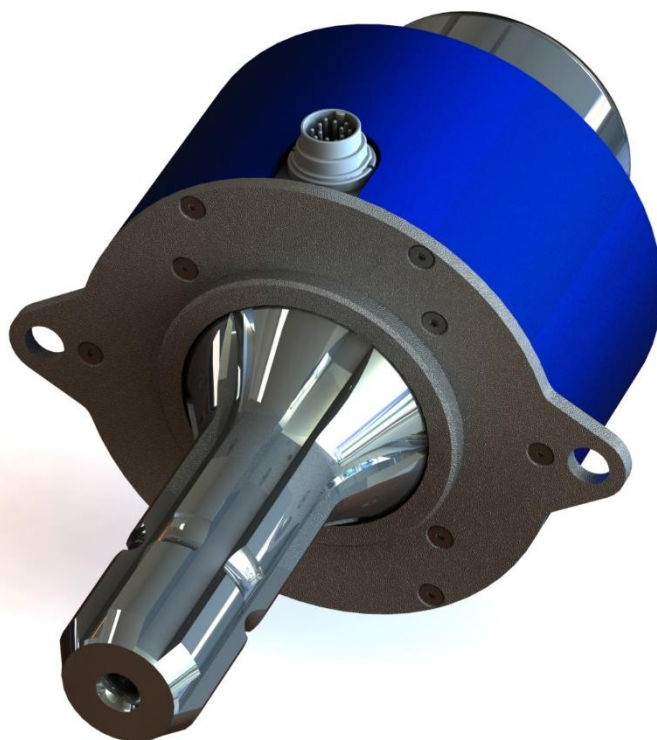




Instruction manual and data sheet

Torque Sensor Series 7300

PREMIUM QUALITY
MADE IN GERMANY



Version 24/01 – State January 2024

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NCTE AG® Torque Sensor Series 7300 Instruction Manual and Data Sheet.

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D-82041 Oberhaching

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State: January 2024

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Instruction Manual

1 General

Dear customers,

Thank you for your decision to buy our sensor products. You have chosen a high quality and extremely precise torque measuring system.

This manual contains all the information necessary for you and the installation, operating and maintenance personnel to use your measuring system under the intended conditions of use. It contains important information to ensure proper and safe installation and operation.

For these reasons, the Instruction manual must always be available at the place of use of the torque measuring system and always ready to hand.

We reserve the right to make changes in the course of product improvements. We try to maintain compatibility with previous versions. All information without guarantee subject to technical changes.

For further questions, we are of course also available after the purchase at any time.

Please use our contact address.

1.1 Customer Service Address

NCTE AG
Raiffeisenalle 3
D-82041 Oberhaching

Tel.: +49 (0)89 66 56 19 30

Email: sales@ncte.de

Web: <https://ncte.com/>

1.2 Warranty

The warranty period is 12 months from the date of delivery from the factory, provided that the product is used in accordance with its intended purpose, in compliance with the maintenance and calibration regulations and the General Terms and Conditions of Business.

You can find these, current instruction manuals and data sheets on: <https://ncte.com/en/standard-products/>

(Please note that due to product revisions, the latest version of the user manual and data sheet may not be fully compatible with your older product. You can obtain documentation for your sensor system at the time of manufacture through the contact information provided above.)

1.3 Scope of delivery

The torque sensor system consists of a calibrated sensor, signal acquisition / -processing integrated in the housing, and the magnetized measuring shaft, which is installed between the (pto-)shaft and the attachment. Additionally, the package includes a connection cable and a retaining chain.

Also included is the calibration certificate and safety instructions.

1.4 Declaration of conformity

EU Declaration of Conformity according to directive 2014/30/EU (EMC)

The manufacturer

NCTE AG
Raiffeisenalle 3
D-82041 Oberhaching

hereby declares that the following product

Product designation:	Torque sensor series 7300	
Trade designation:	Series 7300	
Model names:	7300-3000-1-0-A-1	7300-3000-1-2-A-1
	7300-3000-1-0-AU-1	7300-3000-1-2-AU-1
	7300-3000-1-0-AC-1	7300-3000-1-2-AC-1
	7300-3000-1-0-S-1	7300-3000-1-2-S-1
	7300-3000-1-0-SU-1	7300-3000-1-2-SU-1
	7300-3000-1-0-SC-1	7300-3000-1-2-SC-1

conforms to the requirements of the EMC Directive 2014/30/EU – including its amendments in force at the time of this declaration.

The following harmonized standards were applied:

EN 61000-6-2:2019-11
EN 61000-6-4:2020-09
EN 61326-1: 2022-11

The following national laws, standards and specifications were applied:

Electromagnetic compatibility law – EMCG

Place: Oberhaching
Date: September 12th 2023



Dr. Jürgen Uebbing, CEO

2 Safety

Please note the enclosed sheet on the warning notes.

2.1 Intended Use

The sensors of the Series 7300 are designed exclusively for measuring torque and depending on the configuration rotational speed. The respective load range can be taken from the data sheet and must not be exceeded.

Proper use also includes compliance with the commissioning, assembly, operating, ambient and maintenance conditions specified by the manufacturer.

Any use beyond these is considered improper. The manufacturer is not liable for any damage resulting from such use.

2.2 Recalibration and duration of use

A factory recalibration should be executed annually. See the corresponding label on the sensor.

This recalibration can be carried out quickly and easily by NCTE AG.

Please contact us.

If the sensor is used within the limits of its intended use and regularly calibrated, the sensor's operating life is unlimited.

2.3 Structural change

Unauthorized conversions or changes to the torque measuring system are prohibited for safety reasons and lead to the immediate expiration of the warranty claims.

2.4 Training of the operating personnel

Assembly, commissioning and maintenance personnel must have read and understood the complete operating instructions, especially Chapter "**Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**". The operator is recommended to have this confirmed in writing.

2.5 Transport and handling

During handling, storage and transport, make sure that the sensor is not exposed to strong magnetic or electromagnetic fields (e.g. degaussing coils), in addition the sensor is not to be exposed to mechanical shocks especially the measuring shaft. Further during handling of the sensor, it can be damaged or injure the handling personal during movement or if the sensor drops, please make sure that neither the user nor body parts of the user get caught between the sensor and other items or between the parts of the sensor. This also applies for when the sensor is in use. It is recommended to use proper safety gear when handling the sensor, like safety boots. The sensor is only to be transported packaged so that the sensor is shielded against the transport environment. It has to be packaged tightly to stop it from moving. During transport and storage, make sure the sensor cannot fall down or roll away.

3 Torque Sensor Series 7300

The Torque Sensor Series 7300 is specifically designed to be used in the construction, agriculture and industrial sectors and it is made for the harsh environmental conditions prevalent in these areas. The nominal torque range is specific to each sensor type and can be found in the datasheet. It should be noted that depending on the sensor type the calibration range and continuous load range may differ from each other.

3.1 Short description

With the Series 7300 torques can be measured statically as well as dynamically in real time. The sensor is available, with standardized shaft connections listed in the datasheet for use in the construction, agricultural, and industrial sectors.

The Series 7300 also offers a wide range of signal outputs. 0 ... 10 V, 4 ... 20 mA, CAN-Bus or USB. The USB output is included with the appropriate NCTE software, enabling plug & play data to be displayed on a screen in real time.

The sensor is supplied as a ready-to-connect unit including a 5 meter cable (2.8 meters for USB), a safety chain, and a calibration certificate.

3.2 Assembly and disassembly

The sensor of the 7300 series can be attached by a standardized shaft connector to the power take off shaft of a tractor. The sensor is secured (if configured that way) by a spring-loaded ball locking system, which ensures a secure attachment to the tractor or implement¹, if the sensor is configured different the user has to ensure an appropriate securing of the sensor on the shaft. To stop the sensor from rotating the sensor comes with a retaining chain. The customer has to make sure that the sensor is secured against rotating with set chain or by other means before use. Also make sure, no people and other items are in the vicinity of rotating parts, where they can be caught by them. If necessary, an incasement to shield rotating parts of the install needs to be brought up.

Due to the combination of shaft and sleeve end, the sensor can be installed into existing drive systems. Hereby, the sensor only serves as an extension of the tractor or drive unit (pto-)shaft for the customer and the attachments can be used as usual.

The disassembly may only be carried out without applying torque to the measuring shaft and if the drive unit is secured against getting powered on again, neither the sensor housing nor the shaft shall move. During assembly and disassembly make sure the user is not caught between the parts of the sensor or between the sensor and other items.

3.3 Adjustment

If required, the zero point output signal (5 V or 12 mA) can be adjusted. The sensor is factory set so that 5 V or 12 mA corresponds to a torque of 0 Nm.

¹ Note that the ball locking system has to be engaged properly and the outer sleeve has to glide back all the way.

3.4 Interface description

Mechanical interfaces:

For power transmission, the measuring shaft has standardized connectors on both sides. There are two eyelets on the housing to secure the sensor from rotating.

Electrical interface:

A flange socket for power supply and signal output is attached to the top of the housing.
(Pin assignment see Chapter "7 Wiring diagram")

3.5 Starting up

After mounting the sensor, the following must be observed:

- Switch on power supply and check voltage value.
(Voltage peaks at the sensor must be avoided, devices must be checked accordingly before connection to the sensor)
- Connect the sensor to the power supply (using the cable supplied)
- Record the output signal of the sensor with high resistance (A/D converter, oscilloscope, PC)
- Record output signal in mechanically unloaded state of the sensor
- **The first measurement can be taken after the sensor has warmed up for 15 minutes**

3.6 Operation during regular mode

Optimal measuring values are achieved when the sensor is used while maintaining the specific nominal torque. If the permissible operating conditions are observed, the sensor operates trouble-free and maintenance-free.

3.7 Irregular operation, actions in case of failures

If the sensor is mechanically overloaded (e.g. if the maximum permissible longitudinal force or torque limit is exceeded or if there are strong vibrations) or mounted incorrectly, the sensor may be damaged and the signal output may be distorted. In addition, due to overload of parts of the sensor or other parts of the measuring setup can be destroyed and could pose a severe danger for people in the acting range. Those aspects are especially true for the shaft and the bearing. In this case do not open the device. Contact NCTE AG directly.

3.8 Safety instructions

The following safety instructions should be followed for smooth operation:

- Opening the sensor or even single screws is not allowed
- Only use power supplies safely disconnected from the mains voltage
- Regarding the electrical and mechanical load of the sensor, the specifications according to the sensor-specific nameplate and the table in Chapter “4 Technical characteristics” must be observed.
- The sensor is not to be used as support bearing - The existing fastening options serve exclusively to secure the housing against twisting
- Don't use the sensor in potentially explosive atmosphere
- Due to prolonged high rotational speeds the sensor can become very hot and poses a risk of burn

3.9 Service, maintenance and repair

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

Maintenance plan by NCTE AG

Calibration:	Every 12 months
Check the wiring, connectors and shaft:	Every 12 months

Repairs and recalibrations can only be carried out by NCTE AG personnel.

3.10 Disposal

The device must be returned to **NCTE AG, Raiffeisenallee 3, D-82041 Oberhaching** for disposal.

Data Sheet

1 Key Facts

Technical	Features
- Nominal torque: depending on the ordered option (see 10. Order options), bidirectional - Speed: $\leq 1,200$ rpm - Accuracy: $\leq \pm 0.75$ % - Operating temperature: -40 °C to $+85$ °C - Protection class: IP65 - Output signal: 0-10 V / 4-20 mA / CAN-Bus / USB - Cutoff frequency: 2500 Hz	- Made in Germany - Short delivery time (< two weeks) - Excellent price / performance ratio - Integrated electronics (Plug & Play) - Completely contactless measurement system - Standardized shaft splines

2 Torque ranges

Model Series 7300	Measurement range bidirectional (+/-) [Nm]	Continuous load torque: bidirectional (+/-) [Nm]	RPM [U/min]
standardized 1 $\frac{3}{8}$ " 6-spline PTO	3000	2500	1200

Note: In case of overload, the sensor leads to a measurement offset. 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

Model	Axial force [N] ²	Limit transverse force [N]	Limit bending moment [Nm]
Series 7300	3000	to be avoided	to be avoided

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.

4 Technical characteristics

Nr.	Accuracy class ³		0.75	
	Description	Unit	Value	
1	Linearity deviation including hysteresis	%ME ⁴	< ±0.75	
2	Rotational Signal Uniformity (RSU)		< ±0.75	
3	Repeatability		< ±0.05	
	Output signal general	Unit	Value	
4	Frequency range, -3dB point, Bessel characteristics	Hz	2500	
5	Analog signal	V mA	0 ... 10	4 ... 20
6	Signal at torque = Zero ⁵	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/measuring range	8 mA/measuring range
10	Error output	V mA	0/10	<4/20<
11	Output resistance (Voltage output)	Ω	43	
12	Output resistance (Current output)	k Ω	≥ 600	
	Effect of temperature	Unit	Value	
13	Zero point drift over temperature	%/10 K	< 0.5	

² The specified values apply only to direct axial force on the shaft. If the axial force acts on the retaining ring, only 50% of the force is permissible.

³ The accuracy class states that the linearity deviation and Rotational Signal Uniformity, individually, are less than or equal to the value specified as the accuracy class. The accuracy class should not be confused with a classification according to DIN 51309 or EA-10/14.

⁴ %ME: Referring to the measuring range.

⁵ The exact sensor-specific values can be found in the calibration certificate supplied.

14	Signal drift over temperature within nominal temperature range	%/10 K	< 0.5
	Power supply	Unit	Value
15	Power supply	VDC	9 ... 28
16	Current consumption (max.)	mA	100
17	Start-up peak	mA	< 100
18	Absolute max. supply voltage	VDC	30
	General information	Unit	Value
19	Protection class according to EN 60529 ⁶	IP	65
20	Reference temperature	°C	+15 ... +35
21	Operating temperature range	°C	-40 ... +85
22	Storage temperature range	°C	-40 ... +85
	Nominal torque (bidirectional)	Nm	3000 Nm
23	Weight	kg	5.1
24	Moment of inertia	kg mm ²	11450
	Load limits⁷	Unit	Value
25	Maximum measurable torque	Nm	configuration specific

5 EMV Emission data

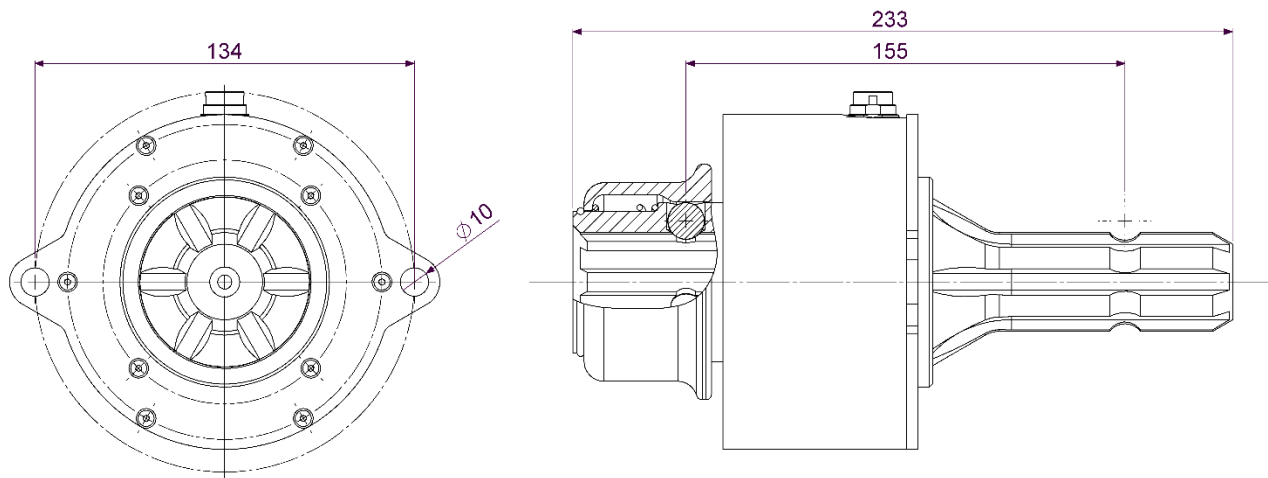
EMV immunity and emitted interference (DIN EN IEC 61000-6-2 / DIN EN IEC 61000-6-4 / DIN EN 61326-1)

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

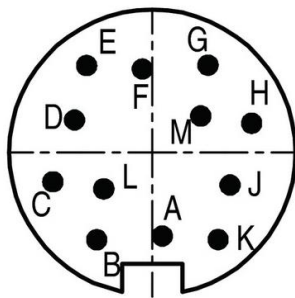
⁶ Wiring connected.

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.

6 Dimensions



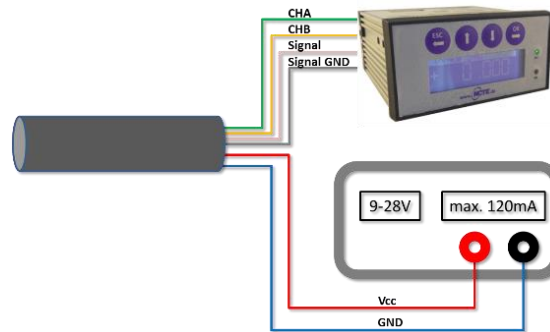
7 Wiring diagram



Connector
Power supply and
outputs
Figure: Front view

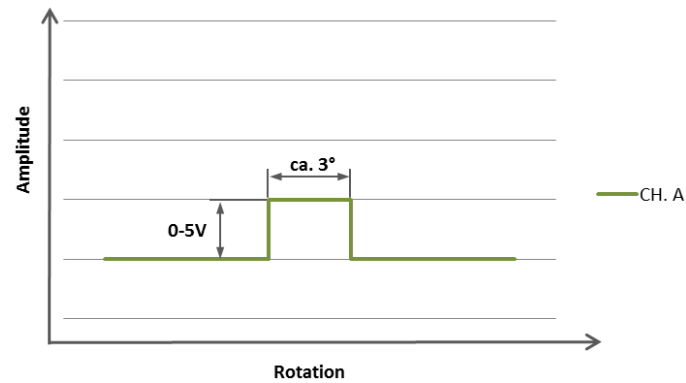
Type	Binder Plug Series 423/723/425 IP67 (Colour coding acc. to DIN 47100)		
Pin	Color	Description	Value
A	White	CAN / USB	High/D-
B	Brown	CAN / USB	Low/D+
C	Green	rpm channel	0 ... 5 V
D	Yellow	-	-
E	Gray	Analog GND	-
F	Pink	Analog output signal Voltage / Current	0 ... 10 V 4 ... 20 mA
G	Blue	Supply voltage GND	-
H	Red	Supply voltage V _{CC}	9 ... 28 V
J	Black	USB GND	-
K	Violet	-	-
L	Gray-Pink	USB	+5 V
M	Red-Blue	-	-

8 Sensor wiring



9 Speed sensor

Magnetic (Hall effect) speed sensor with 60 CPR.



Parameters	Min.	Typ.	Max.	Unit
Operating frequency	0	-	8000	Hz
Analog signal bandwidth	20	40	-	kHz
Upper level output signal	2.4	5	-	V
Lower level output signal	-	0	0.4	V

10 Order options

Series 7300 Accuracy 0.75 %									
Measurement range [Nm]									
3000		including 5m cable and calibration certificate							
Shaft type									
1		Shaft 1 3/8" 6-teeth (m/f)							
X		Customized							
Speed sensor									
0		Without speed sensor							
2		Speed sensor 60 CPR							
Output signal analogue									
A		Voltage output 0-10 V							
S		Current output 4-20 mA							
Digital output signal (optional)									
U		USB including NCTE software and 2.8 m cable							
C		CAN-Bus							
Protection class to EN 60529									
1		IP 65							
7300	3000	1	2	A	U	1	Example sensor configuration		

We would be pleased to provide you with further information about serial products in a personal contact under

Phone: +49 (0)89 66 56 19 30 or by e-mail: sales@ncte.de.

11 Accessories

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

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.

Your experts for magnetostrictive sensors

