

Operating Manual

BROSA Torque Sensor Type 0701

Version: 01/2021

Notes

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1 General information

Read the operating instructions and the product-specific documents carefully before commissioning the sensor.

Make sure that the sensor is fully suitable for the applications in question.

Improper use or any use other than intended may result in a malfunction of the sensor or undesirable effects in your application. For this reason, installation, electrical connection, commissioning and maintenance of the sensor may only be carried out by trained personnel authorized by the plant operator.

We also expressly point out that any liability is excluded if instructions in this documentation are disregarded.

Only the German version of this operating manual represents the original document.

1.1 Safety instructions – Explanation of symbols:



WARNING! This symbol indicates dangers that can lead to personal injury and property damage!

2 Description of the BROSA Torque Sensor

2.1 Structure and functionality

The BROSA torque sensor type 0701 is used to measure torque on all types of machines and equipment. Figure 1 shows the typical layout:

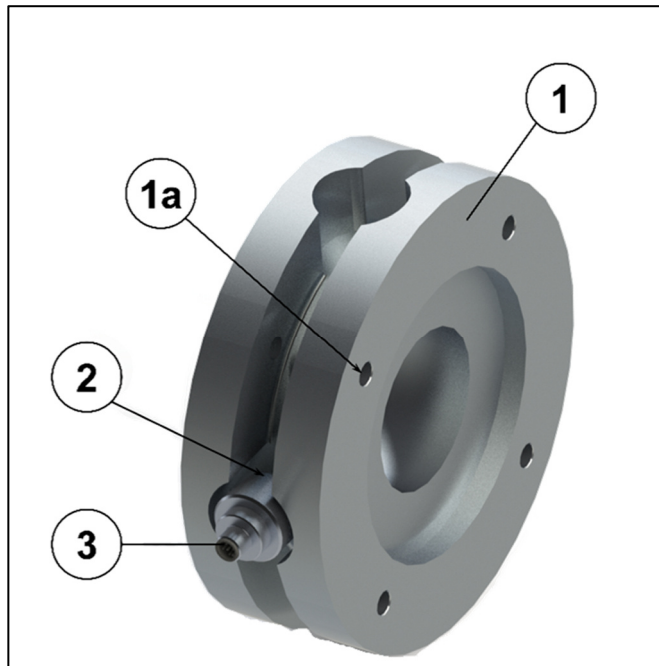


Figure 1: Torque Sensor

The torque sensor typically consists of a hollow cylindrical measuring element (1) which accommodates the load to be measured and has features for mounting and axial securing (1a), as well as, in some cases, a connection element (2) which is firmly attached to the measuring element on which - if the connection element is not placed directly on the measuring element - the elements necessary for electrical connection (plug or cable (3)) are mounted and which - if not placed on the measuring element - holds the measuring electronics.

Figure 2 shows the typical installation conditions:

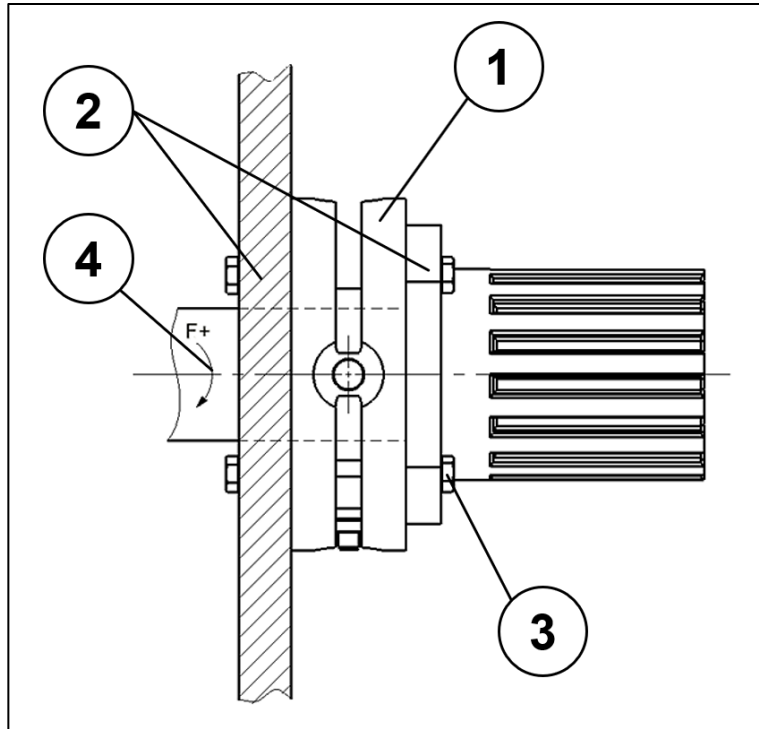


Figure 2: Installation conditions

The torque sensor (1) is mounted to a flange connection (2) by means of mounting screws (3) and secured against unintended movement. Information about the tightening torque can be found in the technical data sheet. The through hole is used for connection to a shaft train. The applied torque (4) is transmitted to the measuring electronics and output as an electrical signal by evaluating the resulting deformation of the measuring element.

Versions with two measuring systems, either with output signals on separate connectors/cables or combined in one connector/cable, are available as options. More information can be found in the technical data sheets, which can be obtained free of charge from BROSA.

2.2 Information on explosion protection

The torque sensor type 0701 is optionally available in an intrinsically safe version for use in potentially explosive areas. This can be done with the 2-wire technique using the ExDANGmicro2W*** amplifier. The following specifications apply:

	Amplifier ExDANGmicro2W***
Ignition protection type:	Ex II2G Ex ib IIC T4 Gb Ex ib IIC T4 Gb
Certificate number:	BVS 16 ATEX E 041 IECEX BVS 16.0031
Safety-related limit values: • Maximum voltage U_i • Maximum current I_i • Indoor capacity C_i • Internal inductance L_i	= 30V DC = 100 mA = 24 nF + 0.3 nF/m = 3 μ H + 1 μ H/m



Deployment of the intrinsically safe torque sensor in zone 0 is not permitted.

2.3 Label (nameplate, indication of measuring direction)

Each BROSA torque sensor is provided with a nameplate showing the specifications applicable to that particular device. Depending on the design, it can be fitted either on the end face, on the circumference (Fig. 3, 1a) or on an attached connection element (Fig. 3, 1b).

The measuring direction is indicated on the front side with an arrow (Figure 3, 2).

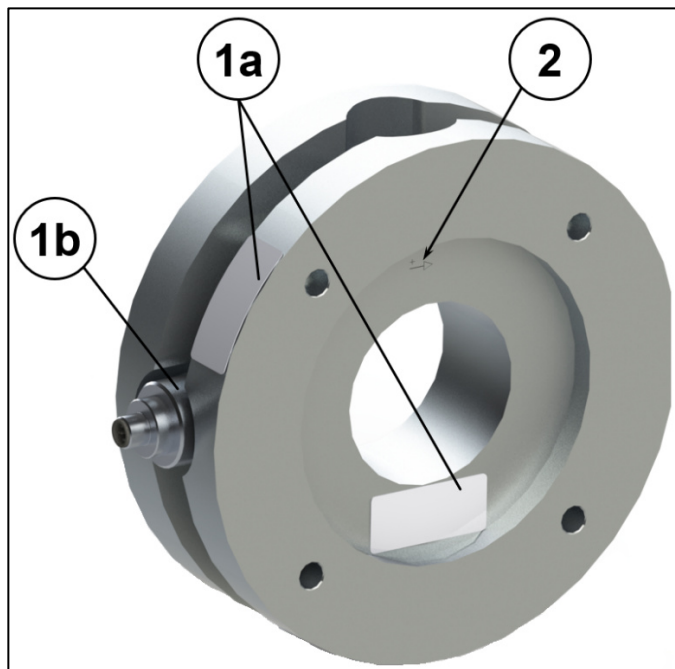


Figure 3: Nameplate positions, measuring direction

3 Instructions for the safe handling of BROSA torque sensors



WARNING! Non-compliance with the following instructions can lead to sensor damage and/or impairment of measurement results. The analysis of an erroneous measurement can result in personal injury or material damage.



WARNING! Despite their robust design, BROSA torque sensors must not be used for any purpose other than their intended use (see section 1.1). Improper use may result in danger to life and limb of the user or third parties and/or impairment of the device in which the torque sensor is implemented or damage to other material assets.

3.1 Handling

 **WARNING!** BROSA sensors contain high-quality measurement electronics. Make sure they are handled carefully.

- BROSA torque sensors are supplied in transport-safe packaging. We recommend that you remove the sensors from the package immediately prior to installation.
- For the selection of suitable handling equipment and/or lifting gear, the mass of the torque sensor must be taken into account; this is indicated on the type plate for sensors > 40 kg.
- BROSA torque sensors must be secured against falling. Do not throw sensors!
- Use as a tool (e.g. striking, slotting or lever tool) is not permitted; it can cause damage to the sensor and thus falsify the measurement results.

3.2 Installation and commissioning

3.2.1 General information

We recommend taking the following actions in the given order using the “four-eye principle”.

- a) Inspecting the sensor - measuring point assignment: It must be ensured that the sensor to be installed is designed for use at the intended measuring point. For this purpose, check information on the nameplate, in particular the item or the identification number and the measuring range, against the data of the measuring point.

 **WARNING!** A sensor not designed for the particular measuring point must not be installed.

- b) Inspection of the sensor for intactness and function: It must be ensured that the sensor to be incorporated is free of damage of any kind.

 **WARNING!** A damaged sensor must not be installed!

- c) Installation of the sensor in the measuring point: The torque sensor is to be inserted and aligned in the intended location hole according to the proposal drawing.



WARNING! The torque sensor must not be installed or aligned using impact tools!

After alignment, the torque sensor must be secured against movement and rotation using the elements provided for this purpose. Ensure that the torque sensor is correctly aligned with the intended measuring direction (see marking on the face, see section 1.2)



WARNING! A misaligned sensor leads to erroneous measurement results!

- d) Establishment of electrical connection: The elements on the sensor for the electrical connection are to be connected to the power supply, the earth connection if necessary, and the evaluation system of the device. In doing so, the information given on the nameplate for connector or cable assignment and, if applicable, the installation guidelines of the cable are to be observed.



WARNING! An incorrect or incomplete electrical connection impairs or prevents measurement.

- e) Functional check: After completed mechanical (see c) and electric (see d) installation, load on the sensor is to be applied over the entire measuring range; the output measurement signals are to be subjected to a plausibility check.



WARNING! If due to unusual events (e.g. deformation or unusual noise), measurement results are considered implausible or there is suspicion that the sensor is malfunctioning for any other reason, it must not be put into operation.

3.2.2 Additional information for operation in areas subject to explosion hazards



Only those sensors with the corresponding labels are approved for use in areas subject to explosion hazards.

If the open cable end is connected inside an area subject to explosion hazards, the connection must be inside a terminal box/switching cabinet certified in accordance with the ATEX-directive. If it is connected outside an area subject to explosion hazards, it must be in line with the general requirements for electrical equipment.

3.2.2.1 Type 0701 intrinsically safe version

The sensors with ExDANGmicro2W*** amplifier must be installed according to the following specifications:

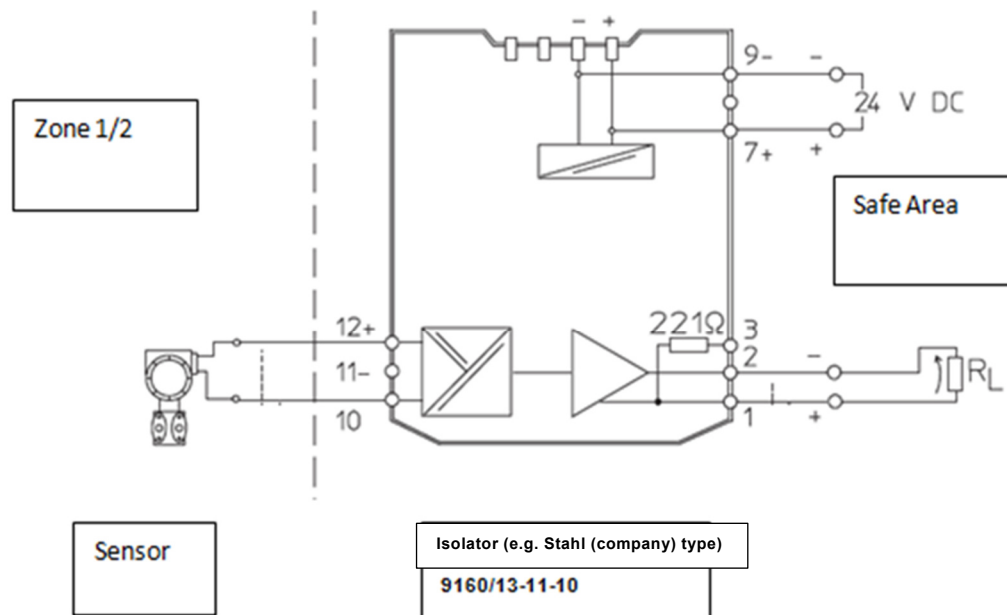


Figure 6: Connection example of sensor Ex i with Ex DANGmicro2W*** amplifier

The supply and the measurement signal are guided over isolation amplifiers in the areas subject to explosion hazards. Isolation amplifiers from other manufacturers can also be used if they meet the safety-related limit values.

During the installation, the differentiation of the insulation resistance of the strain gauge resistance bridge versus the spring body sensor must be taken into account. The amplifier type ExDANGmicro2W_A** is to be regarded as separate from the spring body. The amplifier type ExDANGmicro2W_B** is to be regarded as connected to the spring body in case of error.

The laying of the connection cable with the amplifier type ExDANGmicro2W_* B2 and type ExDANGmicro2W_* B4 requires protection against damage and tensile load, guaranteed by proper installation.

The complete list of possible amplifier configurations can be found in the certificate.

3.3 Operation and maintenance

3.3.1 Operation

BROSA torque sensors are self-acting, no tools are required for operation. Direct manual intervention by the operator is not necessary; there are therefore no requirements for the operator to wear protective equipment during operation. However, the requirements towards the device in which the torque sensor is installed must be observed.

BROSA torque sensors do not emit airborne noise or non-ionizing radiation.

BROSA torque sensors may only be operated within the parameters and characteristics given in the technical data sheets and recorded on the nameplate. These are, among others:

- Measuring range
- Temperature range
- Permissible supply voltage
- Electrical protection class
- Material

It must be ensured that no parasitic influences such as forces or torques transverse to the measuring direction are transmitted via the torque sensor.

Inductive or capacitive coupling with the connection cable(s) of the sensor can distort the measurement result and must be avoided. Some examples of these kinds of couplings can be caused e.g. by unfavourable cable routing (parallel power lines, frequency converters, transformers, motors, incorrect grounding/shielding and the like).

When performing electric welding in the vicinity of the sensor, all connections must be disconnected and isolated. It must be ensured that no welding current is flowing through the sensor.



WARNING! Operation outside the specified parameters or contrary to existing properties or improper use can damage the sensor and cause it to fail or lead to faulty measuring results. If the sensor is overloaded, this can lead to the whole machine being equally overloaded and possibly endangering its stability.

3.3.2 Maintenance

In their capacity as sensors, BROSA torque sensors operate maintenance-free. As load-transmitting elements, however, they are subject to mechanical stress, so that each torque sensor must be regularly checked for perfect condition. The intervals between inspections depend on the intensity of use and must be determined by the end-user.

An inspection includes the following points:

- Visual inspection for damage to the measuring body and wiring as well as soiling
- Function test/plausibility check

The causes of existing errors are to be identified and remedied. If the test indicates an improper sensor state, it must be taken out of operation. If a malfunction or damage is detected on the sensor, it must be sent to the manufacturer's factory for diagnosis and, if necessary, repaired.



WARNING! The sensor may only be repaired at the factory. Intervention (e.g. opening, mechanical processing and the like) done by parties other than the manufacturer means the safe operation of the sensor is no longer ensured and voids the warranty.

3.4 Disassembly

We recommend performing the following actions in the order given.

- a) Establishing no load at the measuring point: The torque sensor must be relieved of load before removal.



WARNING! Removal of a torque sensor under load poses a serious risk to the life and limb of bystanders and can cause major damage to property. This is therefore not permitted.

- b) Undoing the electrical connection
c) Remove the mechanical securing elements
d) Removal of the bearing force transducer



WARNING! If the torque sensor is to be reused, it must not be removed using impact tools!

3.5 Disposal

When the end of the service life has been reached, the torque sensor must be disposed of in an environmentally friendly manner. Since the non-metallic components represent a small mass fraction of the torque sensor, it can be recycled in its entirety as steel scrap. Assignment as stainless steel scrap is preferable.

If the sensor is stored before final disposal, an appropriate storage location is to be selected which prevents harmful substances from entering the environment. If necessary, the sensor must be cleaned.



WARNING! BROSA torque sensors contain trace amounts of environmentally hazardous substances. This is also true of the impurities created during use. Contamination of the environment by these substances is to be prevented.