

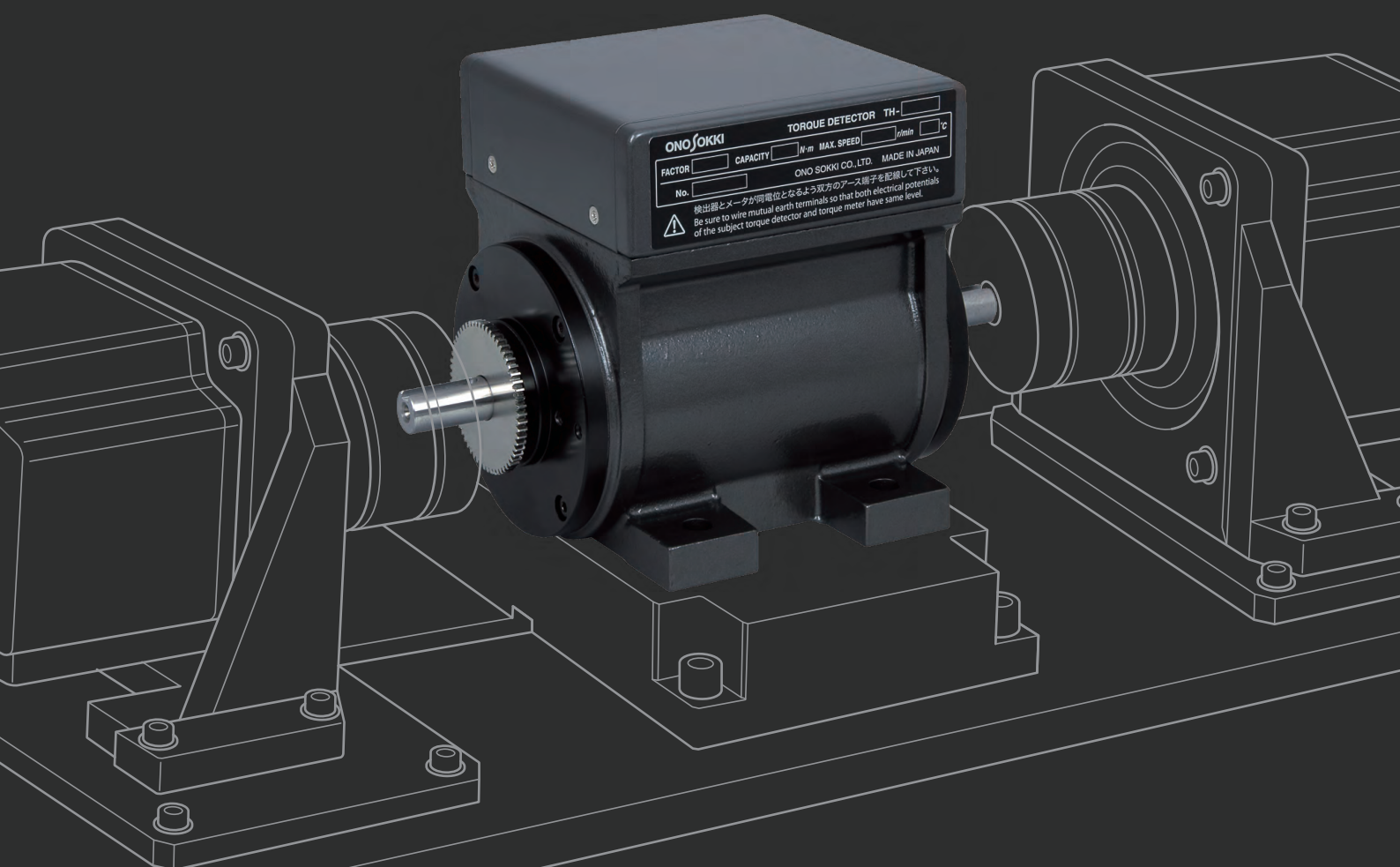
TH/SS/TS series
DD/DSTP/MD series

ONOSOKKI

Digital Torque Meter

A variety of lineup according to applications

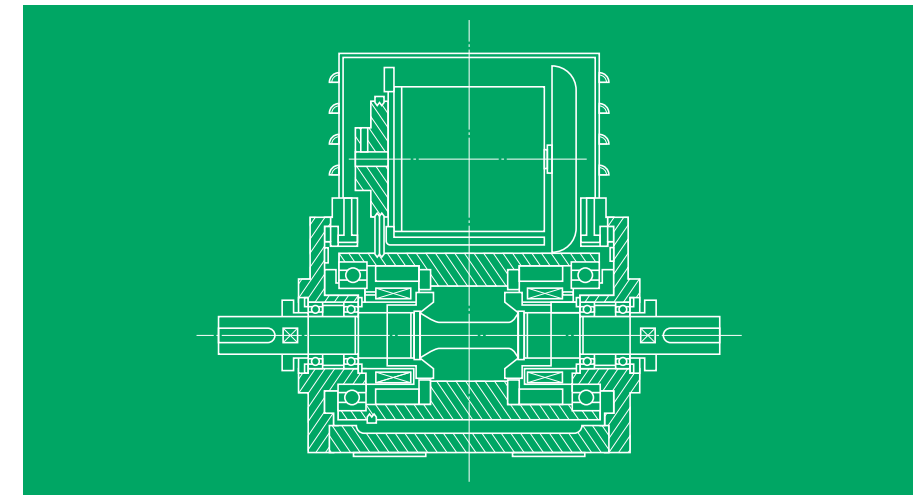
TH-1000 series Torque Detector



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For torque measurement, performance improvement and high efficiency, Ono Sokki meets various demands with advanced technology.



From mN·m to kN·m, from stationary condition to ultra-high-speed rotation, from sensors to Auto measurement system, Ono Sokki contributes to the development of mechatronics with high-performance, high-reliability torque measurement equipment.

Features of Torque Detector & Torque Meter

■ Outstanding durability under extremely high load

The detector shaft will not be damaged even if a load that is 400% of the rated torque is applied. Moreover, when combined with a display unit, continuous display up to 180% of the rated torque is enabled.*1

■ High accuracy and stability

The accuracy is 0.1% FS, and the precision is 0.04% FS. Processing errors are negligible since the measurement is digital, and the reproducibility characteristic is extraordinarily high.

■ Long service life, easy maintenance

The signal is detected without contacting the shaft. As there are no slip rings or brushes that need to be replaced, the detector has a long, easy-maintenance service life.

■ Wide rotation speed range

Ono Sokki has long years of experience in manufacturing torque detectors with an rotation speed range from 0 to 100,000 r/min. Please consult us if you need high-speed detectors.

■ Dual signal output

Since both digital output (BCD, RS-232C) and analog output (voltage) can be specified connection to control systems, recording instruments, panel meters, and personal computers are also facilitated.*2

■ GP-IB connection

Connection via a GP-IB interface enables the CPU to be used for data processing and the control of torque meters, as well as greatly expanding unattended and automated measurement applications.*2

■ Remote functions

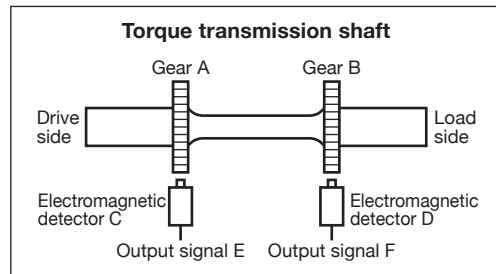
There are several convenient input and output functions for safety and control such as the synchronized driving of torque arithmetic operation display units, zero hold, and measurement preparation output.*2

*1) The guaranteed accuracy range is up to 100% of the rated torque. With 10 V as the upper limit of the analog output of display units, there are some models where output exceeding 100% is not possible.

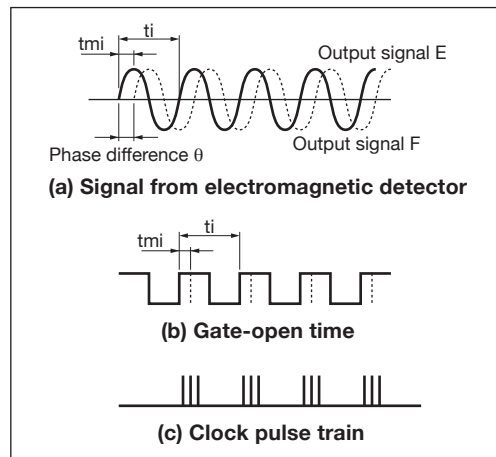
*2) Varies according to the model.

Principle of Torque Detector

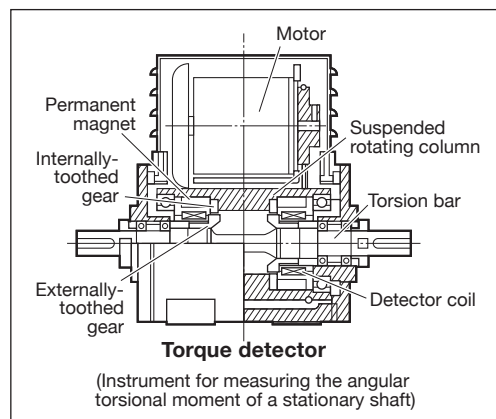
The power transmission shaft generates torsion angle which is proportional to the transmitted torque. By using non-contact type electromagnetic detectors facing gears mounted at two points on the shaft, the torque detector detects this torsion angle as the phase difference between two AC voltage signals. A sophisticated and stable crystal oscillator clock pulse-based digital processing converts the phase difference into a measurement of the transmitted torque.



The torque transmission shaft twists through an angle proportional to the size of the applied torque, so the teeth of gears A and B are displaced in relative position by an amount equal to the torsional angle. Since detectors C and D generate AC voltages E, F with waveforms that track the rotation of gears A and B, the phase difference between the output signals varies in proportion to the torsional angle.



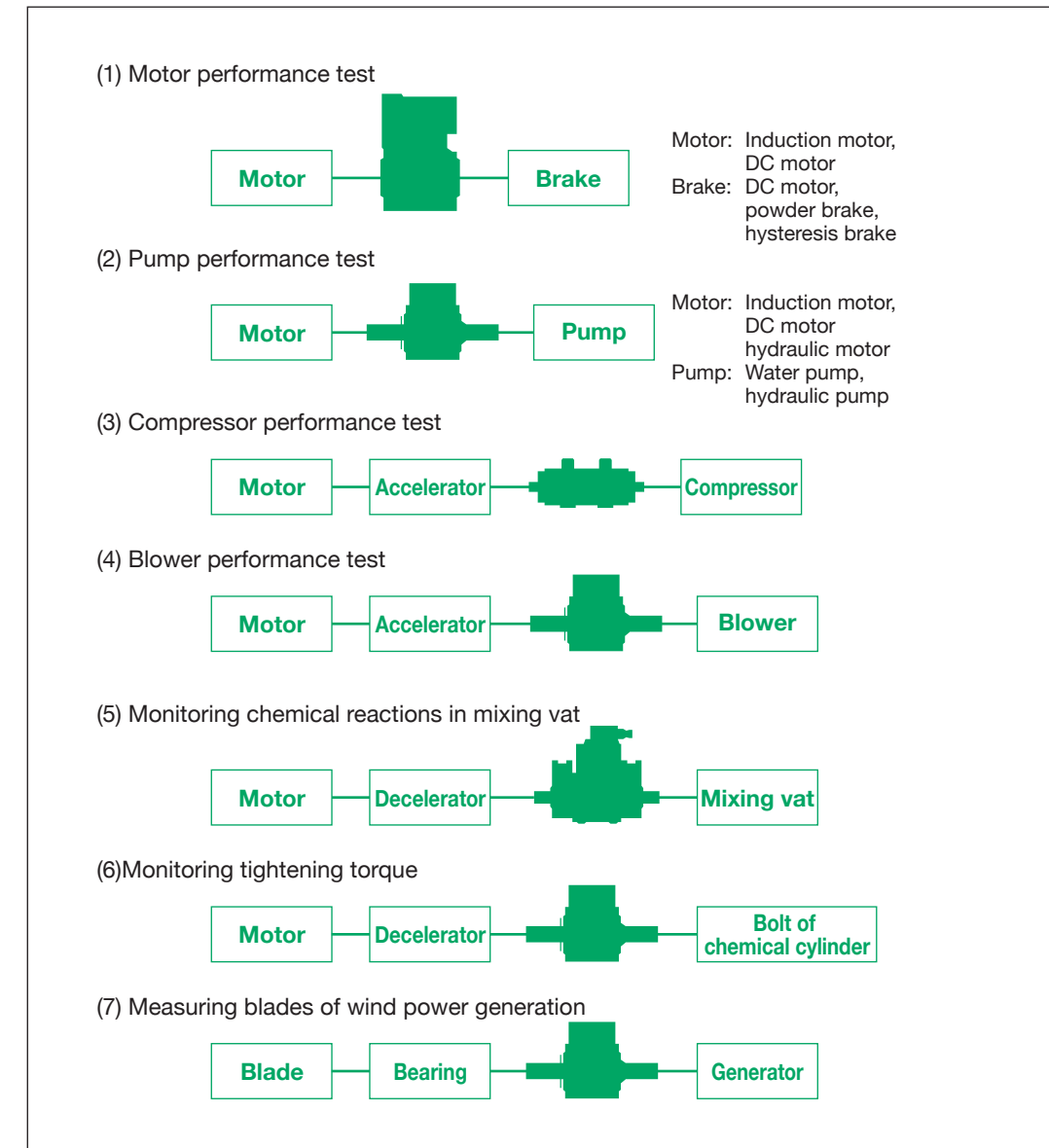
The torque can, therefore, be found by measuring the phase difference θ between the two AC voltages. A gate is opened for a time (t_{mi}) equal to the phase difference between the two AC waveforms, creating an intermittent train of clock pulses from a crystal oscillator. Although the pulse train is not uniformly spaced, it forms a type of periodic signal having a frequency which is proportional to the phase difference (torque). Counting the pulses in the pulse train yields the average value of the torque, and an F-V conversion is used to derive an analog output. Calculation of the phase ratio (t_{mi}/t_i) in each period gives the transient torque in the interval equal to the spacing of the teeth.



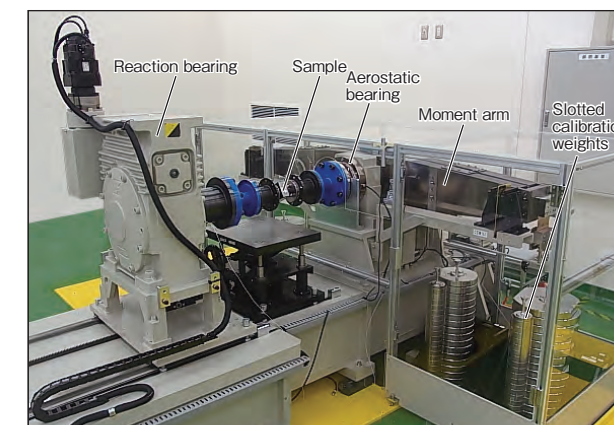
Torque applied to a stationary shaft can also be measured. A motor rotates the suspended column of the torque detector and the internally-toothed gear coupled to it, so even when the shaft (externally toothed gear) is stationary, there is a speed differential between the two gears. The magnetic flux in the coil therefore fluctuates as the internally-toothed gear turns through its circular pitch, generating an AC voltage with a sine waveform.

Torque Measurement: Ono Sokki's Proven Record and Extensive Product Lineup Tell the Whole Story.

Examples of Digital Torque Meter Applications



Calibration of Torque Detector



List of Detection Range

The value in the following table represents the maximum rotation speed of each detector. (unit by 1,000 r/min)
Please refer to the each page for more details.

Detecting method	Model name	Feature	Reference Page	2 mN·m	5 mN·m	10 mN·m	20 mN·m	50 mN·m	100 mN·m	200 mN·m	500 mN·m	1 N·m	2 N·m	5 N·m	10 N·m	20 N·m	50 N·m	100 N·m	200 N·m	500 N·m	1 kN·m	2 kN·m	5 kN·m	10 kN·m	20 kN·m	50 kN·m	100 kN·m
				2 mN·m	5 mN·m	10 mN·m	20 mN·m	50 mN·m	100 mN·m	200 mN·m	500 mN·m	1 N·m	2 N·m	5 N·m	10 N·m	20 N·m	50 N·m	100 N·m	200 N·m	500 N·m	1 kN·m	2 kN·m	5 kN·m	10 kN·m	20 kN·m	50 kN·m	100 kN·m
RH type	RH-1000 series*	Compact and high rigidity	8												20	20											
TH type (Phase difference method using electromagnetic induction theory)	TH-1000 series	Standard and general use	8										6	6	8	8	6	6	6	6							
	TH-2000 series	High rotation speed measurement	8									20	20	20	20												
	TH-3000 series	Micro torque measurement	8				15	15	15	15	15																
	TH-3000H series	Micro torque and high rotation speed measurement	8				25	25	25	25	25																
SS type (Phase difference method using gears)	MD series	Micro torque measurement	9	10	20	20	20																				
	SS series	Standard and general use	10							6	6	6	6	6	8	8	6	6	6	6	5	5					
	DSTP series*	High rigidity and durability	11																			4	3	2	1.5	1	
	DD series	High rotation speed measurement	12						30	30	30	30	30	30	13	13	13	10	10	10	6	4					

* A brochure of RH series Torque Detector is available separately.

Comparison Table in specification of Torque Meter

Specification		TS-2800	TS-3200A	Remarks	
Reference page		13	14		
Applicable torque detector		All torque detectors by Ono Sokki excluding TQ series.	All torque detectors by Ono Sokki excluding TQ and TH series.		
Measurement item		Torque, rotation speed	Torque, rotation speed, output*1	*1: Calculated value	
Measurement unit	Torque	mN·m, N·m, kN·m	mN·m, N·m, kN·m		
	Rotation speed	r/min	r/min, r/s		
	Output	-	mW, W, kW, PS		
Digital display	No. of display digit	5-digit ^{*2} /4-digit	5-digit	*2: 5-digit: When the TH series torque detector is used.	
	Display method	LCD	LCD		
	Display update interval	1 s, 10 s, EXT	1 to 10.0 s, EXT		
	Measurement display accuracy (at reference time (1-second))	Torque	$\pm 0.1\%/F.S.^{*3}$ / $\pm 0.2\%/F.S.$	$\pm 0.2\%/F.S.$	*3: $\pm 0.1\%$: When the TH series torque detector is used.
		Rotation speed	$\pm 0.02\%/F.S.^{*4}$	$\pm 0.05\%/F.S.^{*4}$	*4: F.S. is selectable.
	Absolute value display	-	Available		
Data hold function	-	Max. value, Min. value, Peak-to-Peak value			
Detector's parameter setting memory		1 model	10 models		
Rotation input		Provided	Provided		
Comparator function		-	4 channels (option)		
Analog output	Response time (Time constant)	TH type: 1.6 ms, 16 ms, 63 ms, 500 ms ^{*5}	16 ms to 64 s ^{*5}	*5: Higher speeds are available as an option	
		SS type: 63 ms, 500 ms*			
	Output level	$\pm 10\text{ V} / F.S.$	$\pm 10\text{ V} / F.S.$		
	No. of outputs	1-channel each for torque and rotation speed	2-channel ^{*6}	*6: One channel can be added as an option. Selectable from TORQUE/REVO/POWER	
	Accuracy	Torque	$\pm 0.1\%/F.S./\pm 0.2\%/F.S.$	$\pm 0.2\%/F.S.$	1-s average Depending on accuracy of the detector.
		Rotation speed	$\pm 0.1\%/F.S.$	$\pm 0.1\%/F.S.$	
F.S. voltage conversion	2 V, 2.5 V, 3.33 V, 5 V, 6.67 V	0.01 V step		TS-2800: torque only	
Interface		BCD ^{*7} /RS-232C	BCD ^{*7} /GPIO ^{*7} /RS-232C ^{*7}	*7: Available as an option. Only either one of GPIO or RS-232C can be installed to the TS-3200A.	
Dimensions (mm) W x H x D		76 x 142 x 262	360 x 99 x 301	Not including protruded section.	
Weight		Approx. 2 kg	Approx. 5 kg		
Panel mounting fixture		-*8	Provided as an option	*8: Fixing bracket for main unit is required. (user preparation)	

* The Torque Meter (TQ-5300) for the TQ series and RH series Torque Detectors is available separately.

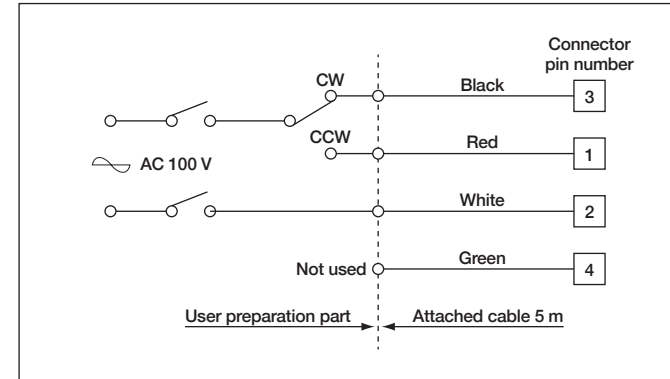
About Rotation direction external selection function

Rotation direction of SS series detector is able to be switched externally by SS-0004 (option) installation and a selector like the following (user preparation).

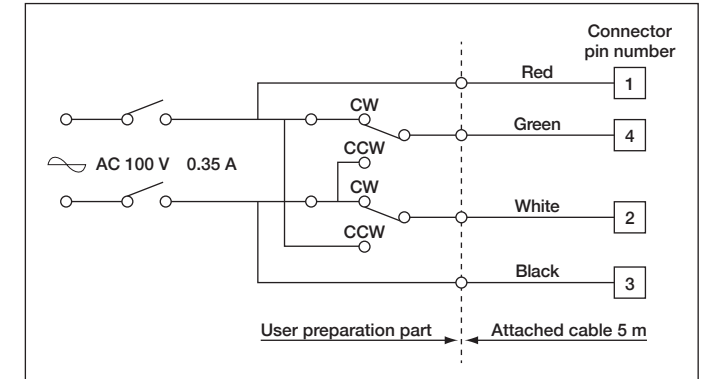
* Wiring specification of SS-002/005/010/020/050/100/200 is changed from 2011/June.

* The detector with new wiring specification has sticker "OM" on the upper surface. Please check the specification before use.

Wiring required for external selection



Previous wiring (SS-002/005/010/020/050/100/200)



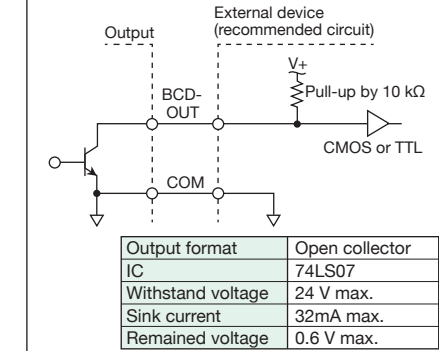
Interface specification of Torque Meter (TS-2800/TS-3200A)

BCD Pin Assignments TS-2800

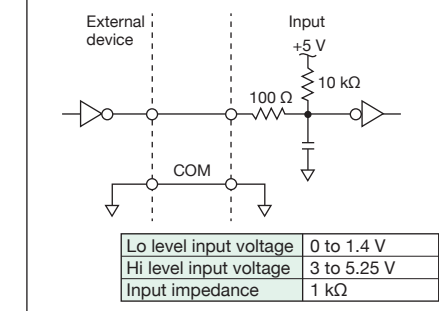
Pin No.	Signal name	Pin No.	Signal name
1	Data output (torque) 1x10 ⁰	26	Data output (rotation) 2x10 ¹
2	2x10 ⁰	27	4x10 ¹
3	4x10 ⁰	28	8x10 ¹
4	8x10 ⁰	29	1x10 ²
5	1x10 ¹	30	2x10 ²
6	2x10 ¹	31	4x10 ²
7	4x10 ¹	32	8x10 ²
8	8x10 ¹	33	1x10 ³
9	1x10 ²	34	2x10 ³
10	2x10 ²	35	4x10 ³
11	4x10 ²	36	8x10 ³
12	8x10 ²	37	1x10 ⁴
13	1x10 ³	38	2x10 ⁴
14	2x10 ³	39	4x10 ⁴
15	4x10 ³	40	8x10 ⁴
16	8x10 ³	41	N.C. (not connected)
17	1x10 ⁴	42	Torque polarity output "-"
18	2x10 ⁴	43	Torque polarity output "+"
19	4x10 ⁴	44	N.C. (not connected)
20	8x10 ⁴	45	N.C. (not connected)
21	Data output (rotation) 1x10 ⁰	46	N.C. (not connected)
22	2x10 ⁰	47	Hold input
23	4x10 ⁰	48	Busy input
24	8x10 ⁰	49	Print command output
25	1x10 ¹	50	Common

Recommended Interface for BCD

① BCD output, polarity output, print command output



② Hold input, busy input



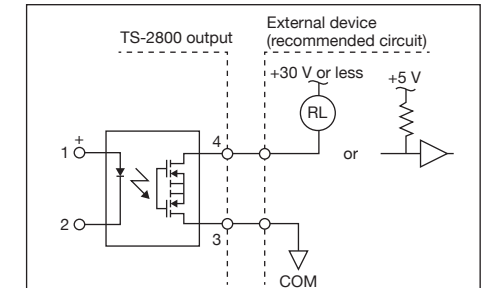
RS-232C Pin Assignments TS-2800/TQ-5300

Pin No.	Signal name	Pin No.	Signal name
1	-	5	RST (Transmission request)
2	RxD (Data reception)	6	-
3	TxD (Data transmission)	7	SG (Signal ground)
4	CTS (Clear to transmission)	8	-

Pin Assignments of Remote Function TS-2800/3200A

TS-2800	TS-3200A	Signal name	Remarks
8	A	CLR IN	No-voltage contact input (Common is common.)
7	B	TRIG IN	
6	C	CW/CCW Switch	
5	D	Input common	
4	E	READY OUT	No-voltage contact output (Common is separated.)
3	F	READY OUT COM-1	
2	G	TRIG OUT	
1	H	TRIG OUT COM-2	

Recommended Interface for remote function



*Note: Although the output is isolated, the rated dielectric withstand voltage is 30 V or less.

TH Series: Torque Detectors Phase Difference Method Using Electromagnetic Induction Theory

Improved operability and functions



•TH-1000 series torque detector <For general use>

Model TH	Rated torque (N-m)	Rated rotational speed (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
1204	2	6,000	6.95 × 10 ⁻⁵	1.67 × 10 ²
1504	5	6,000	6.95 × 10 ⁻⁵	4.12 × 10 ²
1105	10	8,000	7.7 × 10 ⁻⁵	7.75 × 10 ²
1205	20	8,000	7.7 × 10 ⁻⁵	1.57 × 10 ³
1505	50	6,000	1.19 × 10 ⁻³	6.18 × 10 ³
1106	100	6,000	1.19 × 10 ⁻³	1.27 × 10 ⁴
1206	200	6,000	1.34 × 10 ⁻³	2.54 × 10 ⁴
1506	500	6,000	1.34 × 10 ⁻³	6.18 × 10 ⁴

•TH-2000 series torque detector <For general use and high rotation speed measurement>

Model TH	Rated torque (N-m)	Rated rotational speed (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
2204	2	20,000	6.95 × 10 ⁻⁵	1.67 × 10 ²
2504	5	20,000	6.95 × 10 ⁻⁵	4.12 × 10 ²
2105	10	20,000	7.7 × 10 ⁻⁵	7.75 × 10 ²
2205	20	20,000	7.7 × 10 ⁻⁵	1.57 × 10 ³

•TH-3000(H) series torque detector <For micro torque measurement (H: for high rotation speed)>

Model TH	Rated torque (N-m)	Rated rotational speed (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
3502/3502H	0.05	15,000/25,000	2.37 × 10 ⁻⁶	2.06
3103/3103H	0.1	15,000/25,000	2.37 × 10 ⁻⁶	4.12
3203/3203H	0.2	15,000/25,000	2.37 × 10 ⁻⁶	7.63
3503/3503H	0.5	15,000/25,000	7 × 10 ⁻⁶	31.4
3104/3104H	1	15,000/25,000	7 × 10 ⁻⁶	61.8
3204/3204H	2	15,000/25,000	7 × 10 ⁻⁶	127

TH series torque detector enables measurement with high accuracy and high speed signal output. It does not have auxiliary motor, AC power supply to the motor and rotation detection change are no longer required.

<Feature>

- Line driver output having great noise resistance
- Measurement in high accuracy of ±0.1%/F.S. (TH-1000/2000 series) ±0.2%/F.S. (TH-3000(H) series)
- Up to 5 kHz of high response. (when used with the TS-2800 installed the TS-0281.)
- Available up to 25,000 r/min of rotation speed
- Matching is not necessary at changing cable length

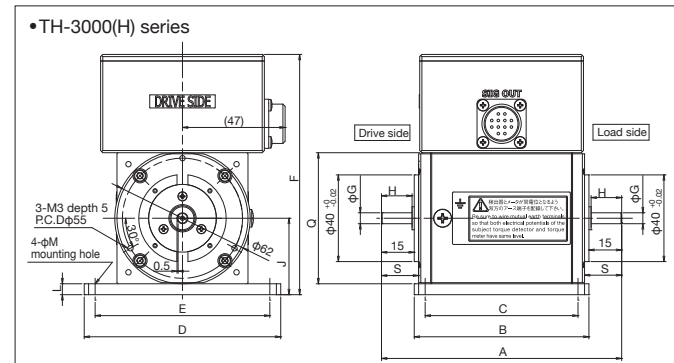
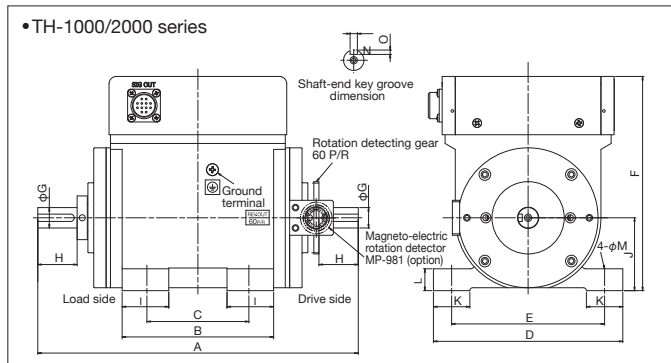
Notes:

- (1) Torque signal cable is sold separately.
- (2) The calibration chart is attached as standard. (Test certificate is sold separately.)

Specification

Linearity : ±0.1 % (When used with the TS-2800) ±0.2 % (TH-3000H series)
 Temperature effect on the sensitivity : ±0.02%/F.S./°C*
 Temperature effect at zero point : ±0.02%/F.S./°C*
 Operating temperature range : 0 to +40°C
 Storage temperature range : -20 to +60°C
 Operating humidity : 95 %RH or less (with no condensation)
 Vibration resistance : Within 50 m/s²
 Power requirement : Supplied from the TS-2800
 CE marking : EMC Directive
 *Average temperature counting in operating temperature range.

Accessory : Instruction manual, calibration chart
 Option (sold separately) : Torque signal cable (TH-0105, 5 m/TH-0110, 10 m/TH-0120, 20 m)
 Rotation detector (Magneto-electric rotation detector) (MP-981: for TH-1000/2000) (MD-0115: for TH-3502(H)/3103(H)/3203(H)) (MD-0118: for TH-3503(H)/3104(H)/3204(H))
 Rotation signal cable (MX-8105: 5 m/MX-8110: 10 m/MX-8120: 20 m)



•Dimensions of the TH-1000/2000 series

TH	A	B	C	D	E	F	φG	H	I	J	K	L	φM	N ⁹⁰	O	Weight (kg)
1204/1504/2204/2504	200	104	70	130	105	147	8 ^{h8}	17	32	50 ^{h9/k9}	25	15	10	-	-	3 (4)
1105/1205/2105/2205	220	104	70	130	105	147	14 ^{h8}	27	32	50 ^{h9/k9}	25	15	10	5	3 ^{0/1}	3 (4)
1505/1106	300	150	115	200	170	207	25 ^{h8}	45	35	80 ^{h9/k9}	40	20	14	8	4 ^{0/2}	9
1206/1506	350	150	115	200	170	207	36 ^{h8}	70	35	80 ^{h9/k9}	40	20	14	10	5 ^{0/2}	10

*The value in parentheses: TH-2000 series.

MD Series: Torque Detectors for Micro Capacity, Rotating and Stationary Shaft

High accurate measurement for micro torque with the compact size



Model MD	Rated torque (mN-m)	Minimum resolution (mN-m)	Rated rotational speed (r/min)	Allowable range (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
201C	2	0.001	10,000	0 to 10,000	1.9 × 10 ⁻⁷	8.24 × 10 ⁻²
501C	5	0.001	10,000	0 to 20,000	1.9 × 10 ⁻⁷	2.06 × 10 ⁻¹
102C	10	0.01	10,000	0 to 20,000	1.9 × 10 ⁻⁷	4.12 × 10 ⁻¹
202C	20	0.01	10,000	0 to 20,000	1.9 × 10 ⁻⁷	8.24 × 10 ⁻¹

* Changes in the the allowable range will be quoted separately.
 * MD-502C, 103C and 203C were replaced by the TH-3502(H), TH-3103(H) and 3203(H).
 * MD-503C, 104C and 204C were replaced by the TH-3503(H), TH-3104(H) and 3204(H).

Specification

Accuracy : ±0.2%/F.S. (when combined with model TS-2800/TS-3200A on N-0 compensation.)
 Temperature effect on : +0.03%/F.S./°C the sensitivity
 Operating temperature : 0 to +50°C
 Storage temperature : -20 to +60°C
 Operating humidity : 85% maximum
 Vibration resistance : Within 50 m/s²
 Applicable connector : TRC116-12A10-7M10.5
 Power requirement : 100 VAC, 50/60 Hz, 10 VA
 Accessory : Power cable (2.4 m) Torque signal cable (5 m) Instruction manual Test certificate
 Option (sold separately) : Rotation detector (120 P/R)

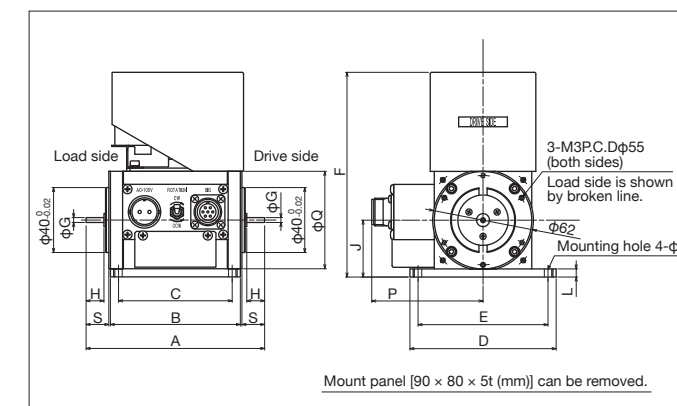
Model name	Applicable detector
MD-0113	MD-201C/501C/102C/202C

Rotation signal cable (MX-8105: 5 m/MX-8110: 10 m /MX-8120: 20 m)
 Rotation direction external selection function (MD-0004)
 •The cable (5 m) is provided as standard, selector switch is sold separately.

Small electric motors drive many of the common machines used in everyday life and business, including digital video camera, DVD player/recorder, and other audio visual equipment and the various tools of office automation: printer, disk drivers, etc. and the parts which are built in the automobiles.
 The torque detectors in the MD Series measure the torque output from these compact, precision motors to the mechanisms.
 By using phase differential principle, the minimum torque measurement is possible by the unit of 0.001 mN-m (with MD-501C).
 MD Series torque detectors are built into the MT Series of small torque measurement systems, where they have established a track record of outstanding reliability in small-motor performance tests.

Notes:

- (1) The MD Series should be used with the model TS-2800/TS-3200A digital torque meter.
- (2) Please refer to the below right drawing when the rotation detector is mounted.
- (3) The rotation detector can be mounted on either one of drive or load side. (It is mounted on drive side if there is no request.)
- (4) Please consult us for details if the optional high speed rotation range as above right table is required.



Dimensions

MD	A	B	C	D	E	F	φG	H	J ^{0.5}	L	φM	P	Q	S	Weight (kg)
201C, 501C, 102C, 202C	110	80	70	90	80	126	3 ^{0/0.1}	11	35	5	4.5	70	60	14	1.5

*Please refer to the page 15 for the dimensions of the detector shaft ends.

SS Series: Torque Detectors for General use, Rotating and Stationary Shafts

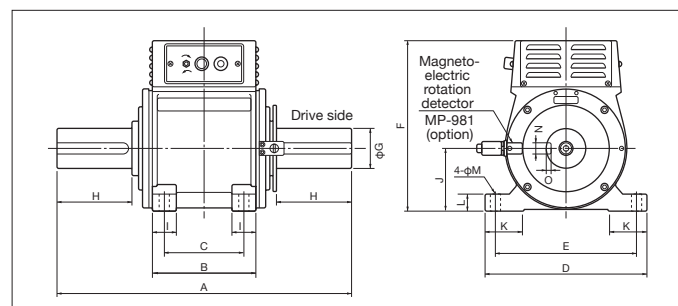
Wide measurement range, from stationary to high-Speed



Model SS	Rated torque (N-m)	Minimum resolution (mN-m)	Rated rotational speed (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
002	0.2	0.1	6,000	4.25 × 10 ⁻⁵	1.67 × 10
005	0.5	0.1	6,000	4.25 × 10 ⁻⁵	4.12 × 10
010	1	1	6,000	4.25 × 10 ⁻⁵	8.24 × 10
020	2	1	6,000	4.25 × 10 ⁻⁵	1.67 × 10 ²
050	5	1	6,000	4.25 × 10 ⁻⁵	4.12 × 10 ²
100	10	10	8,000	5.00 × 10 ⁻⁵	7.75 × 10 ²
200	20	10	8,000	5.00 × 10 ⁻⁵	1.57 × 10 ³
500	50	10	6,000	1.30 × 10 ⁻³	6.18 × 10 ³
101	100	100	6,000	1.30 × 10 ⁻³	1.27 × 10 ⁴
201	200	100	6,000	1.45 × 10 ⁻³	2.54 × 10 ⁴
501	500	100	6,000	1.50 × 10 ⁻³	6.18 × 10 ⁴
102	1,000	1,000	5,000	5.00 × 10 ⁻³	1.67 × 10 ⁵
202	2,000	1,000	5,000	5.25 × 10 ⁻³	3.43 × 10 ⁵

Specification

Accuracy : ±0.2%/F.S. (when combined with model TS-2800/TS-3200A on N-0 compensation.)
 Temperature effect on the sensitivity : +0.03%/F.S./°C
 Operating temperature : 0 to +40°C
 Storage temperature : -20 to +60°C
 Operating humidity : 85% maximum
 Vibration resistance : Within 50 m/s²
 Applicable connector : TRC-116-12A10-7M10.5
 Rotation detecting gear : Provided as standard (60 P/R)
 Power requirement : 100 VAC, 50/60 Hz
 SS-002 to 200: 35 VA
 SS-500 to 202: 50 VA
 Accessory : Power cable (2.4 m)
 Torque signal cable (5 m)
 Instruction manual
 Test certificate
 Key of the detector shaft ends (SS-100, 200, 500, 101, 201, 501, 102, 202)
 Option (sold separately) : Magneto-electric rotation detector (MP-981)
 Rotation signal cable (MX-8105: 5 m)
 Rotation direction external selection function (SS-0004)
 • The cable (5 m) is provided as standard, the selector switch is sold separately.



The SS Series has a long performance sales record in a wide variety of applications, including performance tests of motors, pumps, compressors, blowers, boring machines, and gears. Thanks to the economics of mass production, these detectors are as inexpensive as strain gauge types and they are stocked for immediately delivery. High rigidity results from the unitized cast-casing construction. Combining high performance with ease of use, these standard-type torque detectors require no maintenance or replacement of parts. This series features 13 models, covering the range from 0.2 N-m to 2000 N-m.

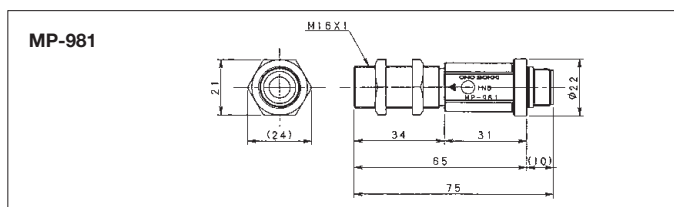
Notes:

- SS Series torque detectors can be connected to any models of TS Series torque meters.
- The standard cable length for torque signal cable is 5 meter and can be extended on request with extra charge when ordering.
- Recommended coupling
 SS-002 to SS-100: Micro coupling
 SS-200 to SS-202: Form-flex coupling
 (Please refer to the page 16 in details.)

Magneto-electric rotation detector MP-981(option)



Specification
 Measurement range: 1 to 20,000 r/min (60 P/R)
 Measurement accuracy: ±0.02%/F.S. at reference time (1 second) of TS Series
 Operating temperature: -10 to +70°C
 Weight : Approx. 80 g



Dimensions

SS	A	B	C	D	E	F	φG	H	I	J	K	L	φM	N ^φ	O	Weight (kg)
002, 005, 010, 020, 050	200	104	70	130	105	167	8 ^{h6}	17	32	50 ^{-0.2}	25	15	10	-	-	5
100, 200	220	104	70	130	105	167	14 ^{h6}	27	32	50 ^{-0.2}	25	15	10	5	3 ^{+0.1} ₀	5.5
500, 101	300	150	115	200	170	230	25 ^{h6}	45	35	80 ^{-0.5}	40	20	14	8	4 ^{+0.2} ₀	14
201, 501	350	150	115	200	170	230	36 ^{h6}	70	35	80 ^{-0.5}	40	20	14	10	5 ^{+0.2} ₀	15
102, 202	430	150	115	230	200	245	55 ^{h6}	110	35	90 ^{-0.5}	55	25	14	16	6 ^{+0.2} ₀	23

*Please refer to the page 15 for the dimensions of the detector shaft ends.

DSTP Series: Torque Detectors for Rotating and Stationary Shafts

Covering large torque capacity with outstanding rigidity and durability



Model DSTP	Rated torque (N-m)	Minimum resolution (mN-m)	Rated rotational speed (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N-m/rad)
500	5,000	1,000	4,000	3.74 × 10 ⁻²	4.81 × 10 ⁵
1000	10,000	10,000	3,000	9.69 × 10 ⁻²	9.71 × 10 ⁵
2000	20,000	10,000	2,000	3.32 × 10 ⁻¹	3.04 × 10 ⁶
5000	50,000	10,000	1,500	8.53 × 10 ⁻¹	7.06 × 10 ⁶

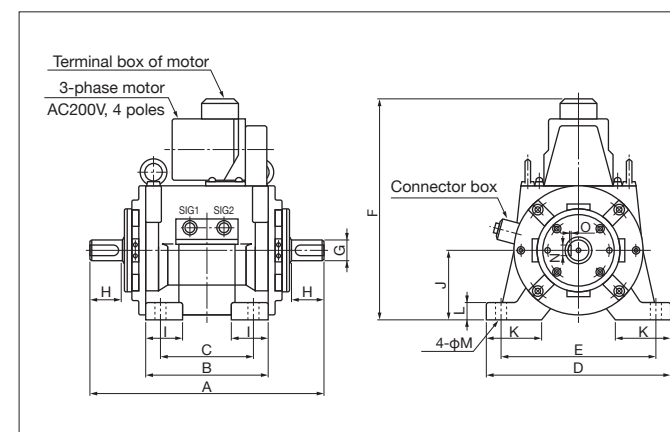
Specification

Accuracy : ±0.2%/F.S. (when combined with model TS-2800/TS-3200A on N-0 compensation.)
 Temperature effect on the sensitivity : +0.03%/F.S./°C
 Operating temperature : 0 to +50°C (DSTP-500/1000)
 0 to +45°C (DSTP-2000/5000)
 Storage temperature : -20 to +60°C
 Operating humidity : 85% maximum
 Vibration resistance : Within 50 m/s²
 Applicable connector : HS12PA-2
 Power requirement : 200 VAC, 50/60 Hz, 3-phase
 Accessory : Torque signal cable (5 m)
 Power cable (5 m)
 Instruction manual
 Test certificate
 Option (sold separately) : Magneto-electric rotation detector (MP-981)
 Rotation detecting gear
 Rotation signal cable (MX-8105: 5 m)

The DSTP Series cover the large capacity range of torque measurement from stationary to high speed. This series have rigid and durable structure, their outstanding capabilities have made them a popular choice in wide variety applications for many years.

Notes:

- DSTP Series torque detectors can be connected to any models of TS Series torque meters.
- The DSTP Series are semi-standard models manufactured on order. They are designed for use in high-speed and large torque measurement. Owing to coupling balance and critical speed problem being raised at high speed, please check the rate of rotation before ordering. Please consult us for details.



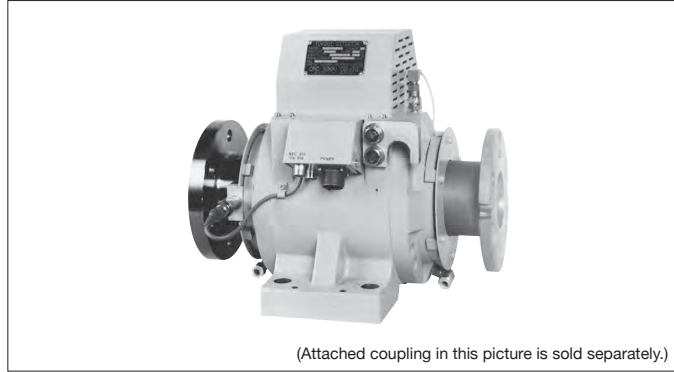
Dimensions

DSTP	A	B	C	D	E	F	φG	H	I	J	K	L	φM	N ^φ	O	Weight (kg)
500	640	320	250	370	310	390	85 ^{h6}	120	100	125 ⁰ _{-0.5}	125	40	27	25	9 ^{+0.2} ₀	120
1000	700	320	250	370	310	390	110 ^{h6}	140	100	125 ⁰ _{-0.5}	125	40	27	28	10 ^{+0.2} ₀	140
2000	900	360	280	520	450	540	140 ^{h6}	220	120	200 ⁰ _{-0.5}	150	55	33	36	12 ^{+0.3} ₀	330
5000	1100	360	280	520	450	540	170 ^{h6}	300	120	200 ⁰ _{-0.5}	150	55	33	45	15 ^{+0.3} ₀	450

*When the rotation detecting gear (option) is mounted, the dimensions of "H" is different from the above table. Please check it when ordering.

DD Series: Torque Detectors for Rotating and Stationary Shafts

Measurement from small to large capacity with high speed rotation



(Attached coupling in this picture is sold separately.)

Model DD	Rated torque (N·m)	Minimum resolution (mN·m)	Rated rotational speed (r/min)	Allowable range (r/min)	Inertia moment (kgm ²)	Torsional stiffness (N·m/rad)	Load value
							radial Thrust (N) (N)
503	0.5	0.1	20,000	0 to 30,000	1.00 × 10 ⁻⁵	3.82 × 10	—
104	1	1	20,000	0 to 30,000	1.00 × 10 ⁻⁴	7.26 × 10	—
204	2	1	20,000	0 to 30,000	1.00 × 10 ⁻⁵	1.32 × 10 ²	—
504	5	1	20,000	0 to 30,000	1.00 × 10 ⁻⁵	2.62 × 10 ²	—
105	10	10	20,000	0 to 30,000	5.93 × 10 ⁻⁵	6.18 × 10 ²	—
205	20	10	20,000	0 to 30,000	5.95 × 10 ⁻⁵	1.11 × 10 ³	—
505	50	10	10,000	0 to 13,000	1.5 × 10 ⁻³	3.63 × 10 ³	300, 1,500
106	100	100	10,000	0 to 13,000	1.5 × 10 ⁻³	7.06 × 10 ³	300, 1,500
206	200	100	10,000	0 to 13,000	1.5 × 10 ⁻³	1.37 × 10 ⁴	300, 1,500
1506B	500	100	8,000	0 to 10,000	8.6 × 10 ⁻³	5.30 × 10 ⁴	300, 2,000
1107B	1,000	1,000	8,000	0 to 10,000	8.6 × 10 ⁻³	9.90 × 10 ⁴	400, 2,000
1207B	2,000	1,000	8,000	0 to 10,000	8.7 × 10 ⁻³	1.77 × 10 ⁵	400, 2,000
507	5,000	1,000	6,000	0 to 6,000	4.8 × 10 ⁻²	5.36 × 10 ⁵	600, 2,000
108	10,000	10,000	4,000	0 to 4,000	1.43 × 10 ⁻¹	1.23 × 10 ⁶	800, 2,000

Remarks: • Drip-feed lubrication system is standard at DD Series.
• The above rated rotational speed are the values for the detector alone, and vary depending on the load balance of the coupling connected to the shaft ends and the mounting method of the coupling.

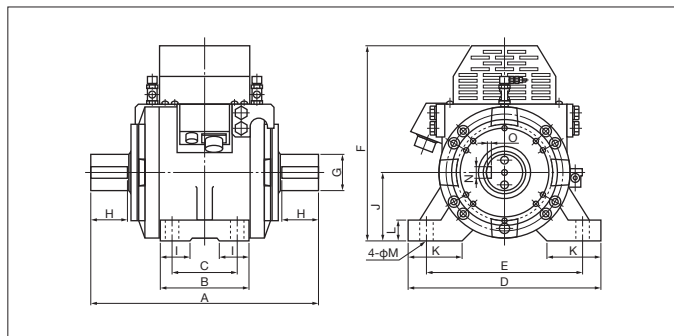
The DD Series is high performance of SS Series, which can measure the larger capacity torque at higher speed. DD-505 to DD-108 are mostly suitable for the torque measurement with heavy load. The double bearings provide three to five times the strength of the DSTP Series under radial and thrust load. Further, it can be connected directly with propeller shaft which does not need the intermediate coupling and save space as well. Oil drop lubrication unit is required.

Notes:

- Radial loads are recovery forces caused by eccentricity and miscentering of the coupling when the shaft rotates. The load specifications are limit values. Loads of these values would affect vibration performance and service life.
- Please consult us for details if the optional high speed rotation range as above table is required.
- Interference-fit coupling is recommended.
- Please consult us concerning the weight of the coupling.
- A rotation detector can not be attached with the main body of DD Series detector. If it is required to measure the rotation, please consult us for details.
- Spindle oil (ISO VG22) should be used for lubrication at a rate of 20 to 30 drops per minute.
- Grease lubrication type is also manufactured depending on the specification. Please consult us for details.

Specification

Accuracy : ±0.2%/F.S.
(when combined with model TS-2800/TS-3200A on N-0 compensation.)
Temperature effect on the sensitivity : +0.03%/F.S./°C
Operating temperature : 0 to +50°C
Storage temperature : -20 to +60°C
Operating humidity : 85% maximum
Vibration resistance : Within 50 m/s²
Applicable connector : TRC116-12A10-7M10.5
Power requirement : 200 VAC, 50/60 Hz, 3-phase
Accessory : Torque signal cable (5 m)
Power cable (5 m)
Instruction manual
Test certificate
Option (sold separately) : Drip-feed lubrication unit (DD-0101, DD-0102)
Rotation detector
Main shaft bearing temperature alarm unit



Dimensions

DD	A	B	C	D	E	F	φG	H	I	J _{-0.5}	K	L	φM	N ^{±0.5}	O	Weight (kg)
503, 104, 204	185	75	50	180	150	215	8 ^{h5}	16	—	65	60	20	12	—	—	20
504	185	75	50	180	150	215	8 ^{h5}	16	—	65	60	20	12	3	1.8 ^{+0.1/0}	20
105, 205	230	100	70	200	170	240	14 ^{h5}	20	—	80	60	20	12	5	3 ^{+0.1/0}	25
505, 106, 206	320	125	90	240	200	280	36 ^{h6}	40	—	85	80	30	19	10	5 ^{+0.2/0}	40
1506B, 1107B, 1207B	380	135	90	280	240	318	60 ^{h6}	65	—	95	90	30	23	18	7 ^{+0.2/0}	53
507	600	230	180	410	345	420	85 ^{h6}	105	80	150	105	40	26	25	9 ^{+0.2/0}	180
108	680	230	180	410	345	420	110 ^{h6}	130	80	150	105	40	26	28	10 ^{+0.2/0}	210

*Please refer to page 15 for the key dimensions.

Torque Meter TS-2800

Compact and space-saving design



The TS-2800 performs calculation, display and output of torque and rotation speed by using signals from torque detector and rotation detector. Can be used with our long-selling torque detectors MD/SS/DD/DSTP series (Phase difference method using gears) and TH series (Phase difference method using electromagnetic induction theory).

Option:

- TS-0281** High-speed response output function for TH series: Adds three more selections of the response setup (0.8 ms, 0.4 ms or 0.16 ms) Adds low-pass filter function (option only for the TH series)
- TS-0282** Time constant change function for DD series: Replace the response setup to 63 ms/16 ms. (option only for the DD series)
- TS-0283** BCD output function: Output digital data every second
- TS-0284** Rotation pulse output function: Synchronously output 0 to 5 V signal after waveform-shaping from a rotation detector

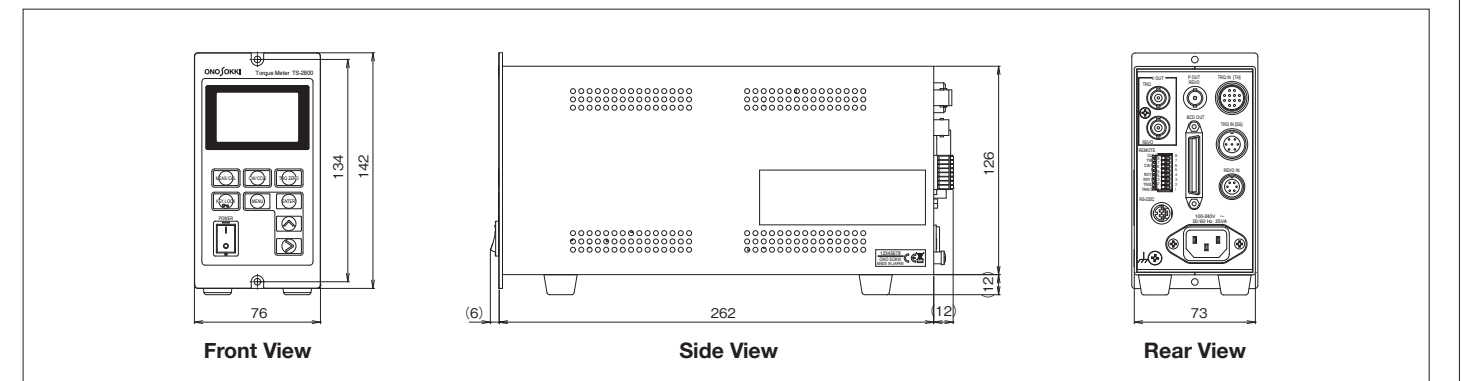
Notes:

- The exclusive power cable (sold separately) is required when the TS-2800 is used on the voltage over 125 V. (The withstand voltage of the cable provided as standard:125 V)
- Set up the time constant value of the analog output 63 ms or more when the TS-2800 is used with MD, SS series detectors.
- Please connect either one of SS type or TH type torque detector.

Specification

■ **Applicable detector**
Torque detector : TH type (Phase difference method using electromagnetic induction theory; TH series)
SS type (Phase difference method using gears; MD, SS, DD, DSTP Series)
Rotation detector : Magneto-electric rotation detector (MP-981/9820)
Optical rotation detector (MD-0100 series)
■ **Display**
Display: LCD

Display contents : torque, rotation speed
Condition display : Sensor mode, measurement ready, torque signal input, rotation signal input, rotation direction, analog output scale setting value
Display update interval : 1 s/10 s/external
Condition display; 0.5 s
■ **Torque measurement**
Number of display digits (with polarity) : TH type; 4/5-digit selectable
Other than TH type; 4-digit
Measurement unit: mN·m, N·m, kN·m
Measurement accuracy : ±0.1%/F.S. or ±0.2%/F.S. (depending on the accuracy of detector connected)
Compensation range of torque factor : 0.8000 to 1.2000
N-0 compensation : 5 points for each direction of CW/CCW
Other functions : Zero setting, analog output calibration
■ **Torque analog output**
Output: Voltage
Output voltage : 0 to ±10 V/rated torque
Voltage selection : Selectable from 2 V, 2.5 V, 3.33 V, 5 V, 6.67 V, 10 V
Time constant : TH type; 500 ms, 63 ms, 16 ms, 1.6 ms (standard)
0.8 ms, 0.4 ms, 0.16 ms (added optionally)
SS type; 500 ms and 63 ms (standard)
63 ms and 16 ms (selectable either one of the pair optionally)
Low pass filter : Available only TH type: 50 Hz, 100 Hz, 500 Hz, 1 kHz, 5 kHz (added optionally)
Output accuracy : ±0.1%/F.S. or ±0.2%/F.S. (depending on the accuracy of detector connected)
Applicable connector : C02 type (BNC) plug
■ **Rotation speed measurement**
Number of display digits : 5-digit (0 to 99,999 r/min)
Measurement accuracy : ±0.02%/F.S ±1 count (10 Hz or more, 1-s average)
F.S. range: 200 to 100,000 r/min
Number of signals of detector : 1 to 9999 P/R
Other function : Analog output calibration
Applicable connector: R03-PB6M
■ **Rotation speed analog output**
Output: Voltage
Output voltage: 0 to +10 V/F.S.
Time constant: TH type; 0.16 ms
SS type; 63 ms
Output accuracy: ±0.1%/F.S.
Applicable connector : C02 type (BNC) plug
■ **Rotation pulse output (added optionally)**
Number of output pulses : Same as the input pulse
Output level : Lo; +0.5 V or less, Hi; +5±0.5 V
Applicable connector : C02 type (BNC) plug
■ **Remote function**
Input signal : CW/CCW changeover, display/output clear, display/BCD trigger
Output signal : Trigger output (synchronous updating), measurement ready
Signal format: See page 7
Applicable connector : FK-MC0.5/8-ST-2.5 (Made by Phoenix Contact) provided as standard
■ **RS-232C**
Function : Readout of measurement value and setting condition, setting of zero value, N-0 value, readout of other functions
Baud rate: 9600 bps (fixed)
Applicable cable : AX-5022 (2 m) with D-sub 9-pins one of the cable ends
■ **BCD output (added optionally)**
Function : Output of torque/rotation speed
Output update : Every display update time
Signal format : See page 7
Applicable connector : DX40-50P or DX30-50P (Made by HIROSE)
■ **General specification**
Power supply voltage : 100 to 240 VAC, 50/60 Hz
Power consumption: 28 VA
Operating temperature range : 0 to +40°C
Weight: Approx. 2 kg
CE marking : EMC, Low Voltage Directive
Accessory : Available connector for remote control
Rubber foot × 4
Power cable (1.9 m)
Instruction manual



Torque Meter TS-3200A

Advanced model with various interfaces



The TS-3200A uses an LCD display for setting measurement condition and displaying the measurement data. Settings are easy to make, and different numerical display formats can be selected to suit various applications. Ten torque detection settings can be stored in memory, which is a very convenient function when you have several torque detectors.

Notes:

- (1) The exclusive power cable (sold separately) is required when the TS-3200A is used on the voltage over 125 V. (The withstand voltage of the cable provided as standard: 125 V)
- (2) Set up the time constant value of the analog output 63 ms or more when the TS-3200A is used with MD, SS Series detectors.

Specification

Torque Measurement Section

Input Section
 Input signal
 : Signal detected by Phase-difference type detectors of Ono Sokki
 Applicable connector
 : TRC116-12A10-7M10.5

Setting Section
 Unit: mN-m, N-m, kN-m
 Zero compensation
 : 1 point each for CW and CCW; manual and automatic
 N-0 compensation
 : 10 points each for CW and CCW; manual and automatic

Display Section
 Number of digits displayed
 : Polarity indication + 4-digit, Polarity indication + 5-digit, selectable
 Display update interval
 : 1 to 10 s (in 1-s increments), or external input signal
 Accuracy (1-s average)
 : With N-0 compensation; ±0.2%/F.S. ±1 count
 Measurement item
 : MAX, MIN, P-P and RIPPLE factor

Setting Section

Unit: r/min, r/s, Hz
 Number of pulses: 1 to 99999 P/R
 Gear ratio
 : ±1 to 9999/1 to 9999
 Possible to display of rotation speed before speed change.
 Offset
 : ±1 to 9999 (Only when the unit is r/min.)
 Measured value = actual value - offset

Display Section
 Number of display digits: 5-digit
 Display resolution
 : 0.001, 0.01, 0.1, 1, selectable from the capacity (full scale) setting
 Display update interval
 : Same as the torque section
 Accuracy (1-s average): ±0.05%/F.S.

Output (Power) Processing Section

Processing Method
 Output (W) = torque (N-m) × rotation speed (r/min) × 2π/60
 Output (PS) = 0.7355 kW

Display Section

Number of display digits
 : Polarity indication + 5-digit
 Unit: mW, W, kW, PS
 Accuracy
 : Torque display accuracy + rotation speed display accuracy

Interface Section

Only either one of the TS-0325 or TS-0326 can be installed.
Analog output
 Analog output format: Voltage output
 Number of output
 : 2ch (standard)
 One analog output channel is added by the TS-0328 (sold separately)
 Output item
 : Selectable from torque, rotation speed or output (POWER)
 Time constant: 16 ms to 64 s
 Scale
 : Voltage of the full scale can be set from 0.1 V to 10 V in 0.1 V steps.
 Accuracy (1 s average)
 : Torque; ±0.2%/F.S. (at N-0 compensation)
 Rotation; ±0.1%/F.S.
 Output; Torque output accuracy + rotation speed output accuracy

Applicable connector
 : C02 type (BNC) plug
TS-0321A Analog output high-speed response (sold separately)
 Analog voltage output up to 1 ms can be added by this optional function.
 Channel: 2ch
 Output connector
 : Output from terminal of analog voltage output
 Restriction
 : No comparator output
 Fixed analog output time constant. SS and MD Series torque detectors cannot be used with.

Remote function
 Input signal
 : CW/CCW, clear input, trigger input.
 Non-voltage contact or voltage (Hi +4 to 5.25 V, Lo 0 to +1 V)
 Output signal
 : Trigger output, ready output, Semiconductor (max. load: 30 VDC, 0.1 A)
 Applicable connector
 : R03-PB8M (provided as standard)
TS-0322A Comparator output (sold separately)
 Channel: 4ch
 Item
 : Upper or lower level limit setting of the torque, rotation speed, and output

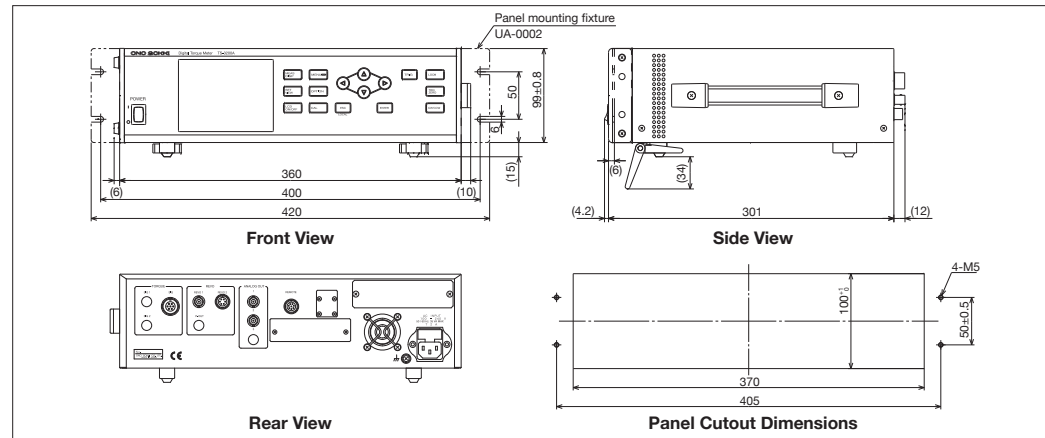
Option (sold separately)
Panel mounting fixture
 UA-0001 for 480-mm width racks
 UA-0002 for mounting in a panel cutout of the same width as the TS-3200A

Output update
 : At the specified interval (0.004 to 10 s, External)
 Reference comparison
 : Average value at each specified time
 Output format
 : Semiconductor relay (max. load: 30 VDC, 0.1 A)
 Applicable connector
 : RM12BPE-6S (provided as standard)
TS-0323 BCD output (sold separately)
 Channel: 2ch
 Item
 : Two items selectable from torque, rotation speed, and output
 Output update
 : At each gate time set (0.1 to 10 s, External) or at each sampling interval
 Output format
 : Positive logic open collector output
 Applicable connector
 : 57-30500 Amphenol full pitch, 50-pin
TS-0325 RS-232C (sold separately)
 Standard
 : Conforms to EIA and JIS X5101
 Baud rate (bps)
 : 1200, 2400, 4800, 9600, 19200
 Applicable connector
 : D-sub 9-pin, female

TS-0326 GPIB (sold separately)
 Electrical and mechanical specification
 : Conforms to IEEE 488-1978
TS-0327 Rotation pulse output (sold separately)
 Channel: 1ch
 Number of output pulse
 : Same as number of input pulse
 Output format: TTL level
 Applicable connector
 : C02 type (BNC) plug

General Specification
 Power supply voltage
 : 100 to 240 VAC ±10%, 50/60 Hz
 Power consumption : 75 VA.
 Operating temperature range
 : 0 to +40°C
 Storage temperature range
 : -10 to +55°C
 Weight : Approx. 5 kg
 Accessory
 : Instruction manual
 Power cable (1.9 m)
 Applicable connector for remote control

Option (sold separately)
Panel mounting fixture
 UA-0001 for 480-mm width racks
 UA-0002 for mounting in a panel cutout of the same width as the TS-3200A

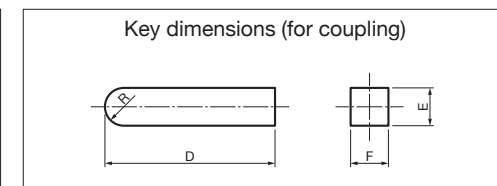
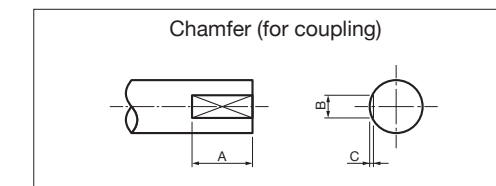


Phase difference method using electromagnetic induction theory

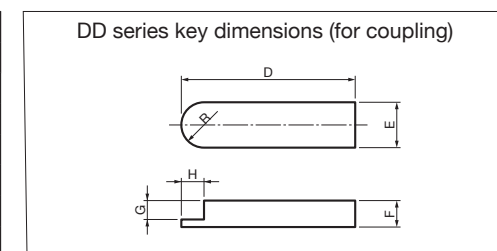
Model name		Chamfer			Key dimensions			
		A	B	C	D	E _{H9}	F	R
TH-1000	1204, 1504	17	4	0.5				
	1105, 1205				25	5	5 ⁰ _{-0.03}	2.5
	1505, 1106				40	8	7 ⁰ _{-0.09}	4
TH-2000	1206, 1506				65	10	8 ⁰ _{-0.09}	5
	2204, 2504	17	4	0.5				
TH-3000	2105, 2205				25	5	5 ⁰ _{-0.03}	2.5
	3502, 3502H 3103, 3103H 3203, 3203H	10	3	0.5				
TH-3000	3503, 3503H 3104, 3104H 3204, 3204H	14	4	0.5				

Phase difference method using gears

Model name		Chamfer			Key dimensions				Attached motor specification		
		A	B	C	D	E _{H9}	F	R	Power requirement	No. of poles	Consumption power (VA)
MD	201C to 202C	Without chamfer			No using of key				100 VAC	Single-phase 2 poles	10
SS	002, 005, 010, 020, 050	17	4	0.5					100 VAC	Single-phase 4 poles	35
	100, 200				25	5	5 ⁰ _{-0.03}	2.5	100 VAC	Single-phase 4 poles	35
	500, 101				40	8	7 ⁰ _{-0.09}	4	100 VAC	Single-phase 4 poles	50
	201, 501				65	10	8 ⁰ _{-0.09}	5	100 VAC	Single-phase 4 poles	50
	102, 202				105	16	10 ⁰ _{-0.09}	8	100 VAC	Single-phase 4 poles	50
DSTP	500				118	25	14 ⁰ _{-0.11}	12.5	200 VAC	3-phase 4 poles	120
	1000				137	28	16 ⁰ _{-0.11}	14	200 VAC	3-phase 4 poles	120
	2000				215	36	20 ⁰ _{-0.13}	18	200 VAC	3-phase 4 poles	460
	5000				294	45	25 ⁰ _{-0.13}	22.5	200 VAC	3-phase 4 poles	460
DD*	503, 104, 204	15	4	0.5					200 VAC	3-phase 4 poles	25
	504				15	3	3 ⁰ _{-0.025}	1.5			
	105, 205				22.5	5	5 ⁰ _{-0.03}	2.5	200 VAC	3-phase 4 poles	50
	505, 106, 206				39	10	8 ⁰ _{-0.09}	5	200 VAC	3-phase 4 poles	50
	1506B, 1107B, 1207B				70	18	11 ⁰ _{-0.11}	9	200 VAC	3-phase 4 poles	140
	507				113	25	14 ⁰ _{-0.11}	12.5	200 VAC	3-phase 4 poles	140
108				137	28	16 ⁰ _{-0.11}	14	200 VAC	3-phase 4 poles	140	



Model name	Key dimensions	
	G	H
504	—	—
105, 205	2.5	2.5
505, 106, 206	—	—
1506B, 1107B, 1207B	7	7
507	7	9
108	9	8

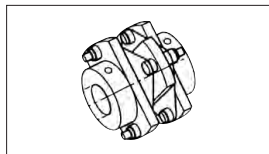


Recommended Couplings for Torque Detection

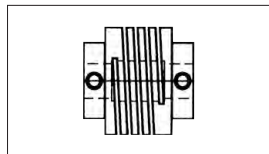
	Micro	Helical	Servoflex	NSO Diaphragm	Form-flex
Recommended torque detector	SS-002 to SS-100	Low-capacity models	Low to high capacity models	High-capacity models	SS-200 to SS-202
Maximum rotation	20,000 r/min / 10 N-m	25,000 r/min / 2.5 N-m	10,000 r/min	23,000 r/min / 1,090 N-m	19,000 r/min / 1,300 N-m
Transmitted torque capacity	10 N-m max.	2.5 N-m max.	0.25 to 250 N-m or less	200 to 38,140 N-m	20 to 181,500 N-m
Features	<ol style="list-style-type: none"> No backlash Large torsional rigidity Non-magnetic material Easy maintenance Eccentric, angle of deviation absorption Low inertia moment Water-resistant, chemical-resistant, oil-resistant 	<ol style="list-style-type: none"> No backlash Small-format, lightweight Ideal for use with micro precision devices Easy maintenance Eccentric, angle of deviation absorption Low inertia moment Duralmin material (non-magnetic material) and stainless, two types 	<ol style="list-style-type: none"> No backlash High rigidity (torsional direction), ultra low inertial High concentricity (Centering in reference axis) Eccentric, angle of axis direction deviation absorption High power aluminium alloy Various kind of sizes (shaft diameter ϕ3 to 45) Easy to fasten with clamp method Specify total length, key grooving, applicable to taper axis 	<ol style="list-style-type: none"> No backlash Large torsional rigidity Large allowable eccentric, angle of deviation tolerance Lightweight, easy attachment and removal High-speed rotation enabled Easy maintenance Water-resistant, chemical-resistant, oil-resistant Fail-safe structure 	<ol style="list-style-type: none"> No backlash Large torsional rigidity Large allowable eccentric, angle of deviation tolerance Lightweight, easy attachment and removal High-speed rotation enabled Easy maintenance Water-resistant, chemical-resistant, oil-resistant Fail-safe structure
Weight	280 (g) (At 10 N-m transmitted torque)	38 (g) (Duralmin) (At 2.3 N-m transmitted torque)	4 (g) (At 0.25 N-m transmitted torque) 1.7 (kg) (At 250 N-m transmitted torque)	4 (kg) (At 200 N-m transmitted torque)	3.7 (kg) (At 250 N-m transmitted torque)
Usage methods	<ol style="list-style-type: none"> Extend the cores of the torque detector and the target measurement object shafts, and then attach the flanges, plate springs and spacers. Move the devices in the axial direction to attach and remove the couplings. Eccentricity and angle deviation are exceedingly small at high rotations. 	<ol style="list-style-type: none"> Extend the cores of both shafts, and then move the devices in the axial direction to connect the couplings to the shafts. Move the devices in the axial direction to attach and remove the couplings. At 25,000 r/min, Core extension 0.1 mm max. Angle of deviation 0.5° max. 	<ol style="list-style-type: none"> Extend the cores of the shafts, and then insert it while preventing compression or pulling force is applied to the element. Check the couplings are able to move to axis direction and rotation direction, then fasten the clamp bolt. 	<ol style="list-style-type: none"> Attach flanges to both devices, extend the cores, and then insert the flexible units. The couplings can be attached or removed without any need to move the devices in the axial direction. 	<ol style="list-style-type: none"> Attach hubs to both devices, extend the cores, and then insert the element spacers. The couplings can be attached or removed without any need to move the devices in the axial direction.
Operating temperature range	-30 to +100°C	-40 to +150°C	-30 to +100°C	-100 to +320°C 120 to 150°C (heating temperature for heat shrinking)	-30 to +100°C 90 to 120°C (heating temperature for heat shrinking)
Applicable torque	10 N-m max.	2 N-m max.	0.25 to 250 N-m	200 to 30,000 N-m	34 to 100,000 N-m
Configuration (see diagrams below)	A	B	C	D	E

■ Coupling Figure

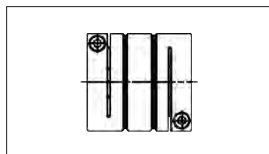
A : Micro



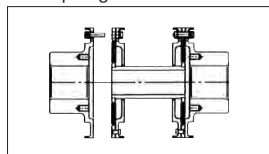
B : Helical



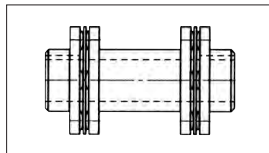
C : Servoflex



D : Diaphragm

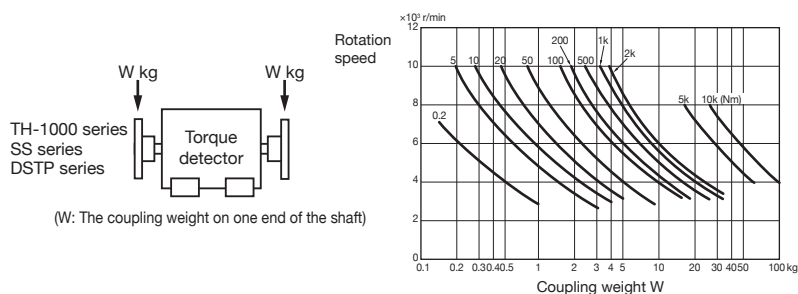


E : Form-flex



■ Rotation speed and Coupling Weight

The weight of the coupling that can be attached to the torque detector is determined by the maximum rotation speed used. Please refer to the following chart for details.



■ Coupling centering accuracy

The coupling centering accuracy should be less than 0.05 mm (depending on the rotation speed). No abnormal noise or vibration should not be caused.

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