

1. Description of BROSA tubular load cells

1.1 Design and operation

The BROSA type 0206 tubular load cell is for measuring the force in single or (normally) double shear connections in or on machines and devices of all kinds. Figure 1 shows the typical construction:

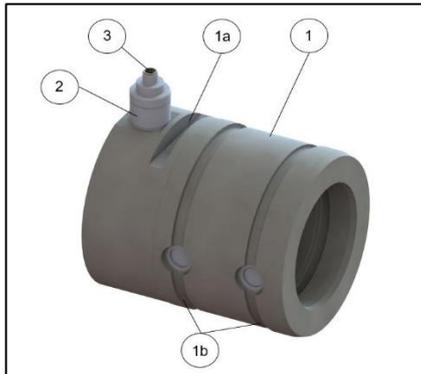


Figure 1: Tubular load cell

The tubular load cell consists of a hollow cylindrical measuring body (1) which receives the load to be measured and has features for rotation lock and axial securing (1a), and depending on the case, also consists of a connection board (2) firmly connected to the measuring body on which - if they are not placed directly on the measuring body - the elements necessary for the electrical connection (plug or cable, 3) are mounted, and which contains the measurement electronics - if they are not placed directly on the measuring body. The necking (1b) present on the measuring body for metrological reasons can be provided with a filler depending on the application or as an option if desired. The measuring body can optionally comprise elements for lubricating the bearing surface (1c). A grub screw can optionally be mounted for electrical potential equalisation. Measuring body and, if necessary, connection board are made of stainless steel; optional constructions in Q&T steel, optionally zinc-plated, can be supplied.

Figures 2a to 2c show the typical installation conditions; here, three basic variants can be distinguished in which the force F transmitted from the connection is transmitted by the evaluation of the resulting deformation of the measuring body on the measurement electronics and outputted as an electric signal:

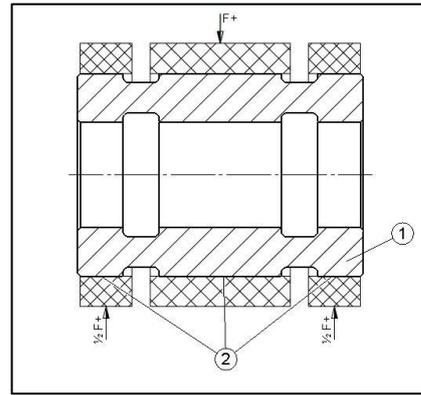


Figure 2a: Installation conditions, force transmission on outer diameter, internal - support on outer diameter, external

The tubular load cell (1) is inserted into the correspondingly constructed receiving holes (2). The force transmission occurs from the introduction on the outer diameter, internally, to the support also on the outer diameter, externally.

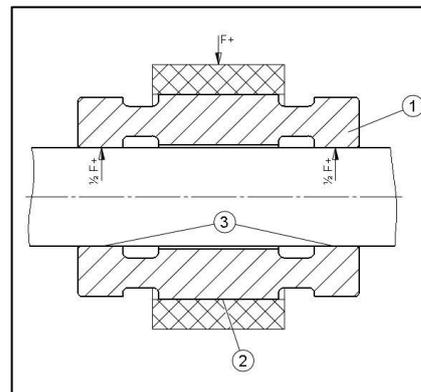


Figure 2b: Installation conditions, force transmission on outer diameter, internal - support on inner diameter, external

The tubular load cell (1) is inserted into the correspondingly constructed receiving hole (2). Its hole receives a correspondingly constructed bolt at two points (3). The force transmission occurs from the introduction on the outer diameter, internally, to the support on the inner diameter, externally.

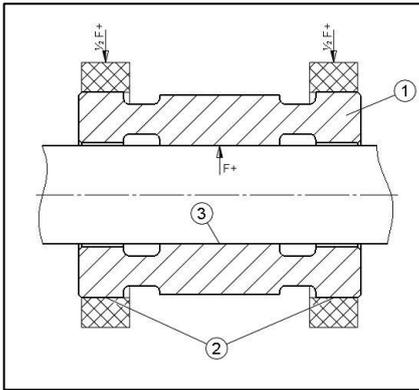


Figure 2c: Installation conditions, force transmission on outer diameter, external - support on inner diameter, internal

The tubular load cell (1) is inserted into the correspondingly constructed receiving holes (2). Its hole receives a correspondingly constructed bolt at one point (3). The force transmission occurs from the introduction on the outer diameter, externally, to the support on the inner diameter, internally.

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

1.2 Information on explosion protection

The type 0206 tubular load cell is optionally available in an intrinsically safe design for use in explosion-hazardous areas. The following information applies:

- Ignition protection class:
Ex II2G Ex ib IIC T4 Gb
- Certificate number:
BVS 03 ATEX E 241
- Safety limits:
 - o Maximum voltage $U_i = 26.4V$
 - o Maximum current $I_i = 51mA$
 - o Internal capacitance $C_i = 24nF +$ interconnect capacitance
 - o Internal inductance $L_i =$ line inductance

⚠ Use of the intrinsically safe tubular load cells in zone 0 is not permitted.

1.3 Labelling (rating plate, indication of the direction of measurement)

Each BROSA tubular load cell is provided with a rating plate containing the applicable information for each unit. It may be mounted, depending on the structural design, either on the face (Figure 3, 1a) or around the circumference (Figure 3, 1b).



Figure 3: Rating plate positions, measuring direction

The measuring direction is indicated by an arrow icon on the end face (Figure 3, 2).

2. Advice on safe handling of BROSA tubular load cells

⚠ CAUTION! Ignoring the following instructions can lead to damage of the sensor and/or impaired measurement results. The evaluation of an erroneous measurement can result in injury or damage.

⚠ CAUTION! BROSA tubular load cells may not be used for purposes other than their intended purpose despite their robust design (see Section 1.1). If not used properly, there are potential risks to life and limb of the user or third parties and/or impairment of the device in which the tubular load cell is implemented, or to other property.

2.1 Handling

⚠ CAUTION! BROSA Sensors include high quality measurement electronics! Careful handling is important!

- BROSA tubular load cells are supplied in transport-safe packaging. It is recommended that you only remove the sensors from the packaging immediately prior to installation.
- For the choice of appropriate handling equipment and / or lifting gear, the mass of the tubular load

cell is to be noted; this is indicated on the rating plate.

- BROSA tubular load cells are to be secured against falling. Do not throw sensors!
- Usage as a tool (e.g. as a striking, slotting or lifting tool) is not permitted; it can cause damage to the sensor and thus falsify the measurement result.

2.2 Installation and commissioning

2.2.1 General

It is recommended to perform the following actions in the given order using the four-eye principle.

- a) Check the allocation sensor – measuring point: It must be ensured that the sensor to be installed is intended for use at the selected measuring point. For this purpose, the information on the rating plate, in particular the article or the identification number and the measuring range, are to be compared to the data of the measuring point.

⚠ CAUTION! A sensor that is not intended for the respective measuring point may not be installed!

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

⚠ CAUTION! A damaged sensor may not be installed!

- c) Installation of the sensor at the measuring point: The tubular load cell is to be used at the measuring point.

⚠ CAUTION! The tubular load cell must not be removed by means of striking tools!

After insertion, the tubular load cell is to be fixed against axial movement and rotation with the appropriate elements. Attention must be paid to the correct alignment of the tubular load cell to the intended direction of measurement (see marking on the face, cf. Section 1.2).

⚠ CAUTION! A misaligned sensor leads to erroneous measurement results!

- d) Manufacturing of electric connection: the elements for electrical connection which are present on the sensor, if applicable including the earth connection, are to be connected to the power supply and with the evaluation system of the device. Here, the information that is provided on the

rating plate regarding the plug or cable assignment and, where appropriate, the cable laying regulations must be observed.

⚠ CAUTION! An incorrect or incomplete electrical connection prevents or impairs the measurement.

- e) Functional check: After the mechanical (see c)) and electrical (see d)) installation, the sensor must be loaded if possible over the entire measuring range provided; the output measured signals are to be subjected to a plausibility check.

⚠ CAUTION! If there is a suspicion, due to extraordinary observations (e.g. deformation or unusual noise development), implausibility of the measurement results or any other reason, that a malfunction of the sensor exists, it may not be put into operation.

2.2.2 Additional advice when operating in explosion-hazardous areas

⚠ Only sensors which are provided with the corresponding labelling are approved for use in explosion-hazardous areas.

If the open end of the cable is connected within the Ex-zone, this must be carried out in a terminal box/switch cabinet approved according to Directive 94/9 EC. If the connection takes place outside the Ex-zone, then connection must be carried out according to the general conditions for electrical equipment.

2.2.3 Type 0206 in intrinsically safe version

The sensors are to be installed according to the following specifications:

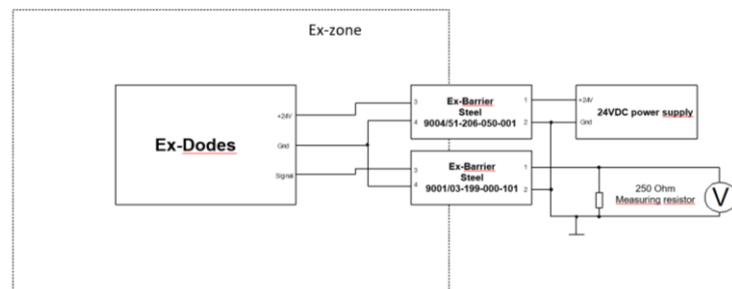


Figure 5: Connection example, Ex i sensor

The supply and the measurement signal are transmitted into the Ex-zone via barriers or isolation amplifiers. Barriers from other manufacturers can also be used if they satisfy the safety-related limit values.

The connection cable in the Ex-zone must be approved for this application.

The 250 Ohm resistor with voltmeter connected in parallel in Figure 5 represents the input of the ammeter.

2.3 Operation and maintenance

2.3.1 Operation

BROSA tubular load cells operate automatically; the attachment of tools is not required for operation. A direct manual intervention of the operator is not necessary, therefore there are no requirements for the protective equipment of the operator when in use. However, the relevant requirements for the device, in which the tubular load cell is implemented, are to be observed.

BROSA tubular load cells emit neither air noise emissions nor non-ionising radiation.

Operation of BROSA tubular load cells is only permitted within the framework of the parameters and properties described in the technical data sheets and provided on the rating plate. Among others, these are:

- Measurement range
- Temperature range
- Approved power supply
- Electrical protection type
- Material

It must be ensured that no parasitic influences such as forces that are transverse to the measuring direction or torques are routed over the tubular load cell.

Inductive or capacitive couplings to the connection cable(s) of the sensor can affect the measurement result and must therefore be avoided. Couplings of this type may occur, for example, through unfavourably laid cable (high voltage power lines running in parallel, frequency converters, transformers, motors, incorrect grounding/shielding etc.).

In the case of electric arc welding work in the vicinity of the sensor, all connections are to be disconnected and insulated. It is to be ensured that no welding current flows over the sensor.

 **CAUTION!** Operation outside the specified parameters or contrary to existing properties or inappropriate use may damage the sensor and lead to failure or

faulty measurement results. If the sensor is overloaded, this can lead to an equally overloaded whole machine and possibly jeopardise its stability.

2.3.2 Maintenance

In their capacity as a sensor, BROSA tubular load cells are maintenance-free. However, as load-transmitting elements they are subject to mechanical stress, so each tubular load cell is to be regularly checked for flawless condition, and the bearing surface lubricated where applicable. The intervals between inspections and lubrication depend on the intensity of use and must be defined by the end user.

An inspection includes the following points:

- Visual inspection for damage to the measuring body and wiring as well as for dirt
- Functional testing/plausibility check

The causes of any errors are to be identified and removed. If the inspection reveals evidence of an improper condition of the sensor, it must not remain in operation. If a malfunction or damage is detected on the sensor, it is to be sent to the manufacturer for diagnosis and possibly repair.

 **CAUTION!** The sensor may only be repaired at the factory. For a procedure which is carried out by entities other than the manufacturer's plant (e.g., opening, mechanical reworking, etc.), the safe operation of the sensor is no longer assured and the warranty will be voided.

2.4 Removal

It is recommended to perform the following actions in the given order.

- a) Removal of loads in the measuring point: all tensions are to be released from the tubular load cell before removing.

 **CAUTION!** The removal of a loaded tubular load cell entails serious risks to life and limb of bystanders and can cause major damage to property. Therefore it is not permitted.

- b) Detachment of the electrical connection
- c) Removal of the mechanical securing elements
- d) Removing the tubular load cell

 **CAUTION!** If the tubular load cell is to be reused, it must not be removed by means of striking tools!

2.5 Disposal

If the end of service life has been reached, the tubular load cell is to be disposed of in an environmentally responsible manner. Since the non-metallic components represent a low mass fraction of the tubular load cell, it can be recycled in its entirety as steel scrap. A classification as stainless steel scrap is preferable.

If the sensor is stored before final disposal, a suitable storage location must be selected which prevents harmful substances from being released into the environment. If necessary, the sensor is to be cleaned.

 **CAUTION!** BROSA tubular load cells contain traces of environmentally hazardous substances. This applies equally to contaminations caused by its use. Contamination of the environment by these substances must be prevented.

Translation of the original



EC/EU Declaration of Conformity

in terms of Directives
2006/42/EC, Annex II Part 1 A,
2014/30/EU, Annex IV and
2014/34/EU, Annex X

Manufacturer: **BROSA AG**
Dr.-Klein-Straße 1
D-88069 Tettngang

On our own responsibility we hereby declare the products according to design/type

Tubular load cell type 0206
from serial number 16040001 onwards

to comply with the relevant regulations of the following directives:

2006/42/EC Machinery Directive
2014/30/EU EMC Directive

Products according to the mentioned design as an ATEX intrinsically safe version are marked as such and additionally comply with the relevant regulations of the following directive:

2014/34/EU ATEX Directive

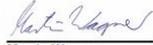
The type examination related with the latter directive has been carried out by the following notified body:

DEKRA EXAM GmbH BVS 03 ATEX E 241
Dinnendahlstraße 9
D-44809 Bochum Notified Body No. 0158

The requirements for production and testing of the product are defined in a quality and environmental management system certified according to ISO 9001 and ISO 14001.

Page 2 of this Declaration contains the standards harmonized with the mentioned Directives and applied to the products according to the mentioned design/type.

Tettngang, April 20th, 2016


Martin Wagner
CEO

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Translation of the original



List of applied, harmonized standards

2006/42/EG	
EN ISO 13849-1:2008 +AC:2009	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
2014/30/EU	
EN 61000-6-2:2005 +AC:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-3:2007 +A1:2011 +AC:2012	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
EN 61326-2-3:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning
2014/34/EU	
EN 60079-0:2012 +A11:2013	Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-11:2012	Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"

Person authorized to compile the technical files:

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End of EC Declaration of Conformity

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