

Data sheet

1 Key Facts

| Technical | Distinctive features |
|--|--|
| <ul style="list-style-type: none"> Nominal torque: up to 500 Nm, bidirectional Speed: ≤ 5000 rpm Accuracy: $\leq \pm 1$ % Operating temperature: -30 °C to $+85$ °C Protection class: IP50 Output signal: ± 10 V, ± 5 V, 0-10 V or 0-5 V Cut-off frequency: 1.000 Hz | <ul style="list-style-type: none"> Made in Germany Short delivery time (< 2 weeks) Excellent price/performance ratio No external measuring amplifier necessary (Plug & Play) Completely contactless measuring system Delivery including 5 m cable and calibration certificate Suitable accessories (bracket, readout unit, couplings) |

2 Torque ranges

| Model line Series 2100 Square shaft | Nominal torque bidirectional (+/-) [Nm] | Limit torque unidirectional [Nm] | Limit torque bidirectional (+/-) [Nm] | RPM [rpm] |
|---|---|--|---|--|
| ¼ inch | 2.5 | 2.5 | 2.5 | 1000 (A higher speed is possible with backlash-free adaptation) |
| | 5.0 | 5.0 | 5.0 | |
| | 7.5 | 7.5 | 7.5 | |
| | 15 | 15 | 10 | |
| ⅜ inch | 60 | 60 | 40 | |
| ½ inch | 140 | 140 | 85 | |
| ¾ inch | 400 | 400 | 270 | |

Note: Series 2100 sensor versions are calibrated to nominal torque. However, the absolute operating limits are as shown in the table above. Do not exceed the specified magnitude of the limit torques for unidirectional and bidirectional loading.

| Model line Series 2200 Round shaft | Nominal torque bidirectional (+/-) [Nm] | Limit torque unidirectional [Nm] | Limit torque bidirectional (+/-) [Nm] | RPM [rpm] |
|--|---|--|---|--------------|
| Ø 9 mm | 2.5 | 3.25 | 3.25 | 5000 |
| | 5 | 6.5 | 6.5 | |
| | 7.5 | 9.75 | 9.75 | |
| | 17.5 | 19.5 | 19.5 | |
| Ø 14 mm | 75 | 97.5 | 97.5 | |
| Ø 19 mm | 175 | 227.5 | 227.5 | |
| | 250 | 325 | 325 | |
| Ø 25 mm | 500 | 650 | 650 | |

Note: In case of overload, the sensor leads to a measurement offset. In this case the sensor must be recalibrated at NCTE AG. The sensor may only be operated within the specified nominal torque range.

3 Load characteristics

| Model line Series 2100 Measuring range | Axial force [N] ¹ | Limit transverse force [N] | Limit bending moment [Nm] |
|---|------------------------------|----------------------------|---------------------------|
| 2.5 and 5 | 1000 | 20 | 2.5 |
| 7.5 | 1000 | 30 | 3.7 |
| 15 | 1000 | 100 | 12.5 |
| 60 | 2600 | 300 | 41.7 |
| 140 | 4000 | 500 | 89.5 |
| 400 | 7000 | 800 | 176 |

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|---|------------------------------|----------------------------|---------------------------|
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| 7.5 | 1000 | 30 | 3.7 |
| 17.5 | 1000 | 100 | 12.5 |
| 75 | 2600 | 300 | 41.7 |
| 175 and 250 | 4000 | 500 | 89.5 |
| 500 | 7000 | 800 | 176 |

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

| No. | Accuracy class ³ | | 1,0 |
|-----------------------|--|------------------|----------------------------------|
| | Description | Unit | Value |
| 1 | Linearity deviation incl. hysteresis | %ME ⁴ | < ±1.0 |
| 2 | Rotational Signal Uniformity (RSU) | | < ±1.0 |
| 3 | Repeatability | | < ±0.05 |
| Output signal general | | Unit | Value |
| 4 | Cut-off frequency, -3dB point, Bessel characteristic | Hz | 1000 |
| 5 | Analog signal | V | +/-10, +/-5, 0-10 or 0-5 |
| 6 | Signal at torque = zero ⁵ | V | 0, 5 or 2.5 |
| 7 | Signal at positive nominal torque ⁵ | V | 9 or 4.5 |
| 8 | Signal at negative nominal torque ⁵ | V | -9, -4,5, 1 or 0,5 |
| 9 | Calibration parameter (normed) ⁵ | mV/Nm | Refer to calibration certificate |
| 10 | Output resistance | Ω | 50 |

¹ 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.

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³ 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.

⁴ %ME: Related to the measuring range.

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

| Effect of temperature | | Unit | Value | | | | | | | |
|--|--|-------------------|-------------|-----|-------|-------|--------|--------|-----|-----|
| 11 | Zero point drift over temperature | %/10 K | < 0.5 | | | | | | | |
| 12 | Signal drift over temperature within nominal temperature range | %/10 K | < 0.5 | | | | | | | |
| Power supply | | Unit | Value | | | | | | | |
| 13 | Supply voltage | VDC | 6 ... 28 | | | | | | | |
| 14 | Current consumption (max.) | mA | 25 | | | | | | | |
| 15 | Start-up peak | mA | < 50 | | | | | | | |
| 16 | Absolute max. supply voltage | VDC | 28 | | | | | | | |
| General information | | Unit | Value | | | | | | | |
| 17 | Protection class according to EN 60529 ⁶ | IP | 50 | | | | | | | |
| 18 | Reference temperature | °C | +15 ... +35 | | | | | | | |
| 19 | Operation temperature range | °C | -30 ... +85 | | | | | | | |
| 20 | Storage temperature range | °C | -30 ... +85 | | | | | | | |
| Nominal torque (bi-directional) Square shaft | | Nm | 2.5 | 5 | 7.5 | 15 | 60 | 140 | 400 | |
| 21 | Weight | g | 395 | 401 | 414 | 652 | 754 | 878 | | |
| 22 | Moment of inertia | g mm ² | 582 | 648 | 904 | 3.339 | 13.294 | 57.770 | | |
| Nominal torque (bidirectional) Round shaft | | Nm | 2.5 | 5 | 7.5 | 17.5 | 75 | 175 | 250 | 500 |
| 23 | Weight | g | 386 | 392 | 400 | 685 | 856 | 1.230 | | |
| 24 | Moment of inertia | g mm ² | 597 | 662 | 1.073 | 4.922 | 19.126 | 79.754 | | |

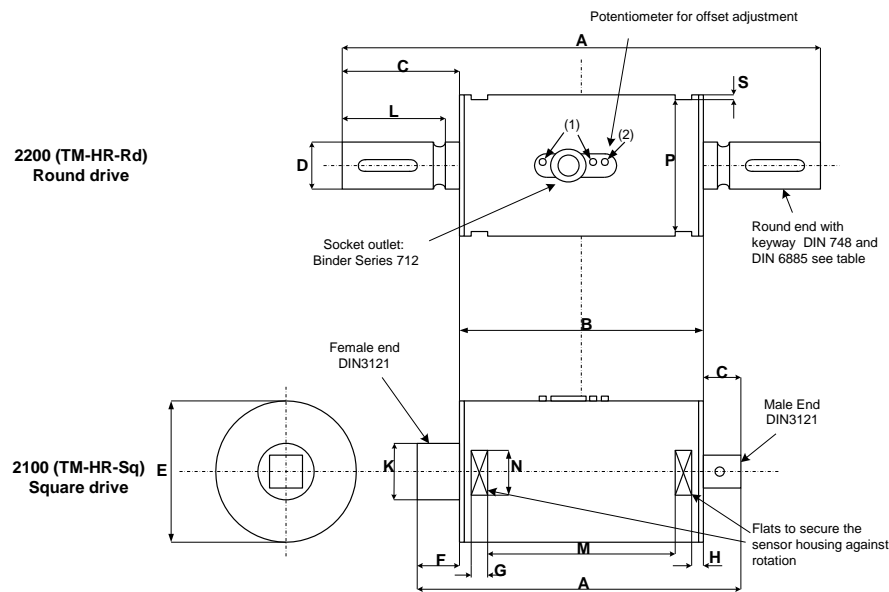
5 EMV Emission data

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 | B passed |
| Electromagnetic HF-field | IEC 61000-4-3 | 80 - 3000 MHz; 10 V/m; 80% AM | A passed |
| Rapid transients | IEC 61000-4-4 | ± 2 kV | B passed |
| High frequency, asymmetrical | IEC 61000-4-6 | 0.15 - 80 MHz; 10V; 80% AM | A passed |
| Examination | Test specification | Admission | Evaluation criteria |
| Interference voltage 0.15 - 30 MHz | CISPR 11:2015 + A1:2017 | Class B | Limit values observed |
| Radio interference field strength 30 - 1000 MHz | CISPR 11:2015 + A1:2017 | Class B | Limit values observed |

⁶ Wiring connected.

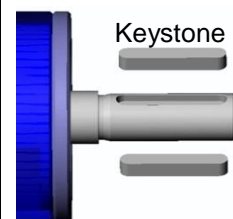
6 Dimensions



| Dimensions | Series 2100 Square shaft | | | | Series 2200 Round shaft | | | |
|---------------------|--------------------------|----------|----------|----------|-------------------------|--------|---------|--------|
| Shaft size | 1/4 inch | 3/8 inch | 1/2 inch | 3/4 inch | ∅ 9 mm | ∅14 mm | ∅19 mm | ∅25 mm |
| Nominal torque [Nm] | 2.5/5/ 7.5/15 | 60 | 140 | 400 | 2.5/5/ 7.5/17.5 | 75 | 175-250 | 500 |
| A | 95.5 | 107 | 123.5 | 146 | 125 | 139 | 179 | 220 |
| B | 70 | 70 | 70 | 87 | 70 | 70 | 70 | 87 |
| C | 9.5 | 13 | 18,5 | 29.6 | 27.5 | 34.5 | 54.5 | 66.6 |
| D | - | - | - | - | 9g6 | 14g6 | 19g6 | 25g6 |
| E | 40 | 50 | 50 | 60 | 40 | 50 | 50 | 60 |
| F | 16 | 24 | 35 | 29.6 | - | - | - | - |
| G | 8 | 8 | 8 | 10,5 | 8 | 8 | 8 | 10.5 |
| H | 5 | 5 | 5 | 2 | 5 | 5 | 5 | 2 |
| K | 12 | 18 | 24 | 33.5 | - | - | - | - |
| L | - | - | - | - | 23 | 30 | 50 | - |
| M | 43.9 | 43.9 | 43. | 61.4 | 43.9 | 43.9 | 43.9 | 61.4 |
| N | 15 | 18 | 18 | 19 | 15 | 18 | 18 | 19 |
| P | 37 | 47 | 47 | 57 | 37 | 47 | 47 | 57 |
| S | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |

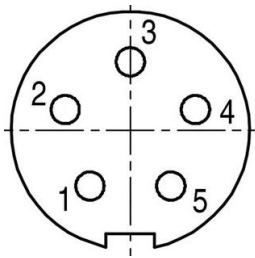
Series 2200

| Dimensions keystone [mm] | | | | Keystone | | |
|--------------------------|-------|-------|--------|----------|--------|--------|
| Round shaft | Width | Depth | Length | Height | Length | Amount |
| ∅ 9 mm | 3 | 1,8 | 18,5 | 3 | 18 | 1 |
| ∅ 14 mm | 5 | 3 | 25,5 | 5 | 25 | 1 |
| ∅ 19 mm | 6 | 3,5 | 45,5 | 6 | 45 | 1 |
| ∅ 25 mm | 8 | 4 | 50,5 | 7 | 50 | 2 |



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

7 Wiring diagram



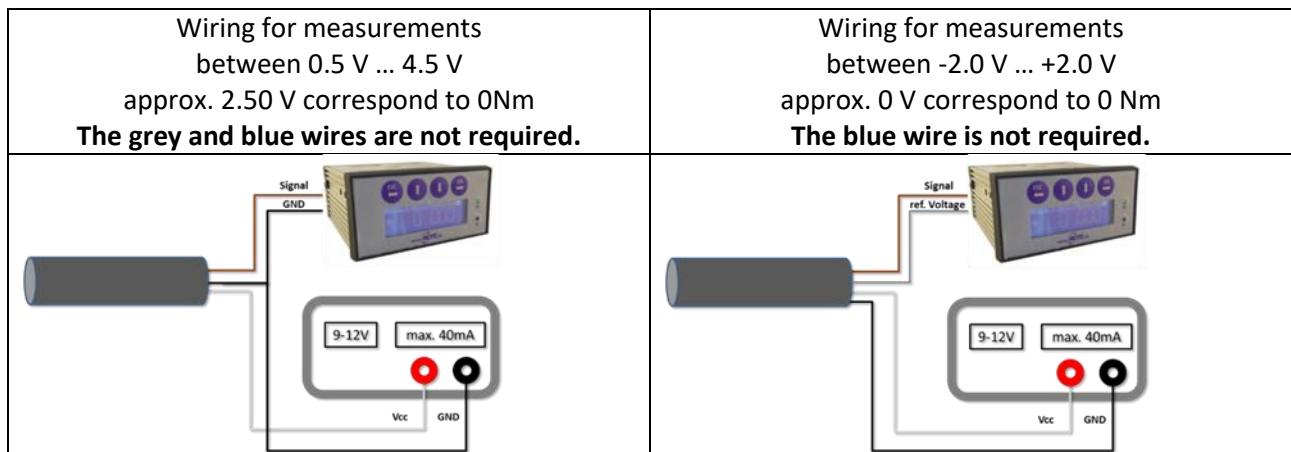
Connector
Power supply and outputs

| Type: Binder Plug Series 712-M9 IP67 (Colour coding acc. to DIN 47100) | | | |
|--|--------|-----------------------------|------------|
| Pin | Colour | Description | Value |
| 1 | White | Supply voltage V_{CC} | 6 V – 28 V |
| 2 | Brown | Output signal analogue | - |
| 3 | Black | Supply voltage GND | - |
| 4 | Blue | Not required | - |
| 5 | Grey | Reference voltage V_{ref} | 2.5 V |

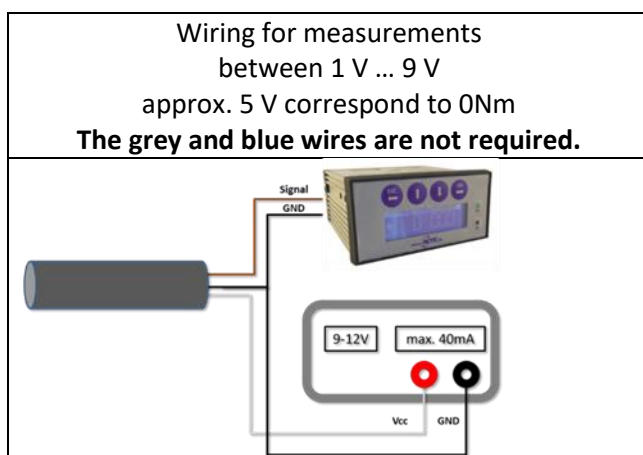
The output V_{ref} is a constant 2.5 V output and represents the virtual zero point for direct +/- torque measurement for the 0-5 V type sensor.

8 Sensor wiring

For 0-5 V type sensor:



For 0-10 V type sensor:



At the moment there is no readout unit available for the +/- 10 V and +/- 5 V type sensors.

9 Order options




| Series 2100 (Square shaft) | | | |
|-----------------------------------|--|----|------------------------------|
| Measuring range [Nm] | | | |
| 2.5 | including 5m cable and calibration certificate | | |
| 5 | including 5m cable and calibration certificate | | |
| 7.5 | including 5m cable and calibration certificate | | |
| 15 | including 5m cable and calibration certificate | | |
| 60 | including 5m cable and calibration certificate | | |
| 140 | including 5m cable and calibration certificate | | |
| 400 | including 5m cable and calibration certificate | | |
| Output signal analog | | | |
| A1 | Voltage output +/-10 V | | |
| A2 | Voltage output +/-5 V | | |
| A3 | Voltage output 0-10 V | | |
| A4 | Voltage output 0-5 V | | |
| 2100 | 15 | A1 | Example sensor configuration |

| Series 2200 (Round shaft) | | | |
|----------------------------------|--|----|------------------------------|
| Measuring range [Nm] | | | |
| 2.5 | including 5m cable and calibration certificate | | |
| 5 | including 5m cable and calibration certificate | | |
| 7.5 | including 5m cable and calibration certificate | | |
| 17.5 | including 5m cable and calibration certificate | | |
| 75 | including 5m cable and calibration certificate | | |
| 175 | including 5m cable and calibration certificate | | |
| 250 | including 5m cable and calibration certificate | | |
| 500 | including 5m cable and calibration certificate | | |
| Output signal analog | | | |
| A1 | Voltage output +/-10 V | | |
| A2 | Voltage output +/-5 V | | |
| A3 | Voltage output 0-10 V | | |
| A4 | Voltage output 0-5 V | | |
| 2100 | 15 | A1 | 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.

10 Accessories

| Bracket | | |
|---|---|---|
|  | | |
| 1 | 2.5 – 17.5 Nm (Art. No.: 400006081) | |
| 2 | 75 – 250 Nm (Art. No.: 400006082) | |
| Readout unit | | |
|  | | |
| 1 | Order number 400010-ATS001 (Art. No.: 400010005) | <p>The NCTE readout unit is a multifunctional readout unit for the NCTE torque sensors. Torque, angle or speed can be displayed. The measured data can be stored on an inserted SD flash memory card or sent directly to a PC in real time via a USB interface.</p> <p>The readout program is available for download on the NCTE-Website (https://ncte.com/service/#zubehor)</p> <p>At the moment there is no readout unit available for the +/- 10 V and +/- 5 V type sensors.</p> |
| Couplings | | |
|  | | |
| coupling types | Used for | D2 max. |
| KB2/45-41-9-D2 | 2000 – D9 | 16 |
| KB2/100-47-9-D2 | 2000 – D9 | 25 |
| KB4C/18-59-9-D2 | 2000 – D9 | 25.4 |
| KB4C/80-78-14-D2 | 2000 – D14 | 42 |
| KB4C/200-83-19-D2 | 2000 – D19 | 45 |
| KB4C/300-94-19-D2 | 2000 – D19 | 60 |
| KB4C/500-100-25-D2 | 2000 – D25 | 70 |

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

