Operating manual

for

loadpin

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Foreword

Fields of application of the operating instructions

This operating manual apply to Batarow Sensorik GmbH loadpins in the standard versions. It contains important information on the correct assembly, operation, maintenance, and disassembly of the loadpins. If you have any questions about custom-made products, please contact our technical support.

This operating manual are aimed at fitters, operators and plant operators and require the necessary basic technical knowledge for the assembly and commissioning of electronic components.

The illustrations used in these operating instructions only show an example of a loadpin. Therefore, the delivered product may differ from the pictures.

Despite the greatest care being taken when compiling this operating manual, the Batarow Sensorik GmbH assumes no responsibility for any errors or missing information. Furthermore, no liability is accepted for damage caused using the information in this operating manual.

This operating manual is available in the following languages.

DE	German (Original documentation)
ENG	Englisch

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Content

1 Introduction

The force occurring on mechanical structures can be measured and evaluated using loadpins. For this purpose, conventional force absorption elements can be replaced by loadpins. This offers simple integration of the measuring system into existing systems. It should be noted that loadpins often do not achieve the same strength values as conventional force elements due to the installed sensors.

2 Safety instructions

While mounting, installation, and operating the loadpin, the currently applicable safety regulations must be observed.
Work on the loadpin may only be carried out by personnel with the appropriate qualifications.
Failure to follow the safety instructions can result in serious injury and / or property damage.
Before operating, check whether the force measuring bolt is suitable for the application. The information from this operating manual, the loadpin data sheet and the test report must be regarded.

3 Product description

3.1 Structure of the loadpin

A loadpin has the following components:

1. Loadpin
2. Connector or cable gland
3. SAC-cable (optional)
4. Spring pin (optional)
5. Circlip or keyplate (optional)

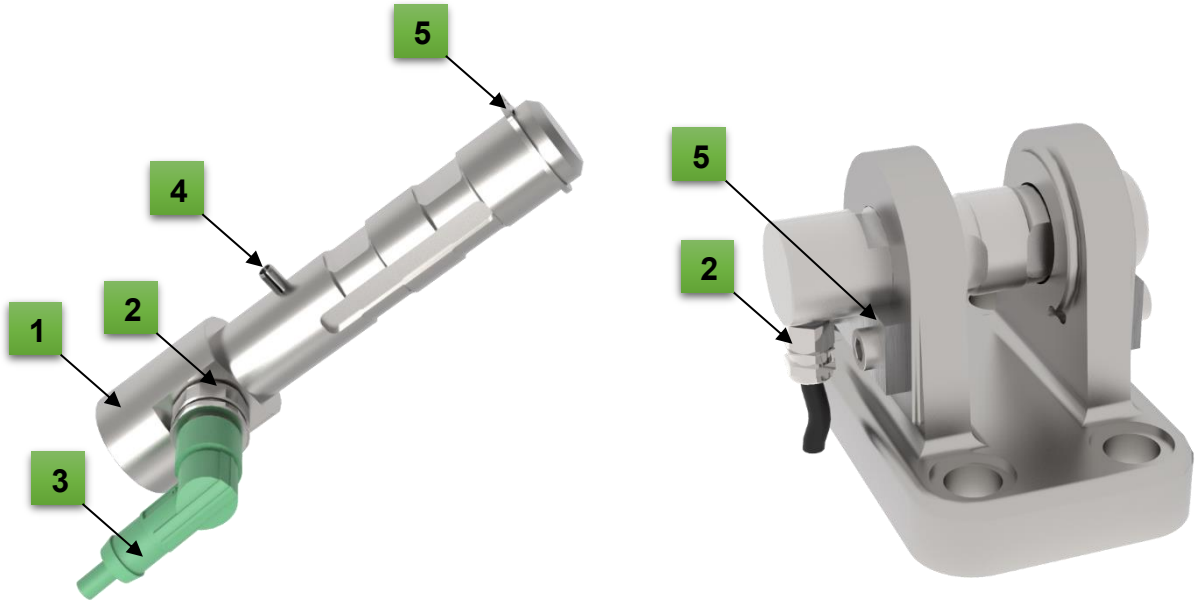

Figure 1: Structure of a loadpin

The loadpin has two indentations, in which strain gauges (DMS) are mounted. The strain gauges are connected as a single full bridge or double full bridge (Weathston bridge) with the cable outlet in the head area. Depending on the selected electronics version, one or more integrated amplifiers are additionally installed.

3.2 Principle of operation of the loadpin

By applying a force along the sensitivity axis of the measuring pin, the Weathston bridge generates an output signal that is proportional to the amount of force applied. The deformation resulting from the introduction of force is concentrated in the area of the strain gage by the two indentations.

3.3 Identification of the loadpin

Each loadpin is marked on the head side with the following information

Loadpin:	MBx	- Model name of the loadpin
Orderno.:	MBx-x-x-x	- Order number of the loadpin
Serialno.:	xxxxxxxx	- Serial number of the loadpin

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The order number of the loadpin provides information about the respective version.

MBx-	**x-**	**x-**	**x**
Model name	Capacity in kN	Electronics version	Design-Review

3.4 Specifications

The applicable specifications can be found in the data sheet.

Uncertainty (k=2):	Describes the possible measurement deviation of the signal in kN at a confidence interval with ± 2 times the standard deviation (95% probability).
Material:	Describes whether the loadpin is made of stainless steel or steel. When made from steel, there is no corrosion resistance.
Protection class:	Describes the type of protection against contact and the ingress of water and particles in accordance with the "**I**nternational **P**rotection" classification.
Hardness:	Describes the hardness of the material according to Rockwell.
Capacity:	Describes the force range in which the nominal accuracy applies. Can be found in the order number.
Safe Load Limit:	Indicates up to what percentage of the capacity the loadpin can be permanently loaded. Exceeding the safe load limit can result in a shifted zero point.
Breaking Load:	Specifies up to what percentage of the capacity the loadpin can be loaded without breaking.
Nonlinearity:	Indicates the possible linearity deviation of the signal as a percentage of the capacity.
Nonrepeatability:	Indicates the possible repetition deviation of the signal as a percentage of the capacity.
Hysteresis:	Indicates the possible hysteresis deviation of the signal as a percentage of the capacity.

Temp. Shift Zero:	Specifies the temperature-related zero-point shift of the signal as a percentage of the capacity per degree Kelvin.
Temp. Shift Span:	Specifies the temperature-related span shift of the signal as a percentage of the capacity per degree Kelvin.
Compensated Temp.:	Indicates the temperature range in which the nominal accuracy applies.
Operating Temp.:	Indicates the temperature range in which the load cell can be operated.

4 Mounting

4.1 Mechanical mounting

Before mounting, the bearing bores and the loadpin must be cleaned. The outer surface of the loadpin is to moisten with oil marginally for assembly. For trouble-free mounting, the bearing holes must be fitted in accordance with the mounting situation described in the data sheet. The rated load shown in the test report can only be achieved in this mounting situation. If difficulties arise when inserting the force measuring bolt, check the concentric alignment of the bearing components.

A loadpin is a high precision sensor, so caution is always required while mounting. Under no circumstances may a hammer or similar tool be used for mounting.

To ensure the accuracy, take care that the only force that impinge the loadpin is the force to be measured. For this purpose, a relative movement of the two outer bearings (X, Y) to each other must be prevented. In addition, there must always be a bearing clearance between the inner and outer bearings (V, W) to prevent the measurement signal from being falsified by external adhesion.

Other forces that act from the environment, such as vibrations, impacts, wind forces and temperatures, can falsify the measurement result or even destroy the loadpin. Make sure that forces impinge the loadpin only from one direction and that the sensitivity axis is correctly aligned with the direction of force impingement.

4.2 Securing the mounting position

To fix the alignment of the sensitivity axis with the direction of force impingement, the loadpin must be secured against radial twisting and axial displacement. The specified measuring accuracy can only be guaranteed by proper fixation. There are various options for fixation. Keyplates according to DIN15058 are used as standard. This enables radial and axial fixation.

Mounting by using a keyplate:

In most cases, the keyplate groove are designed according to DIN15058. It is recommended to use one keyplate up to a diameter of 100 mm, for larger diameters two keyplates must be used.

To obtain optimal results, a small gap is provided between the keyplate and keyplate groove **(B)**. This enables the loadpin to bend freely in the counter bearing. The gap should be about 0.2 mm.

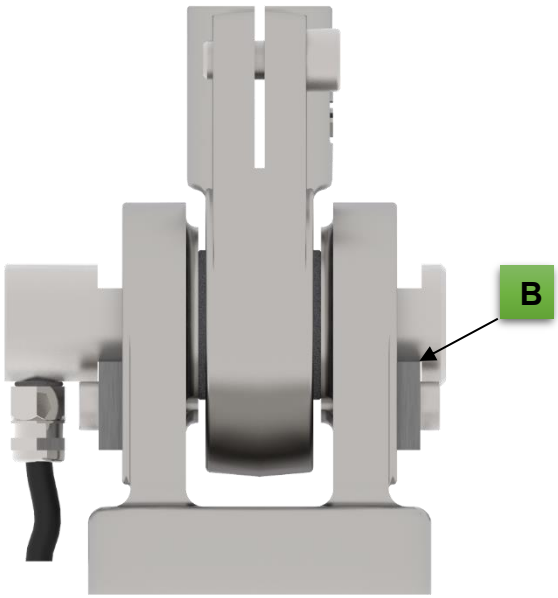

Figure 2: Mounting by using a keyplate

Mounting by using a spring pin and a circlip

Another option is the use of a spring pin and a circlip. Here, the axial securing in one direction is ensured by the circlip. The second direction as well as the radial fixation is implemented via the spring pin, which engages in a corresponding recess in the bearing.

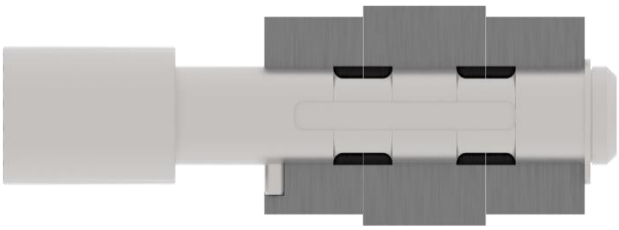

Figure 3: Mounting by using a spring pin and a circlip

4.3 Electrical connection

The electronics version of the loadpin can be found in the order number. Depending on the selected electronics version, different wiring assignments can occur. These can be found in the data sheet (Output Signal & Wiring). You can find the corresponding connection diagrams for the selected amplifier versions under the menu item electronics on our website. To prevent interruptions in the measurement signal, sensor cables must not be laid near high-voltage lines. Sensor cables may only be connected to the ground on one side to prevent signal interference from ground loops.

4.4 Checking the mounting

The values of a correctly working loadpin can be found in the test report.

Passive loadpin (without integrated amplifier)
The following resistance measurements can be carried out to check the loadpin:

- Resistance measurement on the bridge circuit of the loadpin when the amplifier is not connected. The input resistance between the supply wires of the bridge must be approx. the value specified in the test report. The output resistance between the signal output wires of the bridge must be approx. 350, 700 or 1000 Ω. The exact value can be found in the test report.
- Resistance measurement between the body and the connecting wires of the loadpin. The value measured with a multimeter must be higher than 3000 MΩ.

Active load (with integrated amplifier)
To check the force measuring bolt, a signal measurement must be carried out on the unloaded bolt. This should correspond approximately to the zero-signal value specified in the test report.

4.5 Possible causes of errors

Caused by its robust and simple design, the force measuring pin does not require any maintenance when correctly installed, its function is guaranteed for years. However, errors can occur due to the factors listed here:

- Incorrect alignment of the sensitivity axis to the direction of force impingement
- Overload or other mechanical loads above the limit values of the force measuring bolt
- Welding work in the vicinity of the force measuring bolt
- overheating

- Moisture in the load pin due to sudden temperature fluctuations
- Chemical effects
- Damage to the connection cable

5 Requirements for installation

The loadpin may only be put into operation after it has been ensured that the machine or system in which the loadpin is installed complies with the safety regulations and standards of the application.

Checking the operating conditions:
All occurring loads are to be compared with the specifications given in the data sheet.

Checking the environmental conditions:
The loadpin is calibrated for working temperatures from -10 to +40 ° C, at a limit temperature of -20 to + 70 ° C.

The loadpins are manufactured with a standard protection according to the IP classification. This value is specified in the data sheet. The loadpins should not be used in areas where a higher protection class is required.

There must be no substances in the vicinity of the loadpin that could damage or destroy it.

6 Configuration of the loadpin electronics

The following section applies only to active loadpins (with integrated amplifier), these have a tare and a scale function.

The loadpin with integrated amplifier delivers an analog output signal of 0…+10 V or 4… 20 mA. If it is necessary to display both force directions (pressure and tensile loads), the voltage output ± 10 V is recommended. In addition, it is possible to shift the preset zero point (e.g. to 12 mA, 5 V or 2.5 V) and display both load directions in the positive measuring range. To enable scaling with a lower test load, for some electronics versions it is possible to change the preset scaling value in the factory.

Tara function:
With the tare function, the current display value can be adjusted in the unloaded state to the factory-set zero-point value (0 V or 4 mA as standard). To protect against incorrect operation or unintended triggering, this function is only available 30 s after the force measuring bolt is switched on and can be permanently deactivated if necessary. By applying a high signal to the tare input, the output signal is automatically adjusted to the factory-set zero-point valuer. The control pulse must be at least 2 s high and then 0… 2 s low. While switching on the electronics, there must be no high signal at the tare input.

Scale function:
The scale function enables the factory-set scaling value (10 V or 20 mA as standard) to be calibrated to the applied force value under load. The scale function is deactivated at the factory-settings to prevent unintended scaling of the loadpin. If it is necessary to activate the scale function, please contact our technical support. The current measurement signal is scaled to 10 V or 20 mA by applying a high signal to the scale input. The control pulse must be at least 2 s high and then 0… 2 s low. While switching on the electronics, there must be no high signal at the scale input.

If a threshold switch is available, it reacts when the threshold is exceeded. The threshold value preset is 90% of the capacity.

7 Operating

All specifications out of the data sheet must be observed during operation, especially:

- Safe Load Limit
- Operating Temperature

Do not reach into moving parts during operation and ensure that there is no risk of component failure due to unexpected overload.

8 Care, maintenance, and storage

The loadpin must never be lifted or handled on the cable. The use of solvents and aggressive cleaning supplies can cause damage. The indentations on the lateral surfaces must be kept free of dirt.
The maintenance of the force pin is limited to lubrication if there is a grease nipple. If groves occur on the lateral surfaces, the loadpin should be replaced.
When storing the loadpin, pay attention to the ambient conditions (temperature, water, steam, aggressive chemical influences, etc.). To avoid damage to the loadpin, it must only be stored in dry and covered rooms and must be protected from moisture and corrosive influences.

9 Disassembly and replacement

Before disassembling, the loadpin must be disconnected from all electrical connections.
It should be noted that extensive damage can occur when the loadpin is removed. The assembly and disassembly should be done by hand. Under no circumstances should loadpins be assembled or disassembled with a hammer or the use of excessive force. Never pull or lever on the connection cable, plug connection or grease fittings during disassembly.
If the loadpin is stuck in the bearings, first try to turn it around the pin axis and check whether there is no more load on the pin.
Damaged loadpins can be repaired if necessary. Please contact our technical support.

10 Disposal

The loadpin consists of:

- 90% Steel
- 7% Sealing compound
- 3% Electronics (epoxy board, integrated circuits)

Environmentally harmful substances can get into the environment through improper disposal. The load cell and its components should be disposed of properly and in accordance with the applicable national and international guidelines and laws.

11 Service and technical support

If you have any questions about your order, repairs, or the product, please contact our technical support:

Phone: +49(0)3843/855555
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For information on other products, applications or related electronics, visit our website **www.batarow.com**.

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Subject to changes