



# HIOS HM-100 Torque Value Checking Meters for Automatic Controlled System User Manual

[Home](#) » [HIOS](#) » HIOS HM-100 Torque Value Checking Meters for Automatic Controlled System User Manual 

## HIOS HM-100 Torque Value Checking Meters for Automatic Controlled System



## Contents

- 1 Thank you!
- 2 Features
  - 2.1 Before using this instrument
  - 2.2 Cautions at work
  - 2.3 Notes for use
- 3 Parts Name
  - 3.1 Display unit
- 4 Items included with the torque meter
- 5 About Fidaptor (accessories)
- 6 Operation procedure
- 7 How to set the buzzer
- 8 How to replace the spring (attached to HM-100)
- 9 Inspection of Fidaptor
  - 9.1 Handling of Fidaptor
  - 9.2 Maintenance and inspection of Fidaptor
- 10 How to use the socket
- 11 Battery charge
- 12 How to charge the battery
- 13 Customer service
- 14 Attention
- 15 Specifications
- 16 Outline dimensional drawing (and detailed socket dimensions)
- 17 Specifications for analog output
- 18 Data output
- 19 Specifications for serial output
- 20 The following table is for CHINA RoHS2
- 21 Customer Support
- 22 Documents / Resources
  - 22.1 References

## Thank you!

Thank you for purchasing the HIOS torque meter.

The HM series torque meters are carefully designed to be exclusively used for automatic controlled systems. This series of torque meters can measure torque without removing the screwdriver mounted on the system. Please read the following notes carefully before use. We hope you will use our product for a long time.

## Features

1. You can measure the screwdriver torque as it is mounted on the automatic controlled system, and without removing the bit.
2. The detector is compact and you can easily measure the torque even in a small space.
3. The digital display helps easy and precise reading.
4. This instrument can save and indicate peak values for precise measurement.
5. You can carry around this instrument because it is rechargeable and portable.
6. You can use commercially available tools for collection as well as analysis of measurement data.
7. You can also measure the torque of a motor screwdriver for manual use.
  - You need to use HIOS's Fidaptor and a commercially available conversion plug for measurement of the torque of a motor screwdriver for manual use.

A conversion plug allows static (real-time) measurement. For details, please contact us.

8. Analog outputs can be used for multiple purposes including waveform observation, recording or judgment of measurement results (an analog cord is optional)



### **Caution**

Read the notes below carefully for safe and proper use.

#### **Before using this instrument**

- Make sure to carefully read this operation manual and the notes attached to the instrument before use for safe and proper use.
- The torque meter (display unit) and the detector are calibrated and controlled with the same serial number. Always use the proper combination referring to the serial number.
- Please note that HIOS is not responsible for malfunctions caused by unauthorized modification, disassembling and handling of the instrument other than those specified in the operation manual.

#### **Cautions at work**

- When you measure a rotational device including a screwdriver, pay attention to the surroundings (e.g., working table) so that nothing will be involved in the rotation.
- When you detect anything abnormal, stop operation immediately. Wear working clothes properly before starting operation, and fully close the cuffs, buttons and zippers.
- Do not wear gloves during operation because they may be slippery.
- Since the detector is small, fix it firmly for measurement to avoid it being swung around.
- Do not throw around the detector; do not hit it, as such handling may cause the instrument to malfunction.
- Since the strain gauge of the detector is sensitive to the surrounding environment, be sure to set it to [TRACK] mode at power-on and confirm zero is displayed. Please adjust it to zero occasionally while in use. (\*1)

#### **Notes for use**

- Never apply the torque exceeding the maximum value displayed on the instrument. If you do so, the instrument will break inside.
- For correct handling of Fidaptor, refer to page 5.
- Do not use attachments except Fidaptor and other specified attachments.
- Do not use the instrument with a device that gives repeated shocks such as an air screwdriver or an impact wrench. (\*2)
- **When you attach Fidaptor to the socket, always fix it with screws in four directions. (\*3)**
- Do not loosen the screws fixing the socket. (It may cause a precision error.)
- For correct handling of the charger, refer to page 12.
- Do not connect to the data output connector anything but the devices specified in the operation manual.
- When you insert or remove a connector to/from a cord, hold the connector head and check the pin arrangement.
- Always turn off the power after finish using the instrument.
- Do not hit or apply a load to the display plate (acrylic plate).

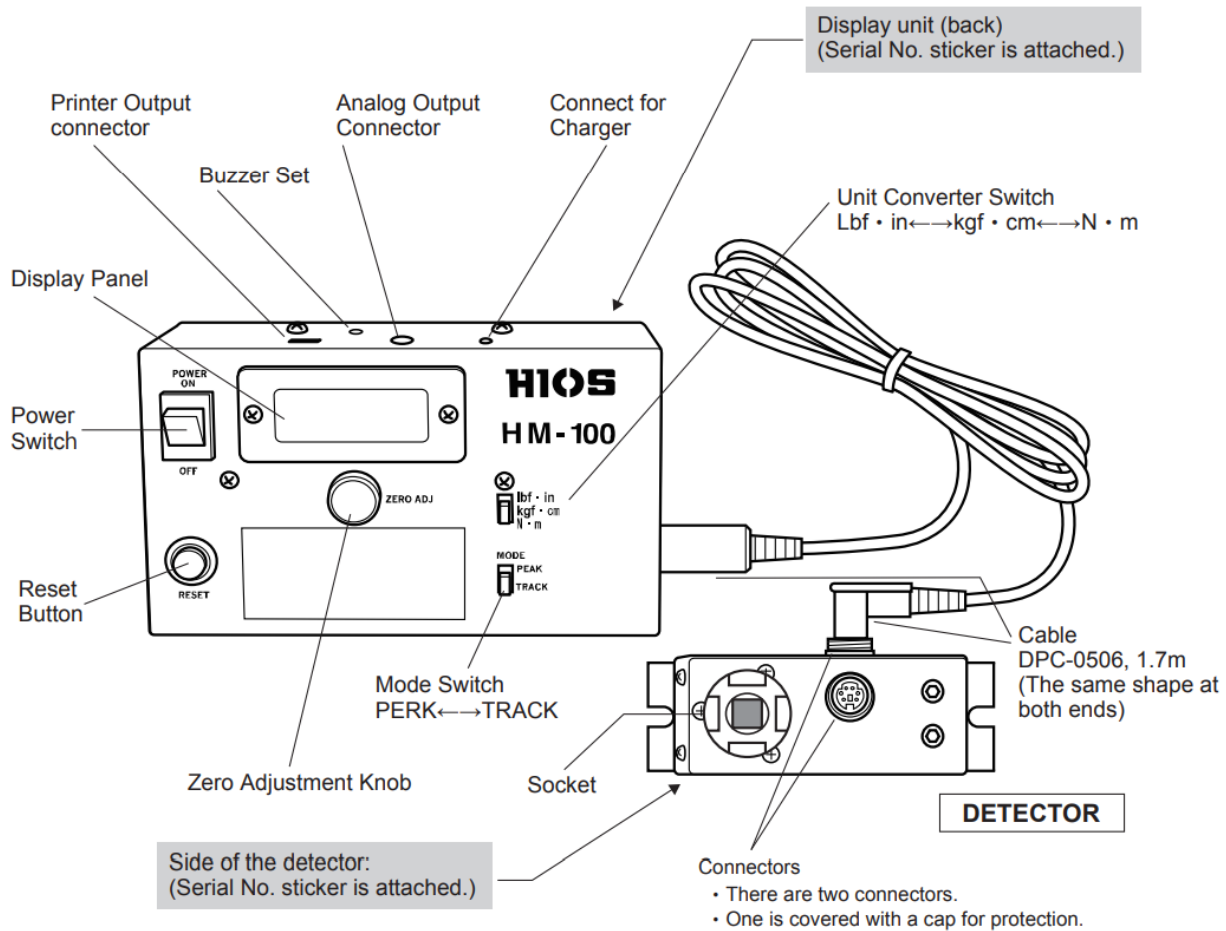
- Do not change the internal volume for calibration, etc.
- Do not handle the detector roughly or drop it.
- Do not use the detector in inappropriate places described below:
  - A place where water, oil and other fluids may be scattered
  - A place where vibrations, dust or heat may exist
  - Outdoors and a place where electric noises may exist
  - A place with high temperatures and high humidity (preferable temperature: 15°C-35°C, preferable **humidity**: 25%-65%)
  - Other places where malfunctions and functional damages may be caused
- Do not store the instrument where the temperatures or humidity may change significantly. If you do so, condensation may occur inside the detector resulting in functional damage.

### Ⓢ Important

1. Before performing zero adjustment, set the unit to the TRACK mode and check if “zero” is displayed.
2. If you want to measure the torque of an air screwdriver or an impact wrench, we have the HIT series for that purpose. Please consult with us.
3. When you attach Fidaptor to the socket, fix it firmly at four points. (Refer to the external views of the detector on pages 6 and 16.)
4. If you turn the zero adjustment knob in the PEAK mode, the reset function will be disabled.  
In that case, turn the measurement mode switch to TRACK and perform “Peak” measurement after confirming zero is displayed. (Refer to Section 7.8 on page 7.)

## Parts Name

### Display unit



- **Mode Switch**

TRACK: The value on the display changes as the load to the detector changes.

(The value will disappear when no load is applied.)

PEAK: The maximum value of load is captured. (The value will disappear when you press the reset button.)

- **Buzzer Set**

The buzzer will start sounding when the torque reaches the specified torque.

- **Display panel (unit):**

Model	N m	N cm
HM-100	0.00	0
HM-10	.000	0.0

- **Conversion of N m: 1 N m ≒ 10.2 kgf cm**




N m	N cm	kgf cm
10	1000	102
1	100	10.2
9.81	981	100
0.981	98.1	10

## Items included with the torque meter

Both the main unit and accessories are packed in a dedicated aluminum attaché case

Model	Fidaptor	Fidaptor Screw for head replacement	Fidaptor spring	Charger	L-shaped wrench	Others
HM-10	P/N: TEM 26-Z Yellow spring 1 piece	5 pieces of Phillips head pan screws, M2.6 x 6 mm 2 pieces of hollow set screws, M3 x 6mm	—	AC100V P/N	Opposite side dis.: 1.5mm 1 piece	<ul style="list-style-type: none"> <li>Cord for detector</li> </ul>
HM-100	P/N: TEM40-Z Black spring 1 piece	5 pieces of Phillips head pan screws, M4.0 x 8 mm 2 pieces of hollow set screws, M4.0 x 6mm	Measurement range: 0.15-0.6 N m Yellow spring 1 piece	TCH-100 N 1 piece	Opposite side dis.: 1.5mm, 2.0mm 1 piece each	P/N: DPC- 0506 <ul style="list-style-type: none"> <li>Inspection report</li> </ul>

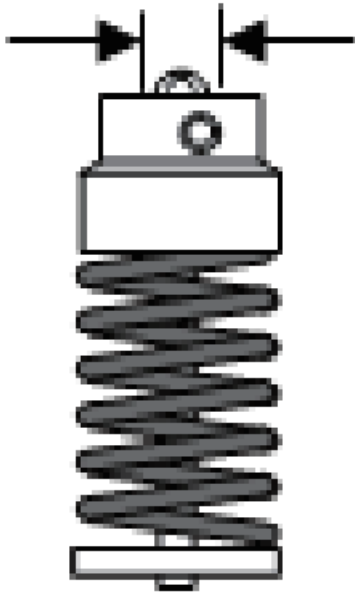
## Fidaptor list

Model	HM-10		HM-100 Standard accessory
	Standard accessory	Optional accessory (separately sold)	
P/N	TFM 26-Z	TFM 20-Z	TFM 40-Z
Measurement range (N m)	0.15-0.6	0.25 or smaller	0.5-3
	 (Yellow spring)	 (Red spring)	 (Black spring)
Supporting bit No.	+#1	+#0	+#2
Head screw diameter	M2.6 (P/N: SPP26×060SUS)	M2.6 (P/N: SPC26×060)	M4.0 (P/N: SPP40×080SUS)

## About Fidaptor (accessories)

Use Fidaptor for torque measurement of the screwdriver for an automatically controlled system.

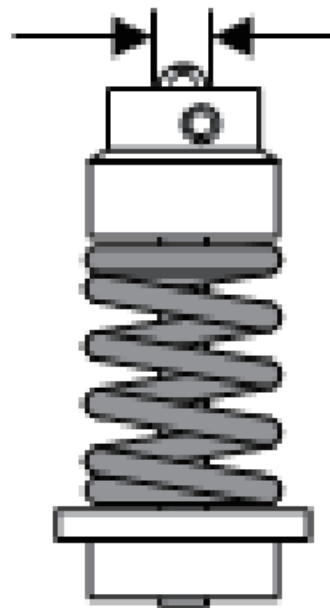
For ⊕ #1 bit



HM-10

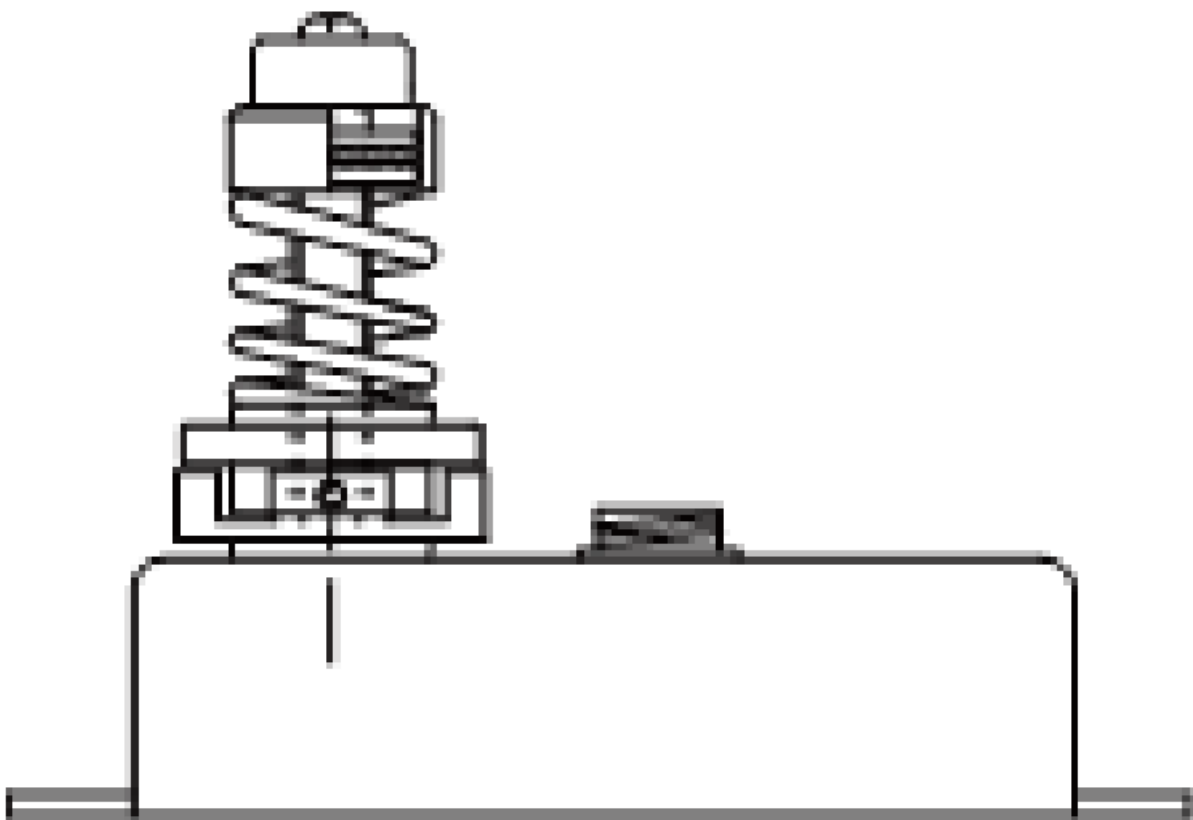
P/N TFM 26-Z

For ⊕ #2 bit



HM-100

P/N TMF 40-Z



**(Note)**

When the screw head on the threaded shaft wears, measurement results vary. Please replace it as soon as

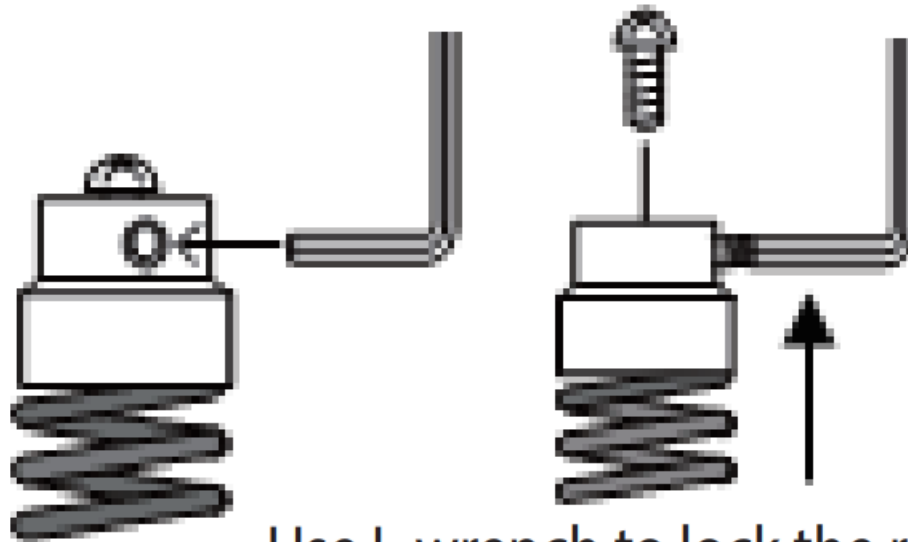
possible.

- Replacement of the head screw (preferably replace it within 10 operation cycles.)

Use the attached L-wrench to loosen the hollow set screws (M3) before the head shape collapses.

Use the L-wrench to lock the rotation of the hollow set screw and unfasten the head screw.

Suitable wrench size: 1.5mm for HM-10, 2.0mm for HM-100. Spare screws are included.



Use L-wrench to lock the rotation  
and unfasten the screw.

## Operation procedure

### How to check torque using Fidaptor





When “LOBAT” is displayed, start charging the battery.

First, connect the torque meter (HM) to the detector.

1. Then turn on the power and confirm if the battery has been charged.

How to check the battery

- ① Turn on the power.
- ② Set the measurement mode to TRACK.
- ③ If the battery is low, “LOBAT” is displayed in the upper left corner of the display.

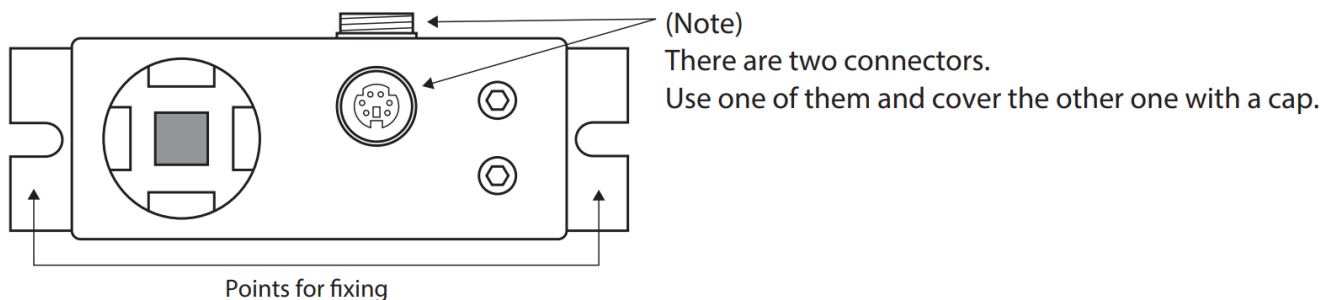
Then, charge the battery (do not charge longer than eight hours). Use the chargers for this battery.

**(Note)** Do not take measurements while charging the battery.

2. Fix the detector. There are two points for fixing. (See the dimensional drawing of the detector on page 16.)
3. Connect the cord to the detector.

Connect the cord to the detector. There are two connectors. Use one of them considering the workability.

\*Make sure the connector has the correct shape. If you ignore this, it may cause pin bending.



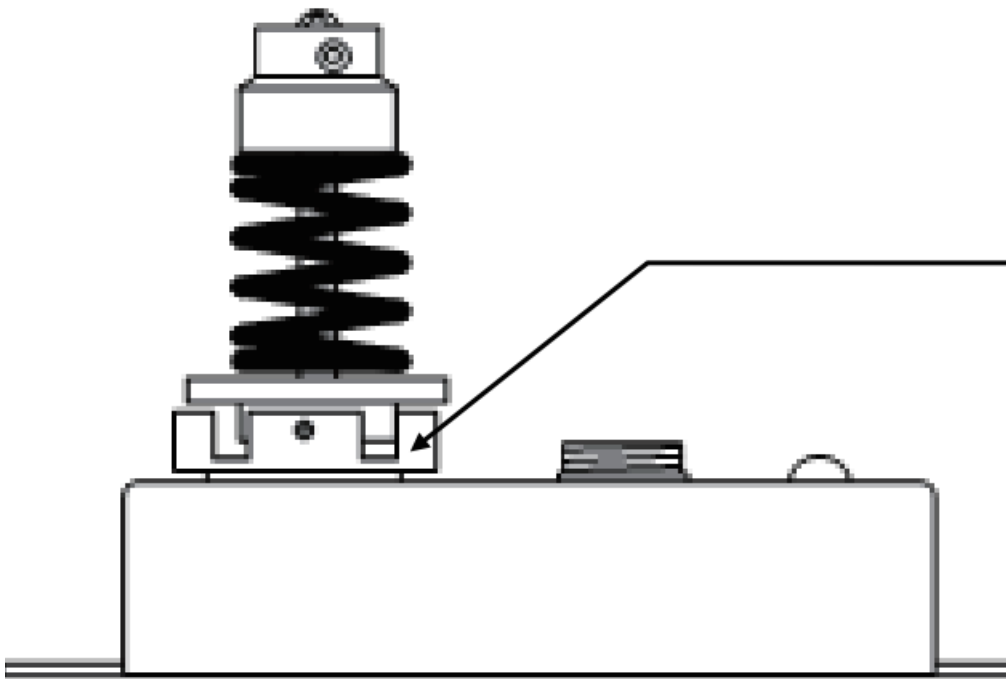
4. Use the handy screwdriver to loosen the threaded shaft ring of Fidaptor a little.



Loosen the shaft so that you can turn the spring with your fingers.  
The shaft should always go back to the same position.

5. Set Fidaptor to the socket.

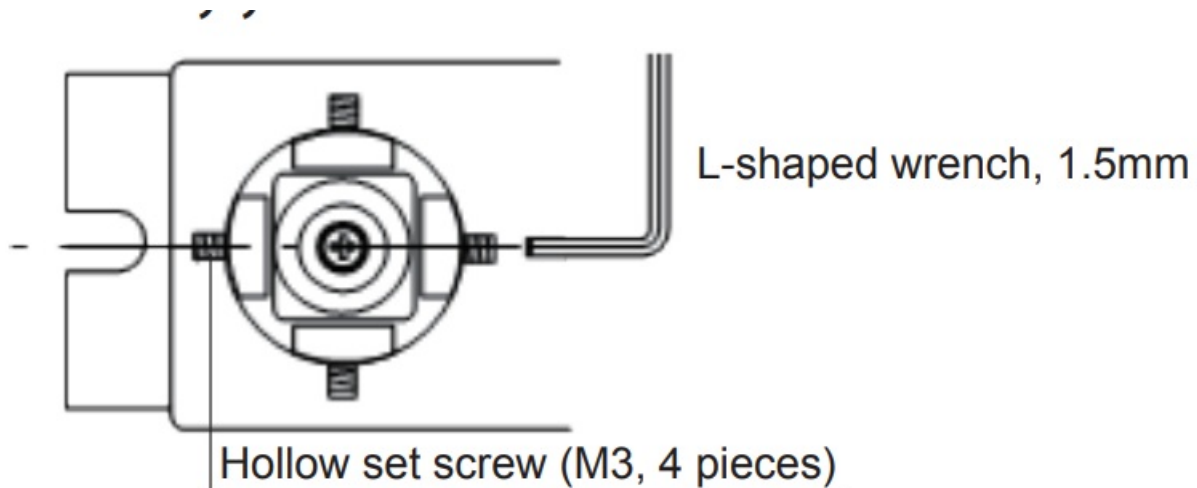
5-1 Fix Fidaptor to the socket



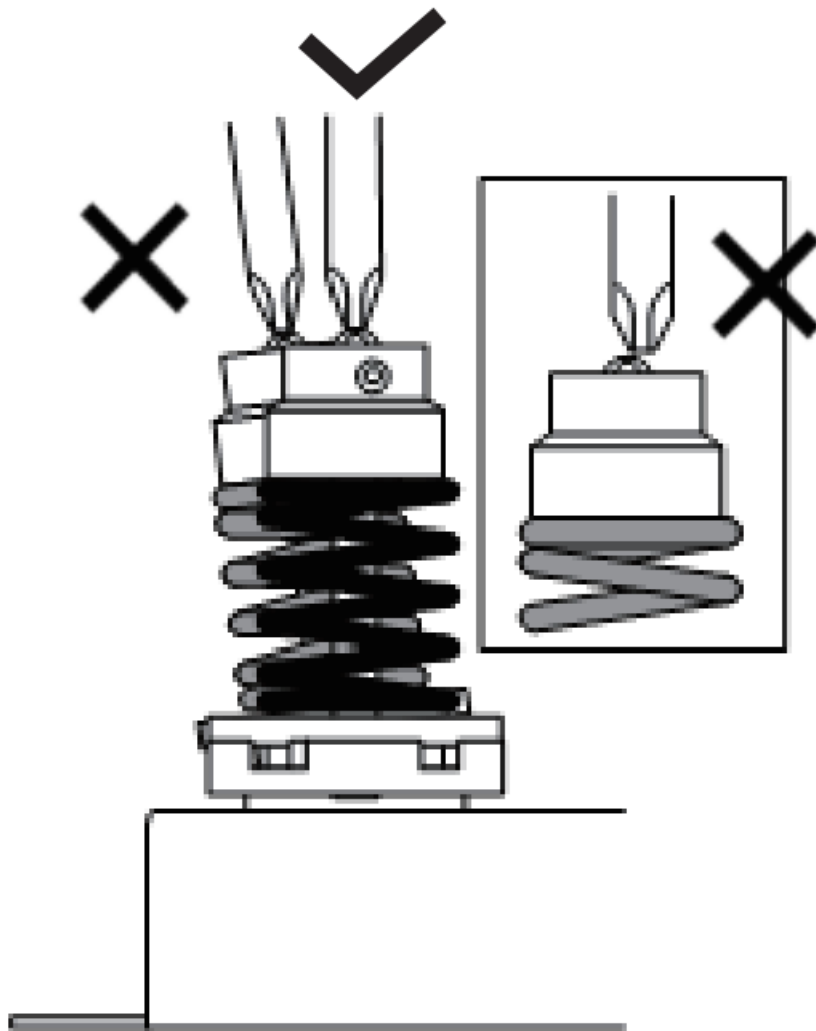
### Important

In order to fix Fidaptor, use the L-shaped wrench (1.5mm) to fasten four hollow set screws (M3.0) on the side of the socket with even torque.

This way you can measure in a stable manner.



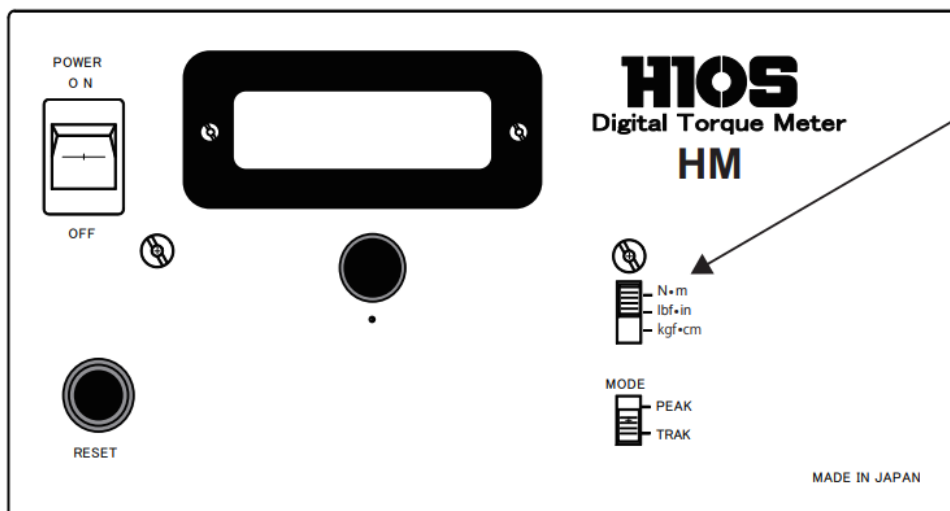
**5-2. Set the bit end of the target screwdriver to the center of the head screw of Fidaptor.**



### Ⓢ Important

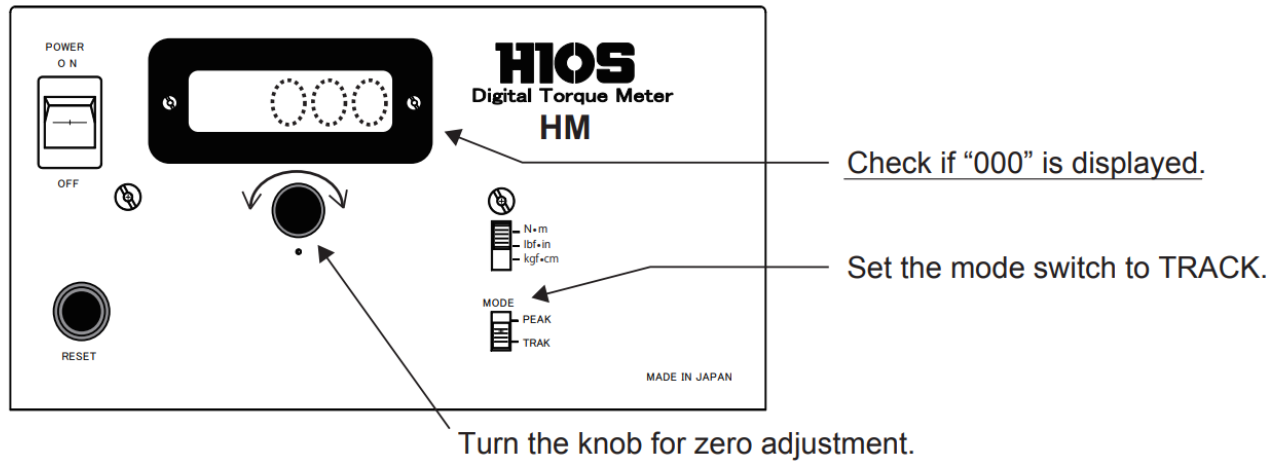
Notes when fixing Fidaptor:

- (1) In order to have the bit set right in the center of the head screw of Fidaptor, you need to fix Fidaptor by fastening the four screws on the side evenly.
  - (2) The bit tip should be engaged precisely in the head screw of Fidaptor for measurement (it should be correctly aligned with the thrust direction and the center of the screw.)
  - (3) Especially, when you use it in the automatically controlled system, it should be aligned with the center of the Z-axis.
6. Set the switch for measurement unit change to your desired unit.



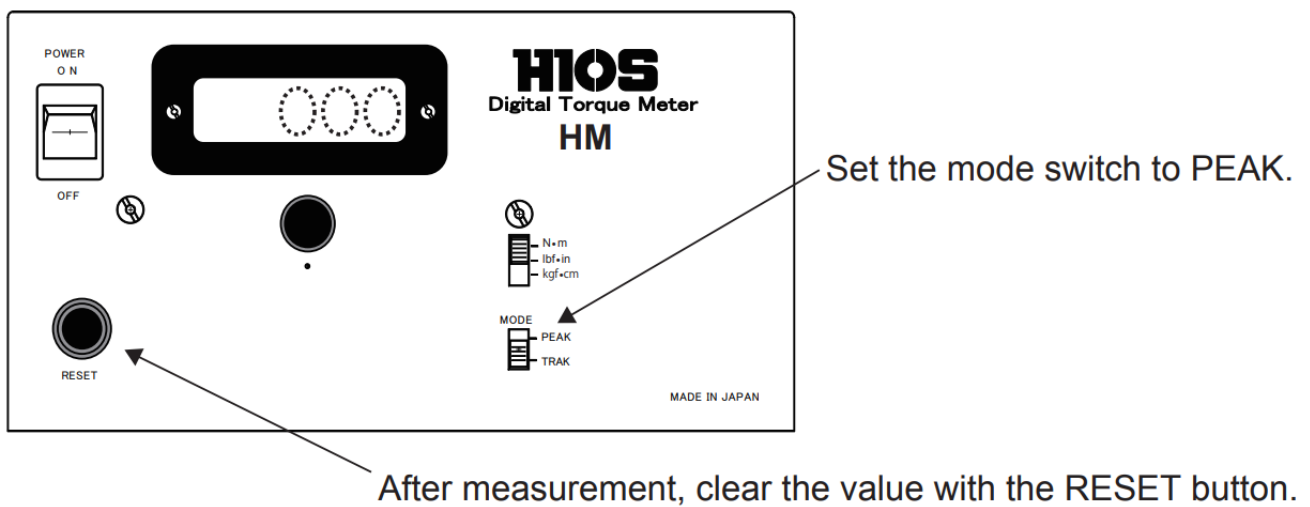
Unit converter  
Switch

7. Set the mode switch to TRACK and turn the zero adjustment knob for zero adjustment.



(Note) Zero adjustment is not available with the PEAK position.

8. Set the mode switch to PEAK.

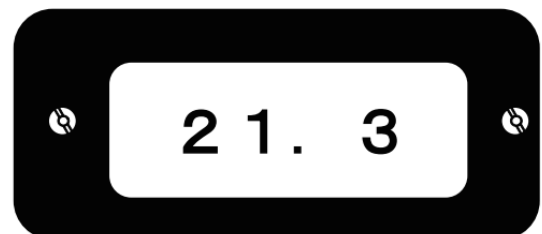
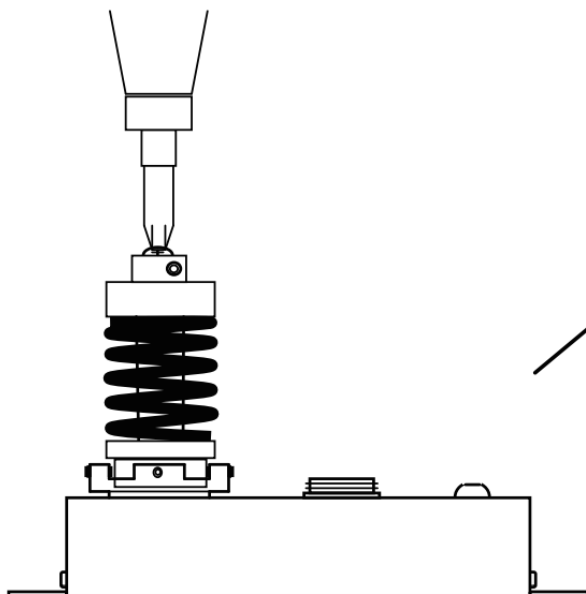


9. Turn the screwdriver for measurement.

When the clutch is disconnected, the spring is compressed.

The measurement is displayed in the window and saved.

This is the output torque of the screwdriver.

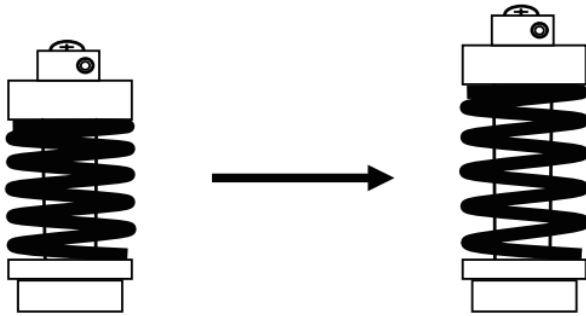


When the clutch of the screwdriver is disconnected, the measured value is displayed in the window and saved.

10. . Let Fidaptor recover from contraction to return to the constant height.

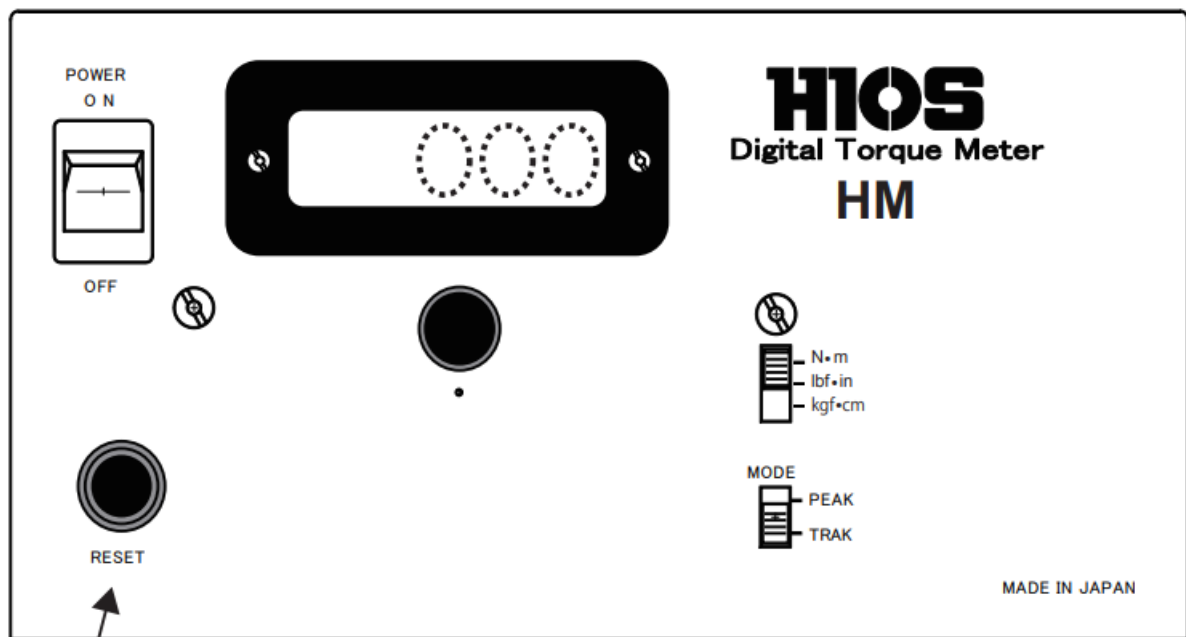
\*Use the handy screwdriver to loosen the threaded shaft.

(Note) Always let the spring recover the constant height by loosening.



◎Important  
The target looseness is that “the spring can be turned with the fingers” to always have a constant height.

11. Cancel the value in the window by pushing the Reset button.



**RESET** button for cancelling the value

12. Repeat the steps 10 to 12 to determine average output torque.

Furthermore, if you want to set any torque, adjust the screwdriver's nut for torque adjustment and follow the same procedure.

13. When you finish measurements, always loosen Fidaptor.

At the end of the operation for the day, turn off the power and remove everything from the socket.

**(Note)** Make sure to loosen the Fidaptor spring at the end of operation and store it.

14. For aggregation of measurement data, turn the mode switch to PEAK.

For measurement, an input signal (torque = load) of 15 digits or larger is required. If you press the Reset button, the data will be output and the value in the display window will be cancelled. (For the data output tool, refer to the description on page 17.)

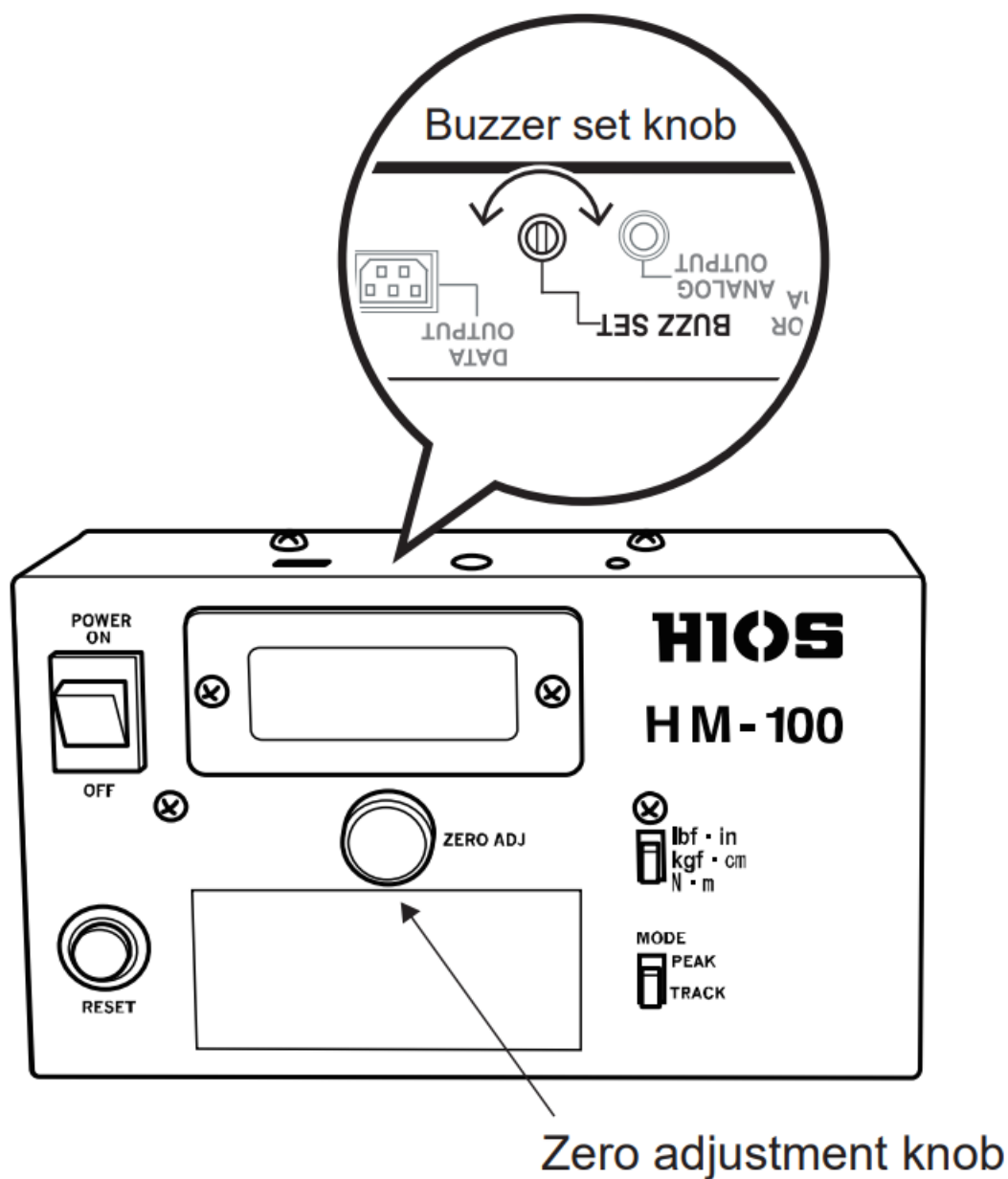
### About “digit”

“digit” means the unit of a value to be displayed regardless of the decimal point.

(Examples) .0.01 = 1 digit

.025 = 25 digits  
.10 = 10 digits  
1.25 = 125 digits

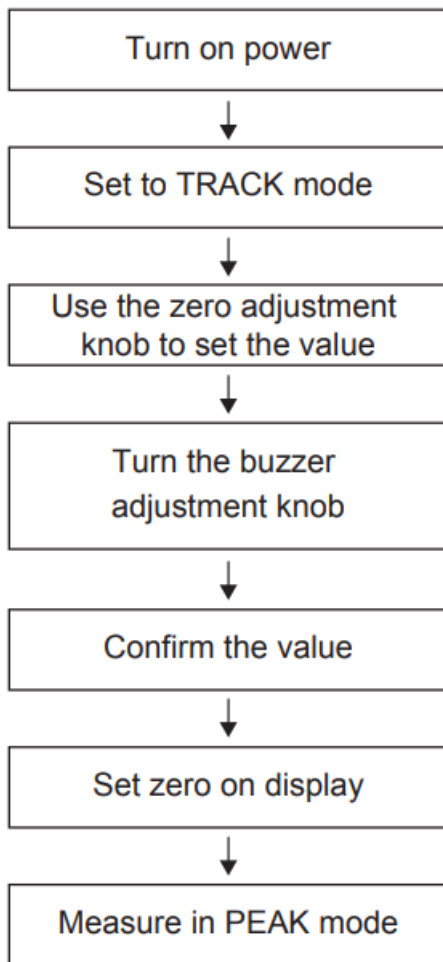
## How to set the buzzer



### (Notes)

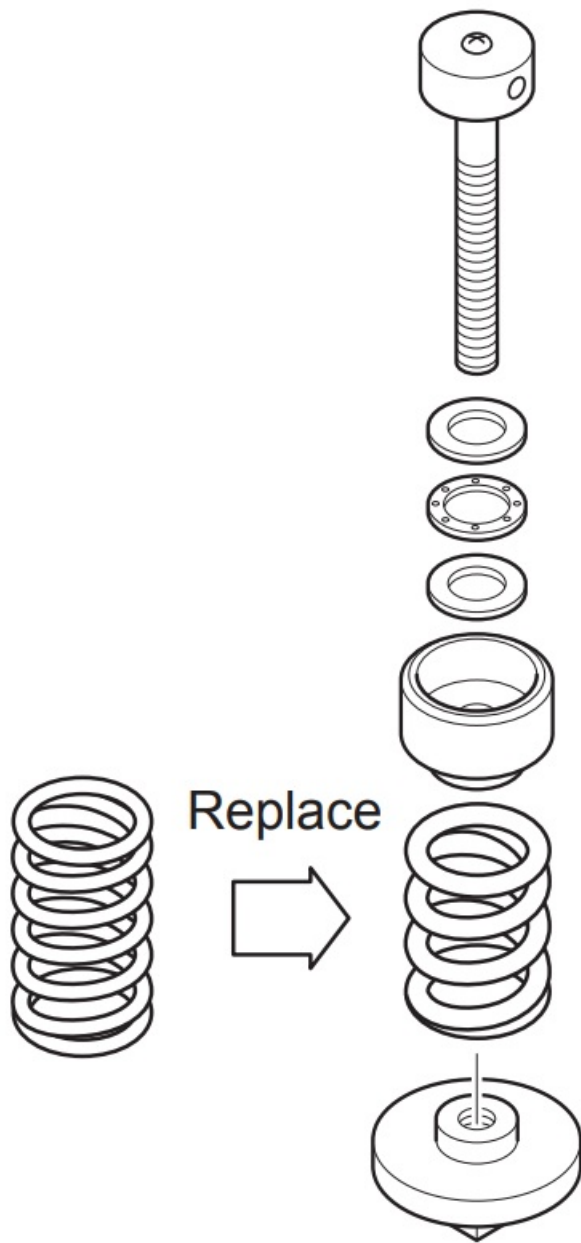
- Check if the display unit is connected to the detector.
- The buzzer is set to 0.981 N m (HM-10) and 9.81 N m (HM-100) by default when shipped.

<Setting procedure>



- Turn the knob to set the value at which you want to start the buzzer.
- Use the zero adjustment knob to set zero on the display.
- Check the value after the buzzer.
- The buzzer starts sounding when the displayed value reaches the set value.
- Stop turning the knob when you hear the buzzer.
- Measurement after setting the buzzer
  - (1) Apply load to the detector.
  - (2) When the load reaches the preset value, the buzzer starts; and:  
In the case of the TRACK mode: The buzzer stops when you release the load; “zero” is displayed.  
In the case of the PEAK mode: The display is retained with no load, but the buzzer stops beeping.
- When you don’t use the buzzer setting, turn the buzzer set knob to specify the value more than the working value (same as the default).

## How to replace the spring (attached to HM-100)



HM-100 has two springs: black (strong) and yellow (weak).

A black spring is attached to the Fidaptor.

If you measure a smaller range of torque, replace the black spring with the yellow one.

(Note) Set the bit of the screwdriver to the Fidaptor's head screw and turn it counterclockwise.

Then the threaded shaft becomes loose to enable replacing the spring.

## Inspection of Fidaptor

### Handling of Fidaptor

1. Never apply a load more than the measurement capability specified for Fidaptor.
2. Use Fidaptor appropriate for the screwdriver and the torque.
3. Always keep Fidaptor loose and remove everything from the socket after measurement.
4. Try to keep the screwdriver and Fidaptor upright while measuring and apply the thrust load of 5kg or smaller.  
(In the case of a lower range of torque, the thrust load should be 2kg or smaller.)
5. For continuous measuring, apply grease to the component parts of Fidaptor.
6. Set the measurement cycle to 5 seconds or longer. If you set the cycle to a time different to that, the



component parts will wear quickly.

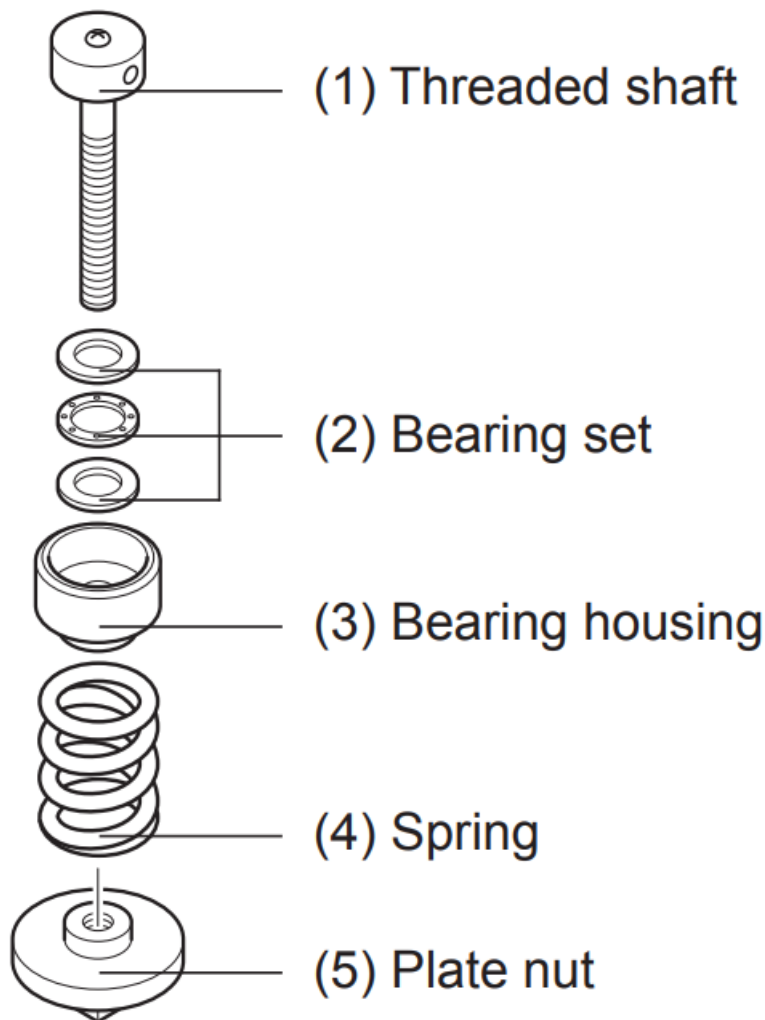
7. Never leave or store Fidaptor in a fastened state.

When you don't use Fidaptor, loosen the spring.

8. Correctly engage the object for measurement and Fidaptor.
9. Don't use a deformed or modified Fidaptor.

#### **Maintenance and inspection of Fidaptor**

1. Apply grease (\*) to the components (1), (2) and (5) (see the figure below) of Fidaptor regularly.
2. Check the components below before you use Fidaptor:
  - 1) The components (1), (2) and (5) have been greased.
  - 2) The threaded shaft is not bent and the threads have not worn.
  - 3) The threaded shaft is free from foreign materials.
3. Fidaptor is a consumable component. Inspect it regularly and replace it whenever required.



[Replacement guide] See the figure to the left for the components (1)-(5).

Components (1) and (2): every 2,500 cycles (1 stroke = 1 cycle)

Component (1): when the shaft is bent or the threads have worn.

Component (4): it should be replaced together with the component (1).

Component (5): every 5,000 cycles

**Note:** The grease is available from HIOS. (Separately sold, grease P/N: TF-3G)

## How to use the socket

This instrument can measure various kinds of torque other than that of screwdrivers by changing the attachment.

**When you use a customized attachment, you must pay attention to the matters below.**

Matters requiring attention when you use a customized attachment:

- There must be no play between the socket and the attachment.
- The attachment must have sufficient strength to prevent breakage during measurement.
- The vertical load to the socket must be 2kg or smaller for HM-10 and 5kg or smaller for HM-100.
- There must be no impact load to the socket.
- There must be no violation to the principles of the torque measuring instrument.

For details of the socket, please refer to the outline view on page 16.

## Battery charge

Always use the dedicated charger and make sure to turn off the power of the main unit before starting charging. When you charge the battery for the first time, it will take eight hours to charge it fully



### Caution

Please read the following carefully

- Do not charge the battery longer than eight hours.
- Use only NiMH batteries, never any other kind, even if obtained from HIOS Corporation.
- Do not use the instrument while charging the battery.
- When “LOBAT” is displayed in the window, stop measurement and charge the battery.
- Do not use the dedicated charger for other purposes.
- Do not place anything heavy on the cord of the charger, and do not bend or bind it.
- Always turn off the power when you connect or disconnect the battery.
- Do not remove the battery in the main unit.



### Danger

If you charge the battery for more than eight hours, it may cause heating, explosion, deterioration, a fire, etc.

## How to charge the battery

1. Turn off the power switch of the instrument and connect the charger's plug to the connector.
2. When charging is completed, disconnect the plug and turn on the power switch of the instrument to check the display.

## Customer service

### Repair

1. Service charges will be made for repairs under the following circumstances:
  - (1) Malfunctioning or damage caused by incorrect use of the instrument, the instrument has been disassembled or it malfunctions due to attempted repair.
  - (2) Oil has been added to the socket, switches or inside the instrument.
  - (3) The instrument has been damaged during shipping, by dropping, etc.
  - (4) Damage due to fire, exposure to gas, earthquake, water, irregular power supply or other type of disaster.
  - (5) Service charges will also be made for calibration, inspection or parts replacement for the Fidaptor, etc.
2. No charge will be made for service in the case of inspection and/ or calibration of the same part that becomes necessary within three months after inspection or calibration has been performed. (This does not apply under circumstances (1) – (4) above.)

**Shipping and handling charges incurred for repair service must be paid by the customer. Please direct questions about customer services to HIOS Corporation or your HIOS dealer.**

## Attention

The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream.

Check with your local solid waste officials for details in your area for recycling options or proper disposal.



NI-MH

Troubleshooting (before deciding the instrument has failed)

Before deciding the instrument has failed, refer to the table below for troubleshooting. If this does not solve the problem, please contact your dealer or HIOS.

Symptom	Possible cause	Action to take
"LOBAT" in the display	<ul style="list-style-type: none"> <li>Insufficient charging of the battery</li> </ul>	<ul style="list-style-type: none"> <li>Charge the battery. Refer to P. 12.</li> </ul>
		<ul style="list-style-type: none"> <li>If nothing is displayed even after charging the battery, please contact us.</li> </ul>

Nothing appears on the display	<ul style="list-style-type: none"> <li>The instrument has not been used for a long time, or the battery has died.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off the power and charge the battery for about 10 minutes and turn on the power. If the display becomes active, then charge the battery within eight hours for ordinary use.</li> </ul>
		<ul style="list-style-type: none"> <li>If it doesn't solve the problem, please contact us.</li> </ul>
Cannot set it to zero	<ul style="list-style-type: none"> <li>Reset does not work if the display value without a load exceeds 10 digits.</li> </ul>	<ul style="list-style-type: none"> <li>Set the Mode switch to TRACK and see if zero will be displayed.</li> </ul> <p>(Perform this zero adjustment in the TRACK mode occasionally while in operation.)</p>
The value cannot be held.	<ul style="list-style-type: none"> <li>The Mode switch is set to TRACK.</li> </ul>	<ul style="list-style-type: none"> <li>Set it to PEAK.</li> </ul>
	<ul style="list-style-type: none"> <li>Zero adjustment has not been done.</li> <li>The connection cable is wrongly connected or it is broken.</li> </ul>	<ul style="list-style-type: none"> <li>Use the zero adjustment knob for adjustment.</li> <li>Replace the cable.</li> </ul>
The instrument cannot be charged	<ul style="list-style-type: none"> <li>The plug of the charger is not inserted correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Check if the plug is correctly inserted.</li> </ul>
	<ul style="list-style-type: none"> <li>The plug is connected to the wrong terminal.</li> </ul>	<ul style="list-style-type: none"> <li>Connect it to the right connector.</li> <li>If it doesn't solve the problem, please contact us.</li> </ul>
After charging the battery it still displ	<ul style="list-style-type: none"> <li>The battery died.</li> </ul>	<ul style="list-style-type: none"> <li>Repair is required.</li> </ul>

ays insufficient charging.	<ul style="list-style-type: none"> <li>Still insufficient charging of the battery</li> </ul>	<ul style="list-style-type: none"> <li>Charge the battery again not exceeding eight hours.</li> </ul>
An irrelevant value is displayed	<ul style="list-style-type: none"> <li>Noises cause wrong value display.</li> </ul> <p>(When power is on or in the PEAK mode)</p>	<ul style="list-style-type: none"> <li>Press the Reset button to delete the value.</li> </ul>

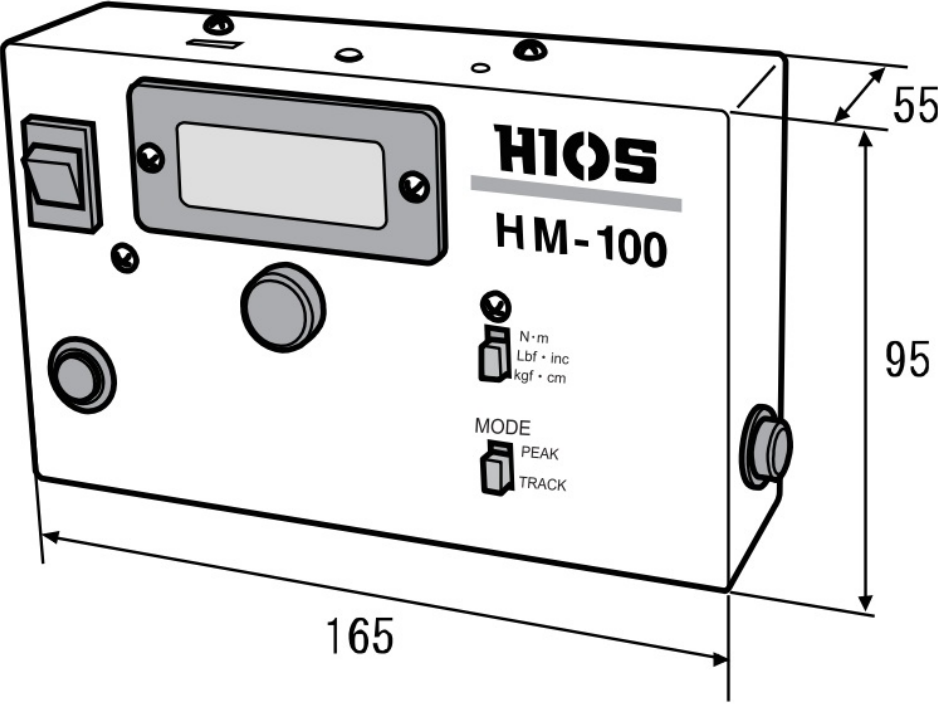
## Specifications

Model		HM-10	HM-100
Peak measuring range	N m	0.015-1.000	0.15-10.00
	lbf in	0.15 – 9.00	1.5 – 90.0
	N cm	1.5-100.0	15-1000
Accuracy		Within $\pm 0.5\%$ (F.S.)	
Battery pack		6V NiMH	
Charging time		8 hours or less	
Weight (kg)	Display unit	1.0kg	
	Detector	0.35kg	
Continuous operating time on a full charge		8 hours	
Battery life		300 cycles of charging	
Detector cord		1.7m (6P cord), P/N: DPC-0506	
Exclusive battery charger		Input: AC100V, 120V, 220-240V Output: DC7.2V 120mA (P/N: TCH-100N)	

- Never apply the load more than the maximum allowable load.
- We cannot guarantee the life of the battery in the specification table because it varies depending on the usage pattern.
- Instruments for use in foreign countries are also available (input: AC120V, 220-240V).

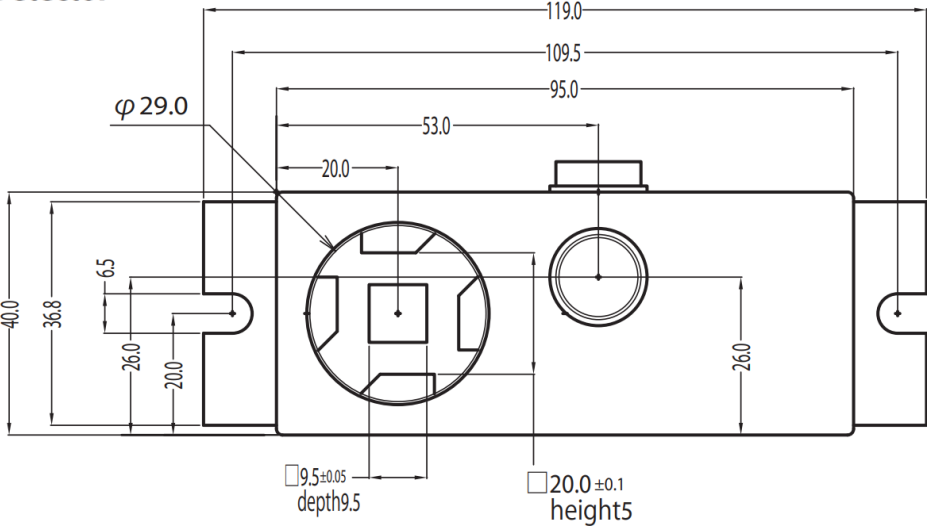
## Outline dimensional drawing (and detailed socket dimensions)

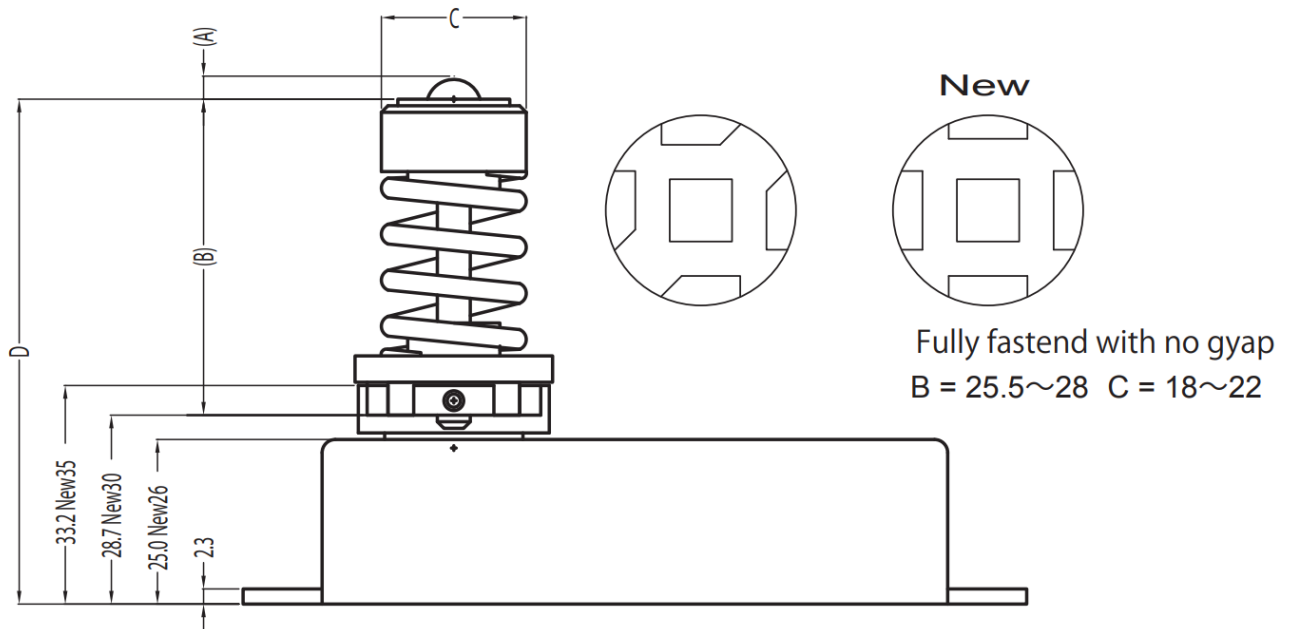
“Main unit”



unit:mm

“Detector”





**Note:** The dimensions of the detector in this drawing are not full-scale.

## Specifications for analog output

It is about 0.72 V at the maximum torque.

(Maximum torque: 9.81N m for HM-100; 0.981N m for HM-10)

- If you want to use it as an output unit for observed waveforms, you may need the devices below:  
Oscilloscope, voltage meter, analog data collection system (Keyence), data logger (Hioki), etc.  
Also prepare a dedicated cord for analog data output (P/N: HP-8060, 1.5m). \*Use the devices properly after reading the operation manuals attached to the devices.

## Data output

If you want to transfer the data to your PC, please use the input tool of Mitutoyo.

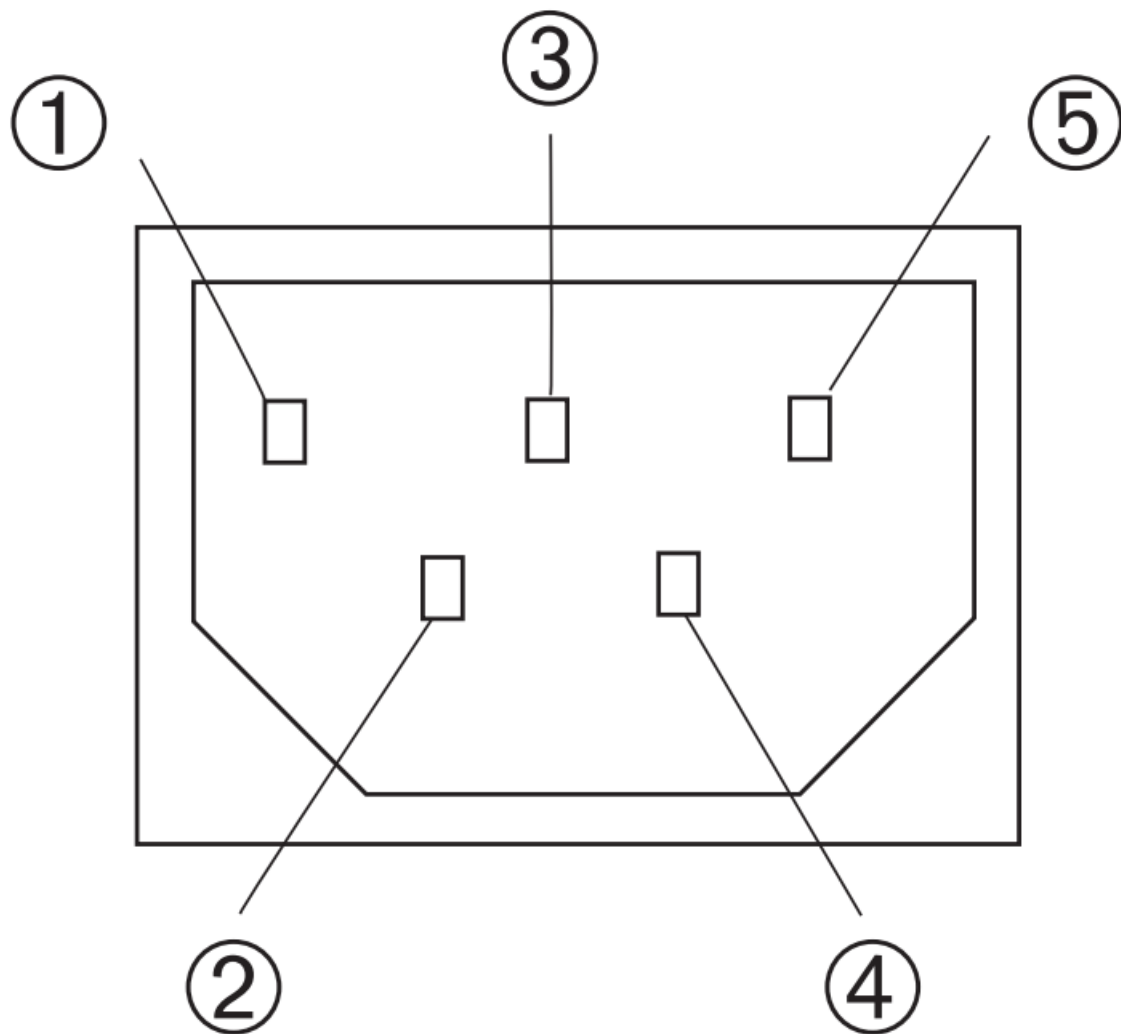
A connection cable (separately sold) is also required to connect the input tool and the torque meter.

- Types of input tools
  - USB keyboard conversion type, P/N: IT016U
- Connection cable: 06AGF590, 5 pins, 2m

\*For the input tool and the printer connection cable, contact Mitutoyo or your dealer.  
Regarding import of measurement data, please contact HIOS.

## Specifications for serial output

1. **Connector pin arrangement: Mitutoyo MQ65-5P**



① GND: Ground

② DATA: The data is output in the format below

③ CK: Clock

④ RD: Request for data

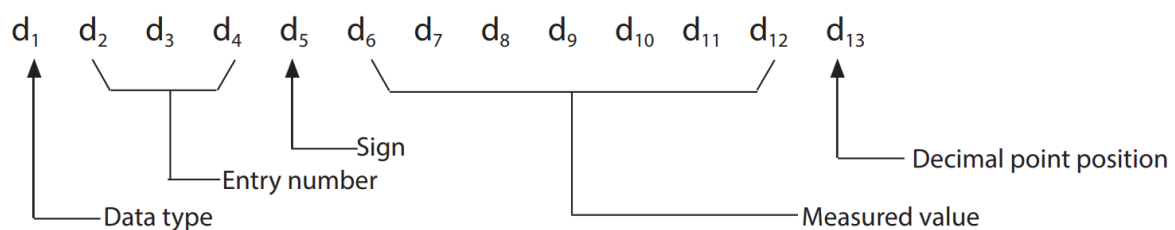
⑤ REQ: Request of data output from the outside

① to ④: Open drain; -0.3 to +7V (400μA max.)

⑤: it is pulled up to VDD (1.55V).

## 2. Data output format

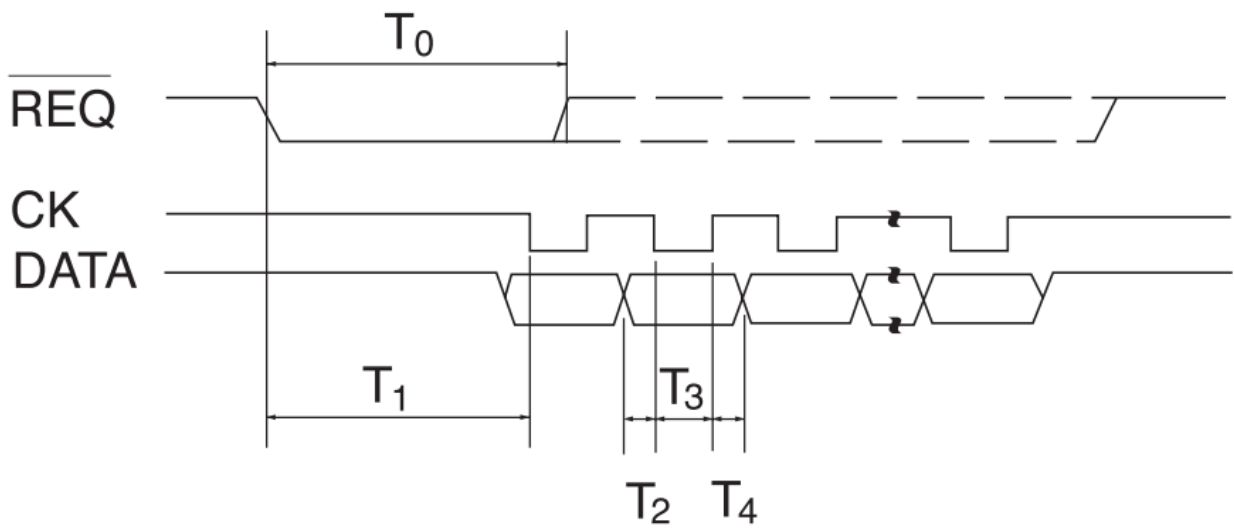
13 digits are output in the sequence below:



Each digit is expressed with a 4-bit binary and output from LSB in the sequence:  $2^0 \rightarrow 2^1 \rightarrow 2^2 \rightarrow 2^3$ .

## 3. Timing chart





	MIN	MAX	UNIT
T0	2	–	sec
T1	0.2	0.4	sec
T2	0.2	0.4	mS
T3	0.5	1	mS
T4	0.2	0.4	mS

### The following table is for CHINA RoHS2

If you are asked by China Customs, please show this table to them.

In addition, the China RoHS marks also is required at the product and product box.

At the product, you can find it at the bottom and it is marked on the product box.

If you cannot find the mark, please ask your distributor.

In case of emergency, please cut the mark below and stick at the bottom of product and on the product box.

### Cusomer Support

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### Documents / Resources

