



# Instruction manual and data sheet

## Torque Sensor Series 2300



## Data sheet

### 1 Key Facts

Technical	Distinctive features
<ul style="list-style-type: none"> <li>Nominal torque: up to 100 Nm, bidirectional</li> <li>Speed: <math>\leq 10000</math> rpm</li> <li>Accuracy: <math>\leq \pm 0.5</math> %</li> <li>Operating temperature: <math>-30</math> °C to <math>+85</math> °C</li> <li>Protection class: IP50</li> <li>Output signal options: 0-10V / 4-20 mA / CAN-Bus / USB</li> <li>Cut-off frequency: 1.000 Hz</li> </ul>	<ul style="list-style-type: none"> <li>Made in Germany</li> <li>Short delivery time (&lt; two weeks)</li> <li>Excellent price / performance ratio</li> <li>Integrated electronic (Plug &amp; Play)</li> <li>Completely contactless measuring system</li> <li>Delivery including 5 m cable and calibration certificate</li> <li>Suitable accessories (bracket, readout unit)</li> </ul>

### 2 Torque ranges

Model line Series 2300	Nominal torque bidirectional (+/-) [Nm]	Limiting torque unidirectional [Nm]	Limiting torque bidirectional (+/-) [Nm]	RPM [rpm]
Ø 8 mm	0.5	0.5	0.5	10000
	1	1.3	1.3	
Ø 9 mm	2.5	3.25	3.25	
	5	6.5	6.5	
	10	13	13	
	20	26	26	
Ø 15 mm	50	65	65	
	100	130	130	

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.

### 3 Load characteristics

Series 2300 Measuring range	Axial force [N] <sup>1</sup>	Limit transverse force [N]	Limit bending moment [Nm]
0.5	250	5	0.5
1	500	8	1
2.5 and 5	1000	20	2.5
10 and 20	1000	30	12.5
50 and 100	1000	100	41.7

Any irregular stress (bending moment, transverse or axial force, exceeding the nominal torque) up to the specified static load limit is only permissible as long as none of the other stresses can occur. Otherwise the limit values must be reduced. If 30 % of the limit bending moment and 30 % of the limit transverse force are present in each case, only 40 % of the axial force is permissible, whereby the nominal torque must not be exceeded.

<sup>1</sup> 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 permissible.

## 4 Technical characteristics

No.	Accuracy class <sup>2</sup>		0.5							
	Description	Unit	Value							
1	Linearity deviation incl. hysteresis	%ME <sup>3</sup>	< ±0.5							
2	Rotational Signal Uniformity (RSU)		< ±0.5							
3	Repeatability		< ±0.05							
	Output signal general	Unit	Value							
4	Cut-off frequency, -3dB point, Bessel characteristic	Hz	1000							
5	Analog signal	V   mA	0 ... 10				4 ... 20			
6	Signal at torque = zero <sup>4</sup>	V   mA	5				12			
7	Signal at positive nominal torque <sup>5</sup>	V   mA	9				20			
8	Signal at negative nominal torque <sup>5</sup>	V   mA	1				4			
9	Calibration parameter (normed) <sup>5</sup>	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	< 1							
12	Output resistance (Current output)	k Ω	≥ 250							
	Effect of temperature	Unit	Value							
13	Zero point drift over temperature	%/10 K	< 0.1							
14	Signal drift over temperature within nominal temperature range	%/10 K	< 0.1							
	Power supply	Unit	Value							
15	Supply voltage	VDC	5 ... 28							
16	Current consumption (max.)	mA	37 ... 45							
17	Start-up peak	mA	< 100							
18	Absolute max. supply voltage	VDC	30							
	General information	Unit	Value							
19	Protection class according to EN 60529 <sup>5</sup>	IP	50							
20	Reference temperature	°C	+15 ... +35							
21	Operational temperature range	°C	-30 ... +85							
22	Storage temperature range	°C	-30 ... +85							
	Nominal torque (bidirectional)	Nm	0.5	1	2.5	5	10	20	50	100
23	Weight	g	391		380		390		550	
23	Moment of inertia	g mm <sup>2</sup>	270		546		698		4535	

<sup>2</sup> The accuracy class means that the linearity deviation as well as the circulation modulation, individually, are each less than or equal to the value specified as the accuracy class. The accuracy class must not be confused with a classification according to DIN 51309 or EA-10/14.

<sup>3</sup> %ME: Related to the measuring range.

<sup>4</sup> The exact sensor-specific values can be found in the calibration certificate supplied.

<sup>5</sup> Wiring connected.

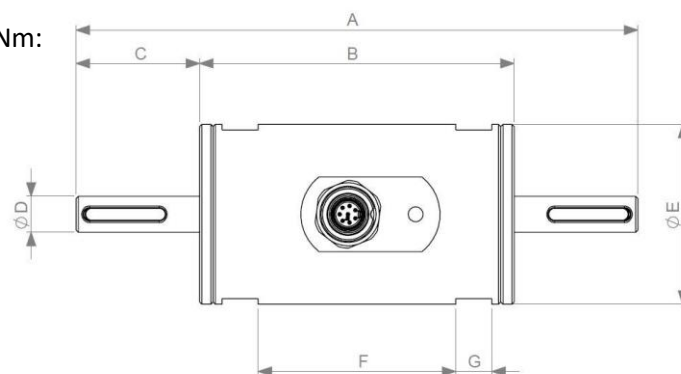
## 5 EMV Emission data

EMV immunity and emitted interference (DIN EN IEC 61000-6-2 / DIN EN IEC 61000-6-4 / DIN EN 61326-1)

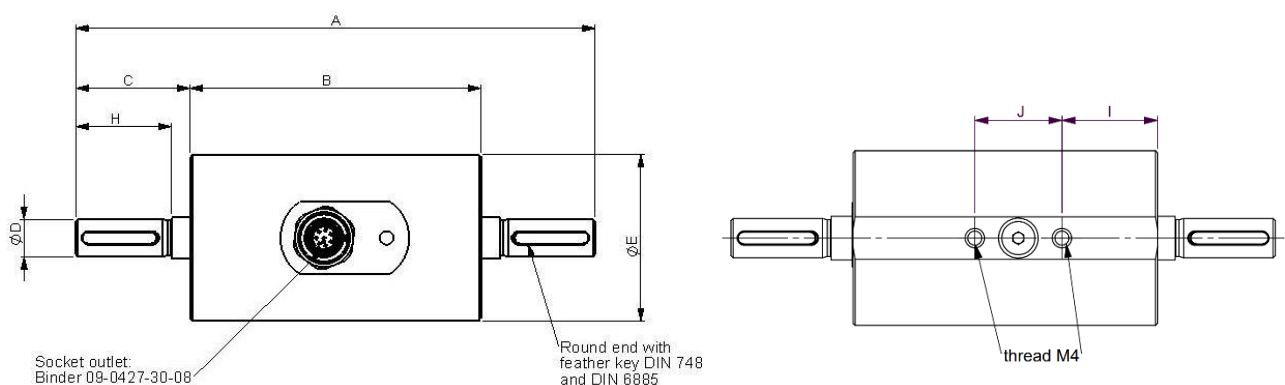
Examination	Test specification	Admission	Evaluation criteria
Discharge of static electricity (ESD)	IEC 61000-4-2	± 4 kV Contact discharge	<b>B</b> passed
Electromagnetic HF-field	IEC 61000-4-3	80 - 1000 MHz; 10 V/m; 80% AM	<b>A</b> passed
Rapid transients	IEC 61000-4-4	± 1 kV	<b>B</b> passed
High frequency, asymmetrical	IEC 61000-4-6	0.15 - 80 MHz; 10V; 80% AM	<b>A</b> passed
Examination	Test specification	Admission	Evaluation criteria
Interference voltage 0.15 - 30 MHz	CISPR 11:2009 + A1:2010	<b>Class B</b>	Limit values observed
Radio interference field strength 30 - 1000 MHz	CISPR 11:2009 + A1:2010	<b>Class B</b>	Limit values observed

## 6 Dimensions

Series 2300 – 0.5 and 1Nm:

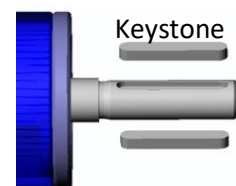


Series 2300 – 2.5Nm to 100Nm:



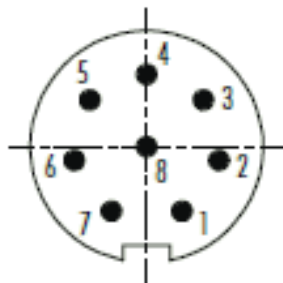
Dimensions	Series 2300		
Shaft size	Ø 8 mm	Ø 9 mm	Ø 15 mm
Nominal torque [Nm]	0.5 - 1	2.5 - 5 - 10 - 20	50 - 100
A	125	125	139
B	70	70	70
C	27.5	27.5	35
D	8g6	9g6	15g6
E	40	40	50
F	44	-	-
G	8	-	-
H	-	23	-
I	-	22	22
J	-	20	20

Dimensions keystone [mm]				Keystone		
Round shaft	Width	Depth	Length	Height	Length	Amount
Ø 8 mm	3	1.3	18.5	3	18	1
Ø 9 mm	3	1.8	18.5	3	18	1
Ø 15 mm	5	3	25.5	5	25	1



For high alternating loads, torque transmission by positive and frictional locking via a suitable fit is recommended.

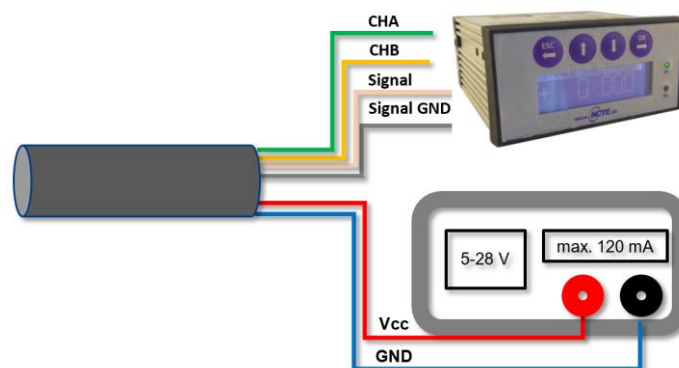
## 7 Wiring diagram



Connector  
Power supply and outputs

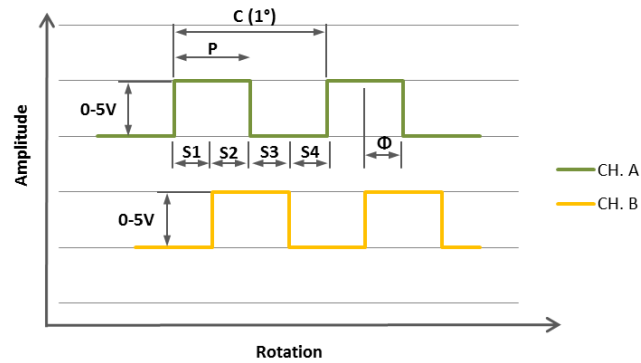
Type	Binder Plug Series 712-M9 IP67 (Colour coding acc. to DIN 47100)		
Pin	Colour	Description	Value
1	White	USB/CAN-Bus	D-/H
2	Brown	USB/CAN-Bus	D+/L
3	Green	Angle Channel A	0V ... 5V
4	Yellow	Angle Channel B	0V ... 5V
5	Grey	Analog GND	-
6	Pink	Signal Output analog Voltage/Current	0V ... 10V 4mA ... 20mA
7	Blue	Ground GND	-
8	Red	Ground V <sub>CC</sub>	5V ... 28V

## 8 Sensor wiring



## 9 Angle sensor

Optical angle sensor with 360 CPR.



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.			

## 10 Order options


Series 2300 accuracy 0,5 %							
		Measuring range [Nm]					
0.5		including 5m cable and calibration certificate					
1		including 5m cable and calibration certificate					
2.5		including 5m cable and calibration certificate					
5		including 5m cable and calibration certificate					
10		including 5m cable and calibration certificate					
20		including 5m cable and calibration certificate					
50		including 5m cable and calibration certificate					
100		including 5m cable and calibration certificate					
		Angle sensor					
0		Without angle sensor					
1		Angle sensor 360 CPR					
		Analog output					
A		Voltage output 0-10V					
S		Current output 4-20mA					
		Digital output (optional)					
U		USB incl. NCTE Software and 2.8 m cable					
C		CAN-Bus					
		Shaft ends					
0		Round shaft with keystone					
		Protection class according to EN 60529					
0		IP50					
2300	10	1	A	U	0	0	Example Sensor configuration

We would be pleased to provide you with further information about series products in a personal conversation at Phone: +49 (0)89 66 56 19 30 or by e-mail: [sales@ncte.de](mailto:sales@ncte.de)

Please note that for the **Sensor 2300 0.5 Nm; 1 Nm** sensor a separate holder (article no.: 400006-ATS100) is necessary, because the sensor housing has no fixing points / thread.

## 11 Accessories


Bracket



1


Series 2300 0.5 Nm and 1 Nm (Art. No. 400006-ATS100)

Readout unit



A	Order number 400010-ATS001 (Art. No.: 400010005)	<b>Sensor input: Voltage output 0-5 V and 0-10 V</b> 1 x angle encoder input, A/B USB interface, Software Windows included SD card slot to use for data logging
S	Order number: 400010-ATS002 (Art. No.: 400010006)	<b>Sensor input: current output 4-20 mA</b> 1 x angle encoder input, A/B USB interface, Software for windows included SD card slot to use for data logging

Couplings



coupling types	Used for	D2 max.
KB2/15-26-8-D2	2300 – D8	10
KB2/45-41-9-D2	2300 – D9	18
KB2/100-47-9-D2	2300 – D9	25
KB2/100-47-9-D2	2300 – D9	25
KB4K/40-46-9-D2	2300 – D9	25,4
KB4K/80-55-15-D2	2300 – D15	30
KB4K/200-60-15-D2	2300 – D15	35

You can obtain further or additional accessories and special requests in a personal discussion with your contact person for series products by calling +49 (0)89 66 56 19 30 or by e-mail: [sales@ncte.de](mailto:sales@ncte.de).

Your experts for magnetostrictive sensors

