

HIGH ACCURATE MEASUREMENTS

# Digital Torque Meters

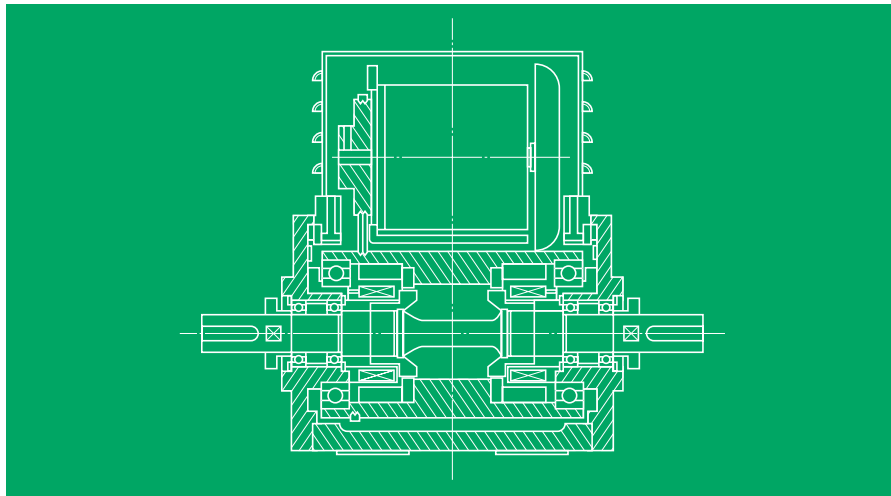
## SELECTION GUIDE



Ono Sokki Torque Meters adopt the original phase difference method to achieve highly accurate and repeatable torque measurements and cover a wide range of applications from mechanical load measurements to torque revolution characteristics measurement of driving motors.

**ONOSOKKI**

# Torque Measurement Demand Quality and Durability in All Environments. Advanced Technology Provides the Solutions.



**Ono Sokki Covers the Full Range of Torque Measurement, from mN·m to kN·m, from Stationary Shafts to Ultra-High-Speed Revolution, Aiming for the Unvarying Maximum in Efficiency, Performance and Reliability.**

## Digital Torque Detector & Digital Torque Meter with Arithmetic Operation Display Features

### ■ 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 revolution range

Ono Sokki has long years of experience in manufacturing torque detectors with an revolution range from 0 to 100,000r/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 is 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

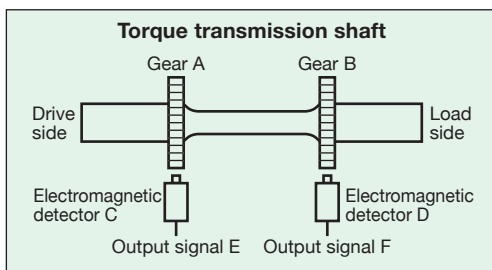
There are several convenient input and output functions for safety and control such as the synchronized driving of torque arithmetic operation display units, zero hold, and measurement preparation output.\*2

\*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.

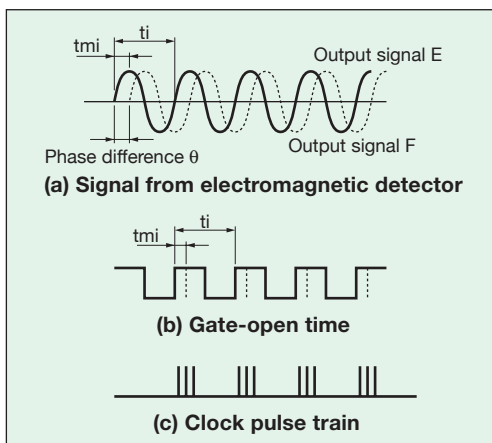
\*2) Varies according to the model.

# Digital Torque Meter Principle

When power is transmitted by a shaft, the shaft undergoes a torsional twisting through an angle which is proportional to the transmitted torque. A digital torque meter coupled to non-contact type electromagnetic detectors facing gears mounted at two points on the shaft detects the torsion angle as the phase difference between two AC signal voltages. Some subtle digital processing, referenced to a highly accurate and stable crystal oscillator, converts the phase difference into a measurement of the transmitted torque. The torsion angle can be detected by inserting a torque detector at a point on the torque transmission shaft.

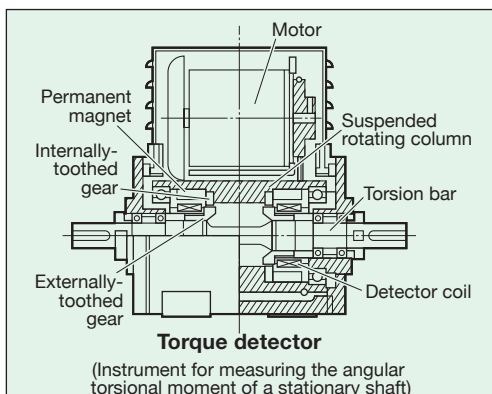


The torque transmission shaft twists through an angle proportional to the size of the applied torque, so the teeth of gears A and B are displaced in relative position by an amount equal to the torsional angle. Since detectors C and D generate AC voltages with waveforms that track the rotation of gears 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 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 Range depending on the Torque Detector

Model of torque detector	Features	Measurement range	Reference Page
SS series	Standard and general use model	200mN·m to 2kN·m	6
SS-2000 series	Torque measurement under high rotational speed with grease lubrication	5N·m to 20N·m	7
MD series	Small torque measurement under high rotational speed	2mN·m to 2N·m	8
DSTP series	High rigidity and durability type	200mN·m to 100kN·m	9
DD series	Torque measurement under high rotational speed	500mN·m to 10kN·m	10

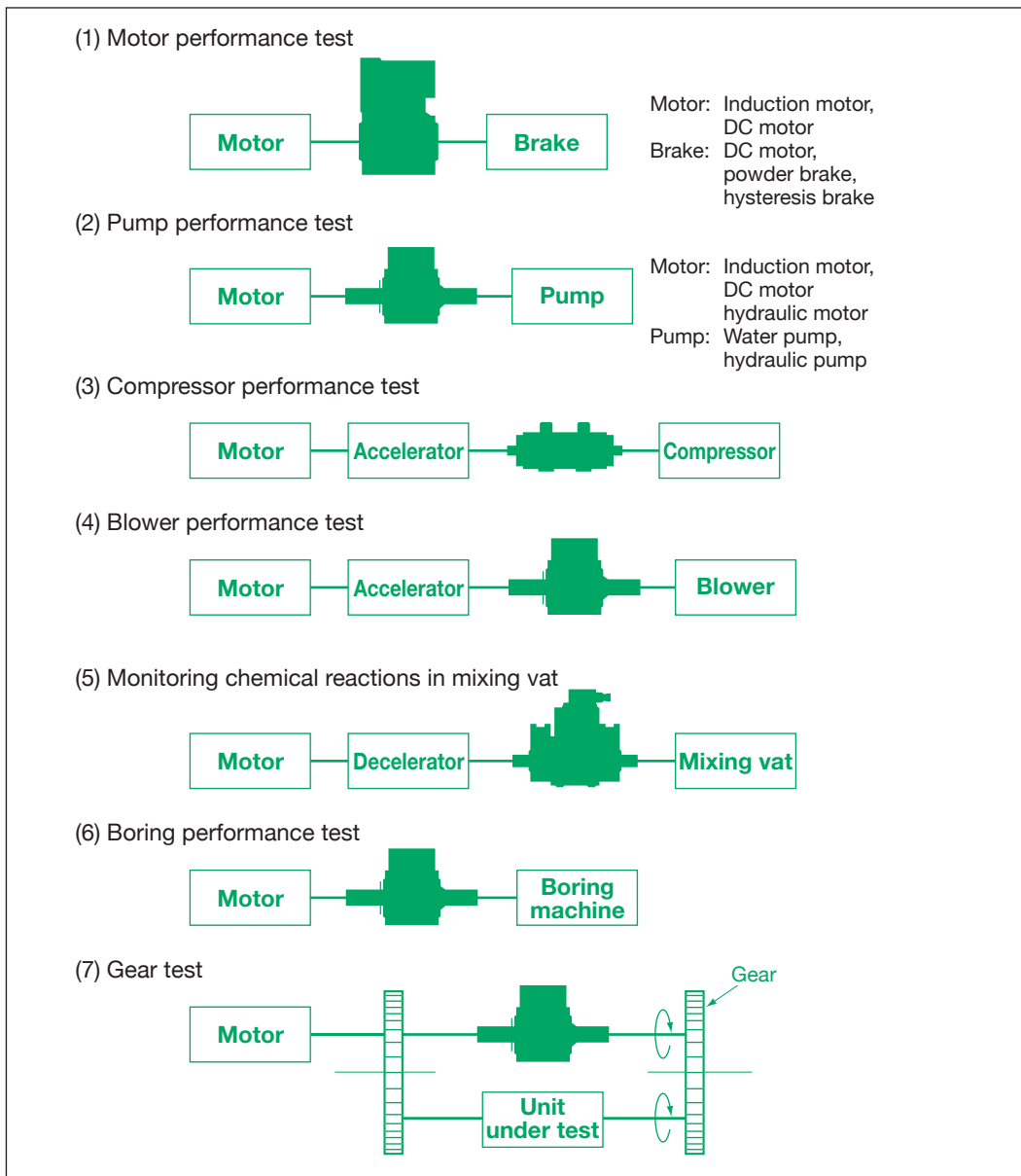
## Comparison Table in specification of Digital Torque Meter

Specification		TS-2700	TS-3200A	Remarks	
Reference page		Page 12, 13	Page 14, 15		
Measurement items		Torque, Revolution	Torque, Revolution, Output (Power)*	*Calculated value	
Measurement unit	Torque	N·m (mN·m*, kN·m*)	mN·m, N·m, kN·m	*Adhesive seal are used to enable the use of these units.	
	Revolution	r/min (r/s*)	r/min, r/s	*Adhesive seal are used to enable the use of this unit.	
	Output (Power)	Not available	mW, W, kW, PS		
Digital display	No. of display digits		4 digits	5 digits	
	Display device		Green LED	LCD with back light	
	Display switching interval		1s, 10s	1s to 10s (at every 1s)	
	Measurement	Torque	±0.2%/FS	±0.2%/FS	With N-0 compensation
	Display accuracy (at 1s reference interval)	Revolution	±0.02%/FS*	±0.05%/FS*	*FS is selectable.
	Absolute value display		Not available	Available	
	Data hold function		Not provided	Max. value, Min. value, Peak-to-Peak value	
No. of detector's parameter setting memory		1 model	10 models		
Revolution input		Provided*	Provided	*DC amplifier only	
Comparator function		Not available	4-channel (Option: TS-0322A)		
Analogue output	Response time (Time constant)		(500ms, 63ms)*	(16ms, 64s)*	*Higher speeds are possible as option (Model TS-0321)
	Output level		±10V/FS	±10V/FS	
	No. of outputs		1 channel each for torque and revolution	2-channel*	*3-channel is possible as an option (Model TS-0328).
	Accuracy	Torque Revolution	±0.2%/FS ±0.2%/FS	±0.2%/FS ±0.1%/FS	1-s averaged value
	Output attenuator		Not available	in 0.01V steps	Adjust the output level.
Interface		BCD/RS-232C	BCD* (Model TS-0323) /GP-IB* (Model TS-0326) /RS-232C* (Model TS-0325)	*Option TS-0326 and TS-0325 can not be built in the TS-3200A simultaneously.	
Dimensions (mm) W x H x D		76 x 142 x 302	360 x 99 x 301		
Weight		Approx. 1.8kg	Approx. 5kg		
CE marking		Available as an option	Available as an option		
Panel mounting		Panel mounting fixture is not required.	Panel mounting fixture is provided as an option.		

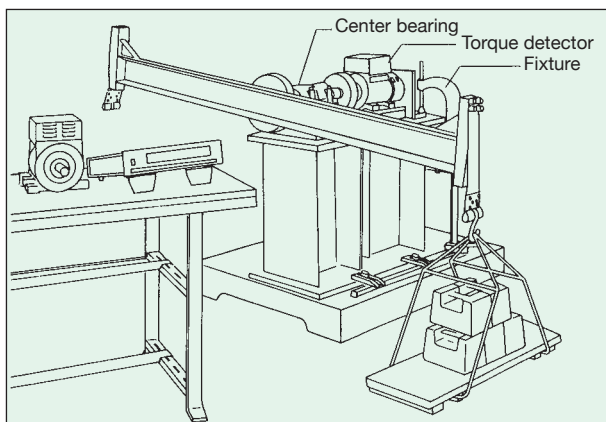
\*FS is abbreviation of Full Scale.

# 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



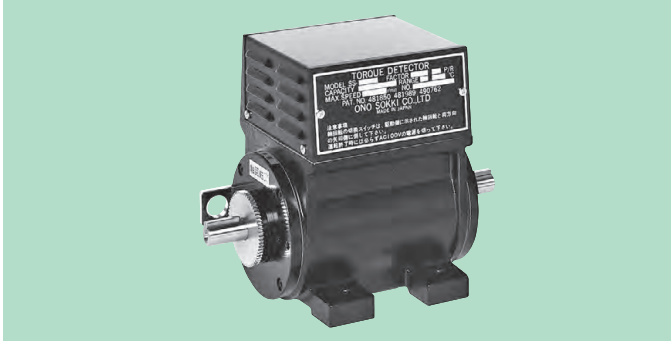
Example:

$$\text{Torque} = W \times \ell$$

( 500Nm = 500N x 1m )

# SS Series: Torque Detectors for Rotating and Stationary Shafts.

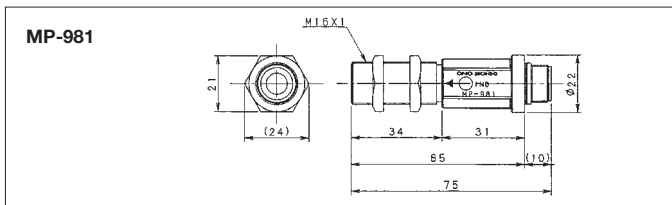
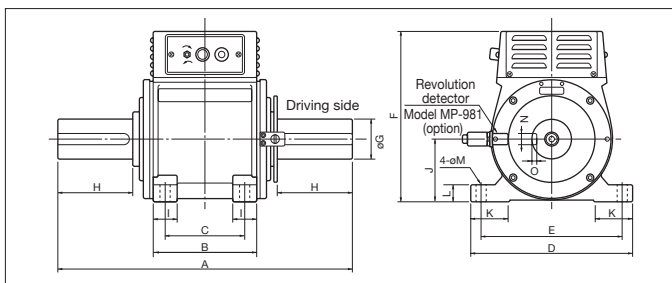
*Wide measurement range, from Stationary to High-Speed.*



The SS Series has a long performance sales record in a wide variety of applications, including performance tests of motors, pumps, compressors, blowers, boring machine, 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 0.2N·m to 2000N·m.

## Notes:

- (1) SS series torque detectors can be connected to any models of TS-series digital torque meters except the TS-7700 Torque Station Pro.
- (2) The standard cable length for torque signal cable is 5 meter and can be extended on request with extra charge when ordering.
- (3) Recommended coupling  
Model SS-002 to SS-100: Micro coupling  
Model SS-200 to SS-202: Form-flex coupling  
(Please refer to the page 16 in details.)



## Dimensions

SS	A	B	C	D	E	F	øG	H	I	J	K	L	øM	N <sup>ø9</sup>	O	Weight (kg)
002, 005, 010, 020, 050	200	104	70	130	105	167	8 <sup>h6</sup>	17	32	50 <sup>0</sup> <sub>-0.2</sub>	25	15	10	-	-	5
100, 200	220	104	70	130	105	167	14 <sup>h6</sup>	27	32	50 <sup>0</sup> <sub>-0.2</sub>	25	15	10	5	3 <sup>+0.1</sup> <sub>0</sub>	5.5
500, 101	300	150	115	200	170	230	25 <sup>h6</sup>	45	35	80 <sup>0</sup> <sub>-0.5</sub>	40	20	14	8	4 <sup>+0.2</sup> <sub>0</sub>	14
201, 501	350	150	115	200	170	230	36 <sup>h6</sup>	70	35	80 <sup>0</sup> <sub>-0.5</sub>	40	20	14	10	5 <sup>+0.2</sup> <sub>0</sub>	15
102, 202	430	150	115	230	200	245	55 <sup>h6</sup>	110	35	90 <sup>0</sup> <sub>-0.5</sub>	55	25	14	16	6 <sup>+0.2</sup> <sub>0</sub>	23

Model SS	Measurement range (N·m)	Minimum resolution (mN·m)	Revolution range (r/min)	Inertia moment (kgm <sup>2</sup> )	Spring constant (N·m/rad)
002	0.2	0.1	0 to 6000	4.25 x 10 <sup>-5</sup>	1.67 x 10
005	0.5	0.1	0 to 6000	4.25 x 10 <sup>-5</sup>	4.12 x 10
010	1	1	0 to 6000	4.25 x 10 <sup>-5</sup>	8.24 x 10
020	2	1	0 to 6000	4.25 x 10 <sup>-5</sup>	1.67 x 10 <sup>2</sup>
050	5	1	0 to 6000	4.25 x 10 <sup>-5</sup>	4.12 x 10 <sup>2</sup>
100	10	10	0 to 8000	5.00 x 10 <sup>-5</sup>	7.75 x 10 <sup>2</sup>
200	20	10	0 to 8000	5.00 x 10 <sup>-5</sup>	1.57 x 10 <sup>3</sup>
500	50	10	0 to 6000	1.30 x 10 <sup>-3</sup>	6.18 x 10 <sup>3</sup>
101	100	100	0 to 6000	1.30 x 10 <sup>-3</sup>	1.27 x 10 <sup>4</sup>
201	200	100	0 to 6000	1.45 x 10 <sup>-3</sup>	2.54 x 10 <sup>4</sup>
501	500	100	0 to 6000	1.50 x 10 <sup>-3</sup>	6.18 x 10 <sup>4</sup>
102	1000	1000	0 to 5000	5.00 x 10 <sup>-3</sup>	1.67 x 10 <sup>5</sup>
202	2000	1000	0 to 5000	5.25 x 10 <sup>-3</sup>	3.43 x 10 <sup>5</sup>

## Specifications

- Accuracy : ±0.2%/Full Scale (when combined with model TS-3200A and TS-2700 on N-0 compensation.)
- Operating temperature : 0°C to +40°C
- Storage temperature : -20°C to +60°C
- Operating humidity : 85% maximum
- Vibration : 50m/s<sup>2</sup> maximum
- Connection : Connector (Model TRC116-12A10-7M10.5 at cable side)
- Revolution detecting gear : Attached as standard
- Power requirement : 100/120/220/240/VAC, 50/60Hz  
(Please specify the voltage when ordering.)
- Accessories : Power cable (2.4 meter) x 1 pc.  
Torque signal cable (5 meter) x 1 pc.  
Instruction manual x 1 copy  
Inspection certificate x 1 copy  
Key of the detector shaft ends (Model SS-100 to SS-202 only)
- Options : Revolution detector (Model MP-981)  
Revolution signal cable (Model MX-800 /MX-8000 series)  
Rotational direction of the the attached motor of torque detector is changed externally.  
(Only for wiring without exchange switch)

## Revolution detector Model MP-981(option)

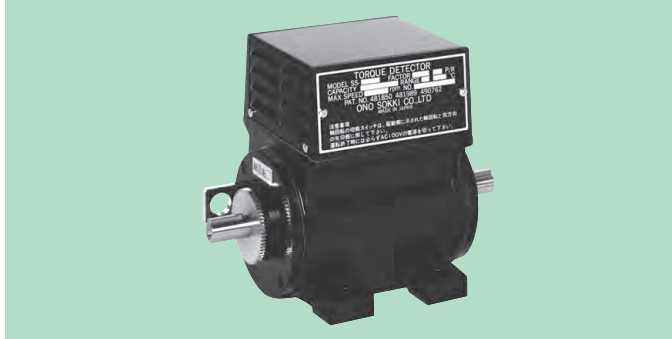


### Specifications

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

\*Please refer to the page 11 for the dimensions of the detector shaft ends.

# SS-2000 series: Detector with grease lubrication function for the torque measurement at high speed revolution.



Ideal detector for the torque measurement at high speed from 0 to 15,000r/min without the lubrication oil dropping device.

## Notes:

- (1) External dimensions of all models (SS-2000 series) are same as those of SS-100/200. The figure of edge of SS-2050 is  $\phi 14\text{mm}$  with key, which external dimension differs from SS-050.
- (2) Be sure to use SS-2000 series with TS-3200A or TS-2700 displaying unit.
- (3) When the signal cable of the torque detector is requested at over 5 meter, the cable should be purchased separately. Further, the additional charge shall be required as the matching adjustment fee between detector and displaying unit.
- (4) It is recommended to use the spring plate which is same as for the SS-series detector. Please make sure that the weight of the coupling should be less than 0.4kg for SS-2050, 0.6kg for SS-2100 and 0.8kg for SS-2200 at 15,000r/min.

Model SS	Measurement range (N·m)	Minimum resolution (mN·m)	Revolution range (r/min)	Inertia moment (kgm <sup>2</sup> )	Spring constant (N·m/rad)
2050	5	1	0 to 15,000	$5.00 \times 10^{-5}$	$4.12 \times 10^2$
2100	10	10	0 to 15,000	$5.00 \times 10^{-5}$	$7.75 \times 10^2$
2200	20	10	0 to 15,000	$5.00 \times 10^{-5}$	$1.57 \times 10^3$

## Specifications

Accuracy	: $\pm 0.2\%$ /Full Scale (When combined with model TS-3200A or TS-2700 on N-0 compensation.)
Drift by temperature	: $-0.03\%$ /Full Scale/ $^{\circ}\text{C}$
Operating temperature	: $0^{\circ}\text{C}$ to $+40^{\circ}\text{C}$
Storage temperature	: $-20^{\circ}\text{C}$ to $+60^{\circ}\text{C}$
Operating humidity	: 85% maximum
Vibration	: $50\text{m/s}^2$ maximum
Matching connector	: TRC116-12A10-7M10.5
Revolution detecting gear	: Attached as standard (60P/R)
Power requirement	: 100VAC, 50/60Hz, 35VA
Accessories	: Power cable 2.4-m Torque signal (TS) cable (5-m) Instruction manual x 1 copy Inspection certificate x 1 copy Key of the detector shaft ends
Options	: Revolution detector (Model MP-981/MP-9820) Revolution signal cable (MX-800/MX-8000 series) Power requirement : 220V Rotation direction of the attached motor of torque detector can be changed externally. Cable (5-m) is attached as standard. (Only for wiring without exchange switch)
Outer dimensions	: Dimensions are same as SS-100/200 Please refer to the page 6 for details.

\* Please contact your nearest distributor or send an e-mail to us [overseas@onosokki.co.jp](mailto:overseas@onosokki.co.jp) for SS series detectors with CE marking/UL.

# MD Series: Low-Capacity Torque Detectors for Rotating and Stationary Shafts.

*High accurate measurement for small torque with the compact size.*



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 measurement is possible by the unit of 0.001mNm (with MD-201C/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.

\* When you use the MD-201C, please pay attention to handle it owing to the shaft being thin.

## Notes:

- (1) The MD Series should be used with the model TS-3200A, TS-2700 digital torque meter.
- (2) Please refer to the below right drawing when the revolution detector is mounted.
- (3) The revolution detector can be mounted on either driving or loading side.
- (4) Please consult us for details if the optional high speed revolution range as above table is required.

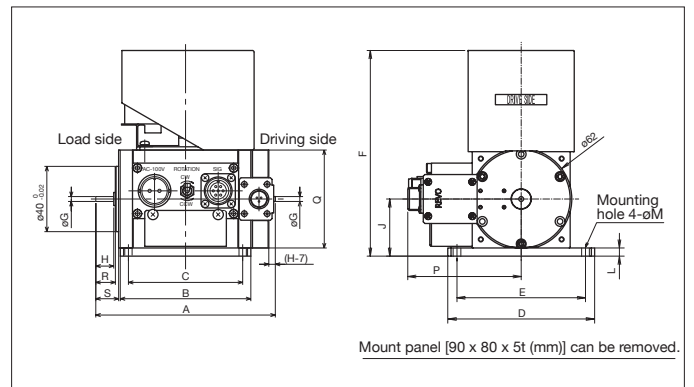
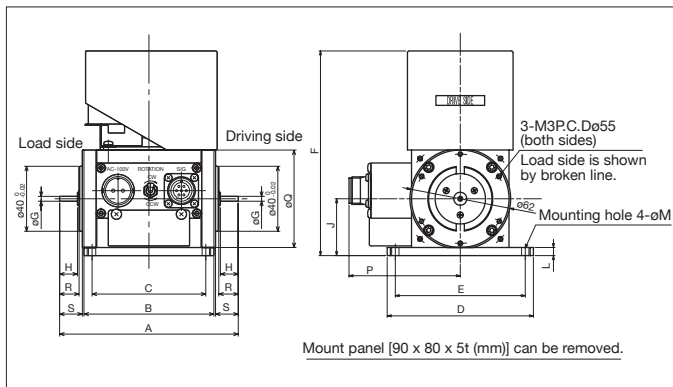
Model MD	Measurement range (mN·m)	Minimum resolution (mN·m)	Standard revolution range (r/min)	Optional high speed revolution range (r/min)	Inertia moment (kgm <sup>2</sup> )	Spring constant (N·m/rad)
201C	2	0.001	0 to 10,000	0 to 10,000	1.9 x 10 <sup>-7</sup>	8.24 x 10 <sup>-2</sup>
501C	5	0.001	0 to 10,000	0 to 20,000	1.9 x 10 <sup>-7</sup>	2.06 x 10 <sup>-1</sup>
102C	10	0.01	0 to 10,000	0 to 20,000	1.9 x 10 <sup>-7</sup>	4.12 x 10 <sup>-1</sup>
202C	20	0.01	0 to 10,000	0 to 20,000	1.9 x 10 <sup>-7</sup>	8.24 x 10 <sup>-1</sup>
502C	50	0.01	0 to 10,000	0 to 20,000	4.6 x 10 <sup>-7</sup>	2.06
103C	100	0.1	0 to 10,000	0 to 20,000	4.6 x 10 <sup>-7</sup>	4.12
203C	200	0.1	0 to 10,000	0 to 20,000	4.6 x 10 <sup>-7</sup>	7.63
503C	500	0.1	0 to 10,000	0 to 20,000	1.45 x 10 <sup>-6</sup>	3.14 x 10
104C	1000	1	0 to 10,000	0 to 20,000	1.45 x 10 <sup>-6</sup>	6.18 x 10
204C	2000	1	0 to 10,000	0 to 20,000	1.45 x 10 <sup>-6</sup>	1.27 x 10 <sup>2</sup>

## Specifications

- Accuracy : ±0.2%/Full Scale  
(when combined with model TS-3200A or TS-2700 on N-0 compensation.)
- Operating temperature: 0°C to +50°C  
Storage temperature : -20°C to +60°C  
Operating humidity : 85% maximum  
Vibration : 50m/s<sup>2</sup> maximum  
Connection : Connector  
(Model TRC116-12A10-7M10.5 at cable side)
- Power requirement : 100/120/220/240/VAC, 50/60Hz  
(Please specify the voltage when ordering.)
- Accessories : Power cable (2.4 meter) x 1 pc.  
Torque signal cable (5 meter) x 1 pc.  
Instruction manual x 1 copy  
Inspection certificate x 1 copy
- Options : Revolution detector (120 P/R)

Model name	Applicable detector
MD-0113	MD-201C/501C/102C/202C
MD-0115	MD-502C/103C/203C
MD-0118	MD-503C/104C/204C

Revolution signal cable (Model MX-800/8000 series)



## Dimensions

MD	A	B	C	D	E	F	øG	H	J±0.5	L	øM	P	Q	S	Weight (kg)
201C, 501C, 102C, 202C	110	80	70	90	80	126	3 <sup>0</sup> <sub>-0.01</sub>	11	35	5	4.5	70	60	14	1.5
502C, 103C, 203C	110	80	70	90	80	126	5 <sup>0</sup> <sub>-0.01</sub>	11	35	5	4.5	70	60	14	1.5
503C, 104C, 204C	120	80	70	90	80	136	8 <sup>0</sup> <sub>-0.01</sub>	16	40	5	4.5	75	70	19	1.8

\*Please refer to the page 11 for the dimensions of the detector shaft ends.

# DSTP Series: Torque Detectors for Rotating and Stationary Shafts.

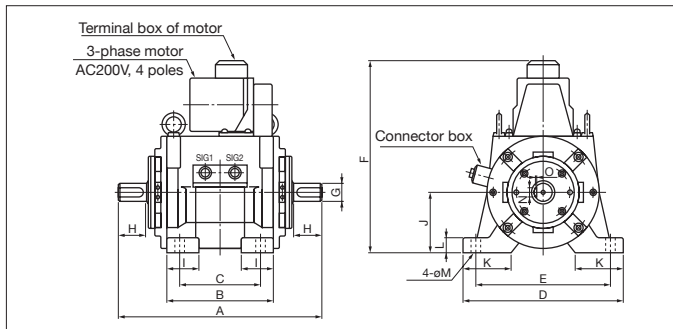
## Outstanding Rigidity and Durability with Covering Large Torque Capacity



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

### Notes:

- (1) DSTP Series torque detectors can be connected to any models of TS-series digital torque meters except the TS-7700 Torque Station Pro.
- (2) The standard cable length for torque signal cable is 5 meter and can be extended on request when ordering (extra charge is required).
- (3) 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 revolution before ordering. Please consult us for details.



### Dimensions

DSTP	A	B	C	D	E	F	øG	H	I	J	K	L	øM	N <sup>ø</sup>	O	Weight (kg)
002, 005, 01, 02	180	90	60	170	140	250	8 <sup>h6</sup>	17	30	65 <sup>0</sup> <sub>-0.5</sub>	35	15	12	-	-	9
05, 1, 2	270	136	110	180	150	270	14 <sup>h6</sup>	25	33	70 <sup>0</sup> <sub>-0.5</sub>	46	15	12	5	3 <sup>+0.1</sup> <sub>0</sub>	19
5, 10	300	156	120	234	200	305	30 <sup>h6</sup>	43	48	90 <sup>0</sup> <sub>-0.5</sub>	69	22	14	8	4 <sup>+0.2</sup> <sub>0</sub>	27
20	330	156	120	234	200	305	30 <sup>h6</sup>	58	48	90 <sup>0</sup> <sub>-0.5</sub>	69	22	14	8	4 <sup>+0.2</sup> <sub>0</sub>	27
50	450	180	140	260	220	350	36 <sup>h6</sup>	72	50	110 <sup>0</sup> <sub>-0.5</sub>	50	23	15	10	5 <sup>+0.2</sup> <sub>0</sub>	56
100	500	180	140	260	220	350	46 <sup>h6</sup>	93	50	110 <sup>0</sup> <sub>-0.5</sub>	50	23	15	14	5.5 <sup>+0.2</sup> <sub>0</sub>	58.5
200	600	180	140	280	240	380	51 <sup>h6</sup>	110	50	125 <sup>0</sup> <sub>-0.5</sub>	80	25	15	16	6 <sup>+0.2</sup> <sub>0</sub>	93
500	640	320	250	370	310	390	85 <sup>h6</sup>	120	100	125 <sup>0</sup> <sub>-0.5</sub>	125	40	27	25	9 <sup>+0.2</sup> <sub>0</sub>	120
1000	700	320	250	370	310	390	110 <sup>h6</sup>	140	100	125 <sup>0</sup> <sub>-0.5</sub>	125	40	27	28	10 <sup>+0.2</sup> <sub>0</sub>	140
2000	900	360	280	520	450	540	140 <sup>h6</sup>	220	120	200 <sup>0</sup> <sub>-0.5</sub>	150	55	33	36	12 <sup>+0.3</sup> <sub>0</sub>	330
5000	1100	360	280	520	450	540	170 <sup>h6</sup>	300	120	200 <sup>0</sup> <sub>-0.5</sub>	150	55	33	45	15 <sup>+0.3</sup> <sub>0</sub>	450
10000	1500	490	400	700	620	748	220 <sup>h6</sup>	330	160	280 <sup>0</sup> <sub>-1</sub>	200	90	45	50	17 <sup>+0.3</sup> <sub>0</sub>	1500

\* Please refer to page 11 for the dimensions of the detector shaft ends. (DSTP-002/005/01/02)

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

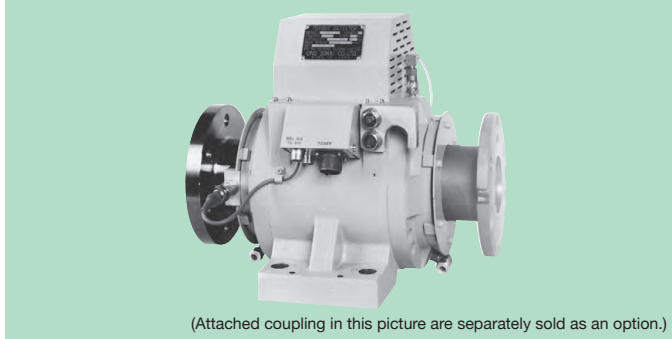
Model DSTP	Measurement range (N·m)	Minimum resolution (mN·m)	Revolution range (r/min)	Inertia moment (kgm <sup>2</sup> )	Spring constant (N·m/rad)
002	0.2	0.1	0 to 4000	2.9 x 10 <sup>-5</sup>	1.47 x 10
005	0.5	0.1	0 to 4000	2.9 x 10 <sup>-5</sup>	3.53 x 10
01	1	1	0 to 4000	2.9 x 10 <sup>-5</sup>	6.67 x 10
02	2	1	0 to 4000	2.9 x 10 <sup>-5</sup>	1.18 x 10 <sup>2</sup>
05	5	1	0 to 6000	1.00 x 10 <sup>-4</sup>	3.44 x 10 <sup>2</sup>
1	10	10	0 to 6000	1.00 x 10 <sup>-4</sup>	6.37 x 10 <sup>2</sup>
2	20	10	0 to 6000	1.00 x 10 <sup>-4</sup>	1.08 x 10 <sup>3</sup>
5	50	10	0 to 6000	6.70 x 10 <sup>-4</sup>	3.63 x 10 <sup>3</sup>
10	100	100	0 to 6000	6.73 x 10 <sup>-4</sup>	6.96 x 10 <sup>3</sup>
20	200	100	0 to 6000	6.80 x 10 <sup>-4</sup>	1.27 x 10 <sup>4</sup>
50	500	100	0 to 6000	2.00 x 10 <sup>-3</sup>	2.94 x 10 <sup>4</sup>
100	1000	1000	0 to 5000	3.30 x 10 <sup>-3</sup>	5.98 x 10 <sup>4</sup>
200	2000	1000	0 to 5000	5.71 x 10 <sup>-3</sup>	1.08 x 10 <sup>5</sup>
500	5000	1000	0 to 4000	3.74 x 10 <sup>-2</sup>	4.81 x 10 <sup>5</sup>
1000	10,000	10,000	0 to 3000	9.69 x 10 <sup>-2</sup>	9.71 x 10 <sup>5</sup>
2000	20,000	10,000	0 to 2000	3.32 x 10 <sup>-1</sup>	3.04 x 10 <sup>6</sup>
5000	50,000	10,000	0 to 1500	8.53 x 10 <sup>-1</sup>	7.06 x 10 <sup>6</sup>
10000	100,000	100,000	0 to 1000	4.175	1.40 x 10 <sup>7</sup>

### Specifications

- Accuracy : ±0.2%/Full Scale  
(when combined with model TS-3200A or TS-2700 on N-0 compensation.)
- Operating temperature : 0°C to +50°C  
Storage temperature : -20°C to +60°C  
Operating humidity : 85% maximum  
Vibration : 50m/s<sup>2</sup> maximum
- Connection : Connector (Model 12P2B at cable side)  
Power requirement : 200VAC, 50/60Hz, 3-phase  
Accessories : Torque signal cable (5 meter) x 1 pc.  
Power cable (5 meter) x 1 pc.  
Instruction manual x 1 copy  
Inspection certificate x 1 copy
- Options : Revolution detector (MP-981)  
Revolution detecting gear  
Revolution signal cable (Model MX-800/8000 series)

# DD Series: Torque Detectors for Rotating and Stationary Shafts.

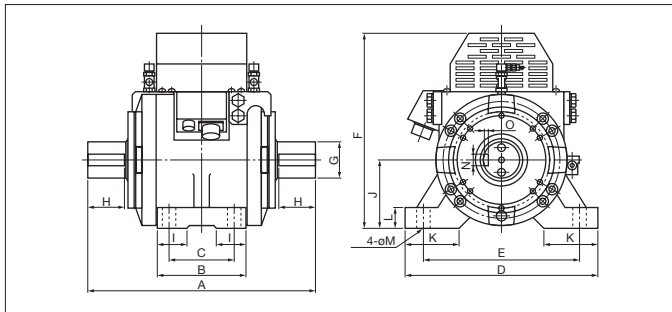
*Heavy Duty Type with Double Bearings  
to Withstand Thrust and Radial Loads Fluctuation.*



The DD Series is high performance of SS Series, which can measure the larger capacity torque at higher speed. Model 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:

- (1) Radial loads are recovery forces caused by eccentricity or 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.
- (2) Please consult us for details if the optional high speed revolution range as above table is required.
- (3) Interference-fit coupling is recommended.
- (4) Please consult us concerning the weight of the coupling.
- (5) A revolution detector can not be attached with the main body of DD detector. If it is required to measure the revolution, please consult us for details.
- (6) Spindle oil (ISO VG22) should be used for lubrication at a rate of 20 to 30 drops per minute.
- (7) Grease lubrication type is also manufactured depending on the specification. Please consult us for details.



## Dimensions

DD	A	B	C	D	E	F	øG	H	I	J <sup>0</sup> <sub>-0.5</sub>	K	L	øM	N <sup>ø9</sup>	O	Weight (kg)
503, 104, 204	185	75	50	180	150	215	8 <sup>h5</sup>	16	-	65	60	20	12	-	-	20
504	185	75	50	180	150	215	8 <sup>h5</sup>	16	-	65	60	20	12	3	1.8 <sup>+0.1</sup> <sub>0</sub>	20
105, 205	230	100	70	200	170	240	14 <sup>h5</sup>	20	-	80	60	20	12	5	3 <sup>+0.1</sup> <sub>0</sub>	25
505, 106, 206	320	125	90	240	200	280	36 <sup>js6</sup>	40	-	85	80	30	19	10	5 <sup>+0.2</sup> <sub>0</sub>	40
1506B, 1107B, 1207B	380	135	90	280	240	318	60 <sup>js6</sup>	65	-	95	90	30	23	18	7 <sup>+0.2</sup> <sub>0</sub>	53
507	600	230	180	410	345	420	85 <sup>js6</sup>	105	80	150	105	40	26	25	9 <sup>+0.2</sup> <sub>0</sub>	180
108	680	230	180	410	345	420	110 <sup>js6</sup>	130	80	150	105	40	26	28	10 <sup>+0.2</sup> <sub>0</sub>	210

\*Please refer to page 11 for the dimensions of the detector shaft ends.

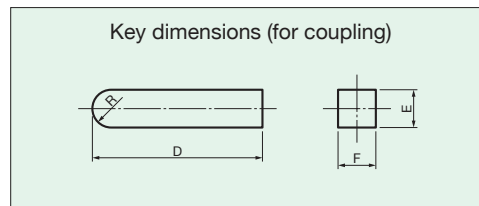
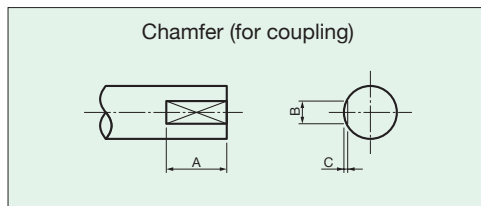
Model DD	Measurement range (N·m)	Minimum resolution (mN·m)	Standard revolution range (r/min)	Optional high speed revolution range (r/min)	Inertia moment (kgm <sup>2</sup> )	Spring constant (N·m/rad)	Load value		
							radial (N)	Thrust (N)	
503	0.5	0.1	0 to 20,000	0 to 30,000	1.00 x 10 <sup>-5</sup>	3.82 x 10	-	-	
104	1	1	0 to 20,000	0 to 30,000	1.00 x 10 <sup>-5</sup>	7.26 x 10	-	-	
204	2	1	0 to 20,000	0 to 30,000	1.00 x 10 <sup>-5</sup>	1.32 x 10 <sup>2</sup>	-	-	
504	5	1	0 to 20,000	0 to 30,000	1.00 x 10 <sup>-5</sup>	2.62 x 10 <sup>2</sup>	-	-	
105	10	10	0 to 20,000	0 to 30,000	5.93 x 10 <sup>-5</sup>	6.18 x 10 <sup>2</sup>	-	-	
205	20	10	0 to 20,000	0 to 30,000	5.95 x 10 <sup>-5</sup>	1.11 x 10 <sup>3</sup>	-	-	
505	50	10	0 to 10,000	0 to 13,000	1.5 x 10 <sup>-3</sup>	3.63 x 10 <sup>3</sup>	300	1500	
106	100	100	0 to 10,000	0 to 13,000	1.5 x 10 <sup>-3</sup>	7.06 x 10 <sup>3</sup>	300	1500	
206	200	100	0 to 10,000	0 to 13,000	1.5 x 10 <sup>-3</sup>	1.37 x 10 <sup>4</sup>	300	1500	
1506B	500	100	0 to 8000	0 to 10,000	8.6 x 10 <sup>-3</sup>	5.30 x 10 <sup>4</sup>	300	2000	
1107B	1000	1000	0 to 8000	0 to 10,000	8.6 x 10 <sup>-3</sup>	9.90 x 10 <sup>4</sup>	400	2000	
1207B	2000	1000	0 to 8000	0 to 10,000	8.7 x 10 <sup>-3</sup>	1.77 x 10 <sup>5</sup>	400	2000	
507	5000	1000	0 to 6000	0 to 6000	4.8 x 10 <sup>-2</sup>	5.36 x 10 <sup>5</sup>	600	2000	
108	10,000	10,000	0 to 4000	0 to 4000	1.43 x 10 <sup>-1</sup>	1.23 x 10 <sup>6</sup>	800	2000	
Remarks	Oil dropping lubrication method is standard at DD Series. The above revolution range 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.								

## Specifications

Accuracy	: ±0.2%/Full Scale (when combined with model TS-3200A or TS-2700 on N-0 compensation.)
Operating temperature	: 0°C to +50°C
Storage temperature	: -20°C to +60°C
Operating humidity	: 85% maximum
Vibration	: 50m/s <sup>2</sup> maximum
Connection	: Connector (Model TRC116-12A10-7M10.5 at cable side)
Power requirement	: 200VAC, 50/60Hz, 3-phase
Accessories	: Torque signal cable (5 meter) x 1 pc. Power cable (5 meter) x 1 pc. Instruction manual x 1 copy Inspection certificate x 1 copy
Options	: Oil drip lubrication device (model DD-0101, DD-0102) Revolution detector Bearing temperature alarm output

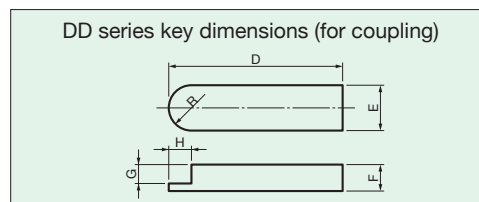
# Torque Detector Shaft End and Attached Motor Specifications.

Model name		Chamfer			Key dimensions				Attached motor specifications		
		A	B	C	D	E <sub>h9</sub>	F	R	Power requirement	No. of poles	Consumption power (VA)
SS	002, 005, 010, 020, 050	17	4	0.5					100/120/220/240VAC	Single-phase 4 poles	35
	100, 200				25	5	5 <sup>0</sup> <sub>-0.03</sub>	2.5	100/120/220/240VAC	Single-phase 4 poles	35
	500, 101				40	8	7 <sup>0</sup> <sub>-0.09</sub>	4	100/120/220/240VAC	Single-phase 4 poles	50
	201, 501				65	10	8 <sup>0</sup> <sub>-0.09</sub>	5	100/120/220/240VAC	Single-phase 4 poles	50
	102, 202				105	16	10 <sup>0</sup> <sub>-0.09</sub>	8	100/120/220/240VAC	Single-phase 4 poles	50
DSTP	002, 005, 01, 02	17	4	0.5					200VAC	3-phase 4 poles	50
	05, 1, 2				23	5	5 <sup>0</sup> <sub>-0.03</sub>	2.5	200VAC	3-phase 4 poles	50
	5, 10				40	8	7 <sup>0</sup> <sub>-0.09</sub>	4	200VAC	3-phase 4 poles	50
	20				55	8	7 <sup>0</sup> <sub>-0.09</sub>	4	200VAC	3-phase 4 poles	50
	50				70	10	8 <sup>0</sup> <sub>-0.09</sub>	5	200VAC	3-phase 4 poles	120
	100				91	14	9 <sup>0</sup> <sub>-0.09</sub>	7	200VAC	3-phase 4 poles	120
	200				108	16	10 <sup>0</sup> <sub>-0.09</sub>	8	200VAC	3-phase 4 poles	120
	500				118	25	14 <sup>0</sup> <sub>-0.11</sub>	12.5	200VAC	3-phase 4 poles	120
	1000				137	28	16 <sup>0</sup> <sub>-0.11</sub>	14	200VAC	3-phase 4 poles	120
	2000				215	36	20 <sup>0</sup> <sub>-0.13</sub>	18	200VAC	3-phase 4 poles	460
	5000				294	45	25 <sup>0</sup> <sub>-0.13</sub>	22.5	200VAC	3-phase 4 poles	460
10000				355	50	28 <sup>0</sup> <sub>-0.13</sub>	25	200VAC	3-phase 4 poles	460	
* DD	503, 104, 204	15	4	0.5					200VAC	3-phase 4 poles	25
	504				15	3	3 <sup>0</sup> <sub>-0.025</sub>	1.5			
	105, 205				22.5	5	5 <sup>0</sup> <sub>-0.03</sub>	2.5			
	505, 106, 206				39	10	8 <sup>0</sup> <sub>-0.09</sub>	5	200VAC	3-phase 4 poles	50
	1506B, 1107B, 1207B				70	18	11 <sup>0</sup> <sub>-0.11</sub>	9	200VAC	3-phase 4 poles	50
	507				113	25	14 <sup>0</sup> <sub>-0.11</sub>	12.5	200VAC	3-phase 4 poles	140
	108				137	28	16 <sup>0</sup> <sub>-0.11</sub>	14	200VAC	3-phase 4 poles	140
MD	201C to 202C	Without chamfer			No using of key				100/120/220/240VAC	Single-phase 2 poles	10
	502C to 203C	10	3	0.5							
	503C to 204C	15	4	0.5							



\*

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



# Digital Torque Meter TS-2700

## General Type of Compact Torque Converter with Digital Display, Suitable for Panel Mounting



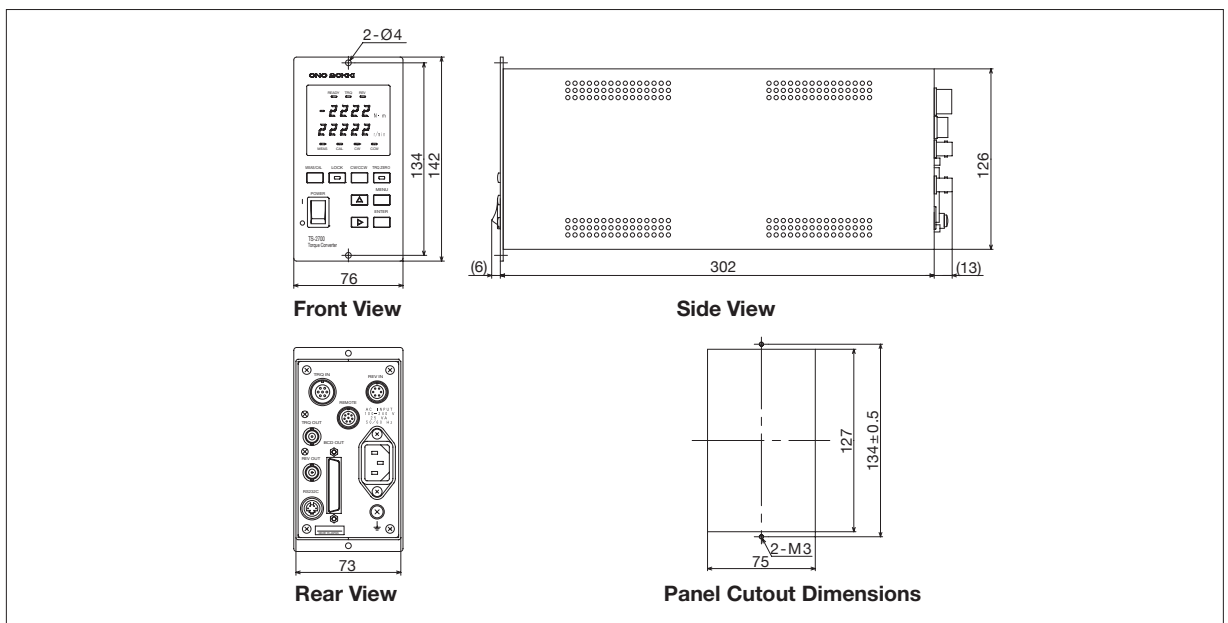
The TS-2700 can provide a digital display of the measurement data while outputting the data to an external device using analog voltage, BCD or RS-232C outputs. Being compact in size, it does not take up much space when mounted in an instrumentation panel. It can also be accommodated neatly adjacent to a control device inside the panel. The display units are N·m, and r/min, but other units can also be specified by using the accessory unit seals.

### Notes:

- (1) In order to supply the suitable cable which can withstand the power supply to this unit, please specify the electrical power voltage when ordering.
- (2) When using the TS-2700 in combination with MD or SS type torque detector, use a time constant of at least 63ms for analog output.

### Other functions:

- Remote control functions: External switching of rotation direction setting, changing the BCD data switching interval (100 ms to 64 s), synchronized driving of two TS-2700 units, safety interlock using measurement preparation complete signal outputs are possible.
- N-0 compensation function: Inputting the N-0 compensation value enables a torque measurement accuracy of  $\pm 0.2\%$  of full scale.
- CW/CCW switching: The settings of both rotation directions are stored in an internal non-volatile memory to enable them to be switched.



## Specifications

Torque Measurement Section	
<b>■ Input Section</b>	
Input signal	: Phase-differential type detector output signal
Matching connector	: TRC116-12A10-7M10.5
<b>■ Setting Section</b>	
Zero compensation	: 1 point each for CW, CCW, push-button setting of auto-zero
N-0 compensation	: 5 points each for CW, CCW
Zero switching	: CW, CCW, EXT.
Decimal point lighting	: Automatic
<b>■ Display Section</b>	
Numerical value display	: 7-segment green LEDs
Display range	: -9999 to +9999
Display unit	: N-m (mN-m, kN-m are also available by using the accessory seals.)
Display switching in interval	: 1s/10s/EXT
Accuracy (1-s averaged values)	: With N-0 compensation : $\pm 0.2\%/FS \pm 1$ count Without N-0 compensation : $\pm 0.5\%/FS \pm 1$ count
<b>Revolution Measurement Section</b>	
<b>■ Input Section</b>	
1. REV IN....	Output signal from Ono Sokki's MP-981/MP-9820 electromagnetic type revolution detector
Input frequency range	: 1Hz to 100kHz (accuracy guaranteed from 10Hz)
Matching connector	: R03-PB6M
2. INT.....	Used for SIG2 torque signals

<b>■ Setting Section</b>	
Number of detector pulses	: 1 to 9999P/R
<b>■ Display Section</b>	
The numerical value display unit and the display switching interval are the same as those given in the Torque Measurement Section.	
Display range	: Up to 99999
Display unit	: r/min
Accuracy (1-s averaged values)	: $\pm 0.02\%/FS \pm 1$ count

Output Section	
<b>■ Analog Voltage Output Section</b>	
Torque output level	: 0 to $\pm 10V/FS$
Revolution output level	: 0 to 10V/FS
Time constant	: Torque: 500ms/63ms Revolution: 63ms
Accuracy	: Torque: $\pm 0.2\%/FS$ (when N-0 compensation is used.) $\pm 0.5\%/FS$ (when N-0 compensation is not used.) Revolution: $\pm 0.2\%/FS$
Temperature drift	: $\pm 0.01\%/FS/^{\circ}C$
Matching connector	: C02 type (BNC)
<b>■ Digital Output Section</b>	
Output format	: BCD
Output renewal	: Every 1s
Matching connector	: DX40-50P

<b>■ RS-232C (refer to the chart below.)</b>	
Transmission speed	: 9600bps
Functions	: Input of zero value, N-0 value, and settings; output of measured values and setting conditions
Compatible cable	: AX-5022
<b>■ Remote functions (refer to the chart below.)</b>	
Input	: CW, CCW switching, clear input, trigger input
Output	: Trigger output, measurement preparations complete signal output

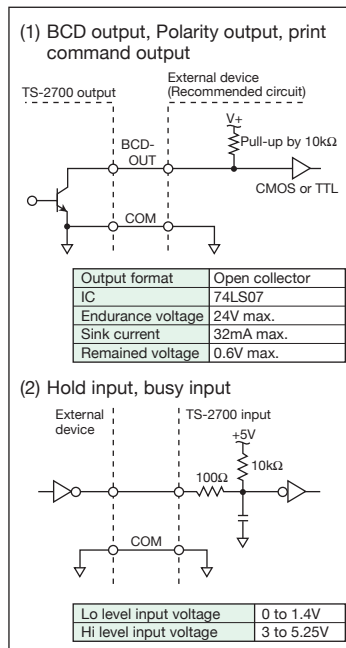
Option	
<b>■ RS-232C cable</b>	
	: AX-5022 (2m)
<b>■ Modification of time constant for analog output</b>	
	: TS-0222
	Modified item ; Torque, rotation
	Time constant ; 16ms or 63ms selectable

General Specifications	
Power supply voltage	: 100 to 240VAC, 50/60Hz
Power consumption	: Approx. 25VA (100VAC)
Insulation resistance	: 10M $\Omega$ min. at 500VDC
Withstand voltage	: 1500VAC for one minute
Operating temperature range	: 0 $^{\circ}C$ to +40 $^{\circ}C$
Storage temperature range	: -10 $^{\circ}C$ to +55 $^{\circ}C$
Weight	: Approx. 1.8kg
Accessories	: Display unit seals x 1 set Matching connector for remote control x 1 set Rubber foot x 4 pcs. Power cable (1.9m) x 1 pc. Instruction manual x 1 copy

### BCD Pin Assignments

Pin No.	Signal name	Pin No.	Signal name
1	Data output (Torque value)	26	Data output (Revolution value)
2	$1 \times 10^0$	27	$2 \times 10^1$
3	$2 \times 10^0$	28	$4 \times 10^1$
4	$4 \times 10^0$	29	$8 \times 10^1$
5	$8 \times 10^0$	30	$1 \times 10^2$
6	$1 \times 10^1$	31	$2 \times 10^2$
7	$2 \times 10^1$	32	$4 \times 10^2$
8	$4 \times 10^1$	33	$8 \times 10^2$
9	$8 \times 10^1$	34	$1 \times 10^3$
10	$1 \times 10^2$	35	$2 \times 10^3$
11	$2 \times 10^2$	36	$4 \times 10^3$
12	$4 \times 10^2$	37	$8 \times 10^3$
13	$8 \times 10^2$	38	NC
14	$1 \times 10^3$	39	NC
15	$2 \times 10^3$	40	NC
16	$4 \times 10^3$	41	NC
17	NC	42	Torque polarity output "-"
18	NC	43	Torque polarity output "+"
19	NC	44	NC
20	NC	45	NC
21	NC	46	NC
22	Data output (Revolution value)	47	Hold input
23	$1 \times 10^0$	48	Busy input
24	$2 \times 10^0$	49	Print command
25	$4 \times 10^0$	50	Common
	$8 \times 10^0$		
	$1 \times 10^1$		

### BCD Recommended interface



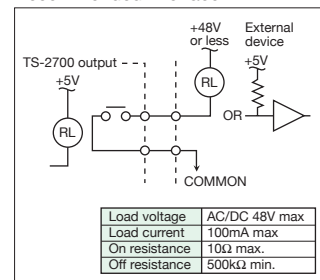
### RS-232C Pin Assignments

Pin	Signal name	Pin	Signal name
1	-	5	RTS (Request to Send)
2	RxD (Receive Data)	6	-
3	TxD (Transmit Data)	7	SG (Common)
4	CTS (Clear to Send)	8	-

### Remote Function Pin Assignments

Pin	Signal name	Remarks
A	CLR IN	
B	TRG IN	Non-voltage contact input (COMMON is common.)
C	CW/CCW switching	
D	COM	
E	READY OUT	
F	Ditto COM-1	Non-voltage contact output (COMMON is separate.)
G	TRG OUT	
H	Ditto COM-2	

### Recommended interface



# Digital Torque Meter with Arithmetic Operation Display **TS-3200A**

*Advanced Model with an Easy-to-use LCD and a Range of Optional Interfaces to Utilize the Full Potential of High-accurate Digital Data*



The TS-3200A uses an LCD display for the setting the 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. A wide selection of interfaces, including those sold separately as options, is provided to enable remote input/output of control functions, data output using analog voltage, BCD and comparator outputs, and data transmission using RS-232C, and GP-IB interfaces. Select the optimal interface to use with your equipment combination.

### Notes:

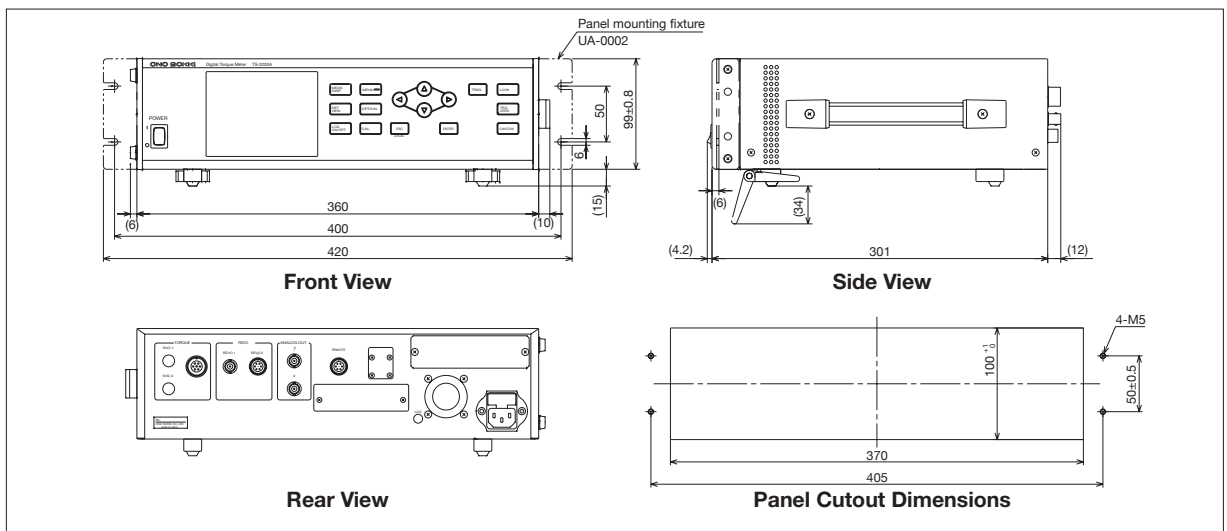
- (1) In order to supply the suitable cable which can withstand the power supply to this unit, please specify the electrical power voltage when ordering.
- (2) When using the TS-3200A in combination with an MD or SS type torque detector, use a time constant of at least 63ms for analog output.

### Built-in option

#### ■ High-speed response software: TS-0321A (sold separately)

Enables output of results processed at high speeds up a maximum of 1ms. This option is added to the standard analog voltage output function.

- Channels : 2 channels
- Connector : Output from the normal analog voltage output terminal
- Restrictions: No comparator output.  
Fixed analog output time constant.  
Software cannot be used with SS or MD torque detectors.



## Specifications

### Torque Measurement Section

#### ■ Input Section

Input signal : Phase-differential type detector output signal  
Matching connector : TRC-116-12A10-7M10.5

#### ■ Setting Section

Capacity :  $\pm 1$  to 9999  
Factor : 1 to 65535  
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

Zero switching : CW, CCW, EXT

Response time : Time constant, 16ms /31ms/63ms/125ms /250ms/500ms/1s /2s/4s/8s/16s/32s/64s

#### ■ Display Section

Number of digits displayed : Polarity indication + 4 digits, Polarity indication + 5 digits, selectable

Display renewal rate : 1 to 10s (in 1-s increments), or external input signal  
Accuracy : When used in combination with a torque detector (and the display renewal rate is 1s.)

With N-0 compensation :  $\pm 0.2\%/FS \pm 1$  count (when the display is 4 digits.)  
Without N-0 compensation :  $\pm 0.5\%/FS \pm 1$  count (when the display is 4 digits.)

#### ■ Output Section

Analog output : Voltage output  $0 \pm 10V$ /full scale

Scale : Full scale voltage can be set from 0.1V to 10V. (in 0.1V increments)

Response time : 16ms to 64s, depending on the time constant setting

Accuracy : When used in combination with a torque detector (and the display renewal rate is 1s.)  
With N-0 compensation :  $\pm 0.2\%/FS \pm 1$  count (when the display is 4 digits.)  
Without N-0 compensation :  $\pm 0.5\%/FS \pm 1$  count (when the display is 4 digits.)

Temperature drift :  $\pm 0.01\%/FS/^{\circ}C$

Matching connector : C02 type (BNC)

### Revolution Measurement Section

#### ■ Input Section

1. REVO1... For sinewave input  
Input signal : Signal output from an electromagnetic revolution detector such as Ono Sokki's MP-9100

Input impedance : 10k $\Omega$  min.

Input frequency range : 10Hz to 100kHz

Input signal amplitude range : 0.2 to 45Vrms

Matching connector : C02 type (BNC)

2. REVO2... For squarewave input  
Input signal : Signal output from an electromagnetic revolution detector such as Ono Sokki's MP-981/MP-9820

Input impedance : 10k $\Omega$  or more.  
Input frequency range : 1Hz to 200kHz  
Input signal amplitude range : High level +4 to +30V  
Low level 0.6V max.  
Pulse width 2 $\mu$ s or more.

Power supplied : 12VDC, 100mA

Matching connector : R03-PB6M

3. INT..... Used for SIG2 torque signals

#### ■ Setting Section

Unit : r/min, r/s, Hz  
Number of pulses : 1 to 99999 P/R  
Gear ratio :  $\pm 1$  to 9999/1 to 9999 (display is possible of the revolution prior to the speed change.)

Offset :  $\pm 1$  to 9999 (only when the unit is r/min.)  
Measured value = actual measured value - offset

Response time : Time constant setting, 16ms/31ms/63ms/125ms/250ms/500ms/1s/2s/4s/8s/16s/32s/64s

#### ■ Display Section

Number of display digits : 5 digits  
Display resolution : 0.001, 0.01, 0.1, 1, selectable from the capacity (full scale) setting

Display renewal rate : Same as the torque section

Accuracy :  $\pm 0.05\%/FS \pm 1$  count (when the display renewal rate is 1s.)

#### ■ Output Section

Accuracy : (1-s averaged values)  $\pm 0.1\%/FS$

※ The other specifications are the same as those for the Torque Output Section

### Output (Power) Processing Section

#### ■ Processing Method

Output (W) = torque (N-m) x revolution (r/min) x  $2\pi/60$

Output (PS) = 0.7355kW

#### ■ Display Section

Number of display digits : Polarity indication + 5 digits  
Display renewal rate : Same as for the torque section

Unit : mW, W, kW, PS

Accuracy : Torque display accuracy plus revolution display accuracy

#### ■ Output Section

Accuracy : Torque output accuracy plus revolution output accuracy  
※ The other specifications are the same as those for the Torque Output Section

### Display Panel

#### ■ LCD Specifications

Backlight : 320 x 240 dots  
On/off function provided  
Main display: Selectable from 2 to 3 levels. Select from torque, revolution, Output (Power).  
Sub display : Peak value (MAX, MIN, P-P), ripple ratio

#### Status display

: Measurement preparations complete, clear input, torque signal input, revolution signal input, CW/CCW, comparator output ON/OFF

### Interface Section

Model TS-0325 and TS-0326 can not be built in simultaneously.

#### ■ Remote Functions

Clear input : Contact input, when contact closure, the display and output are forced to 0.

Revolution direction selection input : Contact input, switching between CW and CCW torque zero position, CCW when contact closure

#### Trigger input

: Contact input, when external gate is contact closure, the display and BCD are renewed. When the trigger function is used, OR function with the display panel switch.

#### Trigger output

: Contact output, on/off synchronized with the gate time. Example: When the gate is 1s, 0.5s ON 0.5s OFF.

Preparations complete output : Contact output, contact closure when TS is in the torque measurement status.

#### Input section

: When the input is non-voltage contact  
Open voltage : 5.25V max.  
Short-circuit current : 1mA max.  
When the input is voltage  
High level +4 to +5.25V  
Low level 0 to +1V

#### Output Section

: PhotoMOS relay  
Load voltage 30VDC max.  
Load current 100mA max.  
On resistance 10 $\Omega$  max.  
Off resistance 500k $\Omega$  min.

#### Matching connector

: R03-PB8M

#### ■ Analog Voltage Output (refer to each item for more details)

Channels : 2 channels  
Item : Two items selectable from Torque, Revolution, and Output (Power)

#### Matching connector

: C02 type (BNC)

#### ■ TS-0322A Comparator Output (sold separately)

Channels : 4 channels  
Item : Setting of the Torque, Revolution, and POWER (output) upper or lower level

Output renewal : At the specified interval (0.004 to 10s, External)

Reference comparison : Average value at each specified time

Output format : Same as the remote function output section

Matching connector : RM12BPG-6S

#### ■ TS-0323 BCD Output (sold separately)

Channels : 2 channels  
Item : Two items selectable from Torque, Revolution, and Output (Power)

Output renewal : At each gate time set (0.1 to 10s, External) or at each sampling interval

Output format : Positive logic open collector output

Matching connector : 57-30500 Amphenol full pitch, 50-pin

#### ■ TS-0325 RS-232C (sold separately)

Standard : Conforms to EIA and JISX5101  
Transmission rate (bps) : 1200, 2400, 4800, 9600, 19200

#### Matching connector

: D-sub 9-pin, female

■ TS-0326 GP-IB (sold separately)  
Electrical and mechanical specifications: Conform to IEEE 488-1978

#### ■ TS-0327 Rotation pulse output (sold separately)

Channel : 1 channel  
Number of output pulse : Same as number of input pulse

Output format : TTL level

Matching connector : C02 type (BNC)

### General Specifications

Power supply voltage : 100 to 240VAC  $\pm 10\%$ , 50/60Hz

Power consumption : 35VA max.

Insulation resistance : 10M $\Omega$  min. at 500VDC

Withstand voltage : 1500VAC for one minute

Operating temperature range : 0 $^{\circ}C$  to 40 $^{\circ}C$

Storage temperature range : -10 $^{\circ}C$  to 55 $^{\circ}C$

Weight : Approx. 5kg  
Accessories: Instruction manual 1 copy  
Power cable (1.9 meter) 1 pc.  
Matching connector for remote control x 1 pc.

### Options

#### ■ 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

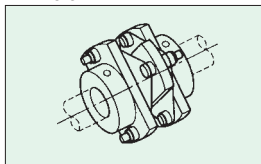
#### ■ CE marking

# Recommended Couplings for Torque Detection

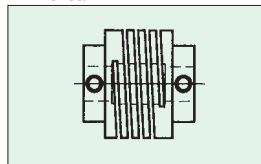
	Micro	Helical	NSO Diaphragm	Form-flex
Recommended torque detector	SS-002 to SS-100	Low-capacity models	High-capacity models	SS-200 to SS-202
Maximum revolution	20,000r/min / 10N·m	25,000r/min / 2.5N·m	23,000r/min / 1,090N·m	19,000r/min / 1,300N·m
Transmitted torque capacity	10N·m max.	2.5N·m max.	200 to 38,140N·m	20 to 181,500N·m
Features	<ol style="list-style-type: none"> <li>1. No backlash</li> <li>2. Large torsional rigidity</li> <li>3. Non-magnetic material</li> <li>4. Easy maintenance</li> <li>5. Eccentric, angle of deviation absorption</li> <li>6. Low inertia moment</li> <li>7. Water-resistant, chemical-resistant, oil-resistant</li> </ol>	<ol style="list-style-type: none"> <li>1. No backlash</li> <li>2. Small-format, lightweight</li> <li>3. Ideal for use with micro precision devices</li> <li>4. Easy maintenance</li> <li>5. Eccentric, angle of deviation absorption</li> <li>6. Low inertia moment</li> <li>7. Duralmin material (non-magnetic material) and stainless, two types</li> </ol>	<ol style="list-style-type: none"> <li>1. No backlash</li> <li>2. Large torsional rigidity</li> <li>3. Large allowable eccentric, angle of deviation tolerance</li> <li>4. Lightweight, easy attachment and removal</li> <li>5. High-speed rotation enabled</li> <li>6. Easy maintenance</li> <li>7. Water-resistant, chemical-resistant, oil-resistant</li> <li>8. Fail-safe construction</li> </ol>	<ol style="list-style-type: none"> <li>1. No backlash</li> <li>2. Large torsional rigidity</li> <li>3. Large allowable eccentric, angle of deviation tolerance</li> <li>4. Lightweight, easy attachment and removal</li> <li>5. High-speed rotation enabled</li> <li>6. Easy maintenance</li> <li>7. Water-resistant, chemical-resistant, oil-resistant</li> <li>8. Fail-safe construction</li> </ol>
Weight	280 (g) (At 10N·m transmitted torque)	38 (g) (Duralmin) (At 2.3N·m transmitted torque)	4 (kg) (At 200N·m transmitted torque)	3.7 (kg) (At 250N·m transmitted torque)
Usage methods	<ol style="list-style-type: none"> <li>1. Extend the cores of the torque detector and the target measurement object shafts, and then attach the flanges, plate springs and spacers.</li> <li>2. Move the devices in the axial direction to attach and remove the couplings.</li> <li>3. Eccentricity and angle deviation are exceedingly small at high revolutions.</li> </ol>	<ol style="list-style-type: none"> <li>1. Extend the cores of both shafts, and then move the devices in the axial direction to connect the couplings to the shafts.</li> <li>2. Move the devices in the axial direction to attach and remove the couplings.</li> <li>3. At 25,000r/min, Core extension 0.1mm max. Angle of deviation 0.5° max.</li> </ol>	<ol style="list-style-type: none"> <li>1. Attach flanges to both devices, extend the cores, and then insert the flexible units.</li> <li>2. The couplings can be attached or removed without any need to move the devices in the axial direction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Attach hubs to both devices, extend the cores, and then insert the element spacers.</li> <li>2. The couplings can be attached or removed without any need to move the devices in the axial direction.</li> </ol>
Operating temperature range	-30 to +100°C	-40 to +150°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	10N·m max.	2N·m max.	200 to 30,000N·m	34 to 100,000N·m
Configuration (see diagrams below)	A	B	C	D

## ■ Coupling Figure

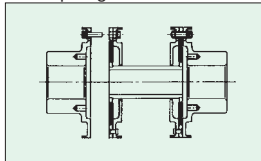
A : Micro



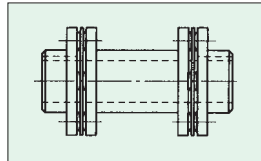
B : Helical



C : Diaphragm

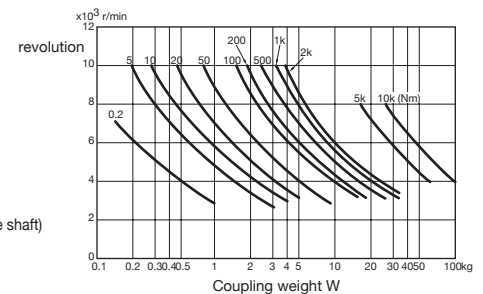
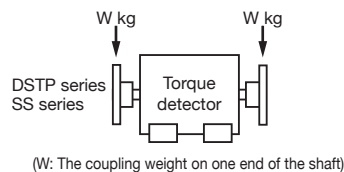


D : Form-flex



## ■ Revolution and Coupling Weight

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



## ■ Alignment

Allowable alignment should be less than 0.05mm (depending on the revolution). No abnormal noise or vibration should not be caused.

**ONOSOKKI**

\* 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@public.bta.net.cn](mailto:onosokki@public.bta.net.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)