite to the previous Forward direction.*

5.9. Using Auto Operation Modes

Automatic Peak Value Reset

If ZERO ON START in the auto operation setting mode set to ON, the ZERO signal output before the onward rotation starts, and the Torque meter is automatically reset to zero, eliminating the need to press the ZERO button on the Torque meter.

In many cases, the real-time value not 0 Newton because the sample already gripped at the start of the operation. If [Individual] is selected in the ZERO setting within the initial settings of the Torque meter, only the peak value reset without tare.

Please refer to the Torque Tester Operating Manual for the setting details.

Automatic transmission of measured values

If the SEND SIGNAL in the **Auto Operation Setting Mode** set to **ON**, a SEND signal output after the return trip stops, and the measured value data stored in the Torque Tester, pressing the SEND button on the Torque Tester not required.

The SEND setting should select the measured value saved by the SEND signal in the initial settings of the Torque Tester.

If [+/-Peak] is selected, both the +peak and -peak values stored.

If the RS-232C printer connected, the data printed from the printer and stored in the main unit.

Depending on the firmware version of the Torque Tester, the RS-232C printer may not be supported.

The included connection cable (C2C) available for use with the printer.

(The included connection cable (CB-528 or CB-728) not for the RS-232C use).

Please contact the local authorized distributor or us if any problems or concerns.

Please refer to the Torque Tester Operating Manual for the setting details.

Interlocking with the Force Recorder series

When RECORD TRIGGER in the auto operation setting mode set to ON, a trigger signal output at a predetermined timing.

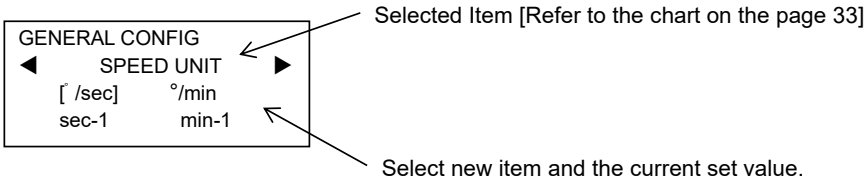
By setting the Force Recorder series (graphing software, separately sold) setting the automatic recording by the trigger, a graph automatically drawn following the operation of the Test-stand.

Please refer to the HELP details in the Force Recorder series for the setting method.

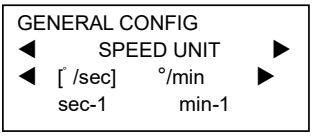
5.10. User Setting Mode

Procedures

1. Turn the **Power ON**, while pressing the **Push and Turn Dial** and Move to the **User Setting** display.



2. Turn the **Push and Turn Dial** to the left or the right and select the items to change.
   Push the Dial to confirm the selection.



3. Select and adjust the setting value by turning the **Push and Turn Dial**. The values and items differ based on the select items. Refer to the **Item Settings** for details.
4. After adjusting or selecting, set the items by pressing the **Push and Turn Dial**.

   Pressing 

   before pressing the **Push and Turn Dial**; cancels the changes and returns to the **Item selection.**

5. When 

   pressed, during the Item selection process.

   PRESS ENTER TO SAVE, and EXIT shown on the display to confirm the select setting items
   When the **Push and Turn Dial** pressed the display changes to **PRESS ENTER TO SAVE AND EXIT**, the Mode change applied to the **Automatic Mode** from the Setting Mode.
   The settings saved regardless of the **Power ON / OFF.**

Details of setting items

Below setting items in User setting Mode.

Items	Selecting item/ Adjusting value	Description
SPEED UNIT	[°/sec] / [°/min] / [sec-1] / [min-1]	Select the **Main-Shaft** rotating speed in the Manual and the **Automatic Mode**s.
DIRECTION	[NORMAL] / [REVERSE]	**[NORMAL]** When  pressed, turns Clockwise (CW). When  pressed, turns Counterclockwise (CCW) **[REVERSE]** When  pressed, turns Counterclockwise (CCW) When  pressed, turns Clockwise.
SOUND	[ON] / [OFF]	[ON] Sounds the **Operation alarm** and Ending buzzer. [OFF] No sound.
MENU LOCK	[UNLOCKED] / [LOCKED]	Locks the AUTO and User setting Modes. (The settings can be displayed even locked) [UNLOCKED] displayed at the initial factory default settings [LOCKED] displayed when settings changed. Press the push dial to show the lock number entry display. ◀ 0 ▶ 0 0 0 Turn the dial to select from the numbers 0-9 and press the push dial to move to the next digit (use ◀ ▶) 0 0 0 0 ◀ 0 ▶ Repeat to enter the 4-digit lock number. Press the push dial to finalize the setting. (keep the set number safe). To change the lock numbers, unlock first and then repeat above settings.
PRESS ENTER TO SAVE AND EXIT	–	Press the **Push and Turn Dial** to Save settings and Exit from the User Setting.

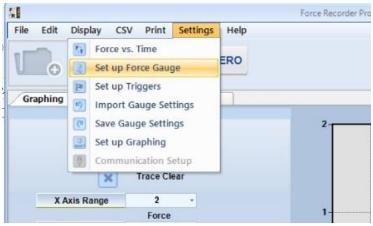
5.11. Angle Measurements

Combining the **ACMTS Series** and the **Torque Tester DTXA series**, the rotating angle acquired, and the angle data recorded in the Real-Time **Measurement Mode** together with the Torque Value.

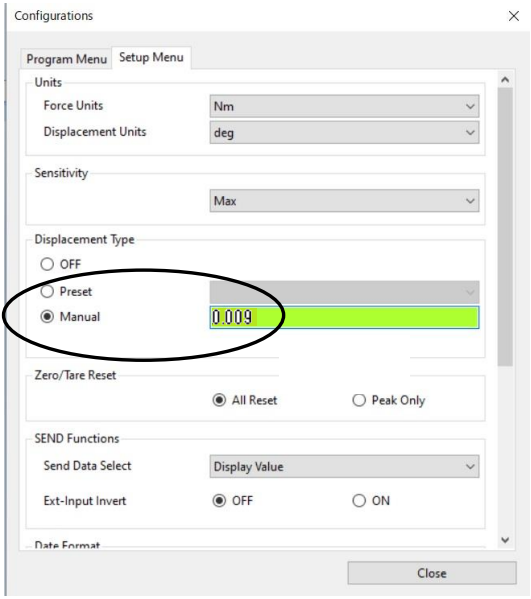
The **Torque Tester** DTXA Series, Scale Settings required to acquire the Rotation Angle.

Settings: **Torque Tester**: DTXA Series

Set up the data acquisition software “Force Logger” included in the DTXA Package or “Force Recorder Professional” (sold separately). Select Settings→Force Gauge Settings.



Select Manual for the scale setting in the initial settings menu, enter 0.009, and press the Enter.



CAUTION

- When the **Torque Tester** overloaded during the operation, a warning alarm sounds, and the Toque-Gauge automatically stops. If the sound does not stop, loosen the handles of the chuck jig or the table clamp to loosen the grip holding sample and reduce the Load applied to the **Torque Tester**.
- If the alarm does not stop, the **Torque Tester** may have received the damage. Stop the Operation and contact the local authorized distributor or us immediately.
- During the Operation, regardless of the Mode or the Display data, the Torque values checked to prevent overload.
- The **Automatic Operation Mode** does not work when the **Torque Tester** display is in the Peak Measurement Mode. To protect the Sample measurement environment and the Devices, always use it in the real-time measurement Mode.
- The damage also occurs when the Load applied other than the rotating measuring direction, even within the capacity.
- Do not use the Devices for purposes other than the **Torque Measurements**, specified in the **Operating Manual.** Any damage caused otherwise not covered under our **Warranty.**
- The operation proceeded indoors in a clean, dry environment, away from any liquids, dust, or the risks, or getting wet, at all times.

6. I/O connector

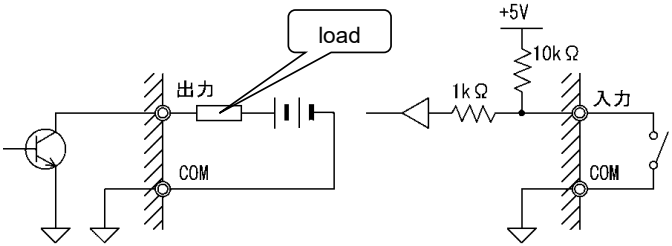
Cables specifications for the use of the connections with The **Torque Tester**.

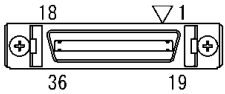
	Pin No.	Signals	Descriptions
Input	1~4	N/C	Not used
	5	-NG	Comparator Input Signal
	6	OK	
	7	+NG	
	8	OVL	Overload Input Signal
	9~10	COM	COM for Input Signal
Output	11	RESERVE	Not used
	12	ZERO	Zero Signal for Torque Tester
	13	RESERVE	Not used
	14	SEND	Send Signal for Torque Tester
	15	Rec	Record Trigger Signal for the Torque Tester.
	16~18	RESERVE	Not used
	19~20	COM	COM for Output Signal
	21~22	+5V	Output Signal for the Rotary Encoder
	23	N/C	
	24	A-	
	25	N/C	
	26	B-	
	27~28	N/C	
	29~30	GND	

Input pin specifications: Turn ON with short-circuiting with Com.

Output pin specifications: Transistor collector output. MAX30mA / DC30V per pin

Internal Schematic and Connection Example: -





Connector: Half pitch 36P female

7. Error

The Error notifications in the following status: -

Display	Error conditions
EMERGENCY STOP BUTTON PRESSED	Emergency Button pressed, **Stops** Compulsorily with the Overload detected function active and Alarm notification Sound.
PLEASE CONNECT GAUGE TURN **POWER ON**	 or  was pressed in the Auto operation Mode, to Stop the Tester when the set torque reached or the communication with the Torque Tester was disconnected during Auto Operation Mode.
MENU LOCKED	The **MENU LOCK** (Items Locked) tried to change various settings in the User Setting Mode. To change the settings, enter the Lock Number in the **MENU LOCK** screen in the User Setting Mode and unlock the item.

Display: When Malfunctioning Identified

During the Cycle Operation, when the Operator touches the Torque Stand, the discharge of static electricity accumulated in the human body may be released, and the Display malfunctions and fails to display correctly.

By pushing the 

Button, the issue solved to **recover** for the correct Display.
With the Auto-Operation Mode and Display malfunctioning found, the operation can continue even with the Display incorrect, and the Measurement Data required obtained.
The **Button pressed to recover the Display** with the **Cycle Count** and other **information maintained and restored** correctly.

If the Display does not recover, please contact the **Local Authorized Distributor or us,** to investigate the problems further.

CAUTION

- Do not apply external voltage to the **Input Pins** of the **IO Connector**.
- Do not reverse voltage to the I/O connector's Output Pins or apply more than the specified voltage or wire to more than the specified current flows.

8. Emergency Stop Function with Overloading

Emergency Stop Function valid only when the **dedicated Cable** used for the **Measuring-Instrument** and the **Torque Stand** connections.

- Emergency Stop operates with the **Overload signals detected** with the **Torque Tester**, with a Load exceeding the Device's Maximum capacity by a few percent.
- Regardless of the set Mode, the Function active with the **Torque Testers power ON** and correctly connected.

CAUTION

- This Function **supports minimizing damages** to the **Torque Tester** from **Overloading** and **no complete protection guaranteed** from any damage.
- When stopped, the operation unable to **restart** unless the cause detected removed.
- When rotation stopped during the operation with the sample caught / Shaft stuck, loosen the chuck, and remove the sample first, then release the **Emergency Stop Button** by turning right.
- The **Torque-Sensor** could have generated the **Overload signal at fault**. What seems no damage could have issues of the malfunctioning or luck inaccuracy. Contacting the local authorized distributor or us immediately for the safety and accuracy confirmations strongly recommended.

9. Calibration

We offer calibration services** for the **IMADA Gauges**: (Force-Gauges / Toque-Gauges) at cost.
Regular Calibrations recommended for maintenance, measurement accuracy, reliability, and safety. (For optimal safe performance, yearly Calibration suggested.)
Please inquire to the local authorized distributor or us for details.
*All installed memory data erased with the calibration processes.
Ensure that the settings and the memory data installed in the Devices recorded before the Calibration, as required.

****IMADA In-house Calibration facilities** available: ISO/IEC 17025:2005 Accredited

10. Warranty

Under regular use and proper maintenance, this **Torque Stand** covered with a **one-year limited Standard Warranty**, as stated in the **Warranty Certificate** included in this Package.
Any problems or faults within this one year from the Date Purchased. Please contact the local authorized distributor or us immediately for confirmation.

The **Torque Tester (Screw Cap Torque Tester DTXS / DTXA Series)** mentioned in this **Operating Manual**, used together with the **Motorized Torque Stand (MTS Series)** under the separate **Warranty**.
Please refer to the **Torque Tester Warranty Certificate** for separate details.
Please also refer to the **Torque Tester Operating Manual** for individual details as required.

Service address:

HANS SCHMIDT & Co GmbH
Schichtstr. 16
D-84478 Waldkraiburg
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Notes:

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