

# Phase Difference Torque Detector

## TH series

The TH series torque detectors employ a new magnetic phase difference method.

They have significantly higher measurement accuracy than the conventional torque detectors, offering fast signal output update speed.

These detectors do not require rotation direction change, have strong noise withstanding capability, and are easy to use even at factories.



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# TH series torque detectors offer the torque detection method for the future

The TH series torque detectors employ a new magnetic phase difference method with improving functionality while maintaining the advantages of Ono Sokki's conventional torque detectors. You can design your machines with the same installation and axial dimensions as our SS series torque detectors. They incorporate high durability and long service life-the biggest features of our torque detectors.

The new magnetic phase difference method does not require AC power supply to an auxiliary motor for rotation direction change. Furthermore, the characteristic data of the detector can be automatically set up on the TH-5100 digital torque meter when the power is turned on.

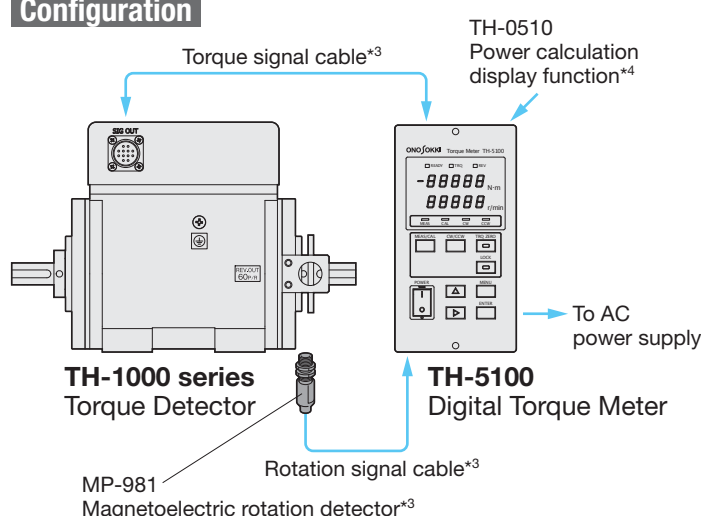
## Features

- High accuracy:  $\pm 0.1\%$ /full scale
- Long service life: Non-contact phase difference method adopted in the rotating and the signal detecting sections.
- Superior noise withstanding: Line driver output with strong noise immunity
- No rotation direction change (CW/CCW).
- High-speed analog output, updating every  $50\mu\text{s}^*$
- Long distance cable extension up to  $50\text{m}^{**}$  (matching not required)

\*1 Response time: depending on time constant setting.

\*\*2 The signal cable is sold separately.

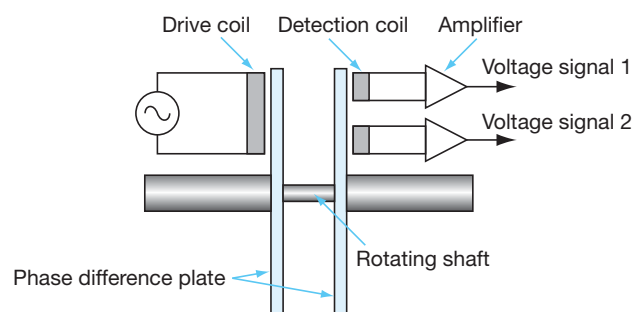
## Configuration



\*3 The MP-981 magnetolectric rotation detector is sold separately. Please consult us about combination.

\*4 Optional software

## Detection principle of the New Magnetic Phase Difference Method



The above drawing shows the interior structure of the torque detector. It is configured with a rotating shaft, phase difference plates, where a drive coil and detection coils are located face to face. A magnetic signal that flows from the excited drive coil to the phase difference plates is converted into an electric signal by the two detection coils. When torque is applied to a rotating shaft, the revolution torque is twisted. Change of torsion angle appears as a phase difference of magnetic flux in the magnetic circuit. The magnetic signal is converted into voltage signals by the two detection coils and amplifier while the drive coil is excited. And then, the TH-5100 torque meter calculates the torque value from the phase difference.

## Specification

### TH series Torque Detector

Model name	Torque capacity N·m	Applicable rotation range r/min	Spring constant N·m/rad	Inertia moment kgm <sup>2</sup>
TH-1204	2	0 to 6000	$1.67 \times 10^2$	$6.95 \times 10^{-5}$
TH-1504	5	0 to 6000	$4.12 \times 10^2$	$6.95 \times 10^{-5}$
TH-1105	10	0 to 8000	$7.75 \times 10^2$	$7.7 \times 10^{-5}$
TH-1205	20	0 to 8000	$1.57 \times 10^3$	$7.7 \times 10^{-5}$
TH-1505	50	0 to 6000	$6.18 \times 10^3$	$1.19 \times 10^{-3}$
TH-1106	100	0 to 6000	$1.27 \times 10^4$	$1.19 \times 10^{-3}$
TH-1206	200	0 to 6000	$2.54 \times 10^4$	$1.34 \times 10^{-3}$
TH-1506	500	0 to 6000	$6.18 \times 10^4$	$1.34 \times 10^{-3}$

- Accuracy :  $\pm 0.1\%$  (display average value per 1-second, static calibration)
- Critical torque : 180% of rated torque
- Breakdown torque : 400% of rated torque
- Influence of temperature on sensitivity :  $0.02\% / ^\circ\text{C} / \text{F.S.}$
- Influence of temperature at zero point :  $0.02\% / ^\circ\text{C} / \text{F.S.}$
- Operating temperature range : 0 to  $+40^\circ\text{C}$
- Storage temperature range :  $-20$  to  $+60^\circ\text{C}$
- Operating humidity range : 95%RH or less
- Vibration resistance :  $50\text{m/s}^2$  or less
- Rotation detecting gear : Provided as standard accessory (60 P/R)
- Power requirement : Supplied from the TH-5100 digital torque meter
- Accessories : Instruction manual, calibration chart

### Options

- Torque signal cable : TH cable

Model name	Length (m)
TH-0105	5
TH-0110	10
TH-0120	20

- Rotation signal cable : MX-8100 series

Model name	Length (m)
MX-8105	5
MX-8110	10
MX-8120	20

### TH-5100 Digital Torque Meter

Model name	Product name
TH-5100	Digital torque meter
TH-0510	Power calculation display function

#### Torque input section

Input signal : Output signal from the TH-1000 series torque detector

#### Rotation speed input section

Input signal : Output signal from the MP-981 magnetolectric rotation detector

Input frequency : 1Hz to 100kHz

Power requirement :  $12 \pm 0.6 \text{ VDC}$ , 100mA max.

Applicable connector : R03-PB6M (TAJIMI ELECTRONICS CO., LTD.)

#### Display section

Display items : Torque, rotation speed  
Status display; measurement ready (READY), torque signal input, rotation signal input

Display : LED 7-segment

Display range : Torque; -99999 to 99999

Rotation speed: 0 to 99999

Display unit : Torque; N·m

Rotation speed; r/min

Display accuracy (1-second average value)

: Torque;  $\pm 0.1\% / \text{F.S.} \pm 1 \text{ count}$

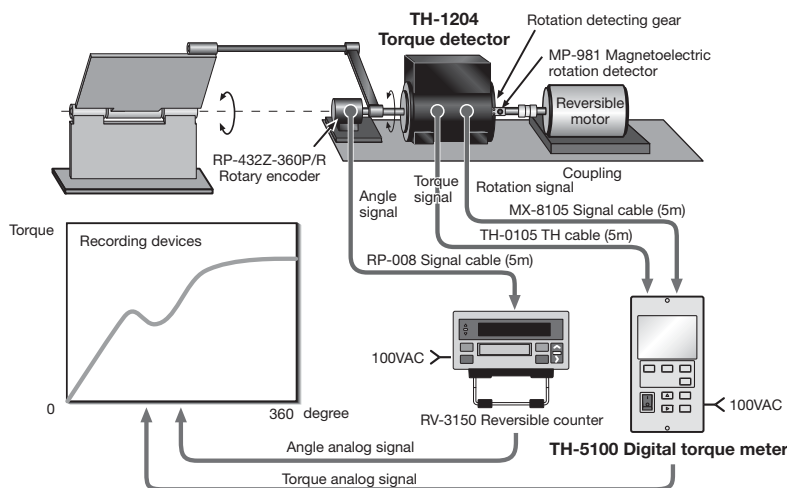
: Rotation speed;  $\pm 0.02\% / \text{F.S.} \pm 1 \text{ count}$   
(input frequency: 10 Hz or more)

Display / output update time

: 1s / 10s / external gate (TRIG IN signal)

## Applications

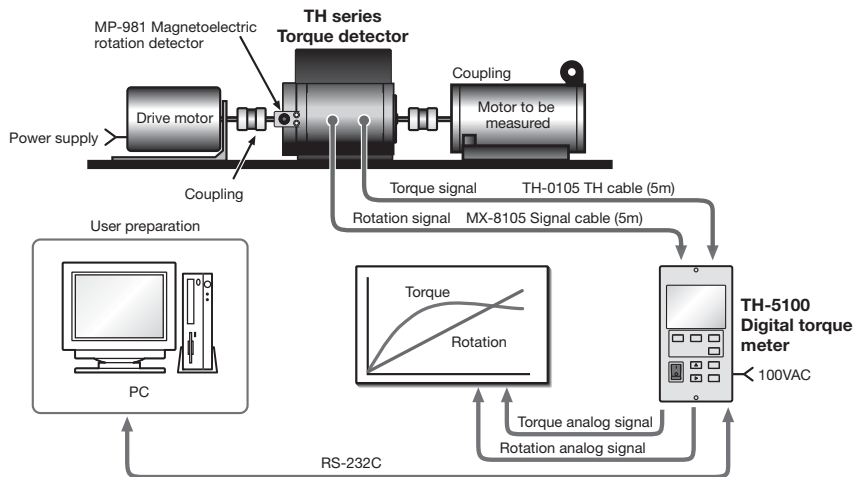
### ● Evaluation of opening and closing torques for OA equipment and mobile phone



The TH series torque detectors can measure torque continuously, regardless rotation direction. Change of torque at starting rotation can be captured at much faster speed. Because the detector has a long service life and high stability, it exhibits superior performance in durability tests.

- Suitable for hinge torque of notebook PCs and mobile phones.
- For performance test of automobile parts in CW/CCW direction, such as wipers, power windows and valves.

### ● Measurement of cogging torque in small motors



The TH series torque detectors measure cogging torque in small motors with fast response capability.

Basic setting data of the detector can be set up on the TH-5100 torque meter automatically. No need to change condition setup when the detector is replaced.

- Measurement of cogging torque and detent torque in brushless motors, reluctance motors, stepping motors and other motors.
- Measurement of loss torque in winding machines, gear box, rotary switches and others.

#### Analog output section

The number of channels

: 2 channels

Output items : Torque, rotation speed

Output format : Isolated voltage output (Common is shared between 2 channels.)

Output voltage :  $\pm 10V$

Time constant : Torque ; Selectable from 500ms, 63ms, 16ms or 1.6ms  
Rotation speed; 0.16ms

Temperature drift :  $\pm 0.01\%$  / F.S. /  $^{\circ}C$

Update time : 50 $\mu$ s

Applicable connector : CO2 type (BNC) plug

#### BCD output section

The number of channels

: 2 channels

Output items : Torque, rotation speed

Output update time : 1s / 10s / external gate (TRIG IN signal)

Output format : Positive logic open collector output

Applicable connector : DX40-50P (HIROSE ELECTRIC CO., LTD)

Applicable cable : PE3531609 (5m, open ended)

#### RS-232C

Baud rate : 9600 bps (fixed)

Functions : Input of setup conditions, output of displayed value / setup status

Applicable cable : AX-5022 (by Ono Sokki, 2m)

#### Remote function

Input items : Selectable torque polarity / trigger input / clear input

Output items : Trigger output / READY output (measurement ready signal)

Input format : No-voltage contact input or logic input

Output format : No-voltage contact output

#### General specification

Power requirement : 100 to 240VAC, 50/60Hz

Power consumption: Approx. 12VA (100VAC) or less

Isolation resistance : 500VDC at megohm 10M $\Omega$  or more

Withstand voltage : 1500 VAC, one minutes

Operating temperature range

: 0 to  $+40^{\circ}C$

Storage temperature range

:  $-10$  to  $+55^{\circ}C$

Outer dimensions : 76 (W) x 142 (H) x 302 (D) mm (not including protruded section)

Weight : Approx. 2kg

Accessories : Unit label, connector for remote, four rubber feet, power cable (1.9m), instruction manual

#### Options

Power calculation display function (TH-0510)

Calculation: Power (W) =  $2\pi/60$  x torque (N-m) x rotation speed (r/min)

Display : Selective display; Rotation (fixed), torque or power (selectable)

Display range : -99999 to +99999

Unit : W, kW, mW (available to stick a unit label)

Accuracy : Torque display accuracy + rotation speed display accuracy

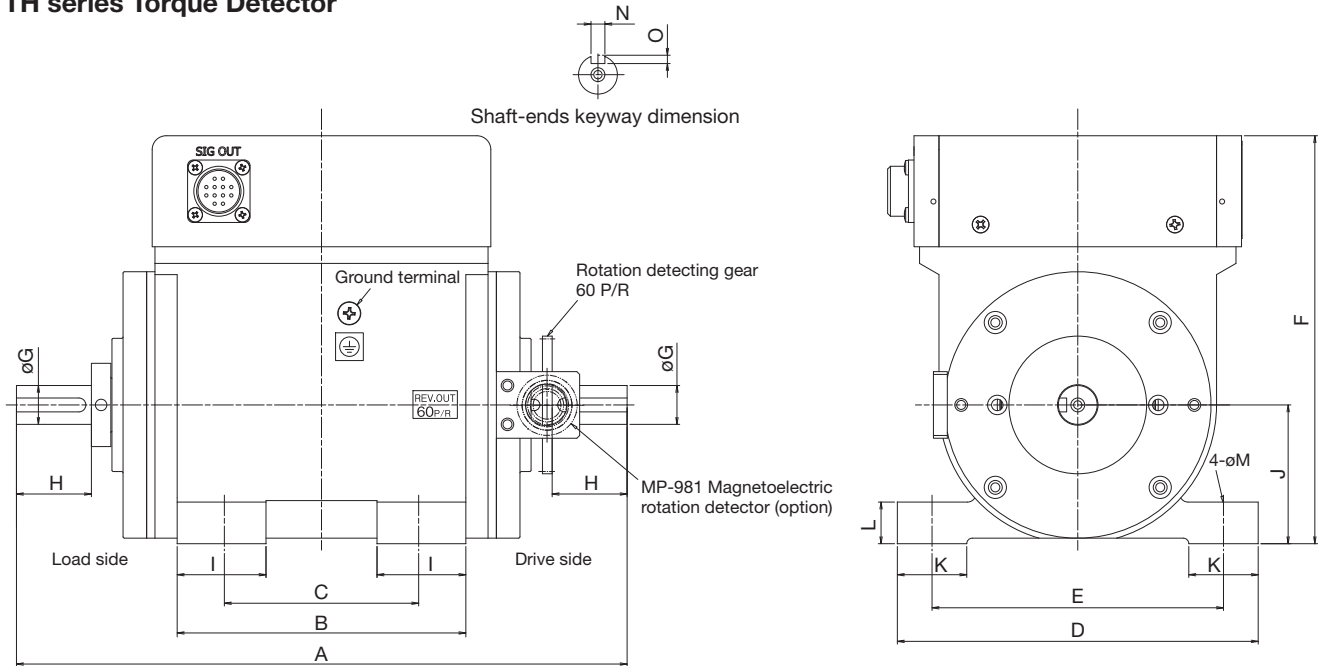
Output : Selective output; Output can be selected from torque or power output in both analog output and BCD output

Time constant : Depending on the torque setup

## Outer Dimensions

(Unit: mm)

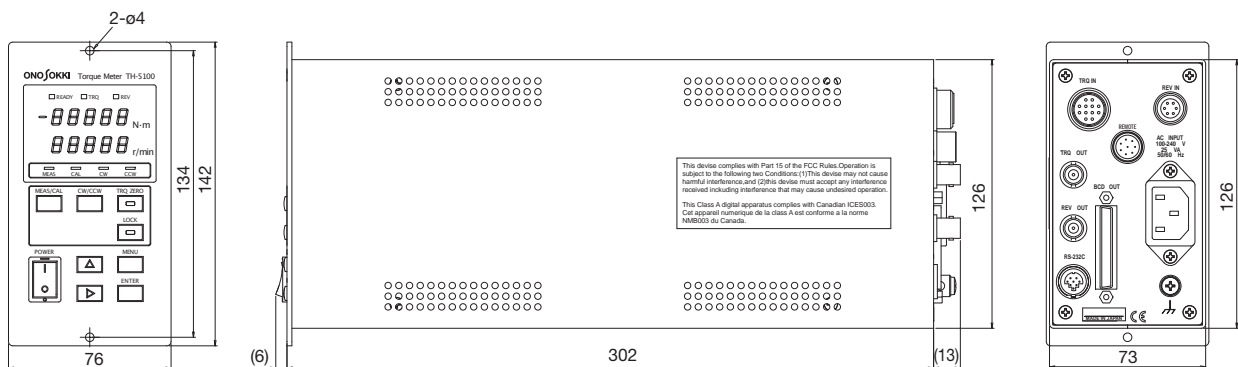
### ● TH series Torque Detector



#### ■ Dimensions

TH	A	B	C	D	E	F	øG	H	I	J	K	L	øM	N <sup>P9</sup>	O
1204, 1504	200	104	70	130	105	147	8 <sup>h6</sup>	17	32	50 <sup>0 -0.2</sup>	25	15	10	-	-
1105, 1205	220	104	70	130	105	147	14 <sup>h6</sup>	27	32	50 <sup>0 -0.2</sup>	25	15	10	5	3 <sup>+0.1 0</sup>
1505, 1106	300	150	115	200	170	207	25 <sup>h6</sup>	45	35	80 <sup>0 -0.5</sup>	40	20	14	8	4 <sup>+0.2 0</sup>
1206, 1506	350	150	115	200	170	207	36 <sup>h6</sup>	70	35	80 <sup>0 -0.5</sup>	40	20	14	10	5 <sup>+0.2 0</sup>

### ● TH-5100 Digital Torque Meter



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• Outer appearance and specifications are subject to change without prior notice.

URL: <http://www.onosokki.co.jp/English/english.htm>

#### U.S.A

Ono Sokki Technology Inc.  
2171 Executive Drive, Suite 400  
Addison, IL. 60101, U.S.A  
Phone : +1-630-627-9700  
Fax : +1-630-627-0004  
E-mail : [info@onosokki.net](mailto:info@onosokki.net)  
<http://www.onosokki.net>

#### THAILAND

Ono Sokki (Thailand) Co., Ltd.  
29/67 Moo 5 Tivanon Road, Pakkred,  
Nonthaburi 11120, Thailand  
Phone : +66-2-964-3884  
Fax : +66-2-964-3887  
E-mail : [osth\\_sales@onosokki.co.jp](mailto:osth_sales@onosokki.co.jp)

#### P.R.CHINA

Ono Sokki Beijing Office  
Beijing Jing Guang Center 3510  
Hu Jia Lou, Chao Yang Qu  
Beijing 100020, P.R.China  
Phone : +86-10-6597-3113  
Fax : +86-10-6597-3114  
E-mail : [onosokki@bbn.cn](mailto:onosokki@bbn.cn)

#### WORLDWIDE

Ono Sokki Co., Ltd.  
3-9-3 Shin-Yokohama, Kohoku-ku,  
Yokohama 222-8507, Japan  
Phone : +81-45-476-9712  
Fax : +81-45-470-7244  
E-mail : [overseas@onosokki.co.jp](mailto:overseas@onosokki.co.jp)