



Technical data

- Nominal torque: up to +/- 100 Nm, bidirectional
- Rotational speed: ≤ 10.000 rpm
- Accuracy: $\leq \pm 0,5$ %
- Temperature range: -30 °C to $+85$ °C
- Protection class: IP50
- Output signal options: 0-10V/4-20 mA/CAN-Bus/USB
- Cut-off frequency: 1.000 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
- Free Software with USB option
- Suitable accessories (Readout unit, couplings)

Short description

The 2300 series is the most cost-effective entry into professional torque measurement technology.

This series is mainly used in automotive test facilities, professional testing construction, climatic exposure test cabinets (exceeding dew point), process monitoring and medical engineering.

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

Series 2300 offers a wide range of output signals such as 0-10 V, 4-20 mA, CAN-Bus or USB. USB is offered including a special NCTE software enables to show data in real time.

The sensor is provided as a complete unit with integrated evaluation electronic, including 5 m cable, keystones and factory calibration certificate and in case of digital output 2,8 m USB cable is also included.

Model series 2300

Model series 2300 round shaft	Unit	Nominal torque bidirectional (+/-) Nm	Limiting torque unidirectional (Nm)	Limiting torque bidirectional (+/-) Nm	Rotational speed [rpm]
Ø 8 mm	[Nm]	1	1,3	1,3	10.000
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.

Load characteristics

Model series 2300 measuring range	Unit	Axial force [N] ¹	Lateral limit force [N]	Bending limit moment [Nm]
1	[Nm]	500	8	1
2,5 and 5		1.000	20	2,5
10 and 20		1.000	30	12,5
50 and 100		1.000	100	41,7

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	Unit	Series 2300	
	Accuracy class ²		0,5	
		Unit	Value	
1	Linearity deviation incl. hysteresis	%ME ³	< ±0,5	
2	Rotational Signal Uniformity (RSU)		< ±0,5	
3	Repeatability		< ±0,05	
Output signal in general		Unit	Value	
4	Frequency range, -3dB point, Bessel characteristics	Hz	1.000	
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 ⁴	V mA	9	20
8	Signal at negative nominal torque ⁴	V mA	1	4
9	Calibration parameter (normed) ⁴	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	

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.

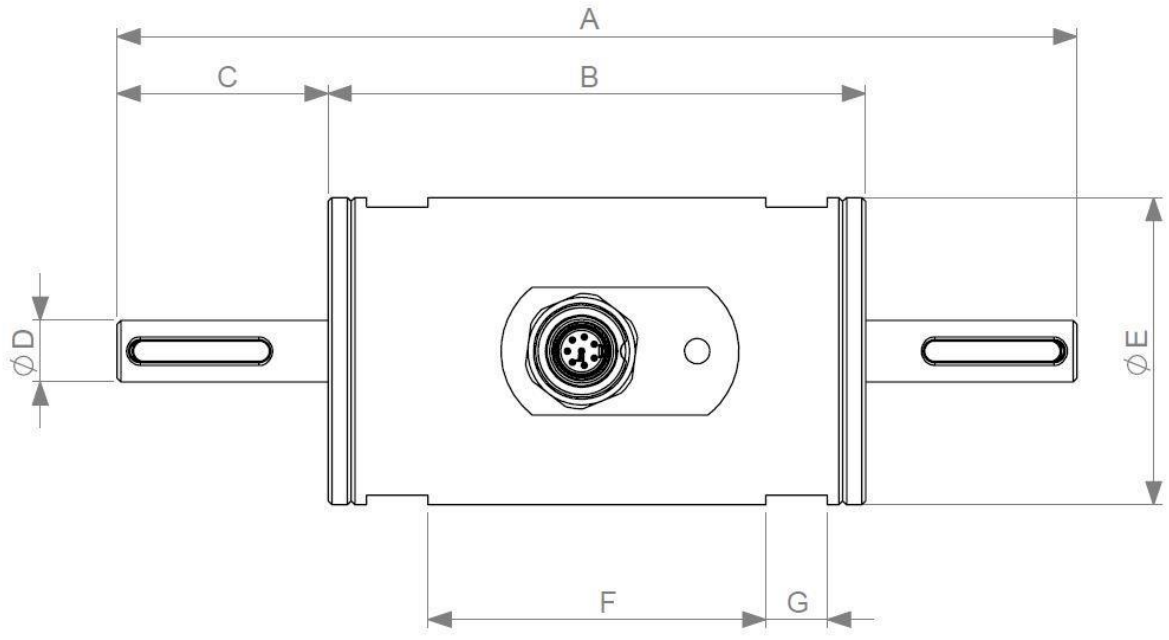
⁴ Please check the exact data at the sensors calibration certificate.

	General information	Unit	Value						
19	Protection class according to EN 60529 ⁵	IP	50						
20	Reference temperature	°C	+15 ... +35						
21	Operational temperature range	°C	-30 ... +85						
22	Storage temperature range	°C	-30 ... +85						
	Nominal torque (bi-directional)	Nm	1	2,5	5	10	20	50	100
23	Weight	g	391	380		390		550	
23	Moment of inertia	g mm ²	270	546		698		4.535	

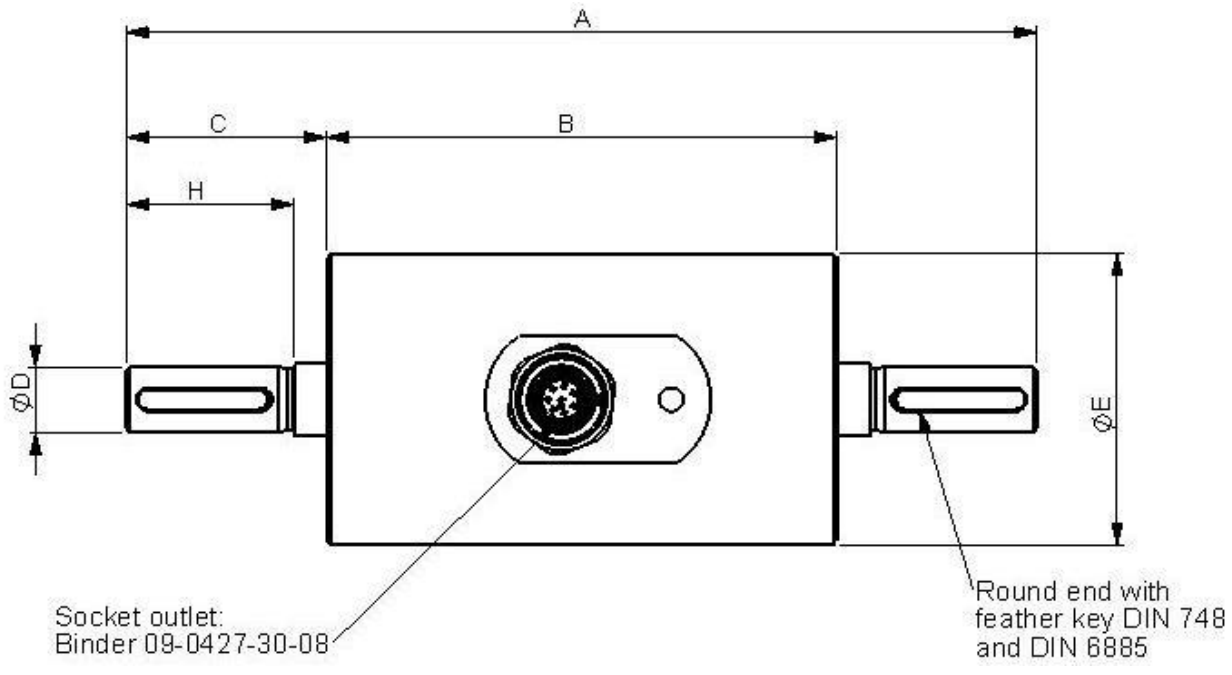
⁵ Wiring connected.

Dimensions

Series 2300 1Nm

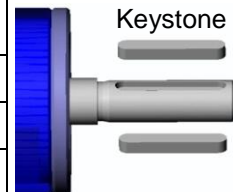


Series 2300 from 2,5 Nm



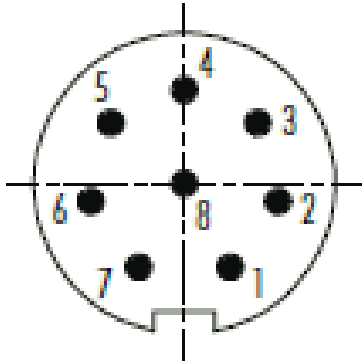
Dimensions	Round shaft nominal torque [Nm]		
	∅ 8 mm	∅ 9 mm	∅ 15 mm
Nominal torque [Nm]	1	2,5 - 5 - 10 - 20	50 - 100
A	125	125	139
B	70	70	70
C	27,5	27,5	35
D	8g6	9g6	15g6
E	40	40	50
F	44	-	-
G	8	-	-
H	-	23	-
I	-	22	22
J	-	20	20

Dimensions keyway [mm]				Keystones		
Round shaft	Width	Depth	Length	Height	Length	Amount
∅ 8 mm	3	1,3	18,5	3	18	1
∅ 9 mm	3	1,8	18,5	3	18	1
∅ 15 mm	5	3	25,5	5	25	1



In the case of high alternating loads, torque transmission through a positive and frictional connection with the shaft via a suitable fit or a coupling is recommended.

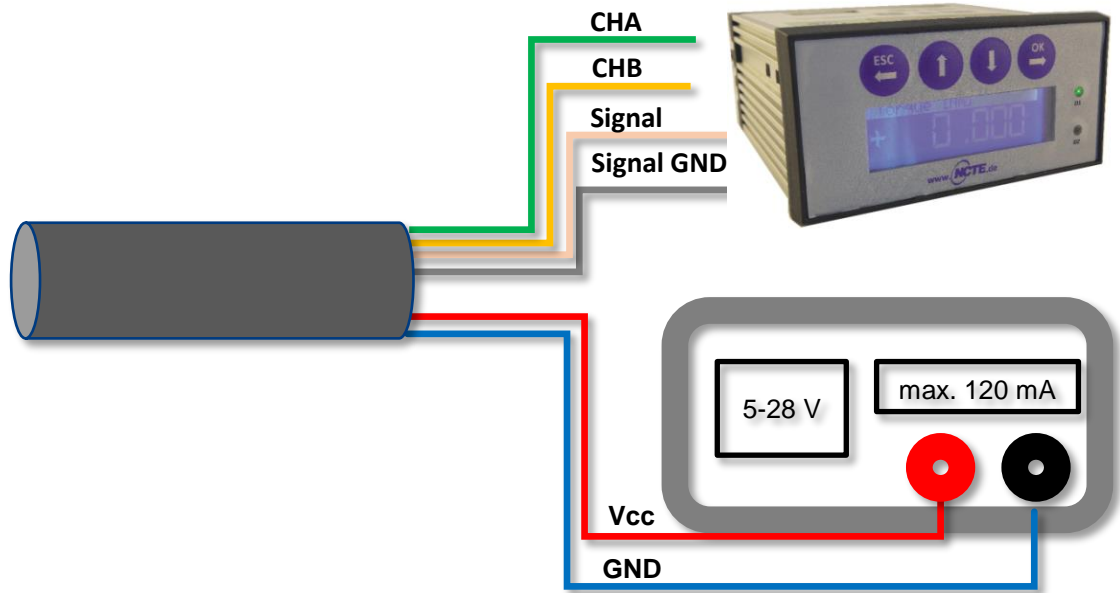
Connection plan



Connector
Power supply and outputs

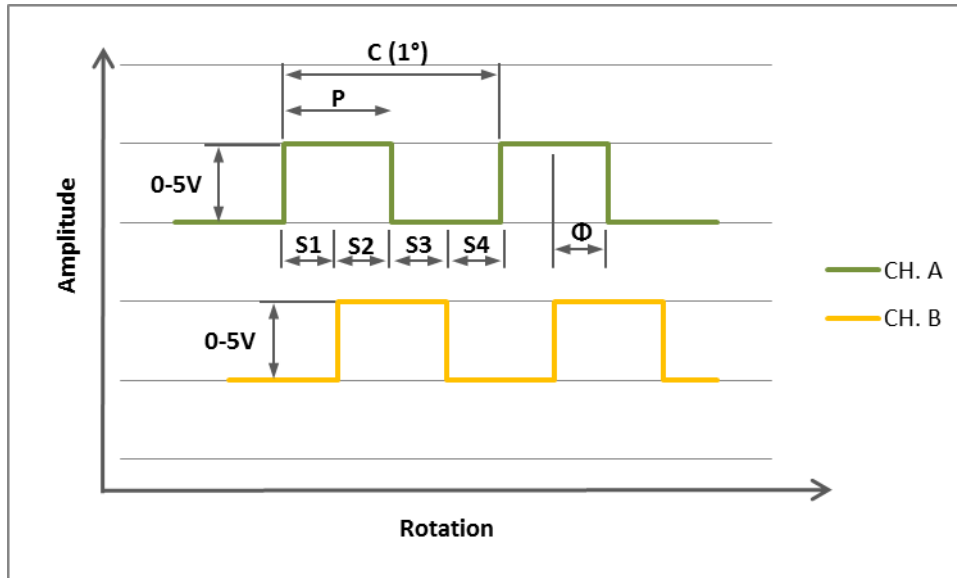
Type	Binder series s712-M9 connector IP67 colour coding according to DIN 47100		
Pin	Colour	Description	Value
1	White	USB/CAN-Bus	D-/H
2	Brown	USB/CAN-Bus	D+/L
3	Green	Angle Channel A	0 V ... 5 V
4	Yellow	Angle Channel B	0 V ... 5 V
5	Grey	Analog GND	-
6	Pink	Signal Output analog Voltage/Current	0 V ... 10 V 4 mA ... 20 mA
7	Blue	Ground GND	-
8	Red	Ground V _{CC}	5 V ... 28 V

Connection example:



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.			

Order options

Series 2300 accuracy 0,5 %

Measurement range	
1	Nm including 5 m cable and calibration certificate
2,5	Nm including 5 m cable and calibration certificate
5	Nm including 5 m cable and calibration certificate
10	Nm including 5 m cable and calibration certificate
20	Nm including 5 m cable and calibration certificate
50	Nm including 5 m cable and calibration certificate
100	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
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
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Please feel free to contact your Sales representative Serial products for additional information.

Email: sales@ncte.de or Phone: +49 89 66 56 19 30

For **Series 2300 1 Nm** measurement range please keep in mind to order it with sensor bracket (order no.: 400006-ATS100) as the housing has no treats, since the sensor housing has no fixing points/threads.

Series 2300 - accessories

Sensor bracket



1	Serie 2300 1 Nm (Art. Nr. 400006-ATS100)
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Readout Unit



A	<p>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 Windows included SD card slot to use for data logging</p>
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S	<p>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</p>
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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.

USB-cable will be delivered in 2.80 m length, when sensor is ordered with USB option.

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

Installation and removal

It must be ensured that the measuring shaft is aligned exactly with the connecting shafts when installing the sensor (corresponding couplings can be found in the accessories). Then the feather key adapter / square ends of the connecting shafts must be able to be pushed onto the feather key adapter connections / square connections of the sensor without effort. When fastening, no force may be exerted on the housing in the axial direction. The wrench flats are to be used to secure the sensor against twisting (optional sensor fastening element). The cable length may be max. 5 m. If a cable other than the one supplied by NCTE or the same cable with a different cable length is used, the function of the sensor system may be impaired.

Disassembly may only be carried out without torque on the measuring shaft.

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 (see 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.

