Technical data

- Nominal torque: up to 2.000 Nm, bidirectional
- Rotational speed: ≤ 10.000 rpm
- Accuracy: ≤ ±0,2 %
- Temperature range: -40 °C to +85 °C
- Protection class: IP50
- Output signal options: 0-10 V/4-20 mA
- Cut-off frequency: 2.500 Hz

Your advantages

- Made in Germany
- Short lead time(< two weeks)
- Best price-performance ratio
- Integrated electronic (Plug & Play)
- Contactless measurement system
- Including 5 m cable and calibration certificate
- Suitable accessories (Readout unit, couplings)

Short description

The series 3000 covers the accurate and reliable professional torque measurement technology.

This series is mainly used in laboratory, test facilities, trials, medical engineering, process monitoring and quality control.

Transmitted torque can be measured statically and dynamically in real time. Shaft is available as Round shaft and Square shaft. Each sensor can be configured individually with a lot of extras, such as angle sensor.

Series 3000 offers different output signals such as 0-10 V, 4-20 mA.

The sensor is provided as a complete unit with integrated evaluation electronic, including 5 m cable, keystones (Round shaft) and calibration certificate.

Model series 3000

Model series 3000 round shaft	Unit	Nominal torque bidirectional (+/-)	Limiting torque unidirectional (Nm)	Limiting torque bidirectional (+/-) Nm	Rotational speed [rpm]
Ø 15 mm	[Nm]	50	65	65	10.000
		100	130	130	
Ø 25 mm		250	325	325	8.000
		500	650	650	
Ø 40 mm		1.000	1300	1300	5.000
		2.000	2600	2600	

Model series 3000 square shaft	Unit	Nominal torque bidirectional (+/-)	Limiting torque unidirectional (Nm)	Limiting torque bidirectional (+/-) Nm	Rotational speed [rpm]
⅜ inch	[Nm]	50	50	30	10.000
		100	100	60	
¾ inch		250	250	150	8.000
		500	500	300	
1 inch		1.000	1.000	600	5.000

Note: In case of overload, the sensor leads to an offset in measurement. In such case, the sensor needs to be recalibrated at NCTE AG. The sensor should be operated only within the specified nominal torque range

Load characteristics

Model series 3000 measuring range	Unit	Axial force [N][1]	Lateral limit force [N]	Bending limit moment [Nm]
50 and 100	[Nm]	2.300	300	41,7
250 and 500		7.000	800	176
1.000 and 2000		24.000	2.000	700

Each type of irregular stress can only be permitted with its given limit value (bending moment, lateral force or axial force, exceeding the nominal torque) if none of the others can occur. Otherwise the permitted limits must be reduced. If for instance 30 % of the limited bending moment and also 30 % of the limited lateral force are present, only 40 % of the limited axial force are permitted, provided that the nominal torque is not exceeded.

[1] The specified values only apply to direct axial force on the shaft. If the axial force acts on the circlip, only 50% of the force is permitted.

Technical characteristics

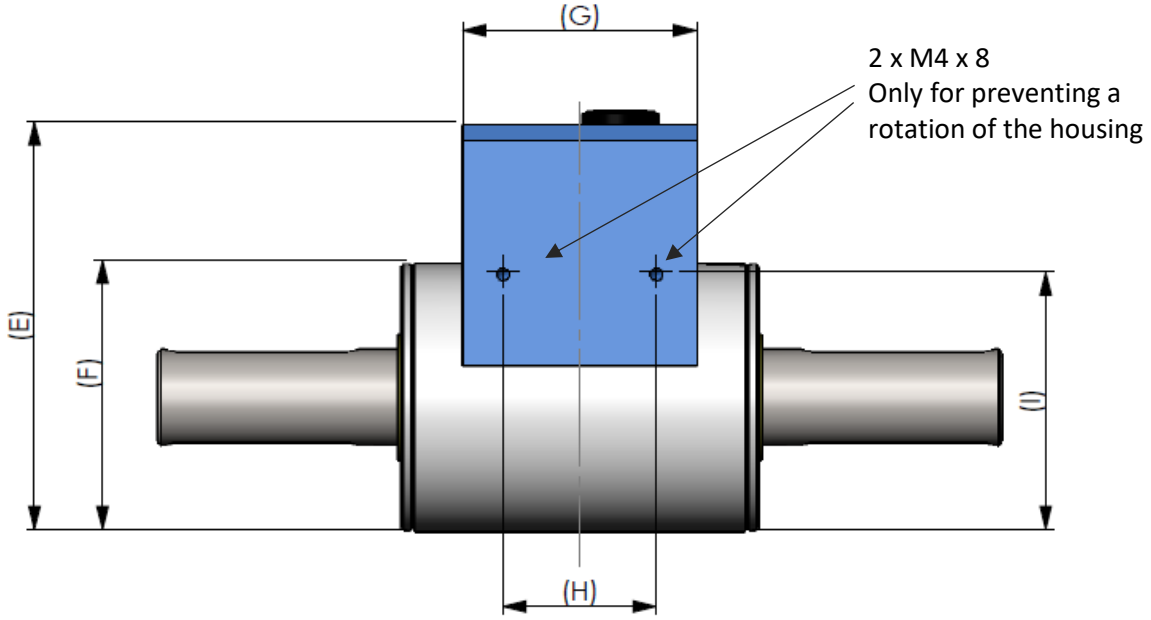
No.	Model		Series 3000	
	Accuracy class[2]		0,2	
		Unit	Value	
1	Linearity deviation incl. hysteresis	%ME[3]	< ±0,2	
2	Rotational Signal Uniformity (RSU)		< ±0,2	
3	Repeatability		< ±0,05	
	Output signal in general	**Unit**	**Value**	
4	Frequency range, -3dB point, Bessel characteristics	Hz	2.500	
5	Analog signal	V | mA	0 … 10	4 … 20
6	Signal at torque = Zero[4]	V | mA	5	12
7	Signal at positive nominal torque[5]	V | mA	9	20
8	Signal at negative nominal torque[5]	V | mA	1	4
9	Calibration parameter (normed)[5]	V/Nm mA/Nm	4 V/Measurement range	8 mA/Measurement range
10	Error output	V | mA	0/10	<4/20<
11	Output resistance (Voltage output)	Ω	62	
12	Output resistance (Current output)	k Ω	≥ 600	
	Effect of temperature	**Unit**	**Value**	
13	Zero point drift over temperature	%/10 K	< 0,2	
14	Signal drift over temperature within nominal temperature range	%/10 K	< 0,5	
	Power supply	**Unit**	**Value**	
15	Supply voltage	VDC	11 … 28	
16	Current consumption (max.)	mA	150	
17	Start-up peak	mA	< 200	
18	Absolute max. supply voltage	VDC	30	

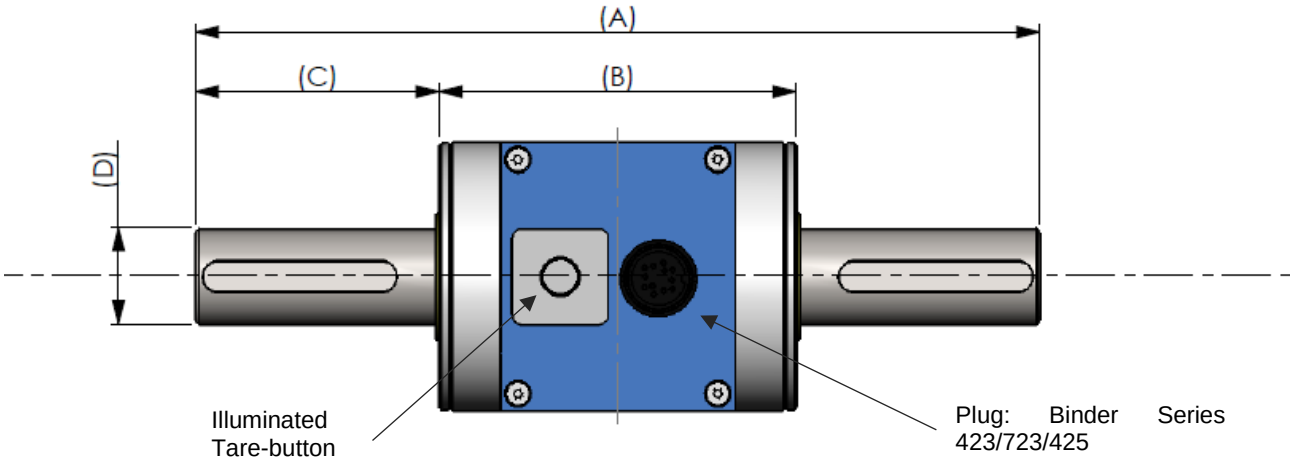
[2] The accuracy class implies that taken separately both the linearity deviation as well as the rotational signal uniformity are either lower than or equal to the value of the accuracy class.
[3] %ME: related to a full scale measurement range.
[4] Zero point can be set to 5 V using a tare button.
[5] The exact sensor-specific values can be found in the calibration certificate supplied.

	General information	Unit	Value					
19	Protection class according to EN 60529[6]	IP	50					
20	Reference temperature	°C	+15 … +35					
21	Operational temperature range	°C	-40 … +85					
22	Storage temperature range	°C	-30 … +85					
	Nominal torque (bi-directional)	**Nm**	**50**	**100**	**250**	**500**	**1.000**	**2.000**
23	Weight	kg	1,4		2,5		6	
24	Moment of inertia	kg mm^2	5,9		59,5		626	
	Load limits[7]	**Unit**	**Value**					
25	Maximum measurable torque	%	110					

[6] Wiring connected.
[7] Based on the non-contact measurement principle the torque sensor is quite insensitive to bending and shearing forces. Self-aligning couplings are recommended in case of dynamic loads.

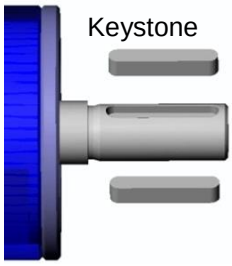
Dimensions

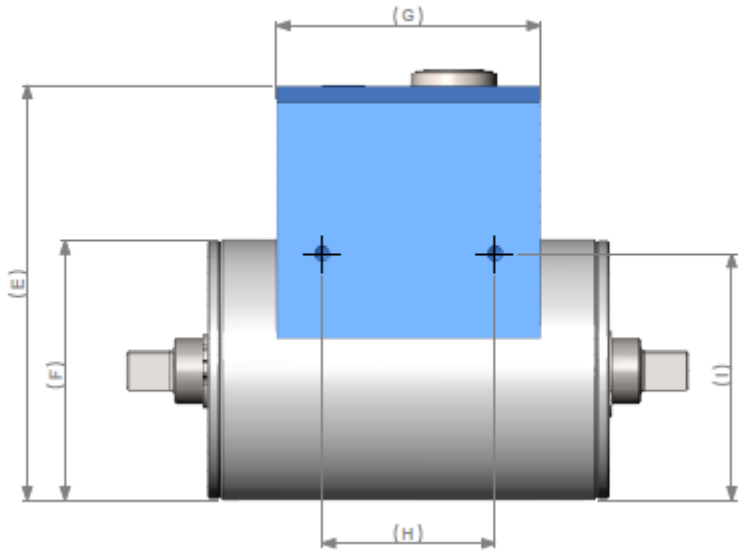

(G)
2 x M4 x 8
Only for preventing a
rotation of the housing
(E)
(F)
(I)
(H)

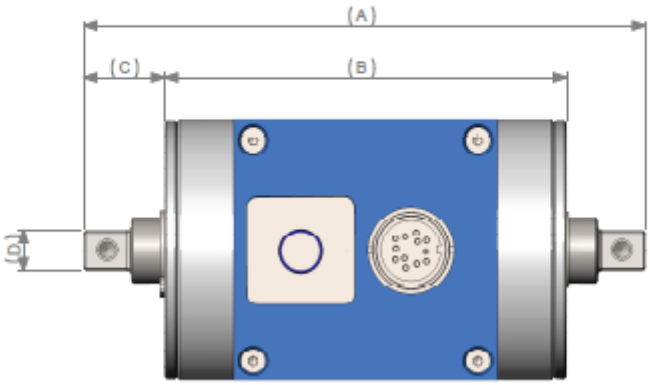

(A)
(C)
(B)
(D)
Illuminated
Tare-button
Plug: Binder Series
423/723/425

Dimensions round shaft (in mm)						
	50 Nm	100 Nm	250 Nm	500 Nm	1.000 Nm	2.000 Nm
A	160	160	220	220	350	350
B	93	93	101	101	130	130
C	33,5	33,5	59,5	59,5	110	110
D	15g6	15g6	25g6	25g6	40g6	40g6
E	96	96	106	106	126	126
F	60	60	70	70	90	90
G	61	61	61	61	80	80
H	40	40	40	40	60	60
I	57	57	67	67	87	87

Dimensions keyway [mm]				Keystones			Key stone-position
Shaft	Width	Depth	Length	Height	Length	Amount	Distance L
Ø 15 mm	5N9	3	25,5	5	25	1	130,5
Ø 25 mm	8N9	4	50,5	7	50	2	165,5
Ø 40 mm	12N9	5	90,5	8	90	2	252,0

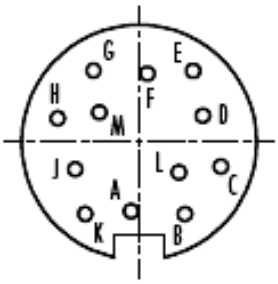






Dimensions square shaft (in mm)			
	50 Nm	250 Nm	1.000 Nm
A	130	180	230
B	93	101	130
C	18,5	39,5	50
D	3/8 inch	3/4 inch	1 inch
E	96	106	126
F	60	70	90
G	61	61	80
H	40	40	60
I	57	67	87

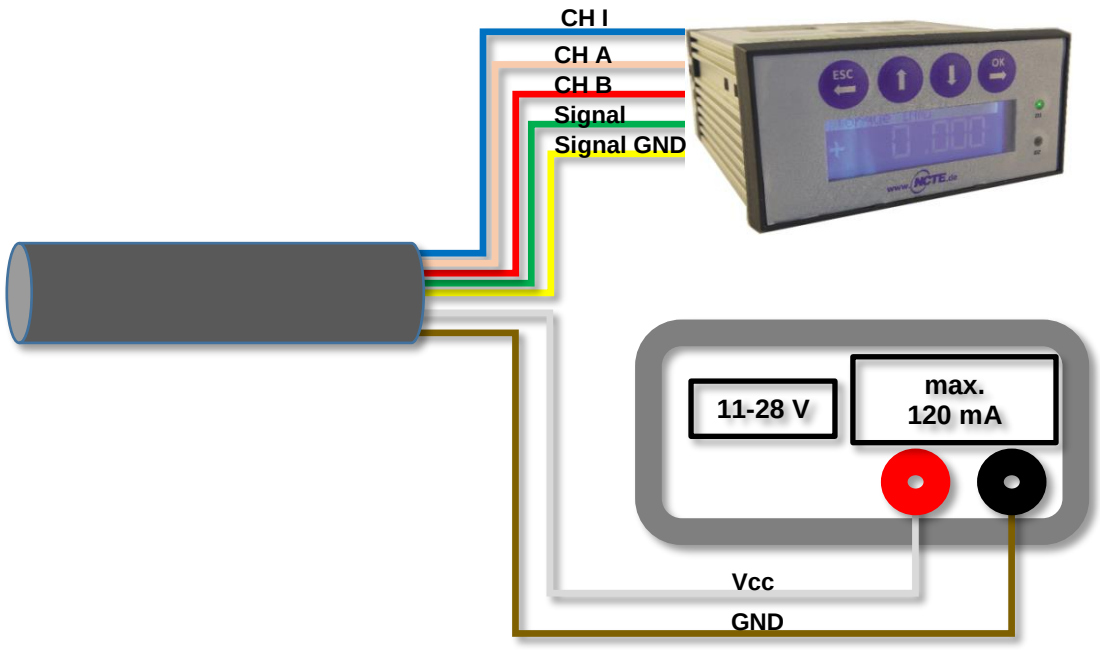
Connection plan



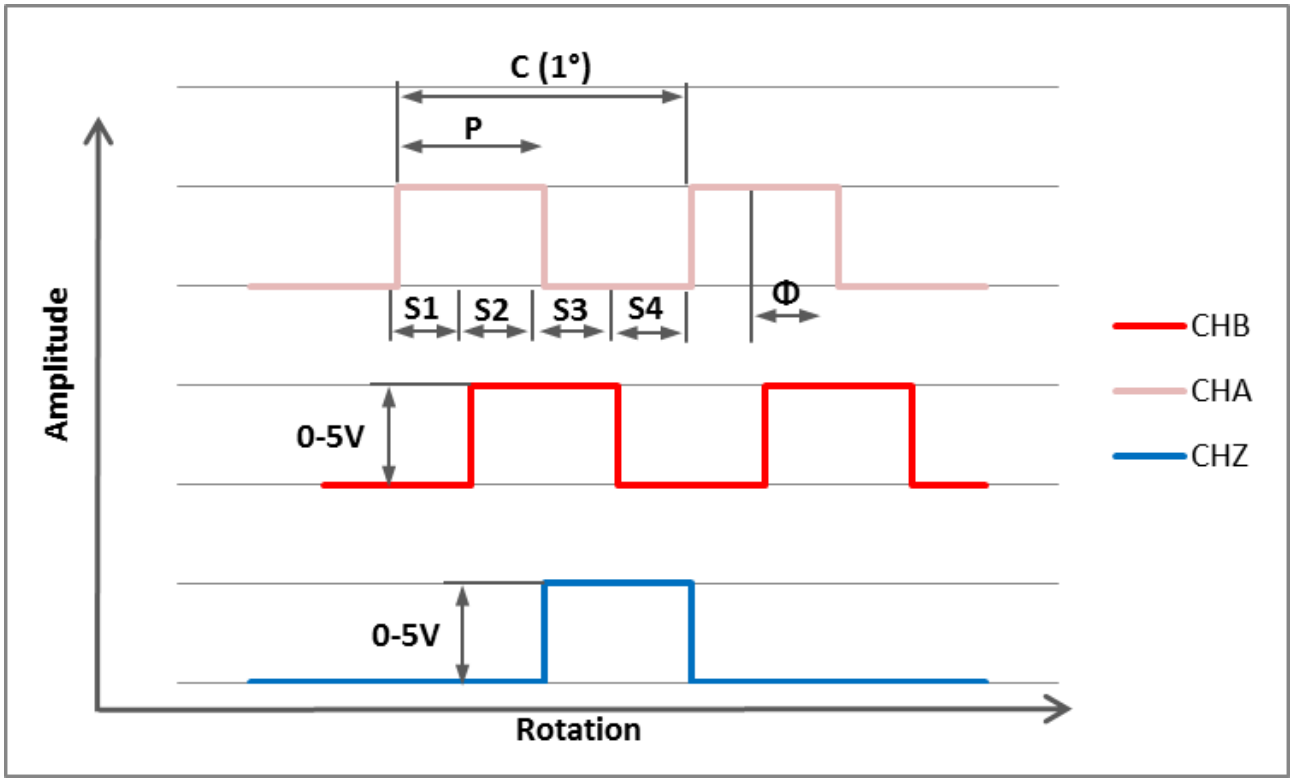
Connector
Power supply and outputs

Typ	Binder series 423/723/425 IP 67 colour code according to DIN 47100		
Pin	**Colour**	**Description**	**Value**
A	White	Supply voltage V_{CC}	11 V ... 28 V
B	Brown	Ground GND	-
C	Green	Analog Out	0 V ... 10 V
D	Yellow	Analog GND	-
E	Grey	Analog Out	4 mA ... 20 mA
F	Pink	Angle Ch A	0 V ... 5 V
G	Blue	Angle Ch I	0 V ... 5 V
H	Red	Angle Ch B	0 V ... 5 V
J	Black	-	-
K	Violet	For internal use only	RX (TTL Pegel)
L	Grey-Pink	For internal use only	RX (TTL Pegel)
M	Red-Blue	Digital GND	-

Connection example:



Angle sensor



Parameter	Min.	Typ.	Max.	Units
High Level Output Voltage	2,4	5	-	V
Low Level Output Voltage	0	-	0,4	V

Parameter	Description
C	One cycle of 360 CPR (degrees)
P	The duration of high state of the output within one cycle.
S	The number of electrical degrees between a transition in Channel A and the neighbouring transition in Channel B.
Φ	The number of electrical degrees between the centre of high state of Channel A and the Centre of high state of Channel B.

Order options

Series 3000 accuracy 0,2 %						
Measurement range						
50	Nm including 5 m cable and calibration certificate					
100	Nm including 5 m cable and calibration certificate					
250	Nm including 5 m cable and calibration certificate					
500	Nm including 5 m cable and calibration certificate					
1.000	Nm including 5 m cable and calibration certificate					
2.000	Nm including 5 m cable and calibration certificate					
	Angle sensor					
	0	Without angle sensor				
	1	Angle sensor 360CPR				
		Analog output				
		A	Voltage output 0-10 V			
		S	Current output 4-20 mA			
			Shaft ends			
			0	Round shaft with keystone		
			1	Square shaft (available with 50/250/1.000 Nm)		
				Protection class according to EN 60529		
				0	IP50	
3000	100	1	A	0	1	Example Sensor configuration

Please feel free to contact your Sales Manager Serial products for additional information.
Email: sales@ncte.de or Phone: +49 89 66 56 19 30

Series 3000 - accessories

Readout Unit

A	**Torque sensor input: Voltage output 0-5 V and 0-10 V** Order number: 400010-ATS001 (Ar. Nr.: 400010005) 1 angle encoder input, A/B USB interface, Software for windows included SD card slot to use for data logging
S	**Torque sensor input: current output 4-20 mA** Order number: 400010-ATS002 (Ar. Nr.: 400010006) 1 angle encoder input, A/B USB interface, Software for Windows included SD card slot to use for data logging

Couplings

Coupling Type	Used for	D2 max.
KB4C/60-67-15-D2	3000/4000 – D 15	32
KB4C/150-78-15-D2	3000/4000 –D15	42
KB4C/300-94-25-D2	3000/4000 –D25	60
KB4C/500-100-25-D2	3000/4000 –D25	70
KB4/1400-168-40-D2	3000/4000 –D40	80
KB4C/300-94-19-D2	3000/4000 –D40	85

Instructions for use

Scope of delivery

The torque sensor set consists of the sensor itself (signal pick-up and signal processing integrated into sensor housing), one **connecting cable** 5 m with a **soldered plug** (binder plug no. 99-0426-10-08), **key stones** (round shaft) and the calibration certificate.

Datasheets and instruction manuals are available at https://ncte.com/en/standard-products/#.

Installation and removal

Make sure to install the sensor shafts exactly with the proper aligned connecting shafts. The key stone adapter/square endings of the connecting shafts are to be attached forceless to the corresponding ones of the sensor. No external axial force should be on the housing of the sensor from distortion. A maximum cable length of 5 m must not to be exceeded. Using a cable or connector other than supplied by NCTE, or a similar cable that is of a different length may affect the overall performance of the sensor.

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

Offset adjustment

If required the zero point output signal (5 V or 12 mA) can be adjusted by pressing the Tare-button. By factory default the sensor is set to 5 V or 12 mA at zero torque.

Interface description

Mechanical connection:
The key stone adapters on both ends of the measurement shaft are intended for torque transmission.

Electrical connector:
On the sensor housing there is a socket for the power supply and the signal output (chapter connection plan).

Operation (in regular case or in optimal case)

Optimal measurement parameters can be achieved if the sensor is applied in accordance to the specification. By compliance with the specification the sensor works generally trouble-free and maintenance-free.

Irregular operation, measures against disturbance

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 please do not open the sensor. Contact NCTE directly for assistance.

Commissioning

After sensor installation pay attention to the following:

- Switch on the power supply unit and check the supply voltage. Peak voltage 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.

Tare function and error indication:

Series 3000 contains a LED button on the housing surface. Pressing the button (min. 3 seconds)will set the signal output to 5 V. The illumination of the button serves as a function/malfunction indicator.

Functional indicator:
LED off: missing power supply or sensor is damaged
LED on: Sensor is ready.

Error indicator:
LED flashes: The sensor is not ready.
Flashing of LED can have several possible causes. Various causes are interpreted through a flash code. After each flash code the LED makes a short pause before repeating the code.

2x flashing: Magnet field sensors defective. 4x flashing: Electronics defective.

Shaft coating

The shafts are protected on both sides with a film of anticorrosion wax. We recommend to leave the protection permanent. As far as technologically needed, the coating can be removed with spirit/ethanol

Handling and transportation

While handling, storage and transportation keep the sensor away from magnetic or electromagnetic fields which may exceed the maximal intensity defined from EMC (chapter technical characteristics) like degaussing machines.

Precautions

- Opening the sensor and individual screws is generally not permitted.
- The shaft locking rings on the shaft ends must not be loosened.
- The fastening nut of the plug (see chapter Dimensions) must not be loosened or tightened.
- Only use voltage supplies that are separate from the mains voltage.
- With regard to the electrical and mechanical load on the sensor, the specifications in accordance with the sensor-specific rating plate and the table in (Chapter: Technical characteristics) must be observed.
- The sensor is not to be used as a support bearing. The existing mounting options are only used to secure the housing against twisting.
- To protect your system, we recommend increasing the torque over several stages.

Service and maintenance

As part of your test and measurement equipment management, we recommend regular inspection of your test and measurement equipment. Please also note the relevant standards and guidelines.

Recommended NCTE maintenance plan	
Recalibration	12 month
Control of wiring, plug and shaft	12 month

Service-Hotline: Phone: +49 89 66 56 19 30
Email: sales@ncte.de

Disposal

For disposal the Sensor has to be returned to **NCTE AG, Raiffeisenallee 3, 82041 Oberhaching, Germany.**