

OPERATION MANUAL

Precision torque sensor model 8625

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THE MEASUREMENT SOLUTION.

EU-Konformitätserklärung (nach EN ISO/IEC 17050-1:2010) *EU-Declaration of conformity (in accordance with EN ISO/IEC 17050-1:2010)*

Name des Ausstellers: burster präzisionsmesstechnik gmbh & co kg
Issuer's name:

Anschrift des Ausstellers: Talstr. 1-5
Issuer's address: 76593 Gernsbach, Germany

Gegenstand der Erklärung: Präzisions-Drehmomentsensor
Object of the declaration: Precision Torque Sensor

Modellnummer(n) (Typ): 8625 / 8630 / 8631
Model number / type:

Diese Erklärung beinhaltet obengenannte Produkte mit allen Optionen
This declaration covers all options of the above product(s)

Das oben beschriebene Produkt ist konform mit den Anforderungen der folgenden Dokumente:
The object of the declaration described above is in conformity with the requirements of the following documents:

Dokument-Nr. <i>Documents No.</i>	Titel <i>Title</i>	Ausgabe <i>Edition</i>
2011/65/EU + delegD (EU) 2015/863	Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten <i>Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment</i>	2011 + 2015
2014/30/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit <i>Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility</i>	2014
EN 61326-1	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen <i>Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements</i>	2013
EN 61326-2-3	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen <i>Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements</i>	2006

Gernsbach
Ort / place

02.04.2020
Datum / date

ppa. Christian Karius
Quality Manager

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1 Safety instructions

In this manual the following symbols warn about risks.

1.1 Symbols in this manual

1.1.1 Signal words



The following signal words are used in the operation manual according to the specified hazard classification.

	DANGER
DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.	
	WARNING
WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.	
	CAUTION
CAUTION indicates a hazard with a low level or risk which, if not avoided, could result in minor or moderate injury.	
NOTICE	
Property damage to the equipment or the surroundings will result if the hazard is not avoided.	

Note: It is important to heed these safety instructions in order to ensure correct handling of the torque sensor model 8625.



IMPORTANT: Follow the information given in the operation manual.


1.1.2 Pictograms

	Danger of electric shock!
	Observe the safety notices for protecting the torque sensor model 8625.

1.2 General safety instructions

The torque sensor model 8625 uses state-of-the-art engineering and is safe to operate. However, if the torque sensor model 8625 is not used or operated as intended, it may present a hazard.

	 <h3 style="margin: 0;">DANGER</h3>
	<p>Danger of electric shock! The following instructions must be followed to prevent electric shock and injuries:</p> <ul style="list-style-type: none"> • In order to achieve high measuring characteristic value, the torque sensor model 8625 is not designed with the usual safety factors (2 ... 20) for machine designs. For applicable overload factors, see the technical data (data sheet). • Observe accident prevention regulations, including for accessories used. • Use torque sensor model 8625 only in non-safety-critical applications. • The torque sensor model 8625 must not be used for medical purposes. • Only use torque sensor model 8625 outside of potentially explosive areas (Ex protected areas).

	<h3 style="margin: 0;">NOTICE</h3>
	<p>The following points must be observed to prevent injuries and damage to property:</p> <ul style="list-style-type: none"> • The limits for permissible mechanical, thermal and electrical loads are shown in the data sheet. These limits must not be exceeded. Take these limits into account when planning the measuring arrangement, and during installation (preferably with the display for the torque connected) and operation. • Impacts and shocks may damage the torque sensor model 8625 (e.g. if it is dropped). Exercise the necessary care when transporting and fitting the sensor. • Torque peaks in excess of the permissible overload may destroy the torsion shaft. Make sure that such peaks do not occur, or ensure that they are absorbed. • Avoid excessive torques, bending moments or axial loads. • Support the torque sensor model 8625 while it is being fitted. • When measuring dynamic torques, operating the torque sensor model 8625 close to natural resonance will result in permanent damage. The frequency of dynamic torques must lie below the resonant frequency of the mechanical structure. • Limit the peak-to-peak variation of dynamic torques to 70 % of the rated torque.

2 Introduction

IMPORTANT: Read the operation manual carefully before using the equipment, and keep for future reference.

2.1 Intended use

The torque sensor model 8625 measures static and dynamic torques. This measured quantity is suitable for open-loop and closed-loop control functions. The respective upper range value is shown on the type plate.

Both the low mass of the torque sensor model 8625 and its high torsional rigidity are an advantage when measuring dynamic torques. However, you need to pay attention to the torsion spring constant and the sensor's cut-off frequency with such measurements. You can find both of these in the data sheet. For more information on estimating the resonant frequency and measuring dynamic torques see chapter 3.5 "Dynamic torques" on page 17.

The torque sensor model 8625 is maintenance-free. The electrical measurement signals can be transmitted to remote measuring stations where they can be displayed, recorded, processed and used for control and regulation tasks.

Use the torque sensor model 8625 only for measuring torque and rotational speed or angular displacement.

Do **not** use the torque sensor model 8625 in safety-critical applications.

The torque sensor model 8625 is not intended for use as a safety device.

2.2 Customer service

2.2.1 Customer service department

If you need to ask about repairs, please telephone our Service department on +49-7224-645-53.

Please have the serial number to hand. The serial number is essential to establishing the definite technical status of the torque sensor model 8625 and providing help quickly. You will find the serial number on the type plate of the torque sensor model 8625.

2.2.2 Contact person

If you have any questions relating to the torque sensor model 8625, please contact your representative or go directly to burster präzisionsmesstechnik gmbh & co. kg.

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2.3 Download the test certificates

You have the option to download the test certificate for your torque sensor model 8625 online. To do this, you can either use your direct download link or download it directly from our website (www.burster.com) by entering the serial number.

2.4 Environmental conditions

- Avoid radiant heat or cooling from one side.
- Protect the torque sensor model 8625 from moisture.
- The torque sensor model 8625 is **not** resistant to the effects of chemicals. Do **not** use the torque sensor model 8625 in a corrosive environment.
- Keep the bearings and connectors free of dust, dirt and other foreign matter.


2.4.1 Storage conditions

Use clean packaging to package the torque sensor model 8625. The torque sensor model 8625 must be stored under the following conditions:

- Dry atmosphere
- No condensation
- Dust-free
- Temperature between +0 °C and +60 °C

2.4.2 Cleaning

Disconnect the torque sensor model 8625 from the electrical supply and use a dry cloth to clean it.

	CAUTION
	<p>Do not immerse the torque sensor model 8625 in water or hold it under running water. Do not use strong cleaning agents as these may damage the torque sensor model 8625. Use a dry cloth to clean the torque sensor model 8625. Ensure that the shaft and mating parts are completely clean and have no traces of lubricants at the time of fitting. Use a solvent such as acetone to clean the shafts before fitting. Make sure there is no foreign matter on the shafts at fitting.</p>


2.5 Personnel

Personnel must be familiar with the relevant regulations. They must follow these regulations. Only trained personnel who are familiar with the applicable safety regulations are permitted to operate the torque sensor model 8625.

2.6 Scope of delivery

- Torque sensor model 8625
- Mating connector
- Operation manual
- Data sheet
- Optional: USB cable
- Optional: mounted flange or bracket

2.7 Unpacking

	CAUTION
	Never connect up the torque sensor model 8625 if it shows signs of damage incurred in transit. Only ever use the torque sensor model 8625 under the conditions specified in this operation manual.

Inspect the torque sensor model 8625 carefully for damage. If you suspect that the torque sensor model 8625 has been damaged during shipping, notify the delivery company within 72 hours.

The packaging should be retained for examination by a representative of the manufacturer and/or the delivery company.

The torque sensor model 8625 must be shipped only in its original packaging or in packaging capable of providing an equivalent degree of protection.

2.8 Warranty

burster praezisionsmesstechnik gmbh & co kg provides a manufacturer's warranty for a period of 24 months after delivery.

Any repairs required during this time will be made without charge. This does not include damage arising from improper use.

Please note the following when sending the torque sensor model 8625 in for repair:

- If there is a problem with the torque sensor model 8625, please describe the fault as detailed as possible.
- Technical specifications subject to change at any time without notice. We also state explicitly that we do not accept liability for consequential damage.
- The torque sensor model 8625 must always be dispatched in suitable packaging.

2.9 Conversions and modifications

Note: If you open or dismantle the torque sensor model 8625 during the warranty period, this will void the warranty **immediately**.

The torque sensor model 8625 does not contain any parts that are intended to be serviced by the user. Only the manufacturer's own qualified personnel are permitted to open the torque sensor model 8625.

It is forbidden to make any modification to the torque sensor model 8625 without our written permission. We cannot accept liability in the event of such action.

Our recommendations

- Check cables and connectors annually.
- It is up to you as the user to determine the recalibration interval. We recommend that you check/recalibrate the torque sensor model 8625 after no longer than 12 months. Further details are given in chapter 5 "Calibration and adjustment" on page 35.

Maintenance schedule

Action	Frequency	Date	Date	Date
Check cable and connector	1x annually			
Calibration	< 26 months			
Check the attachment (flanges and shafts)	1x annually			
Check the sensor	< 12 months			

3 Device concept and general information

The figures given for the full dimensions, mass and power depend on the version of the torque sensor model 8625. Please refer to the data sheet for specific figures.

3.1 Definitions

Test side

The test side is that end of the shaft at which you apply the torque being measured to the torque sensor model 8625.

This end normally has the smallest moment of inertia.

You will see these markings "TEST SIDE" on the measurement end of the torque sensor model 8625:

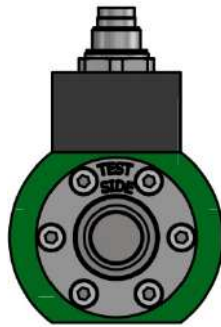


Diagram 1: Test side of torque sensor model 8625

Drive side

The drive end is the opposite end to the measurement end. The torque sensor model 8625 is also mechanically connected at this end.

3.2 Mechanical design

The torque sensor model 8625 does not contain any rotating parts. The shaft is joined directly to the housing at the attachment end. Strain gauges are mounted on the shaft, which acts as the torsion bar in the torque sensor model 8625. The torque is applied to the shaft end labelled "TEST SIDE". The housing provides protection for the sensitive electronic instrumentation and contains the cable/plug connection. The housing is also used as the means of attaching the torque sensor model 8625.

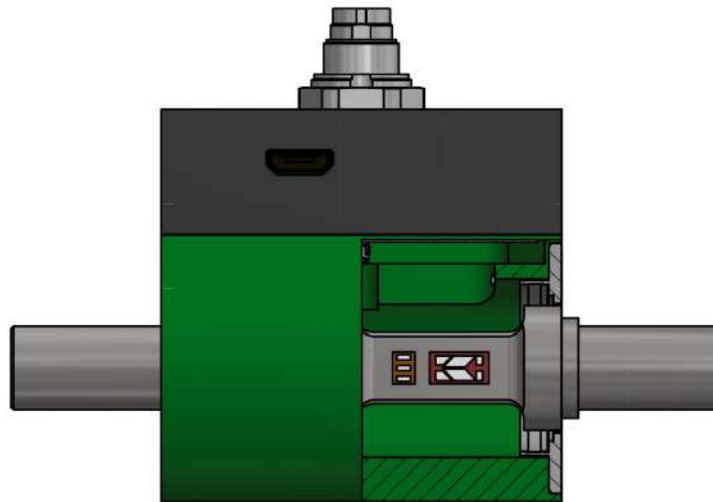
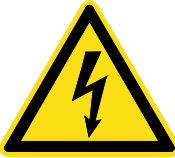



Diagram 2: Basic design of the torque sensor model 8625

3.3 Electrical design

	<div style="background-color: red; color: white; padding: 5px; text-align: center;">  DANGER </div> <p>Electric shock hazard! Because of size constraints, the supply voltage, output voltage and USB socket are not galvanically isolated. This means that the device has common digital and analog grounds, which are connected to the housing.</p>
-------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Thanks to its modular design, the 8625 strain-gauge torque sensor can be configured exactly to suit the application required:

- mV/V with standardized output signal
- mV/V with not standardized output signal and burster TEDS
- ± 10 V output signal, configuration via USB
- ± 10 V output signal, configuration and measurement via USB

With the built-in amplifier option, the torque sensor model 8625 outputs directly a torque-proportional voltage of 0 ... ± 10 V. The Micro USB port can be used to configure the torque sensor model 8625. For instance it is possible to set a filter frequency, configure averaging and set a tare function. With the USB option, measurements via USB are available in addition to the voltage output. The sensor comes with the DigiVision PC software for performing measurements and data archiving, and drivers e.g. for LabVIEW are available. It is also possible to integrate the sensor in the user's own software using DLL. The burster TEDS option (Transducer Electronic Data Sheet; a memory chip containing sensor-specific data and characteristics) allows rapid configuration of compatible evaluation units (instrumentation amplifiers, indicators/meters, process controllers etc.).

Torque sensor model 8625 with bridge output

The torque sensor model 8625 with bridge output has a 7-pin circular connector. This connector is used to supply the sensor with its required rated excitation voltage and to output the measurement signal in mV/V. The supply voltage must be kept absolutely constant. Conventional power supplies cannot guarantee this consistency to an adequate degree. Use an instrumentation amplifier, indicator or process controller that can provide a stabilized supply voltage and processes the mV/V signal.

Torque sensor model 8625-XXXX-VXX3X0

The 8625-XXXX-VXX3X0 torque sensor provides a standardized output signal, i.e. all torque sensors of type 8625-XXXX-VXX3X0 provide the same rated output for each measuring range. Each measuring range has a different rated output, however.

Torque sensor model 8625-XXXX-VXX4X0

The 8625-XXXX-VXX4X0 torque sensor provides all the functions of the 8625-XXXX-VXX3X0 torque sensor plus an internal burster TEDS chip. The burster TEDS chip stores all the characteristic data for the 8625-XXXX-VXX4X0 torque sensor, the model name and serial number. This ensures Plug&Play capability of the 8625-XXXX-VXX4X0 torque sensor with suitable indicating instruments such as the TRANS CAL 7281 and DIGIFORCE® 9311 or DIGIFORCE® 9307, dispensing with the time-consuming task of configuration.

Schematic diagram

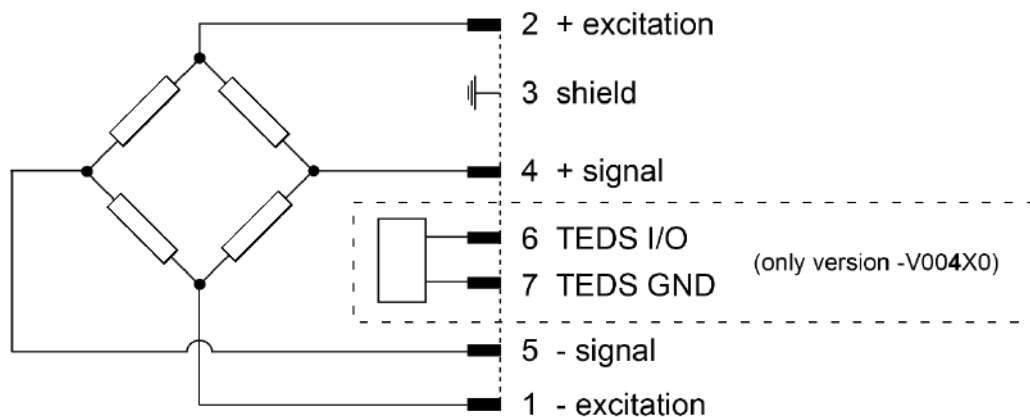


Diagram 3: Model 8625-XXXX-VXX3X0 output mV/V
 Model 8625-XXXX-VXX4X0 output mV/V und TEDS

IMPORTANT: The housing of the torque sensor model 8625 must be grounded.

3.3.1 Torque sensor model 8625 with amplifier

The torque sensor model 8625 with built-in amplifier has two connectors, offering alternative options for operation:

1. 7-pin circular connector, and
2. Micro USB socket.

Schematic diagram

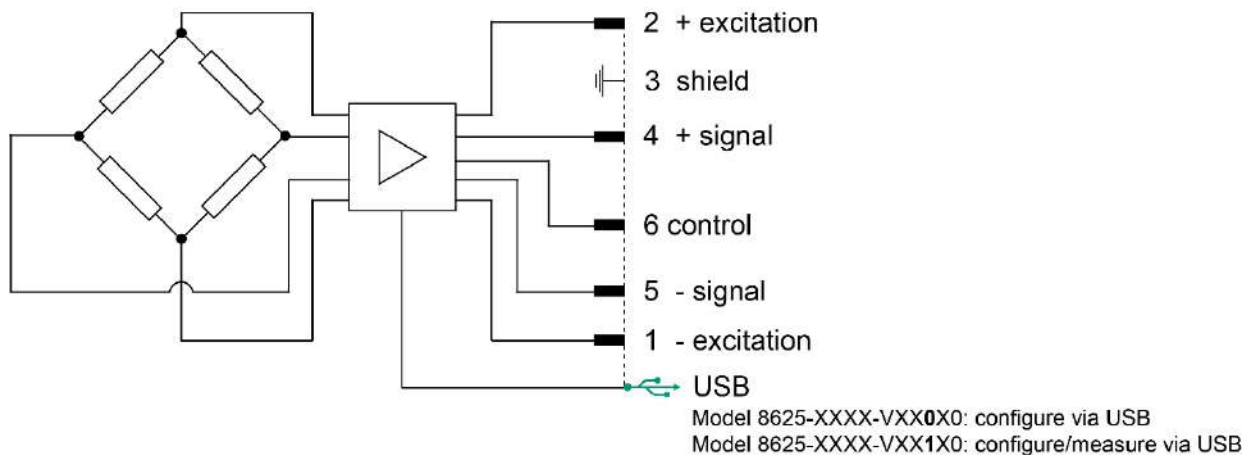


Diagram 4: Model 8625-XXXX-VXX0X0 output 0 ... ±10 V incl. configure via USB
Model 8625-XXXX-VXX1X0 output 0 ... ±10 V incl. configure/measure via USB

Note: Shield, - Excitation, - Signal and USB GND are connected to the housing.

IMPORTANT: The housing of the torque sensor model 8625 must be grounded.

Torque sensor model 8625-XXXX-VXX0X0

The Micro USB socket on the 8625-XXXX-VXX0X0 torque sensor is used for configuring the 8625-XXXX-VXX0X0 torque sensor, or specifically its analog output. Disconnect the plug from the circular connector while configuration is in progress to prevent ground loops. The 8625-XXXX-VXX0X0 torque sensor is supplied with power via the USB cable in this operating mode.

The following options can be configured:

a) The averaging function

You can set here the number of individual measured values to be used to form an arithmetic mean. The value can be set in the range $N = 1$ to $N = 50\,000$. When $N = 1$, averaging is not performed. In this case, the voltage value at the output is refreshed every $10\ \mu\text{s}$. This corresponds to 10 000 digitizations per second.

So if you select $N = 50\,000$, for example, then a measuring time of 5 seconds is needed for a new voltage value at the output ($50\,000 \times 10\ \mu\text{s} = 5\ \text{s}$). Disable the low-pass filter if you set a value $N \neq 1$.

b) The low-pass filter

The low-pass filter is a digital filter designed as a first-order low-pass filter.

Apart from the "OFF" setting, you can select various cut-off frequencies:

- OFF
- 5 Hz

- 10 Hz
- 25 Hz
- 50 Hz
- 100 Hz
- 200 Hz
- 400 Hz
- 1 kHz

Set the averaging value to $N = 1$ if you select a cut-off frequency \neq OFF.

The cut-off frequency is the frequency at which the output signal is attenuated by -3 dB, corresponding to about 70.7 % of the signal at very low frequencies.

Factory settings

- Averaging: $N = 100$
- Low-pass filter: AUS

Programming instructions

The dedicated interface manual (Precision torque sensor model 8625 – Interfaces manual) available at www.burster.com contains precise details of the programming instructions. When using the DigiVision PC software, you can configure the sensor via the user interface.

Version 8625-XXXX-VXX1X0

The 8625-XXXX-VXX1X0 torque sensor provides all the functions of the 8625-XXXX-VXX0X0 plus the option to read the measured values via the USB port. The dedicated interface manual (Precision torque sensor model 8625 – Interfaces manual) available at www.burster.com contains precise details of the programming instructions. When using the DigiVision PC software, you can configure the sensor via the user interface.



CAUTION


- Choose to use either the circular socket or the USB socket, but not both, to avoid ground loops.
- Choose between the voltage output or USB for measurement readings. Doing both at once is not possible.

3.4 Static and quasi-static torques

Static and quasi-static torques change their value only slowly or not at all. As long as they are below the rated torque, these torques can take any value.

3.5 Dynamic torques

A dynamic torque changes very rapidly and can even oscillate. In this case the frequency of the torque must remain well below the resonant frequency of the mechanical structure as a whole.

	<h3>CAUTION</h3>
	<p>Resonance hazard! Operating the torque sensor model 8625 or the entire test setup close to its resonant frequency will result in permanent damage. Keep the torque frequency well below the resonant frequency of the mechanical test setup. Limit the peak-to-peak torque variation to 70 % of the rated torque.</p>

We recommend that you measure dynamic torques only if they do not exceed 70 % of the rated torque. The characteristics of your signal analysis and control systems must be taken into account during dynamic testing.

Determination of the resonant frequency

The resonant frequency of the entire test setup is related to the sensor's spring constant "c" and to the moment of inertia "J" with the connected molding body.

$$f_0 = \frac{1}{2 \cdot \pi} \cdot \sqrt{\frac{c}{J}}$$

- f₀: Resonant frequency in Hz
- J: Moment of inertia in kg · m²
- c: Spring constant in Nm / rad

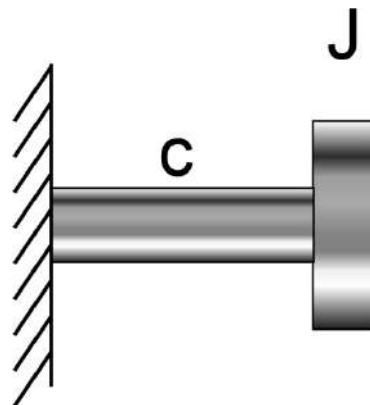


Diagram 5: Resonant frequency model

The Holzer-Tolle method is another way to determine the resonant frequency.

3.6 Interference

Possible sources of interference:

- Temperature change
- Temperature gradient
- Vibration
- Spurious forces
- EMC
- Electrical interference
- Magnetic interference
- Angular, axial or radial misalignment

IMPORTANT: Take suitable measures to counter these sources of interference because otherwise they may cause an incorrect measurement result, e.g. provide covers or takes measures to isolate from vibration.

3.7 Troubleshooting table


This table contains the most common faults and errors with relevant corrective actions.

Fault	Possible cause	Remedial action
No signal	No power supply	Connect supply
	Outside permitted range	Check supply
	No mains supply	Connect supply
	Cable faulty	Repair cable
	Signal output not connected correctly	Connect output correctly
	Electronic evaluation circuit faulty	Repair or replace
Sensor does not respond to torque	Shaft not clamped	Clamp correctly
	No power supply	Connect supply
	No mains supply	Connect supply
	Outside permitted range	Check supply
	Cable faulty	Repair cable
	Plug not connected correctly	Connect plug correctly
Signal drops out	Cable faulty	Repair cable
Zero point out of tolerance	Cable faulty	Repair cable
	Shaft twisted when fitted	Fit correctly
	Shaft line twisted	Release twist

	Strong off-axis loads	Reduce off-axis loads
	Shaft overloaded	Return the torque sensor model 8625 to the manufacturer
Torque reading incorrect	Calibration not correct	Recalibrate
	torque sensor model 8625 is faulty	Return to manufacturer for repair
	Torque bypass	Remove bypass
Torque fluctuations	Vibrations	Isolate from vibrations
	Air movements	Fit cover

4 Installation

4.1 Mechanical installation

CAUTION	
	<p>Avoid excessive torques, bending moments or axial forces! Excessive torques, bending moments or axial forces may damage the torque sensor model 8661.</p> <ul style="list-style-type: none">• Connect the electrical cable to the torque sensor model 8661 during fitting and monitor the measurement signal. This signal must remain within the permitted range.• Support the torque sensor model 8661 during fitting to make sure it does not drop, and do not resort to hammering to aid installation.

Make sure you fit the torque sensor model 8625 the correct way round. The housing is fitted at the attachment end of the sensor. The end of the torque sensor model 8625 to be used for measurement is labelled "TEST SIDE":

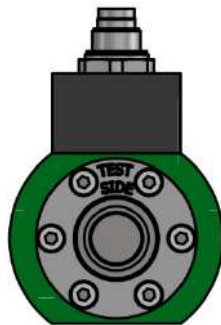



Diagram 6: Test side of torque sensor model 8625

If you get the ends mixed up you must expect the following effects:

- The cable connection affects the measurement
- The inertial masses of the case affect the measurement

4.1.1 Preparing for alignment and fitting

	<h3>CAUTION</h3>
<p>Torque sensors with small rated torques are very sensitive to any overload. Carelessness even during fitting, for instance when tightening the couplings, can overload torque sensors</p> <ul style="list-style-type: none"> • Connect the electrical cable to the torque sensor model 8625 during fitting and monitor the measurement signal. Make sure that the torque never exceeds the maximum value (full scale) at any time. • Support the torque sensor model 8625 during fitting to prevent any bending moments acting on the shaft. • Impacts and shocks may damage the torque sensor model 8625 (e.g. if it is dropped). Exercise due care when handling and fitting the torque sensor model 8625. 	

Additional instructions for correct installation of the torque sensor model 8625:

- Note:** Ensure a correct fit when designing the mechanical connection or selecting the couplings. The applied torque must be transferred reliably and without loss.
- Note:** Ensure that the shaft and mating parts are completely clean and have no traces of lubricants or foreign matter at the time of fitting. Use a solvent such as acetone to clean the shafts before fitting.
- Note:** Use only the appropriate burster accessories such as flange adapter, bracket and/or couplings to ensure correct installation of the torque sensor model 8625. Couplings must be able to slide easily onto the shafts without resistance.
- Note:** Fit the torque sensor model 8625 loosely at first before alignment. Do not tighten the screws on couplings or adapters at this stage.
- Note:** Make sure the whole assembly is exactly in line when aligning the torque sensor model 8625 and/or the shafts. Normally a straight edge is sufficient to achieve alignment in two mutually orthogonal planes. We do recommend, however, using a dial gauge or laser for alignment.
- Note:** Connect the electrical cable to the torque sensor model 8625 during fitting and monitor the measurement signal. Tighten the fixing screws to the specified tightening torques using a torque wrench. Make sure that the measurement signal does not exceed the maximum torque (full scale) during tightening. Use your hand to hold the couplings during tightening.

4.1.2 Installation options

The 8625 static torque sensors can be fitted in a variety of ways

Direct installation

The torque sensor model 8625, measurement range up to 10 Nm, can be attached directly to the system structure. The torque sensor model 8625 provides blind threaded holes and locating-pin holes on the underside of the housing for this purpose. The blind threaded holes are used for screw-fastening the sensor to the system. To correct for any tolerances and play in the threaded holes and screws, the sensor can be fixed precisely in place using the tightly-toleranced holes for mating locating pins. This makes it easier to replace a sensor, because it dispenses with time-consuming re-alignment.

Note: Do not use the internal threads to support the torque sensor model 8625.

Note: Make sure, that the torque is only applied using the shaft ends. Otherwise the torque sensor model 8625 will be damaged.

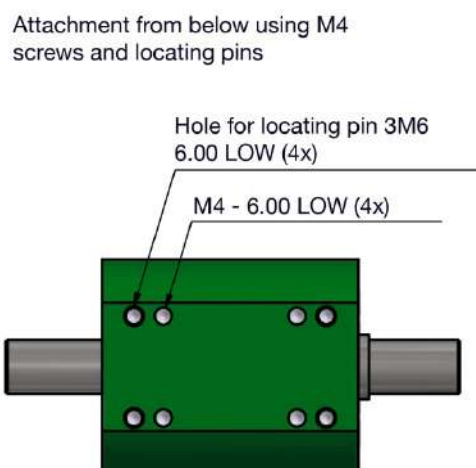
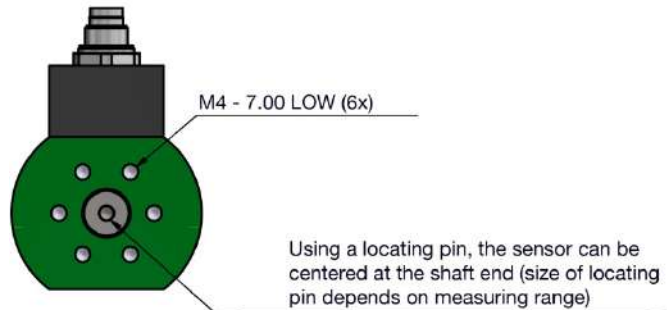


Diagram 7: Blind threaded holes and locating-pin holes - underside

On its end face at the attachment end, the torque sensor model 8625 has six blind threaded holes for fixing the sensor to its surrounding application. Tighten the screws in a diagonal pattern to the specified tightening torque. You can also attach the torque sensor model 8625 directly at the attachment end by means of the shaft. Clamping means and/or couplings and shaft must be designed to fit exactly, and there must be no traces of lubricants or foreign matter prior to fitting. The shaft also contains a locating-pin hole with H7 tolerances for precise alignment.

Attachment from behind using M4 screws



Measuring range	Locating pin
0.01 ... 0.02 Nm	1.00 H7 - 3.00 LOW
0.05 Nm	2.00 H7 - 4.00 LOW
0.1 ... Nm	3.00 H7 - 5.00 LOW

Diagram 8: Blind threaded holes and locating-pin holes - attachment end

Installation using a mounting flange

The torque sensor model 8625 can be supplied with a mounting flange. This mounting flange is fitted in the factory and allows the torque sensor model 8625 to be attached easily to the system structure. For versatile fitting options, each flange has four through-holes and four blind threaded holes. Always tighten the fixing screws in a star pattern. If the torque sensor model 8625 is supplied fitted with a mounting flange (sensor model 8625-XXXX-VXXX40), this flange forms an integral part of the torque sensor model 8625 and is calibrated with the sensor. The mounting flange must always be included in any recalibrations.

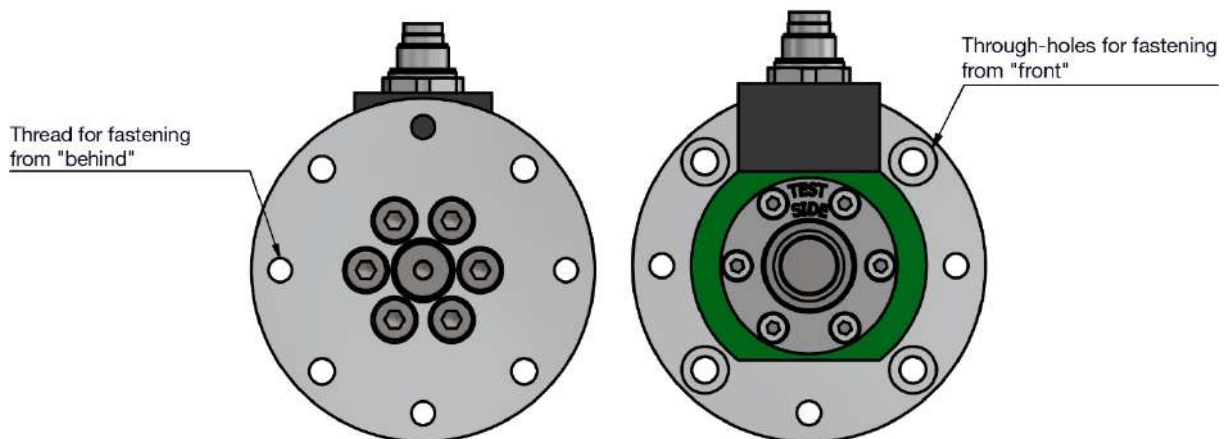


Diagram 9: Mounting flange for simple attachment - view towards the attachment end/test end

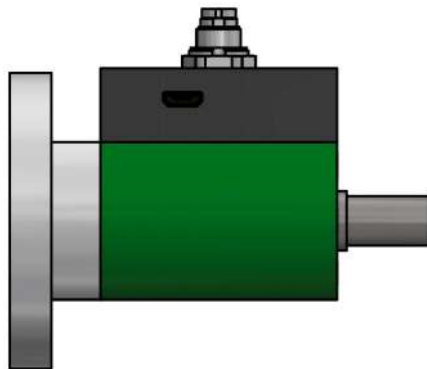


Diagram 10: Mounting flange for simple attachment - side view

Installation using a bracket

The torque sensor model 8625 can be supplied with a bracket as an accessory. This bracket must be fitted independently by the customer and is not included in the calibration.

The bracket is screwed onto the attachment end of the torque sensor model 8625 using six fixing screws. The screws must always be tightened in a star pattern to the specified tightening torques. Various screw holes allow a choice of options for attaching the bracket to the system structure. In addition, the bracket includes two locating grooves in its base and a cable fixing means.

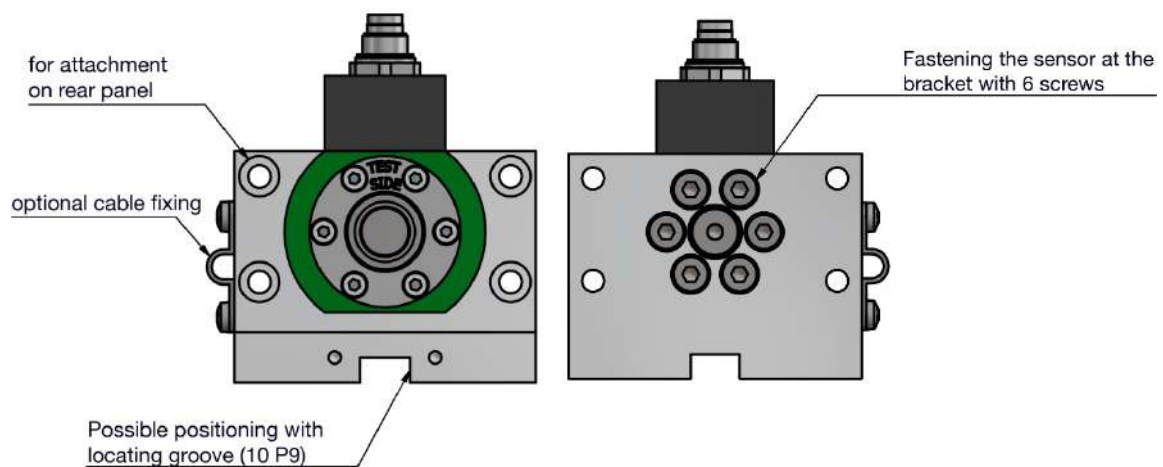


Diagram 11: Bracket for simple attachment - view towards the attachment end/test end

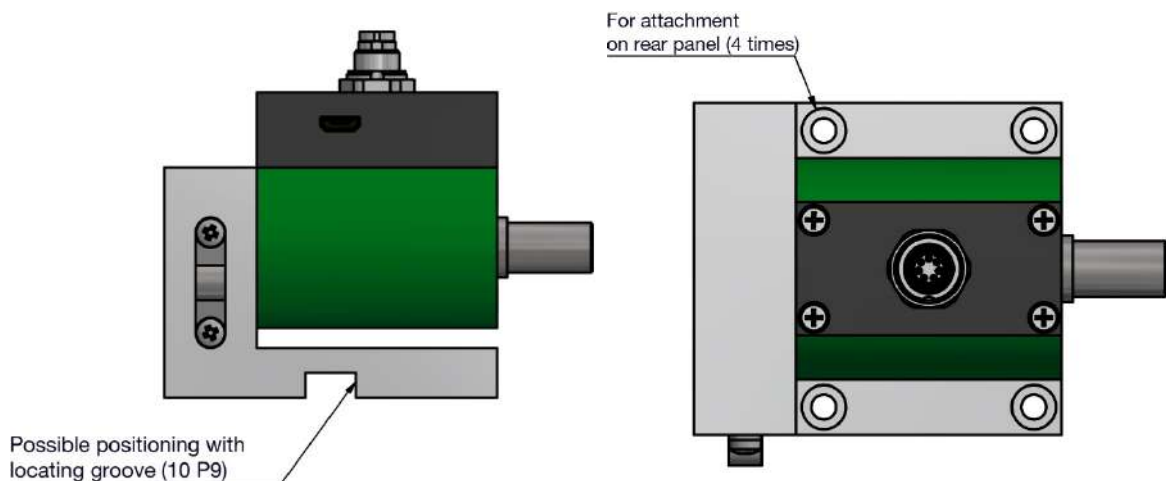


Diagram 12: Bracket for simple attachment - side view

Using metal-bellows couplings

We recommend using split metal-bellows couplings model 8690 or metal-bellows couplings model 8691, to attach the shaft at the measurement end ("TEST SIDE"). The advantage of the model 8690 or 8691 metal-bellows couplings is that they can correct any misalignments of the shaft. Even if the torque sensor model 8625 has been precisely aligned, very slight misalignments can still arise.

Different kinds of misalignments

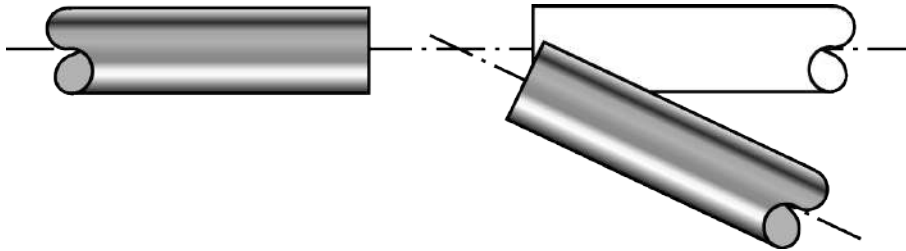


Diagram 13: Angular misalignment

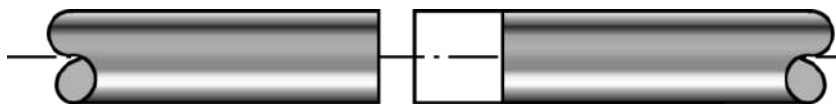


Diagram 14: Axial misalignment, e.g. due to thermal expansion

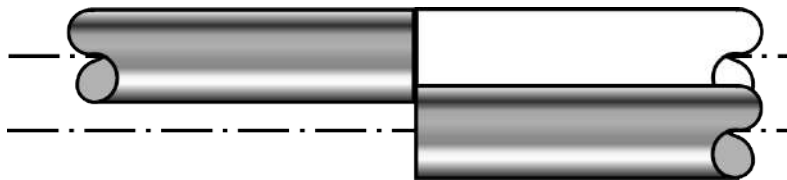


Diagram 15: Radial misalignment



This is how it works

1. Clean and de-burr the shafts and hubs and any other contact and mounting surfaces on your components. At time of fitting, there must be no foreign matter, burrs or lubricants on these components.
2. Fit the torque sensor model 8625 using the specified installation means on the housing or at the attachment end using the mounting flange or bracket.
3. Align the torque sensor model 8625 approximately. Just tighten the fixing screws loosely.
4. Fit the model 8690 or 8691 metal-bellows couplings to the shaft end at the measurement end ("TEST SIDE") of the torque sensor model 8625. If you have chosen to fit the torque sensor model 8625 directly to the shaft at the attachment end, also fit a metal-bellows coupling here. Initially only loosely tighten the fixing screws on the metal-bellows couplings. Always use the entire clamping length of these couplings.

5. Align the torque sensor model 8625 precisely. This avoids any unnecessarily high reaction forces, while also reducing the load on the coupling and any spurious forces acting on the torque sensor model 8625. Normally it is sufficient to align the coupling using a straight edge in two mutually orthogonal planes. We do recommend, however, using a dial gauge or laser to align the coupling and/or the shaft ends.
6. Connect the electrical cable to the torque sensor model 8625 during fitting and monitor the measurement signal. Tighten the fixing screws once you have finally aligned the torque sensor model 8625. When using the mounting flange, tighten its fixing screws in a diagonal pattern.

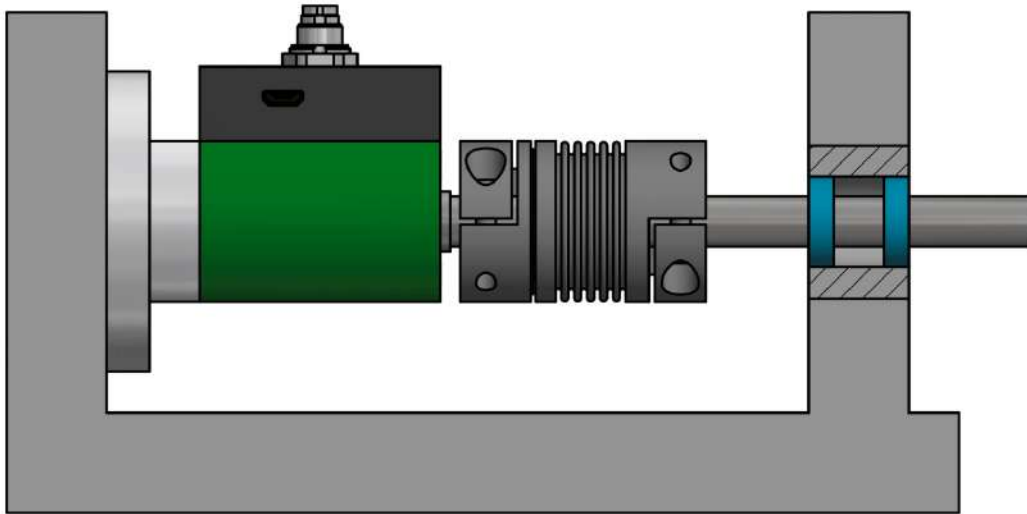


Diagram 16: Mounting example of torque sensor model 8625

4.2 Electrical connection

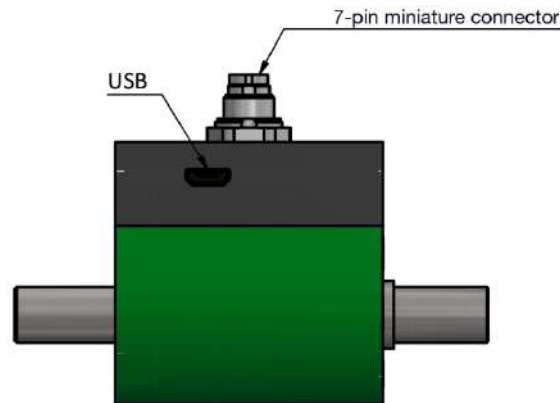





Diagram 17: Electrical connection

4.2.1 Power supply

	 <h2 style="margin: 0;">DANGER</h2>
<p>Danger of electric shock! Because of size constraints, the supply voltage, output voltage and USB socket are not galvanically isolated. This means that the device has common digital and analog grounds, which are connected to the housing.</p>	

	<h2 style="margin: 0;">CAUTION</h2>
<ul style="list-style-type: none"> Choose to use either the circular socket or the USB socket, but not both, to avoid ground loops. Choose between the voltage output or USB for measurement readings. Doing both at once is not possible. 	

4.2.2 Connector pin assignments

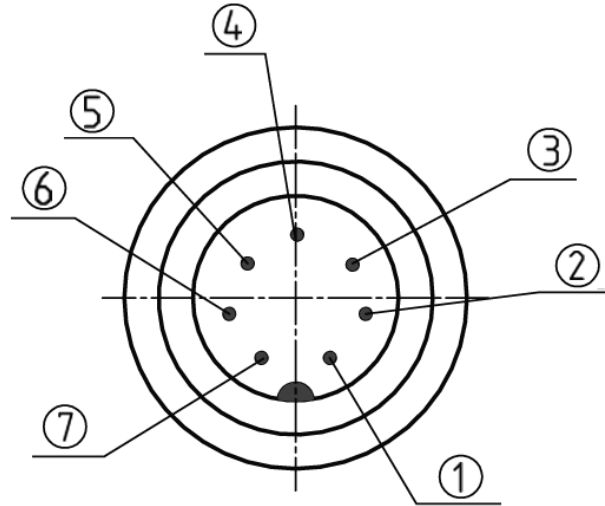


Diagram 18: View from the solder side

Pin assignment depends on selected option.

Pin	Assignment without electronics	Assignment with electronics
1	Bridge supply -	Supply GND
2	Bridge supply +	Supply +5 ... 30 V
3	Shield	Shield
4	Signal +	Output signal ± 10 V
5	Signal -	Output signal GND
6	TEDS I/O (option) / NC	Control signal
7	TEDS GND (option) / NC	Switching between ranges (option)

4.2.3 USB pin assignment

The USB interface complies with the USB 2.0 standard and the pin assignment is as usual. The built-in connector on the torque sensor model 8625 is a "micro USB" plug.

Pin	Name
1	+ 5 V
2	Data -
3	Data +
4	ID (not used)
5	GND

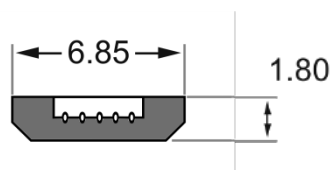


Diagram 19: Micro USB [mm]

The connector fitted on the supplied cable is a “type A USB” plug.

Pin	Name
1	+ 5 V
2	Data -
3	Data +
4	GND

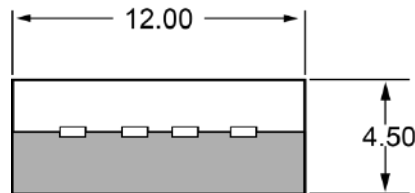


Diagram 20: USB A [mm]

4.2.4 Power supply for torque sensor model 8625 fitted with USB

The device draws 200 mA from the USB port. Usually this is not a problem for desktop PCs.

For laptops, however, several USB ports may share one power supply that is additionally loaded by other connected USB devices (mouse etc.). Therefore under some circumstances the torque sensor model 8625 may be supplied with too little power and cannot register its presence. In this case, you need to connect the torque sensor model 8625 to the laptop via an active USB hub.

Alternatively, for configuration purposes you can provide the torque sensor model 8625 with power via the circular connector. In this case we recommend an excitation voltage of at least 24 VDC. This excitation voltage is interlocked with respect to the USB port. Make sure that no ground loops can arise.

Note: The actual power consumption is: $P = 5 \text{ V} * 0.2 \text{ A} = 1 \text{ VA}$.

4.2.5 Power supply for torque sensor model 8625 with built-in electronics via the circular connector

The torque sensor model 8625 works in an operating voltage range of 5 ... 30 VDC – measured at the torque sensor model 8625. When using cables of small cross-section or with an extension, you must take into account the voltage drop in the cable. In this case set the operating voltage slightly higher. The power consumption is about 1 W.

4.2.6 Power supply for torque sensor model 8625 without built-in electronics

No additional supply voltage is needed because of the bridge excitation voltage.

4.2.7 Cables

- Always use shielded, low-capacitance cables.
- We recommend cables from burster präzisionsmesstechnik gmbh & co kg. These cables meet the relevant requirements.
- Make sure that the cable has a large enough cross-section.

Relationship between sensor rated output and cable length

With extension cables, the sensor rated output is affected by the cable length as a function of the bridge resistance and the conductor cross-section. Therefore always order extension cables at the same time as ordering the torque sensor model 8625. Make sure that calibration is performed on the complete assembly of torque sensor model 8625 plus extension cables.

Note: When extending cables, make sure connections are made correctly and with proper isolation.

When calculating the cable resistance you must take into account both excitation conductors for the torque sensor model 8625.

i.e.:

Cable resistance = 2x resistance of the cable length

burster präzisionsmesstechnik calibrates all sensors in combination with the cable length ordered. In these cases you do not need to take account of the cable length.

Difference per meter of cable length

Cross-section of wires	Cable resistance per m	For 350 Ω bridge resistance	For 700 Ω bridge resistance	For 1000 Ω bridge resistance
0.14 mm ²	0.28 Ω	0.08 %	0.04 %	0.028 %
0.25 mm ²	0.16 Ω	0.046 %	0.023 %	0.016 %
0.34 mm ²	0.12 Ω	0.034 %	0.017 %	0.012 %

4.2.8 Connecting the shield

The shield together with the torque sensor model 8625 and the external electronics form a Faraday cage. Thanks to this cage, electromagnetic interference usually does not affect the measurement signal.

IMPORTANT: The torque sensor model 8625 must always be grounded reliably by means of its fixing screws. In some cases it may be necessary not to attach the cable shield to the indicating equipment.

4.2.9 Running cables

Electrical and magnetic fields can often be picked up by the test leads, causing interference. Such interference mainly stems from power cables running parallel to the test leads, but can also be caused by contactors, thyristor controllers, variable frequency drives and electric motors in the vicinity. Ensure these are a sufficient distance away and route test leads through a grounded steel pipe if necessary.

Galvanic interference can also occur, particularly if the measurement chain is grounded at multiple points creating differences in electrical potential. These ground loop currents can be avoided by either disconnecting the double grounding or bypassing it by running a particularly low-resistance ground cable (6-10 mm²) parallel to the test lead.

The main points to remember are:

- The torque sensor model 8625 must be grounded via its assembly bolts.
- Run the cable loosely and with enough play in the cable to allow for any movement.
- Avoid any tension on the connecting plug.
- Avoid excessive lengths. If that is not possible snake the cable. This will reduce the effective induction area.

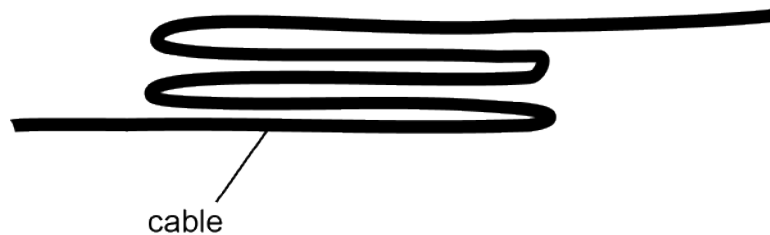


Diagram 21: Layout of a cable with excess length

- Locate the torque sensor model 8625, cable and measuring instrument outside the field of high-energy equipment. These include transformers, motors, contactors, frequency converters and so forth. Otherwise the electromagnetic fields from such equipment will act with their full effect on the measuring chain, causing incorrect measurements.
- Lay the measuring lines separately from high-power cables. If the measuring lines are laid parallel to such cables, interference will be coupled in inductively and capacitively.

Note: In some cases it is helpful to pull an extra shield as additional protection over the measuring cable, or to lay the cable in a metal tube or pipe, which must be grounded.

4.3 Measurement

4.3.1 Switching on



This is how it works

1. Apply the operating voltage to the torque sensor model 8625.

4.3.2 The torque direction

A torque is clockwise (clockwise torque) if the torque is exerted clockwise **when looking at the measurement end**. In this case you will get a positive electrical signal at the torque sensor model 8625 output.



Diagram 22: Torque, clockwise (looking at measurement end)

You can use the torque sensor model 8625 to measure both clockwise and counterclockwise torques. If the torque is exerted in an anticlockwise direction (looking at test side), you will get a negative signal at the output.



Diagram 23: Torque, anticlockwise (looking at measurement end)

4.3.3 Check function (for 8625 with instrumentation amplifier)

The torque sensor model 8625 with analog output has a Check function. This Check function is actuated electronically by applying the supply voltage (Excitation +) additionally to Pin 6 of the connector. As long as this connection is made to Pin 6, a precise voltage of 10.00 V is available at the output of the torque sensor model 8625. This can be used to calibrate indicators, input boards or other evaluation equipment connected to the output of the sensor.

Note: Use the Check signal only when the torque sensor model 8625 is not under load.

Example showing check signal connection

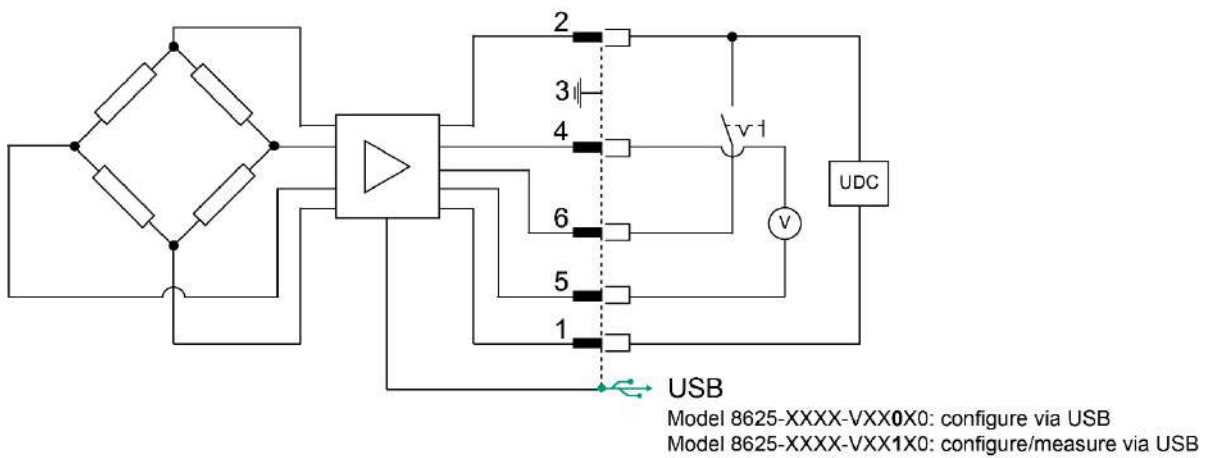


Diagram 24: Example showing check signal connection

Pin	Function
1	Excitation - (= casing)
2	Excitation +
3	Shield (= casing)
4	Signal +
5	Signal - (= casing)
6	Control signal
7	NC

IMPORTANT: The housing of the torque sensor model 8625 must be grounded.

5 Calibration and adjustment

The torque sensors model 8625 from burster praezisionsmesstechnik gmbh & co. kg are already traceably adjusted and tested in the factory. As an option we offer factory calibration of the torque sensor model 8625.

5.1 Factory calibration

As part of the traceable burster factory calibration, the torque sensor model 8625 is checked for calibratability, and is then calibrated and provided with a calibration label and a calibration certificate.

The burster factory calibration certificate includes the following information as a minimum:

- Measurement values and measurement uncertainty
- Reference standards used including measurement uncertainty and traceability
- Zero offset, output sensitivity and interpolation error
- Peak-to-peak range, hysteresis voltage and toggle (relative zero offset right-left)

5.2 DAkkS (DKD) calibration (DIN 51309)

DKD calibration involves calibrating the torque sensor model 8661 in accordance with guidelines from DAkkS (the German accreditation body) in an ISO-17025 accredited calibration laboratory.

It is essentially the user's responsibility to set suitable recalibration dates. In the case of a DAkkS calibration, the user should note that based on current standards, the validity of the DAkkS calibration lasts for no longer than 26 months.

5.3 Recalibration

Quality management standards require regular calibration of any measurement and test equipment that you use in quality-related processes. The reason for this is to ensure measurements are always made correctly, thereby keeping the risk of measurement errors in check.

We recommend that all measurement and test equipment is inspected every 12 months. We advise an immediate inspection if any damage is suspected.

Shorter intervals are recommended in the following cases:

- Torque sensor model 8625 overload
- After repair
- After improper use of the torque sensor model 8625
- When required by quality standards
- Where there is a specific traceability requirement

If you have any questions about the torque sensor model 8625 or calibration, please contact our Customer Service team by phone on +49-7224-645-53 or by email at service@burster.com.

6 Taking out of use

- Remove the torque sensor model 8625 correctly.
- Protect the torque sensor model 8625 from knocks.
- Protect the torque sensor model 8625 against bending moments.
- Support the torque sensor model 8625.
- Do not drop the torque sensor model 8625 **under any circumstances**.

7 Technical data

Please refer to the enclosed data sheet for the technical specification. The latest version of the data sheet is available at: <https://www.burster.com/en/torque-sensors/p/detail/8625> or simply use the QR code.



Diagram 25: QR code

7.1 Electromagnetic compatibility

7.1.1 Interference immunity

Interference immunity to EN 61326-2-3:2006

Industrial locations

7.1.2 Emitted interference

Emitted interference to EN 61326-2-3:2006

8 Accessories

Please refer to the enclosed data sheet for the technical specification. The latest version of the data sheet is available at: <https://www.burster.com/en/torque-sensors/p/detail/8625> or simply use the QR code.



Diagram 26: QR code

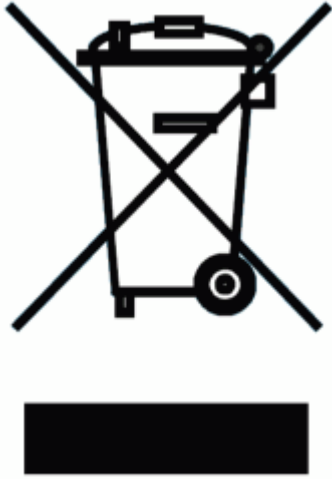
8.1 Software

Please refer to the enclosed data sheet for detailed information about the DigiVision configuration and analysis software. The latest version of the data sheet is available at: <https://www.burster.com/en/torque-sensors/p/detail/8625> or simply use the QR code.



Diagram 27: QR code

9 Disposal



Equipment disposal

Please fulfill your legal obligations and dispose of unserviceable equipment in accordance with applicable legal requirements. Thus you contribute to environmental protection.