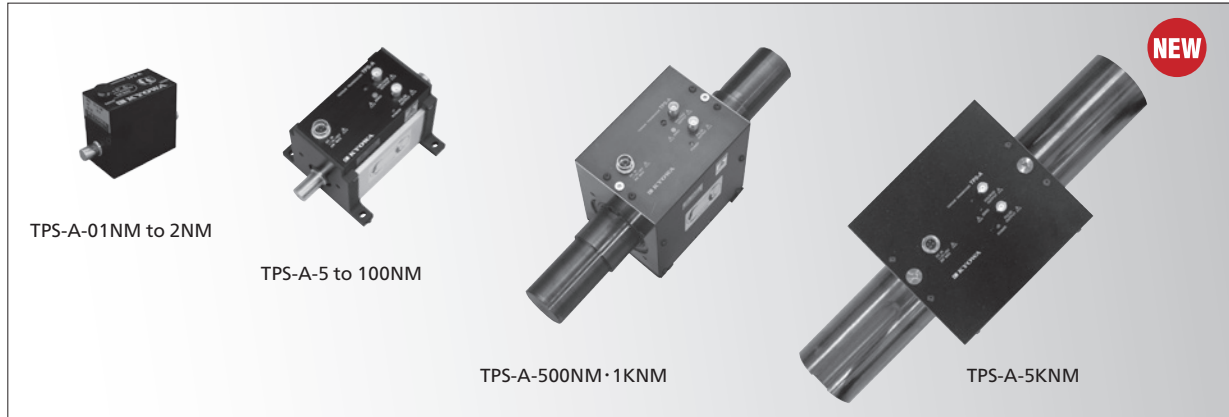


TPS-A

● Compact & lightweight ● 0.1 N·m to 5 kN·m

Built-in Amplifier Torque Transducer

TRANSDUCERS



Noncontact measurement design to shaft ensures easy maintenance.

- Easy maintenance.
- Built-in amplifier with ± 5 V output.
- Rotation speed output: 4 pulses per rotation
- Applicable to a friction-joint coupling (Excluding 5KNM)

Specifications

Performance

Rated Capacity	See table below.
Rated Output	5 V $\pm 4\%$ (Load resistance 5 k Ω * or more) *01NM to 2NM: 2k Ω
Nonlinearity	Within $\pm 0.1\%$ RO (01NM to 2NM) Within $\pm 0.3\%$ RO (5NM to 5KNM)
Hysteresis	Within $\pm 0.1\%$ RO (01NM to 2NM) Within $\pm 0.3\%$ RO (5NM to 5KNM)

Environmental Characteristics

Safe Temperature	-10 to 70°C (Non-condensing)
Compensated Temperature	-10 to 60°C (Non-condensing)
Temperature Effect on Zero	Within $\pm 0.03\%$ RO/°C
Temperature Effect on Output	Within $\pm 0.1\%$ /°C (01NM to 5NM) Within $\pm 0.05\%$ /°C (10NM to 5KNM)

Electrical Characteristics

Cutoff Frequencies of AMP	See table below.
SN Ratio	45 dB or more (When no rotation) (01NM to 2NM: 50 dB or more)
Power Supply	12 ± 0.5 VDC (01NM to 2NM) 10 to 16 VDC (5NM to 5KNM)
Current Consumption	0.4 A or less (TPS-A-01NM to 2NM, 5KNM) 0.5 A or less (TPS-A-5NM to 1KNM) When power supply is 12 VDC.

Mechanical Properties

Safe Overloads	See table below.
Max. Speed	See table below.
Rotational Output	4 pulses/rotation (Open collector output, detecting the rotational direction is not available)
Degree of Protection	IP40 (IEC 60529)
Safe Bending Moment	See table below.
Safe Load at Shaft End	See table below.
Moments of Inertia	See table below.
Weight	See table below.
Compliance	Directive 2014/30/EU (EMC) (TPS-A-01NM to 2NM only) Directive 2011/65/EU (RoHS) (TPS-A-01NM to 2NM only)

Optional Accessories See tables at the right.

Models	Rated Capacity	CE	Safe Overloads	Cutoff Frequencies of AMP	Max. Speed	Safe Bending Moments *1	Safe Loads at the Shaft End *2	Moments of Inertia (kg·m ²)	Weight (Approx.)	
TPS-A-01NM	± 0.1 N·m	Yes	200%	1.5 kHz (-3 ± 1 dB)	15000 rpm	1.0 N·m	300 N	1.5×10^{-6}	150 g	
TPS-A-05NM	± 0.5 N·m					1.2 N·m				
TPS-A-1NM	± 1 N·m					1.5 N·m				
TPS-A-2NM	± 2 N·m					3 N·m				
TPS-A-5NM	± 5 N·m	150%	150%	200 Hz (-3 ± 2 dB)	5000 rpm	1.5 N·m	600 N	2.5×10^{-4}	1.8 kg	
TPS-A-10NM	± 10 N·m					3 N·m				
TPS-A-50NM	± 50 N·m					15 N·m				
TPS-A-100NM	± 100 N·m					15 N·m				
TPS-A-500NM	± 500 N·m					150 N·m		800 N		2.3×10^{-3}
TPS-A-1KNM	± 1 kN·m					500 N·m		1 kN		2.6×10^{-3}
TPS-A-5KNM	± 5 kN·m	550 Hz (-3 ± 1 dB)	4000 rpm	3000 rpm	500 N·m	1.8 $\times 10^{-2}$	1.8×10^{-2}	10 kg		
									30 kg	

*1 Sensor only *2 When no rotation



Optional Accessory Tables

Table of Couplings

Models	Couplings	Models	Couplings
TPS-A-01NM to 2NM	SFC-025SA2-T011-K-8B-ΔB	TPS-A-500NM	SFF-140SS-K-45K-ΔKδ -800N
TPS-A-5NM	SFC-040SA2-K-16B-ΔB		
TPS-A-10NM to 50 NM	SFC-060SA2-K-16B-ΔB	TPS-A-1KNM	SFH-190S-T010-K-45K-ΔKδ
TPS-A-100NM	SFF-080SS-K-19B-ΔBδ-100N	TPS-A-5KNM	SFH-260S-T004-4-K-75H-Δδ

Note: Δ is the other part of hole's diameter, δ is the tolerance on the shaft. (Blank: h7, K: k6, M: m6, J: j6, S: 35+0.010 to 0)
 δ: As for 5KNM, H: New JIS; N: New regulated motors; None: Old JIS

Table of Output Cables and Power Supply Cables

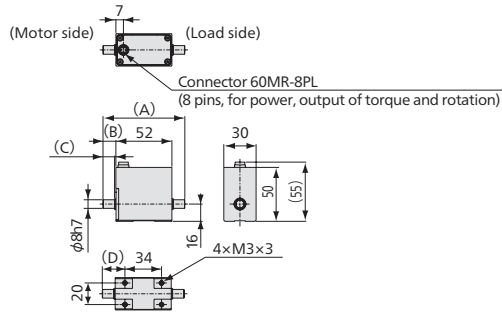
Models	Power Supply	Cables, etc.	
TPS-A-01NM to 2NM	AC	AC adapter SA-10A-EDS (For U.S.A.: UNI318-1215-EDS)	Connection cable TE-58R (2 m, terminated with a connector plug)
	12 VDC	To DC power directly (12 V recommended)	Connection cable TE-57R (2 m, bared at the tip)
		DC power cable (12 V recommended)	Connection cable TE-58R (2 m, terminated with a connector plug)
	24 VDC	To DC power directly (24 V recommended)	Connection cable TE-57-A-24V (2 m, bared at the tip) (For converting the power supply 14 to 30 VDC into 12 VDC.)
TPS-A-5NM to 5 KNM	AC	AC adapter SA-10A-EDS (For U.S.A.: UNI318-1215-EDS)	Output cable U-15 (1.5 m, P-12-7 to BNC)
			Output cable U-58 (1.5 m, BNC to 2 alligator clips)
			Output cable U-59 (1.5 m, BNC to BNC)
	12 VDC	DC power cable P-76 (12 V recommended)	Output cable U-15 (1.5 m, P-12-7 to BNC)
			Output cable U-58 (1.5 m, BNC to 2 alligator clips)
			Output cable U-59 (1.5 m, BNC to BNC)



Torque
Transducers

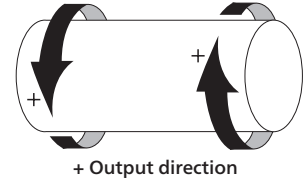
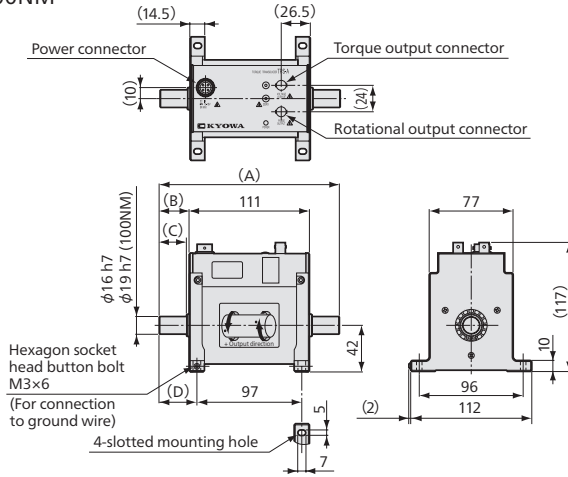
■ Dimensions

TPS-A-01NM to 2NM

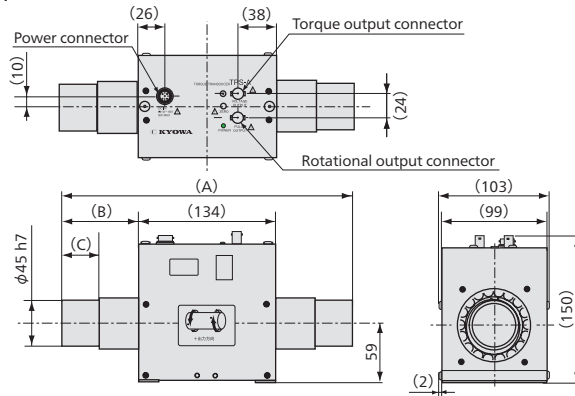


Models	A	B	C	D
TPS-A-01NM to 2NM	76	12	10.75	21
TPS-A-5NM	144	16.5	14	23.5
TPS-A-10NM	166	27.5	25	34.5
TPS-A-50NM	176	32.5	30	39.5
TPS-A-500NM	283	75	36.5	
TPS-A-1KNM	350	108	70	
TPS-A-5KNM	435	134	130	

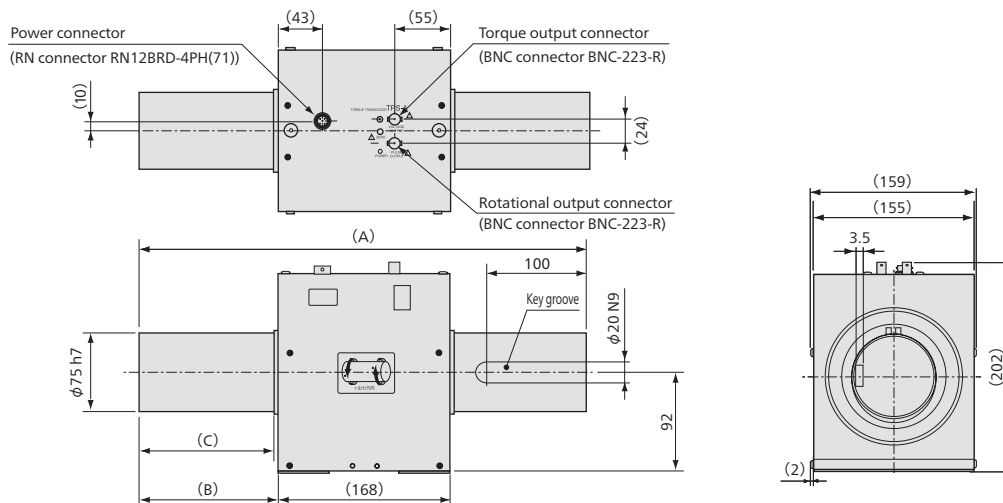
TPS-A-5NM to 100NM



TPS-A-500NM, 1KNM



TPS-A-5KNM



● Dynamic measurement



TPH-A

- 500 N-m to 50 kN-m
- Noncontact design
- No bearing
- High frequency response

Highly Rigid Torque Transducer



Noncontact design to shaft High frequency response High accuracy

- High torsional stiffness.
- Noncontact design without slip rings or bearing enables easy maintenance and accurate measurement in high speed.
- No interference to signal transmission and few noises by rotary transformer power supply method and optical signal transmission method.
- Diaphragm-type flexible coupling provided standard.
- Built-in amplifier gives voltage (± 10 V), current (12 ± 8 mA) output.
- Tachometer output (Open collector output) enables measurement on a digital revolution counter (1 pulse/revolution).

TPH-A torque transducers allow torque to be measured up to 10000 rpm. The main feature of these transducers is high rigidity and an equipped flexible coupling. The unique design with no contact parts such as slip rings, ensures safe use even for long-term measurement of an object rotating at high speeds.

In addition, a built-in amplifier outputs voltage and current signals simultaneously and directly to recorder or indicator and A/D converter helps data acquisition by personal computer.

TPH-A torque transducers allow torque and rotating speed to be measured synchronously.

Specifications

Performance

Rated Capacity	See table below.
Nonlinearity	Within $\pm 0.2\%$ RO (1TMA or more: Within $\pm 0.5\%$ RO)
Hysteresis	Within $\pm 0.2\%$ RO (1TMA or more: Within $\pm 0.5\%$ RO)
Repeatability	0.1% RO or less (1TMA or more: 0.5% RO or less)
Rated Output	10 V $\pm 0.2\%$ (Load resistance 10 k Ω or more) (1TMA or more: 10 V $\pm 0.5\%$) 8 mA $\pm 1.25\%$ (Load resistance 500 Ω or less) (1TMA or more: 8 mA $\pm 1.25\%$) [Minus rated capacity (4 mA) to zero (12 mA) to plus rated capacity (20 mA)]

Environmental Characteristics

Safe Temperature	-10 to 60°C (Non-condensing)
Compensated Temperature	-10 to 60°C (Non-condensing)
Temperature Effect on Zero	Within $\pm 0.03\%$ RO/°C
Temperature Effect on Output	Within $\pm 0.03\%$ /°C

Electrical Characteristics

Cutoff Frequencies of AMP	1 kHz (Amplitude ratio at cutoff point -3 ± 2 dB)
SN Ratio	50 dB p-p or more (Noise 60 mV _{p-p} or less)
Power Supply	100 to 240 V AC

Mechanical Properties

Safe Overloads	150% (1TMA or larger: 120%) Output is saturated at approx. 110% the rated capacity.
Max. Speed	See table below.
Resonant Frequency	See table below.
Torsion Spring Constant	See table below.
Spring Constant in Axial Direction	See table below.
Moments of Inertia	See table below.
Weight	See table below.

Standard Accessories	Power cable (2 m) Dedicated bolts and nuts (42 sets including 2 spare sets) (Note) Flange is not included. Prepare it separately.
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To Ensure Safe Usage

TPH-A series torque transducers are not cased, and thus, the rotating part and couplings are exposed. Considering fatigue failures of these parts, the user should consider installation of a safety steel cover, etc.

Specially designed diaphragm couplings are incorporated into all transducers.

Permissible misalignment of the standard diaphragm coupling in the torque converter is $\frac{1}{4}$ degree for the angular displacement and 0.5mm for compression and expansion. When these limits are exceeded, there is a possibility of damage.

For other general safety precautions, see page 2-139.

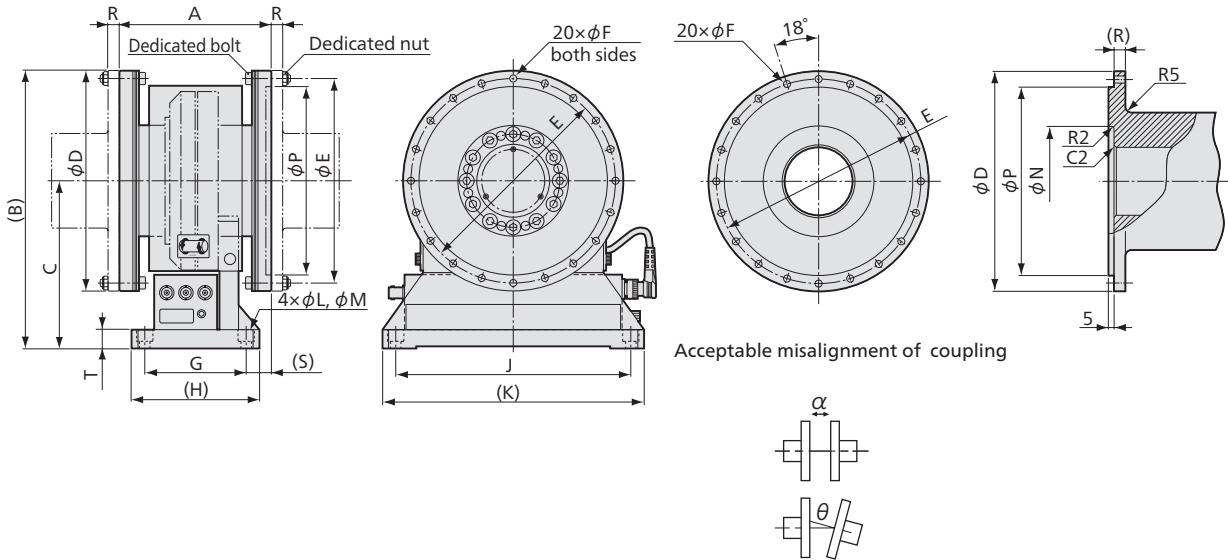
Models	Rated Capacity	Resonant Frequency (Approx.)	Max. Speed (rpm)	Torsion Spring Constant*	Improvement Ratio (Times)	Spring Constant in Axial Direction (N/mm)	Moments of Inertia (Approx.) (kg·m ²)	Weight (Approx.)
TPH-50KMA	± 500 N-m	1.0 kHz	10000	6.37×10^5 N-m/rad	21.0	3.1×10^3	0.032	10.7 kg
TPH-100KMA	± 1 kN-m	1.0 kHz		1.67×10^6 N-m/rad	20.5			
TPH-200KMA	± 2 kN-m	1.4 kHz		3.04×10^6 N-m/rad	18.2			
TPH-500KMA	± 5 kN-m	1.5 kHz	5000	2.25×10^6 N-m/rad	6.4	2.6×10^3	0.120	18.4 kg
TPH-1TMA	± 10 kN-m	1.6 kHz		7.35×10^6 N-m/rad	10.6			
TPH-2TMA	± 20 kN-m	1.7 kHz		1.47×10^7 N-m/rad	12.5			
TPH-4TMA	± 40 kN-m	2.3 kHz	3000	2.94×10^7 N-m/rad	—	2.0×10^3	1.580	83 kg
TPH-5TMA	± 50 kN-m	2.4 kHz		4.90×10^7 N-m/rad	—			

*The stated torsion spring constants of earlier Kyowa's models are with the TPH-A only and excluding the coupling.



■ Dimensions

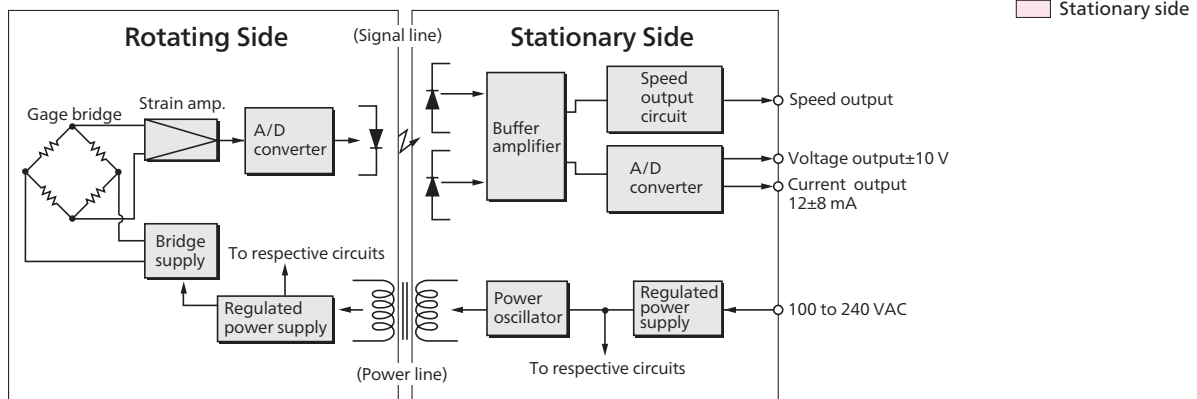
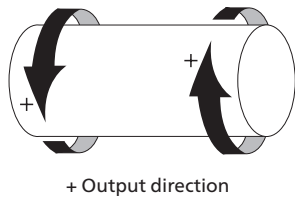
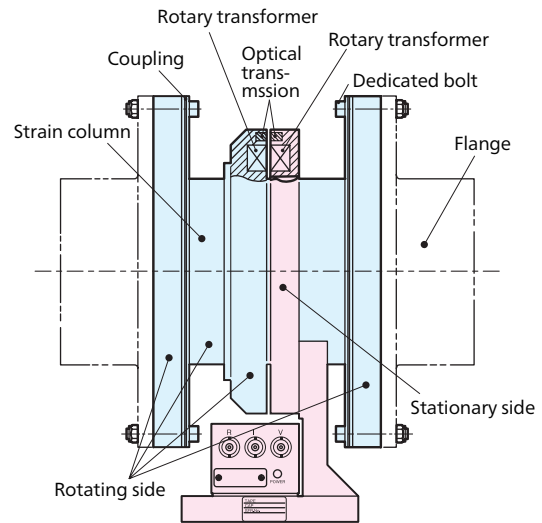
Coupling flange diagram is available on request.



Models	A	(B)	C	ϕD	E	ϕF	G	(H)	J	(K)	ϕL	ϕM	ϕN	ϕP	R	(S)	T
TPH-50KMA	134	241.5	145.5	192	178	6	90	112	208	230	9	14 d=10	96	163	10	22	16
TPH-100KMA	146	272	160	224	207	6	90	112	208	230	9	14 d=10	120	191	10	28	
TPH-200KMA																	
TPH-500KMA	150	281	160	242	220	10	90	112	208	230	9	14 d=10	125	201	12	30	25
TPH-1TMA	200	362	197	330	308	10	90	112	208	230	10	15 d=10	188	283	12	65.3	
TPH-2TMA	200	405	220	370	348	13	120	150	310	340	11	18 d=12	222	325	16	42.3	
TPH-4TMA	200	470	250	440	408	16	150	180	372	400	13	19 d=12	260	376	20	24.3	
TPH-5TMA	260	470	250	440	408	16	150	180	372	400	13	19 d=12	260	376	20	54.3	

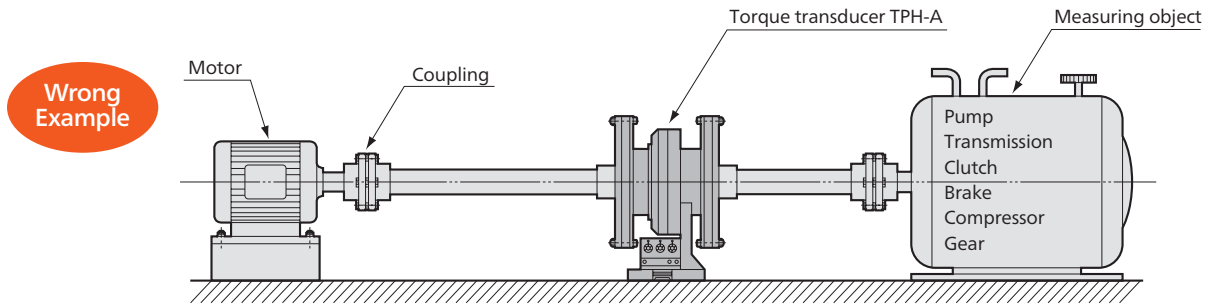
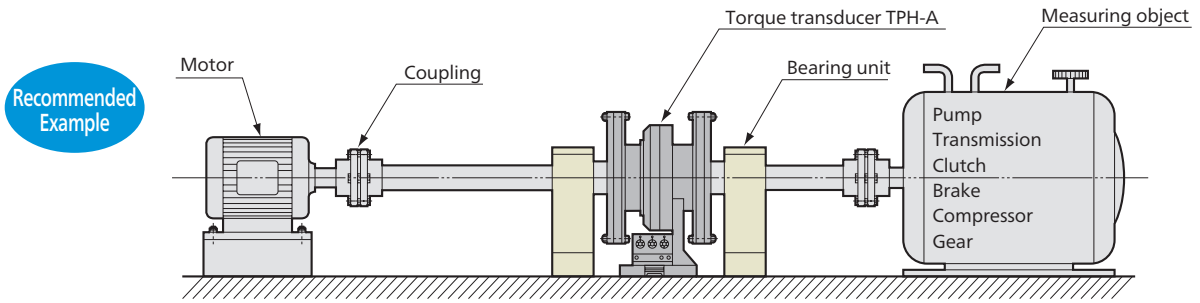
■ Power and signal transmission in TPH series

Using a strain gage, TPH-A torque transducers detect torsion corresponding to torque and convert it to voltage. After amplified, the voltage is digitized and then transferred as an optical signal to the stationary side via light-emitting diode. The transferred digital signal is converted to an analog signal for torque measurement. The rotating speed is optically transferred, too enabling simultaneous measurement of torque and rotating speed. The rotating side is powered through the rotary transformer.



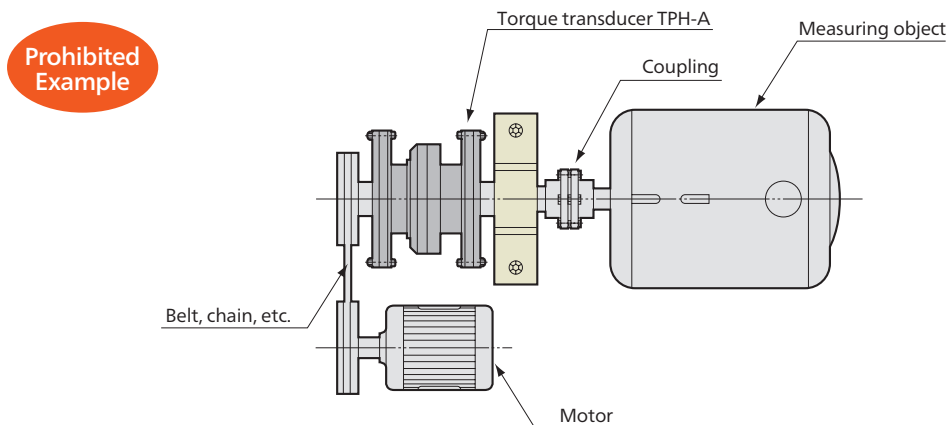
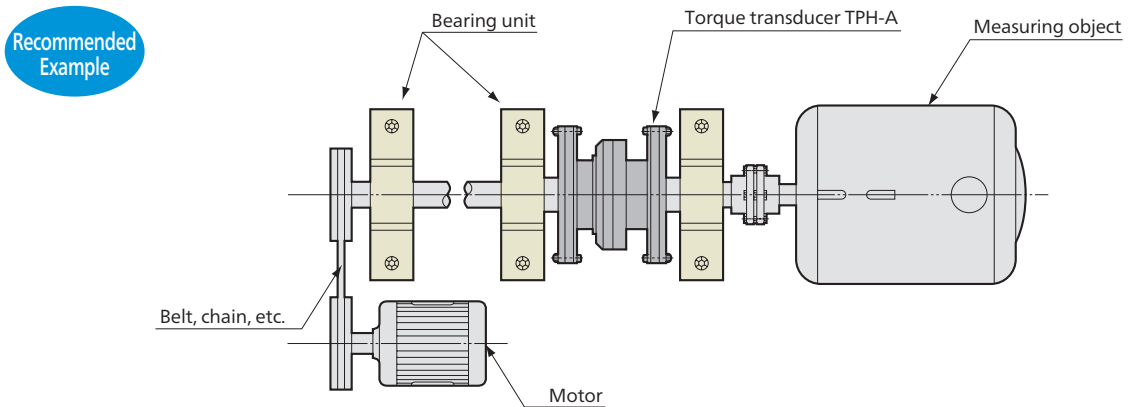
1. Application where the distance between motor and measuring object is long and the rotation speed is high

- It is recommended to install a bearing unit.



2. If connected using belt or chain, etc.

- It is recommended to install bearing units.



● Dynamic measurement

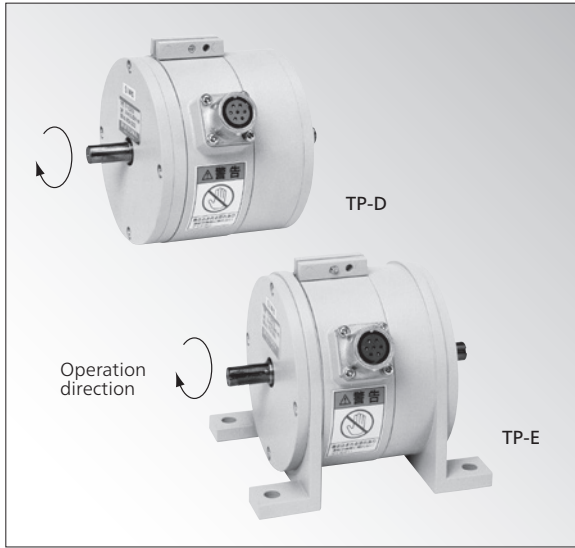
TPH-A Recommended products for combination

- Universal Recorder EDX-200A → 3-55
- Universal Recorder EDX-100A → 3-63
- Memory Recorder/Analyzer EDX-5000A → 3-68

TP-D/E

- For small torque measurement ● 0.2 to 2 N·m
- Slip ring type

Small-sized Torque Transducer



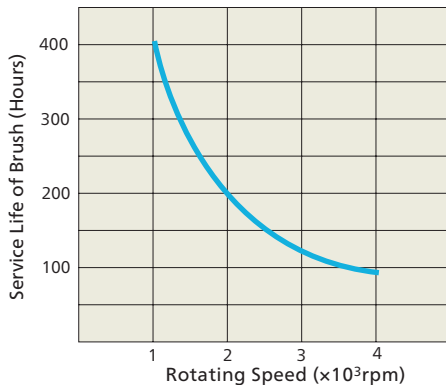
Large voltage enables to measure small torque

- Two types are available: simple installation and stationary.

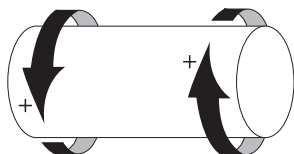
To obtain a large output voltage with a low torque, a unique cantilever system has been adopted for the detection mechanism. While all models are the stationary type with mounting legs, these legs will be easily removed. About measurement instruments, carrier-type strain amplifiers, DPM series, are recommended.

*For DPM series, see page 3-5 and 3-7.

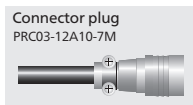
Service Life of Brush



Note: Worn brushes will be replaced for value. Contact us.



+ Output direction



Specifications

Performance

Rated Capacity	See table below.
Nonlinearity	Within ±1% RO
Hysteresis	Within ±1% RO
Rated Output	0.75 to 1.5 mV/V

Environmental Characteristics

Safe Temperature	0 to 60°C
Compensated Temperature	0 to 60°C
Temperature Effect on Zero	Within ±0.03% RO/°C
Temperature Effect on Output	Within ±0.03%/°C

Electrical Characteristics

Safe Excitation	4 V AC or DC
Recommended Excitation	1 to 4 V AC or DC
Input Resistance	350 Ω ±0.5%
Output Resistance	350 Ω ±0.5%
Rotation-induced Noise	12 × 10 ⁻⁶ strain p-p or less
Cable	TT-04, 4-conductor (0.3 mm ²) chloroprene shielded cable, 7.6 mm diameter by 5 m long, terminated with connector plugs PRC03-12A10-7M at both ends (Shield wire is connected to the case.)

Mechanical Properties

Safe Overloads	120%
Max. Speed	4000 rpm
Torsion Angle	See table below.
Torsion Spring Constant	See table below.
Moments of Inertia	Approx. 0.081 × 10 ⁻⁴ kg·m ²
Weight	Approx. 560 g (TP-D), approx. 610 g (TP-E)

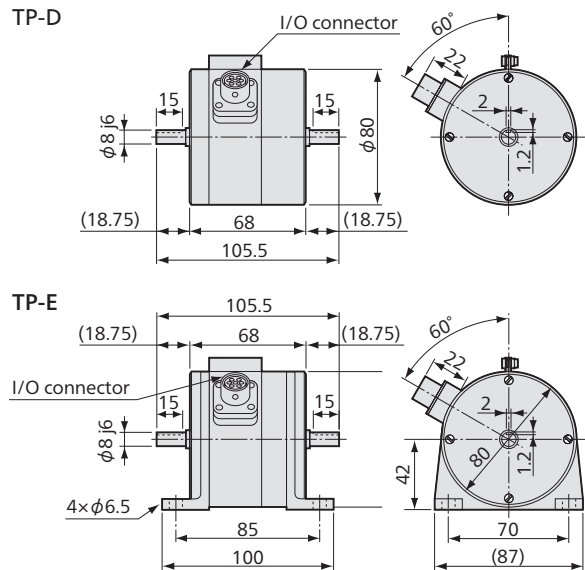
Optional Accessories

Dedicated flexible couplings FC-1B/FC-2B (Page 2-140)

Models	Rated Capacity	Torsion Angle (Rated) (Approx.)	Torsion Spring Constant (Approx.)
TP-2KCD,E	0.2 N·m	0.027 rad	7.4 N·m/rad
TP-5KCD,E	0.5 N·m	0.017 rad	29.4 N·m/rad
TP-10KCD,E	1 N·m	0.015 rad	66.7 N·m/rad
TP-20KCD,E	2 N·m	0.013 rad	153.8 N·m/rad

Note: Starting torque: Approx. 0.02 N·m (Reference value)

Dimensions



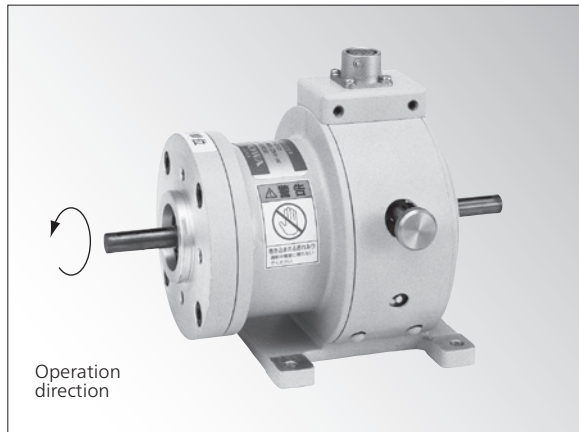
*The height tolerance until the shaft conforms to JIS B 0405 m class while the key seat dimension conforms to JIS standards. Please contact us regarding the tolerance.

Dynamic measurement

TP-D/E Recommended products for combination



High-speed Torque Transducer



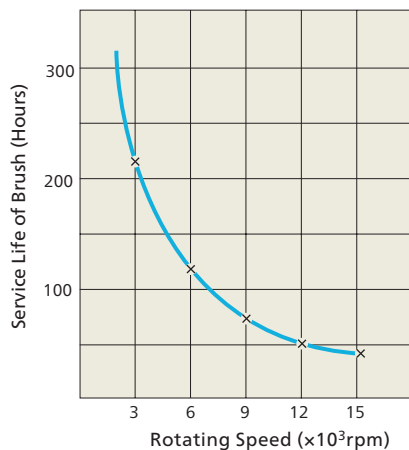
Possible to measure 0.2 N·m torque by 15000 rpm at maximum.

- Overload prevention stopper is provided.
- Mounting legs will be removed as required

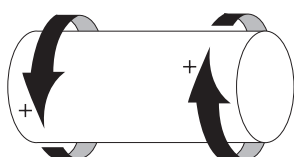
TP-M series high-speed torque transducers allow torque to be measured at a maximum 15000 rpm, and are available with a rated capacity ranging from 0.2 to 5 N·m. An overload prevention stopper avoids large torque generated in motor startup, etc. While all models are the stationary type with mounting legs, these legs will be easily removed. About measurement instruments, carrier-type strain amplifiers, DPM series, are recommended.

*For DPM series, see page 3-5 and 3-7.

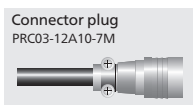
Service Life of Brush



Note: Worn brushes will be replaced for value. Contact us.



+ Output direction



Specifications

Performance

Rated Capacity	See table below.
Nonlinearity	Within ±0.2% RO
Hysteresis	Within ±0.2% RO
Rated Output	0.75 mV/V ±1% (2, 5 KCM) 1 mV/V ±1% (10KCM) 1.5 mV/V ±1% (20, 50KCM)

Environmental Characteristics

Safe Temperature	0 to 60°C
Compensated Temperature	0 to 60°C
Temperature Effect on Zero	Within ±0.02% RO/°C (20, 50KCM: Within ±0.01% RO/°C)
Temperature Effect on Output	Within ±0.02%/°C (20, 50KCM: Within ±0.01%/°C)

Electrical Characteristics

Safe Excitation	4 V AC or DC
Recommended Excitation	1 to 4 V AC or DC
Input Resistance	350 Ω ±0.5%
Output Resistance	350 Ω ±0.5%
Rotation-induced Noise	12 × 10 ⁻⁶ strain p _{pp} or less
Cable	TT-04, 4-conductor (0.3 mm ²) chloroprene shielded cable, 7.6 mm diameter by 5 m long, terminated with connector plugs at both ends (Shield wire is not connected to the case.)

Mechanical Properties

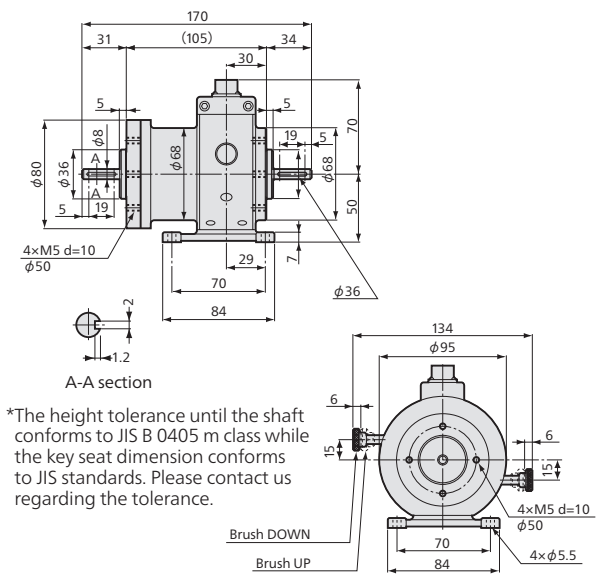
Safe Overloads	150% (Stopper activates at 150%, Ultimate torque with stopper 150% + 2 N·m)
Operating Speed	3000 to 15000 rpm
Torsion Angle	See table below.
Torsion Spring Constant	See table below.
Moments of Inertia	Approx. 0.35 × 10 ⁻⁴ kg·m ²
Weight	Approx. 1.1 kg

Optional Accessories

Dedicated flexible couplings FC-1B/FC-2B (Page 2-140)
Brush carrier TBC-T

Models	Rated Capacity	Torsion Angle (Rated) (Approx.)	Torsion Spring Constant (Approx.)
TP-2KCM	0.2 N·m	0.0098 rad	20.4 N·m/rad
TP-5KCM	0.5 N·m	0.012 rad	41.7 N·m/rad
TP-10KCM	1 N·m	0.016 rad	62.5 N·m/rad
TP-20KCM	2 N·m	0.016 rad	125 N·m/rad
TP-50KCM	5 N·m	0.015 rad	333 N·m/rad

Dimensions



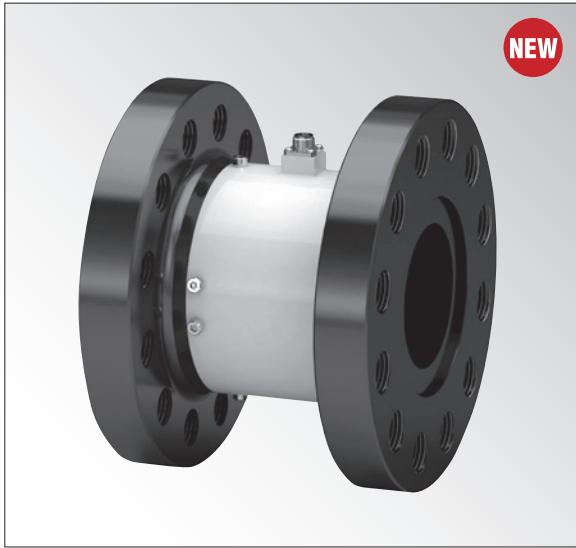
Dynamic measurement

TP-M Recommended products for combination

- Strain Amplifier DPM-900 series → 3-5
- Universal Recorder EDX-200A → 3-55
- Universal Recorder EDX-100A → 3-63
- Sensor Interface PCD-400A/430A → 3-78

TPR-S-10KNMSA48

Non-rotary Type Torque Transducer



- Compact & large capacity (± 10 kN·m)
- Being hollowed structure, lightweight (approx. 10 kg)
- Easily install with bolts on the flange.

- Large capacity
- Compact & lightweight
- 10 kN·m

Specifications

Performance

Rated Capacity	± 10 kN·m
Nonlinearity	$\pm 0.3\%$ RO
Hysteresis	$\pm 0.3\%$ RO
Rated Output	Approx. 1.5 mV/V

Environmental Characteristics

Safe Temperature	0 to 60°C
Compensated Temperature	0 to 60°C
Temperature Effect on Zero	$\pm 0.05\%$ RO/°C
Temperature Effect on Output	$\pm 0.05\%$ /°C

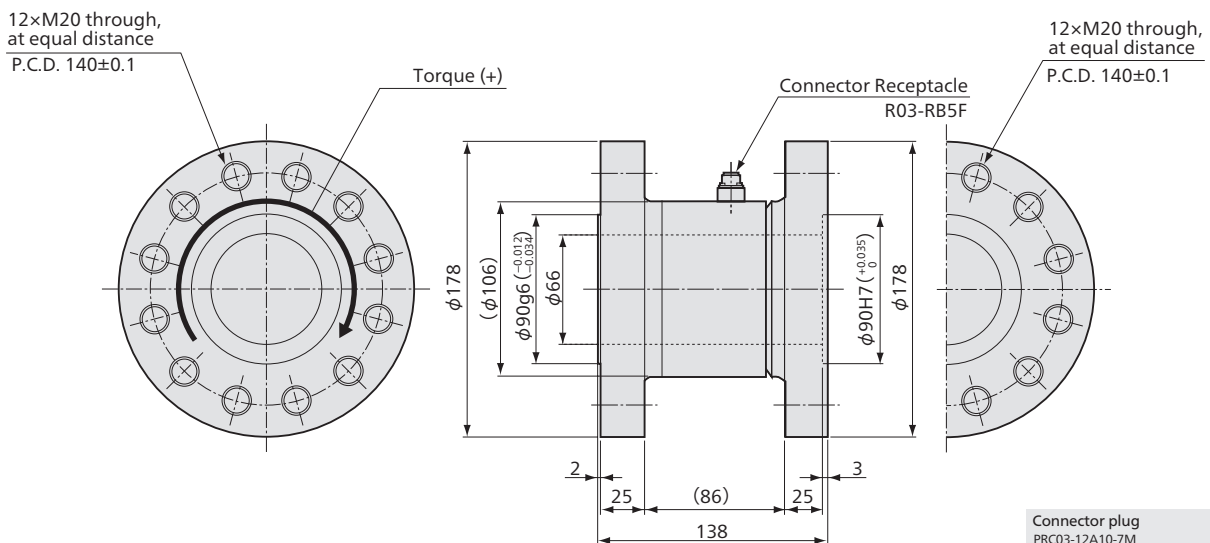
Electrical Characteristics

Safe Excitation	15 V AC or DC
Recommended Excitation	1 to 10 V AC or DC
Input Resistance	$350 \Omega \pm 2\%$
Output Resistance	$350 \Omega \pm 2\%$
Cable	4-conductor (0.3 mm ²) chloroprene shielded cable, 6 mm diameter by 10 m long
	Sensor side: R03-P5M
	Measuring instrument side: PRC03-12A10-7M (Shield wire is not connected to the case.)

Mechanical Properties

Safe Overloads	120%
Weight	Approx. 10.5 kg (Excluding cable)
Material	Main body: Alloy steel Case: Common steel

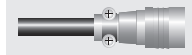
Dimensions



*It's a non-waterproof model, don't cover it with water.

*Being non-rotary type, it is impossible to measure rotary torque.

Connector plug
PRC03-12A10-7M



● Dynamic measurement

TPR-S-10KNMSA48
Recommended products for combination

