

Operating Manual

BROSA Type 0111 & 0113 Tension Load Cell

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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.

Current certificates can be downloaded from the BROSA AG website.

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 tension load cell

2.1 Structure and functionality

The BROSA type 0111 and 0113 tension load cells transmit and measure the tensile and/or compressive force between two pins, which are connected by the tension load cell. Figure 1 shows the typical layout:

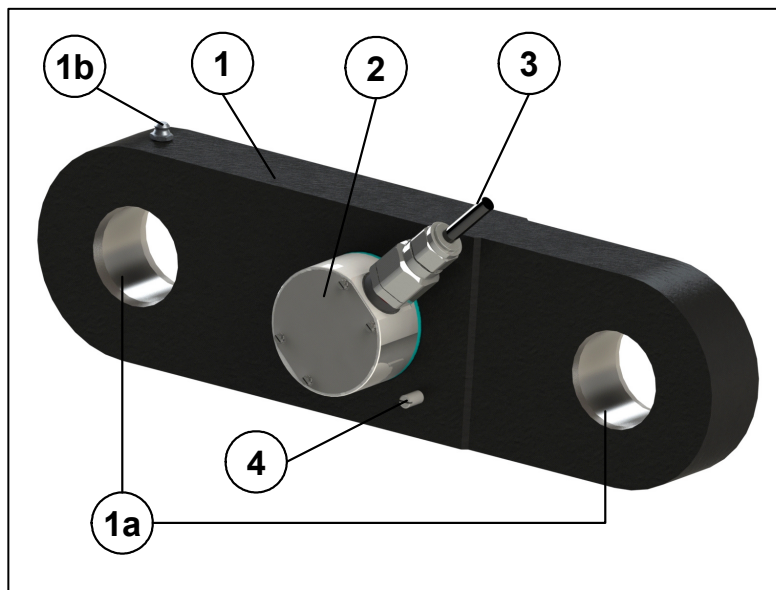


Fig. 1: Tension load cell

The tension load cell consists of a rectangular measuring body that absorbs the load (1), the ends of which have holes (1a) for mounting connecting pins. By default, the bore axes are parallel, special designs with holes arranged at an angle to each other (e.g., 90°) are possible. Fork ends (single- or double-sided) are available. In some cases, there is a connection support (2) firmly connected to the measuring body, on which - if not placed directly on the measuring body - the necessary elements for the electrical connection (plug or cable, 3) are attached and which - if not placed in the measuring body - contains the measurement electronics. Optionally, the measuring body can contain elements to lubricate the bearing (1b). The Ex d type 0113 tension load cell is always equipped with a threaded pin (4) for electrical potential equalisation (optional in the other types). On special request, the holes can be provided with plain or spherical bearings. BROSA tension load cells are by default equipped with a surface coating (primer or paint for use in continental or maritime environments); by special order, tension load cells made of stainless steel are available.

The use below the water surface is generally possible after testing and approval by BROSA, special requirements are the used materials, the tightness and the electrical connections. In addition, there is the possibility that the water pressure impacts the measurement result.

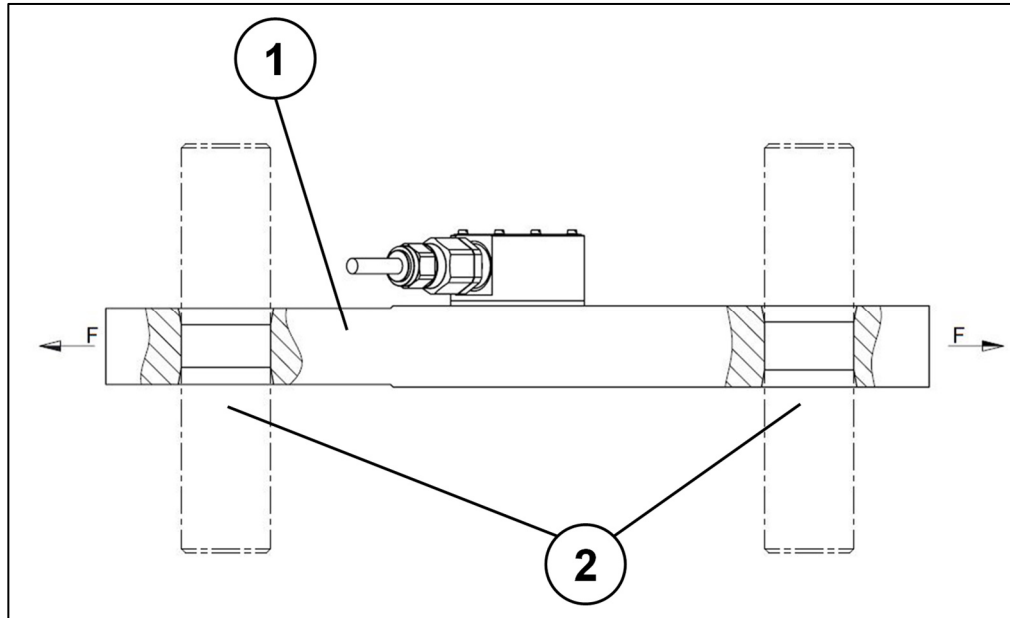


Figure 2: Installation conditions

The tension load cell (1) is connected to the adjacent components with bolts (2). Force F transmitted from the connection is transmitted to the measuring electronics through analysis of the resulting deformation of the measuring body and output as an electric signal.

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 datasheets, which may be obtained free of charge from BROSA.

2.2 Information on explosion protection

The type 0111 tension load cell is optionally available in an intrinsically safe design for use in potentially explosive atmospheres. This is done using a 2-wire amplifier ExDANGmicro2W_***. The following specifications apply:

Certificate number:	BVS 16 ATEX E 041	IECEX BVS 16.0031
Ignition protection type:	Ex II 2G Ex ib IIC T4 Gb	Ex ib IIC T4 Gb
Voltage	30 V DC	30 V DC
Current	100 mA	100 mA
Power	750 mW	750 mW
Effective internal capacitance	24 nF + 0.3 nF/m	24 nF + 0.3 nF/m
Effective internal inductance	3 µH + 1 µH/m	3 µH + 1 µH/m
Ambient temperature	-40 to +80°C	-40 to +80°C



Use of intrinsically safe tension load cells in zone 0 is not allowed.

The Ex d type 0113 tension load cell is designed to be pressure-resistant and is therefore suitable for use in potentially explosive atmospheres.

Certificate number:	BVS 10 ATEX E 156	IECEX BVS 15.0021
Ignition protection type:	II 2G Ex d IIC T4 Gb	Ex d IIC T4 Gb
	II 2G Ex d IIB T4 Gb	Ex d IIB T4 Gb
Input voltage	9-36 V DC	9-36 V DC
Input current	5-100 mA	5-100 mA
Output current	0-10 V DC	0-10 V DC
Output voltage	0-25 mA	0-25 mA
Passive input voltage	1-10 V DC	1-10 V DC
Input current	3-30 mA	3-30 mA
Ambient temperature	-40 to +80°C	-40 to +80°C



WARNING! Use of the Ex d tension load cell in zone 0 is not allowed.

Current certificates can be downloaded from the BROSA AG website.

2.3 Label (nameplate, indication of measuring direction)

Each BROSA tension load cell is equipped with a nameplate containing the respective information applicable for the given product. It is attached to one of the outer surfaces of the tension load cell (see Fig. 3).

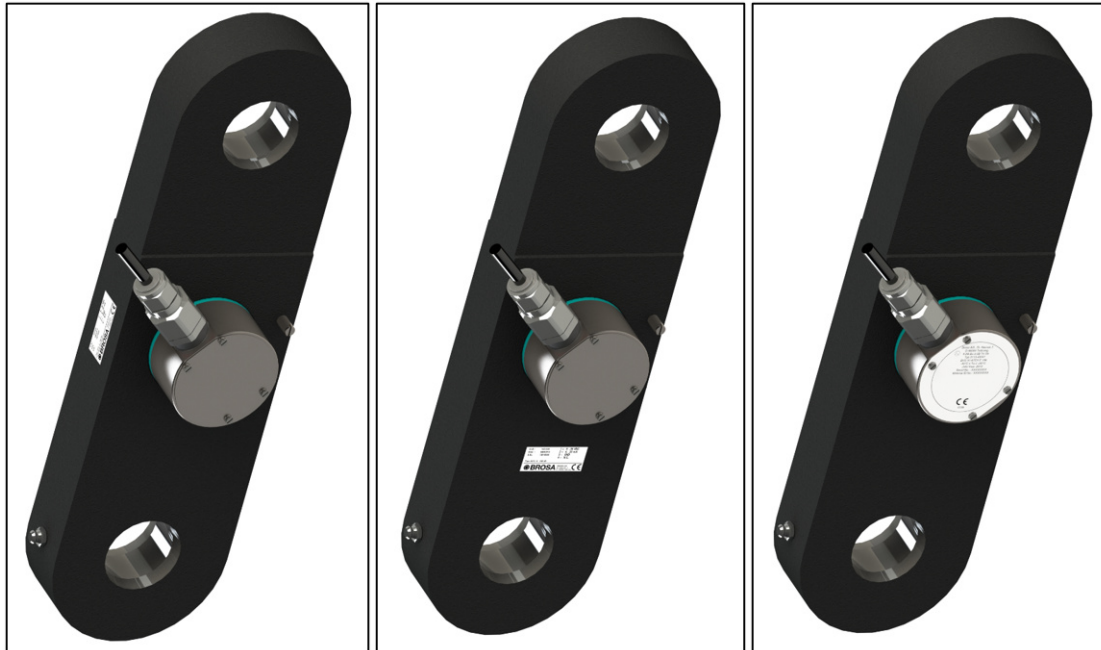





Figure 3: Nameplate positions, measuring direction

3 Advice on the safe handling of BROSA tension load cells

 **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 sturdy design, BROSA tension load cells may not be used for any other than the intended purpose (see. Section 1.1). With improper use, dangers to life and limb of the user or third parties and/or impairment of the device in which the tension load cell is implemented or other material assets can be caused.

3.1 Handling

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


- BROSA tension load cells are delivered in transport-safe packaging. We recommend that you remove the sensors from the package immediately prior to installation.
- The mass of the tension load cell is to be observed when selecting appropriate handling equipment and/or lifting gear; it is indicated on the nameplate.
- BROSA tension load cells must be secured against falling. Do not throw sensors!
- Use as a tool (e.g., impact, 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 tension load cell is to be aligned on the intended contact surface according to the offer drawing.

 **WARNING!** The tension load cell must not be driven in using impact tools!


After alignment, the tension load cell must be secured against movement and rotation using the elements provided for this purpose. Attention must be paid to the correct alignment of the tension load cell to the intended measuring direction (see front mark, compare 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 plug 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.

3.3 Operation and maintenance

3.3.1 Operation

BROSA tension load cells operate automatically; attaching tools is not 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 relevant requirements for the device in which the tension load cell is implemented must be observed.

BROSA tension load cells emit neither airborne acoustic noise nor non-ionizing radiation.


Operation of BROSA tension load cells is permitted only within the parameters and properties given in the technical datasheets and 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 transverse to the measuring direction are transmitted via the tension load cell.

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 its capacity as a sensor, BROSA tension load cells are maintenance-free. As load-transmitting elements, however, they are subject to mechanical stress, requiring regular inspections of the fault-free state of each tension load cell. The intervals between inspections depend on the intensity of use and must be determined by the end-user. Additional lubrication holes are not necessary for the sensor to function, but are used to lubricate secondary components, so the end-user is responsible for the lubrication cycles.

An inspection includes the following points:

- Visual inspection for damage to the measuring body and wiring as well as contamination.
- 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 guarantee and warranty.

3.4 Disassembly

We recommend performing the following actions in the order given.

a) Establishment of a load-free state at the measuring point: The tension load cell is to be unloaded before removal.

 **WARNING!** Removal of a tension load cell under load poses serious dangers to the life and limb of bystanders and can cause major damage. This is therefore not permitted.

- b) Undoing the electrical connection
- c) Remove the mechanical securing elements
- d) Remove the tension load cell



WARNING! If the tension load cell is to be reused, it must not be removed using impact tools!

3.5 Disposal

If the end of the service life is reached, the tension load cell is to be disposed of in an environmentally friendly way. Since the non-metallic components are a small proportion compared to the mass of the tension load cell, it can be recycled as a whole as scrap steel.

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 tension load cells contain traces 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.

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 Tett nang

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

Tension load cell type 0111
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.

Tett nang, April 20th, 2016


Martin Wagner
CEO

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Translation of the original

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Tett nang, 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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D-88069 Tettngang

End of EC Declaration of Conformity

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 60079-1:2007	Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures "d"

Person authorized to compile the technical files:

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End of EC Declaration of Conformity