

Series 6000

Torque measured metal bellow coupling



Properties

- Free of float metal bellow coupling with integrated torque measurement
- Non-contact measurement system, high robustness
- High torsional stiffness
- Limited torque of inertia

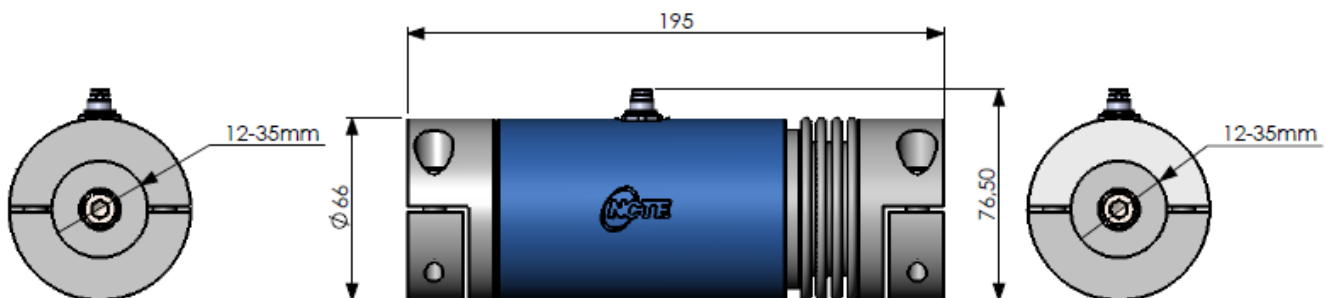
Performance

- Measurement range 60 Nm
- Accuracy class 0,5 %
- Temperature range -40 °C ... +105 °C
- Protection class IP50
- Tuning speed up to 5000 rpm
- Output signals 0-10 V / 4-20 mA / CAN Bus

1. Short description

This metal bellow coupling can measure bidirectional torque in real time. This can be achieved without higher additional torque of inertia between gear and output as well as slack and rotation. The coupling is delivered as one complete unit with integrated electronics and cable. The signal generating shaft is integrated in the coupling also the non contact signal cording and analog/digital signal conditioning. The coupling particularly distinguishes of low price and high robustness and fit very well in applications like servo motors in tool machines, automation technology, packaging machines and woodworking machines.

2. Dimensions



Smaller bore holes available on request.

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3. Technical Characteristics

No.	Type		Series 6000
	Accuracy class ¹		0.5
		Unit	value
1	Linearity deviation incl. hysteresis	%ME*	< ±0.5
2	Rotational signal uniformity	%ME*	< ±0.5
3	Repeatability	%ME*	< ±0.05
Output signal in general		Unit	Value
4	Frequency range, -3dB point, Bessel characteristics	Hz	2500
5	Analog signal	V	0 ... 10
6	Signal at torque = zero	V	≈ 5
7	Signal at positive nominal torque	V	> 5
8	Signal at negative nominal torque	V	< 2.5
9	Calibration parameter (precise value on label)	mV/Nm	Normed output signal 4000 mV/measurement range
10	Output resistance	Ω	50
Temperature influence		Unit	Value
11	Zero point over temperature	%/10 K	< 0.5
12	Signal drift over temperature within operational temperature range ²	%/10 K	< 0.5
Power supply		Unit	Value
13	Supply voltage	VDC	9 ... 28
14	Max. consumption	mA	40
15	Start-up peak	mA	< 100
16	Max. absolute supply voltage	VDC	30
General information		Unit	Value
17	Degree of protection acc. To EN 60529	IP	50
18	Reference temperature	°C	+15 ... +35
19	Operational temperature range	°C	-40 ... +105
20	Storage temperature range	°C	-40 ... +120

%ME: related to a full scale measurement range

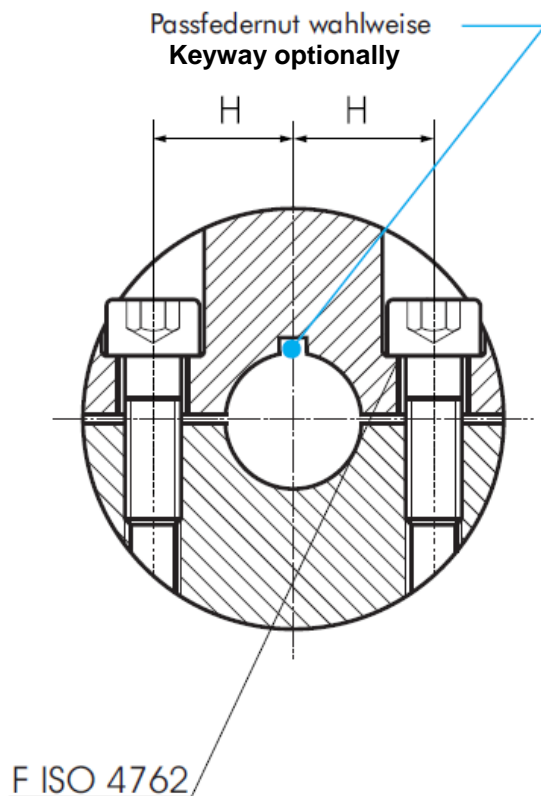
- 1) The accuracy class implies that taken separately both the linearity deviation as well as the rotational signal uniformity are either lower than or equal to the value of the accuracy class. The accuracy class is not to be identified with the classification following DIN 51309 or EA-10/14.
- 2) The factor of transmission declines linearly up to a maximum of 0.5 % / 10 K with rising temperature due to the reduction of the elasticity.

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4. Technical Characteristics of coupling

No.		Unit	value
1	Mass	Kg	2
2	Mass torque of inertia	J (kg*mm ²)	6533
Spring stiffness			
3	Torsion CT 10 ³	Nm/rad	75
4	Radial CR	N/mm	1150
5	Axial CA	N/mm	90
Offset			
6	Radial ΔKr	mm	0.15
7	Axial ΔKa	mm	0.6
8	Angle ΔKw	mm	1.5



Tightening torque of the screws: 40 Nm

Material of bellow: stainless steel

Material of hub: aluminum

Bore holes will be done in H7.

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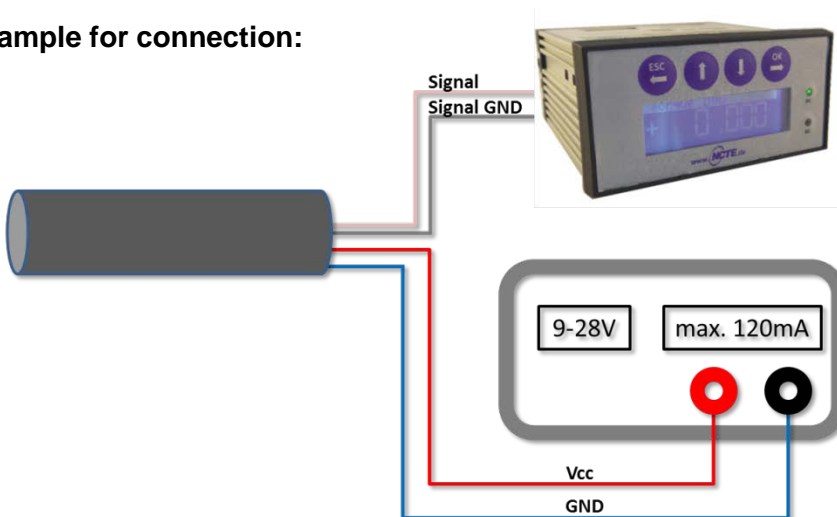
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5. Connection plan

Pin assignment at sensor
Presentation: On top

Type: Assignment connections Binder connector			
Pin	color	Description	Value
A	white	USB D- / CAN-H	
B	brown	USB D+ / CAN-L	
E	grey	Analog GND	
F	pink	Output signal analog Voltage	0 ... 10 V / 4 ... 20 mA
G	blue	Ground GND	
H	red	Supply voltage V_{CC}	9 ... 28 V

Example for connection:



6. Instruction manual

Field of application

The torque sensor is intended mainly for use in test benches and production lines.

Scope of delivery

The torque sensor set consists of the sensor itself (signal pick-up and signal processing integrated into sensor housing), one connection cable with a soldered plug.

Installation and Removal

Make sure to install the sensor shafts exactly with the proper aligned connecting shafts. The sensor is not designed as a pillow block. No external axial or radial force should be applied to the housing of the sensor. In case that the bending or radial forces could not be avoided the ball bearing of the sensor must be double-checked. The sensor is not designed for trailing loads, please load only compressive forces on the shaft ends. A maximum cable length of 5 m must not be exceeded. Using a cable or connector other than supplied by NCTE, or a similar cable that is a different length may affect the overall performance of the sensor.

Do not remove the shaft with torque applied to the sensor.

Adjustment

If required the zero point output signal (5 V) can be adjusted. By factory default the sensor is set to 5 V at zero point.

Interface description

Mechanical connections:

For transmission are provided adapter connections on both shaft ends.

Electrical connections:

On the sensor housing there is a 12-pin socket for the power supply and the signal output. (Pin-assignment please see chapter 5)

Operation (in regular case or in optimization)

Optimal measurement parameters may be achieved, when the sensor is applied in accordance to the specification. Use the sensor only for short periods of time at the maximum rotational speed. By compliance with the specification the sensor works generally trouble-free and maintenance-free.

Irregular operation, Measures against disturbance

The presence of external electromagnetic or magnetic fields can lead to irregular measurement results. The mechanical overload on the sensor (e. g. Exceeding of maximum allowed torque or severe vibrations) may cause damage to the sensor and in consequence the incorrect signal output. In such cases the sensor must be reset. If this does not help, do not open the sensor, but contact NCTE directly for assistance.

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Commissioning

After sensor installation pay attention to the followings:

- Switch on the power supply unit and check the supply voltage. Peak voltage to the sensor must be avoided! Be sure to verify the power supply voltage before connecting the sensor!
- Connect the sensor to the power supply unit by using the delivered cable.
- Connect the sensor output to a high-resistance device such as an A/D converter, oscilloscope, PC measurement board. The sensor should be in mechanical unloaded state while connecting it.

Service / Maintenance

Service-contact:

Phone: +49 89 665619 0

Facsimile: +49 89 665619 29

The sensor is free of maintenance, NCTE advises a yearly recalibration. The ball bearing is designed for a lifetime of 5000 h.

Disposal

For purposes of disposal please send the sensor back to NCTE.

Handling and transport

While handling, storing and transportation keep sensor away from magnetic and electromagnetic fields which may exceed the allowed maximum range of EMC listed in chapter 3.

Precautions

- Do not open the sensor under any circumstances.
- Do not remove or loosen the locking rings on the shaft ends.
- The mounting nut of the socket as well as the fixing screws should not be loosened or tightened.
- Use only a separate power supply for the sensor.
- Use the sensor only according to the specification (chapter 3).
- Keep the sensor away from magnetic and electromagnetic fields which may exceed the allowed maximum range of EMC (chapter 3).
- The sensor is not designed as a pillow block. The existing fixing possibilities serve exclusively for preventing the sensor from rotation.

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7. Order options

Series 6000 Accuracy 0.5%							Price
Measurement range							
60 Nm							
Option 1: Bore hole left D1 (e. g.: 15 or 15 N for bore holt with Nut groove)							
XXX							
Option 2: Bore hole right D2 (e. g. 15 or 15 N for bore holt with groove)							
XXX							
Option 4: Output signal							
A analog voltage 0-10 V							
S current output 4-20 mA							
C CAN Bus							
Option 5: KBK							
P keyway							
6000	x	x	x		x	x	

8. Contact



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