

# Operating Manual

## BROSA Type 0201 & 0203 Force Measuring Pin

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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 force measuring pin

### 2.1 Structure and functionality

Type 0201 and 0203 BROSA force measuring pins are used to measure the force in double shear connections in or on machines and devices of all kinds.

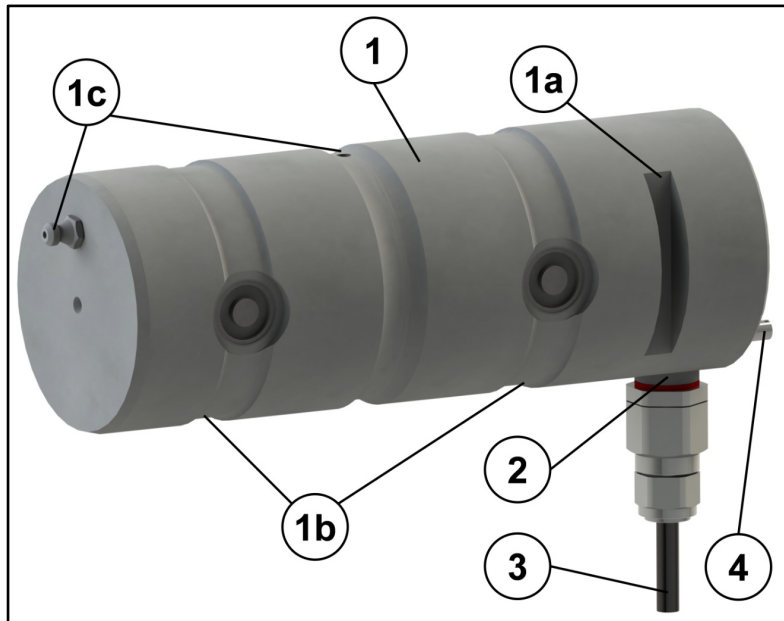


Fig. 1: Force measuring pin

The force measuring pin consists of a cylindrical measuring body (1), that absorbs the load to be measured and exhibits the properties for torsional and axial securing (1a) as well as a connection support (2) firmly connected to the measuring body in some cases, 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. The recess (1b) in the measuring body for technical measurement reasons can be provided with a filling depending on the application or optionally on request. Optionally, the measuring body can contain elements to lubricate the bearing (1c). The Ex d Type 0203 force measuring pin is always equipped with a threaded pin (4) for electrical potential equalisation (optional in the other types). The measuring body and connection support, if applicable, are made of stainless steel.

The MOP force measuring pin contains integrated mechanical overload protection.

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.

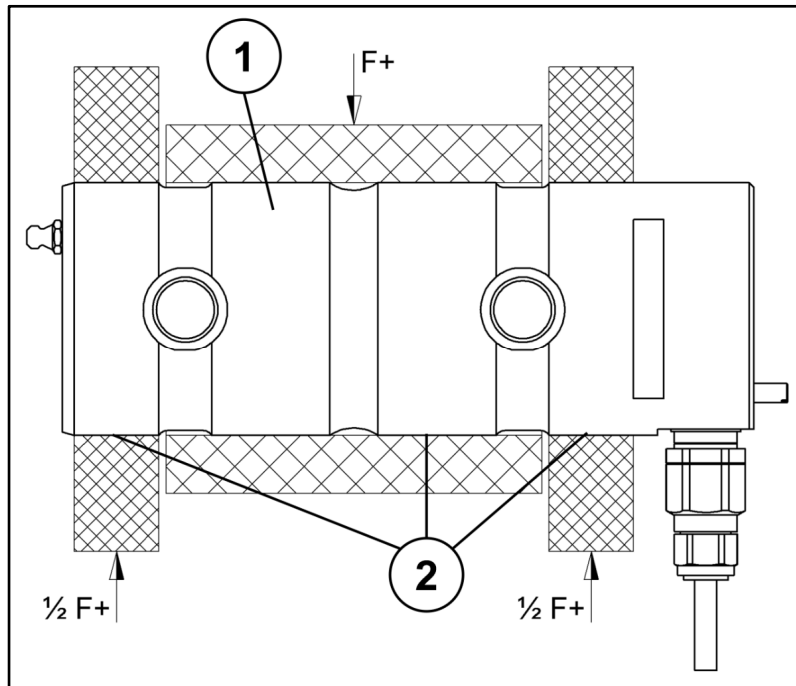


Figure 2: Installation conditions

The force measuring pin (1) is inserted into the mounting holes (2) of the double-shear connection, which have a corresponding diameter, and secured against unintended movement by means of a pin holder (see Fig. 1, point 1a). 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 directions (X-Y force measuring pin) and/or two measuring systems, either with output signals on separate connectors/cables or combined in one plug/cable, are available as options. More information can be found in the technical datasheets, which can be obtained free of charge from BROSA.

## 2.2 Information on explosion protection

The type 0201 force measuring pin 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 force measuring pins in zone 0 is not allowed.

The Ex d type 0203 force measuring pin is designed to be pressure-resistant and is therefore suitable for use in potentially explosive atmospheres.

Certificate number:	BVS 09 ATEX E 037 X	IECEX BVS 14.0110 X
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	4-20 mA	4-25 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 force measuring pin 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 force measuring pin is equipped with a nameplate containing the respective information applicable for the given product. Depending on the structural design, it can be attached either on the front (Figure 3, 1a) or on the long sides (Figure 3, 1b).

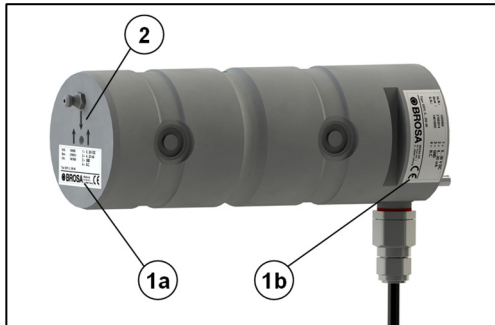


Figure 3: Nameplate positions, measuring direction

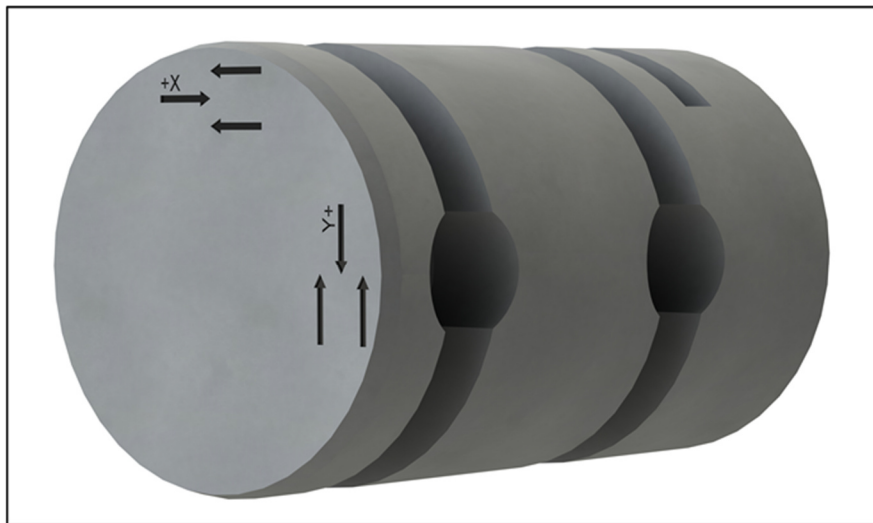


Figure 4: X-Y FMP measuring direction

The measuring direction is indicated on the front side with an arrow (Figure 3, 2). A simplified indication of the measuring direction (omission of the two lower arrows shown in Figure 3) is possible.

In the optionally available version with two measuring directions, the measuring directions are labelled as shown in Figure 4.

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## 3 Advice on the safe handling of BROSA force measuring pins



**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 force measuring pins 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 force measuring pin 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 force measuring pins are delivered in transport-safe packaging. We recommend that you remove the sensors from the package immediately prior to installation.
- The mass of the force measuring pin is to be observed when selecting appropriate handling equipment and/or lifting gear; it is indicated on the nameplate.
- BROSA force measuring pins 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 recommended taking the following actions in the given order using the “four-eye principle”.

- a) Checking 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 force measuring pin is to be aligned on the intended contact surface according to the offer drawing.



**WARNING!** The force measuring pin must not be driven in using impact tools!

After alignment, the force measuring pin must be secured against movement and rotation using the elements provided for this purpose. Attention must be paid to the correct alignment of the force measuring pin 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.

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## 3.3 Operation and maintenance

### 3.3.1 Operation

BROSA force measuring pins 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 force measuring pin is implemented must be observed.

BROSA force measuring pins emit neither airborne acoustic noise nor non-ionizing radiation.


Operation of BROSA force measuring pins 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 force measuring pin.

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.

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### 3.3.2 Maintenance

In its capacity as a sensor, BROSA force measuring pins are maintenance-free. As load-transmitting elements, however, they are subject to mechanical stress, requiring regular inspections of the fault-free state of each force measuring pin. 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 force measuring pin is to be unloaded before removal.

 **WARNING!** Removal of a force measuring pin 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 force measuring pin

 **WARNING!** If the force measuring pin 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 force measuring pin 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 force measuring pin, it can be recycled as a whole as scrap steel. BROSA sensors are usually made of stainless steel and can be disposed of accordingly.

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 force measuring pins 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.

Original

**EG -/EU - Konformitätserklärung**

im Sinne der Richtlinien  
2006/42/EG, Anhang II Teil 1 A,  
2014/30/EU, Anhang IV und  
2014/34/EU, Anhang X

Hersteller: **BROSA AG**  
Dr.-Klein-Straße 1  
D-88069 Tettang

Hiermit erklären wir alleinverantwortlich, dass die Produkte der Bauart/Type

**Kraftmessachse Typ 0201**  
ab Seriennummer 16040001

den einschlägigen Bestimmungen folgender Richtlinien entsprechen:

**2006/42/EG Maschinenrichtlinie**  
**2014/30/EU EMV-Richtlinie**

Produkte der genannten Bauart/Type in eigenerischer ATEX-Ausführung sind als solche gekennzeichnet und entsprechen neben den genannten auch den einschlägigen Bestimmungen der folgenden Richtlinie:

**2014/34/EU ATEX-Richtlinie**

Die mit letztgenannter Richtlinie verbundene Baumusterprüfung wurde von folgender benannter Stelle ausgestellt:

**DEKRA EXAM GmbH BVS 03 ATEX E 241**  
Dinnendahlstraße 9  
D-44809 Bochum Kennnummer 0158

Die Anforderungen an Fertigung und Prüfung des Produkts sind in ein nach ISO 9001 und ISO 14001 zertifiziertes Qualitäts- und Umweltmanagementsystem eingebunden.

Seite 2 dieser Erklärung führt die bei den Produkten der genannten Bauart/Type angewandten, zu den genannten Richtlinien harmonisierten Normen auf.

Tettang, 20. April 2016

**Martin Wagner**  
Geschäftsführer

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Original

**EG -/EU - Konformitätserklärung**

im Sinne der Richtlinien  
2006/42/EG, Anhang II Teil 1 A,  
2014/30/EU, Anhang IV und  
2014/34/EU, Anhang X

Hersteller: **BROSA AG**  
Dr.-Klein-Straße 1  
D-88069 Tettang

Hiermit erklären wir alleinverantwortlich, dass die Produkte der Bauart/Type

**Kraftmessachse Ex d Typ 0203**  
ab Seriennummer 16040001

den einschlägigen Bestimmungen folgender Richtlinien entsprechen:

**2006/42/EG Maschinenrichtlinie**  
**2014/30/EU EMV-Richtlinie**

**2014/34/EU ATEX-Richtlinie**

Die mit letztgenannter Richtlinie verbundene Baumusterprüfung wurde von folgender benannter Stelle ausgestellt:

**DEKRA EXAM GmbH BVS 09 ATEX E 037 X**  
Dinnendahlstraße 9  
D-44809 Bochum Kennnummer 0158

Die Anforderungen an Fertigung und Prüfung des Produkts sind in ein nach ISO 9001 und ISO 14001 zertifiziertes Qualitäts- und Umweltmanagementsystem eingebunden.

Seite 2 dieser Erklärung führt die bei den Produkten der genannten Bauart/Type angewandten, zu den genannten Richtlinien harmonisierten Normen auf.

Tettang, 20. April 2016

**Martin Wagner**  
Geschäftsführer

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Original

Liste der angewandten, harmonisierten Normen

2006/42/EG	
EN ISO 13849-1:2008 +AC:2009	Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen – Teil 1: Allgemeine Gestaltungsleitätze
2014/30/EU	
EN 61000-6-2:2005 +AC:2005	Elektromagnetische Verträglichkeit (EMV) – Teil 6-2: Fachgrundnormen – Störfestigkeit für Industriebereiche
EN 61000-6-3:2007 +A1:2011 +AC:2012	Elektromagnetische Verträglichkeit (EMV) – Teil 6-3: Fachgrundnormen – Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe
EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen
EN 61326-2-3:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen – Prüfplanung, Betriebsbedingungen und Leistungsmerkmale für Messgrößenumformer mit integrierter oder abgesetzter Signalaufbereitung
2014/34/EU	
EN 60079-0:2012 +A11:2013	Explosionsgefährdete Bereiche – Teil 0: Betriebsmittel – Allgemeine Anforderungen
EN 60079-11:2012	Explosionsgefährdete Bereiche – Teil 11: Geräteschutz durch Eigensicherheit

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:

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Original

Liste der angewandten, harmonisierten Normen

2006/42/EG	
EN ISO 13849-1:2008 +AC:2009	Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen – Teil 1: Allgemeine Gestaltungsleitätze
2014/30/EU	
EN 61000-6-2:2005 +AC:2005	Elektromagnetische Verträglichkeit (EMV) – Teil 6-2: Fachgrundnormen – Störfestigkeit für Industriebereiche
EN 61000-6-3:2007 +A1:2011 +AC:2012	Elektromagnetische Verträglichkeit (EMV) – Teil 6-3: Fachgrundnormen – Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe
EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen
EN 61326-2-3:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 2-3: Besondere Anforderungen – Prüfplanung, Betriebsbedingungen und Leistungsmerkmale für Messgrößenumformer mit integrierter oder abgesetzter Signalaufbereitung
2014/34/EU	
EN 60079-0:2012 +A11:2013	Explosionsgefährdete Bereiche – Teil 0: Betriebsmittel – Allgemeine Anforderungen
EN 60079-11:2007	Explosionsgefährdete Bereiche – Teil 11: Geräteschutz durch druckfeste Kapselung „d“

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:

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