

# Mounting instructions

Montageanleitung

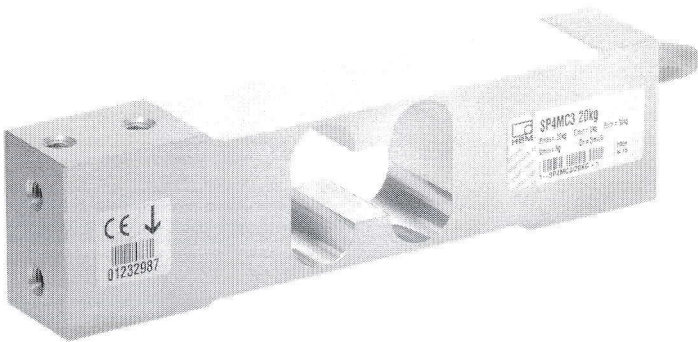
Notice de montage

Single point load cells

Plattformwägezellen

Pesons plateforme

precix 6 **SP4M...**



A2447-1.0 en/de/fr



English ..... Page 3 ... 13

Deutsch ..... Seite 14 ... 24

Français ..... Page 25 ... 35

**Contents** **Page**

<b>Safety instructions</b> .....	4
<b>1 Mounting and Load application</b> .....	8
<b>2 Electrical connection</b> .....	8
2.1 Connecting in four-wire and six-wire configurations .....	9
2.2 Shortening the cable .....	9
2.3 Cable extensions .....	9
2.4 Parallel connection (option) .....	10
2.5 EMC protection .....	10
<b>3 Specifications</b> .....	11
<b>4 Dimensions (in mm ; 1 mm = 0,03937 inches)</b> .....	13

## Safety instructions

In cases where a breakage would cause injury to persons or damage to equipment, the user must take appropriate safety measures (such as safety devices to protect against falls, collapses or overloads). For safe and trouble-free operation, load cells must not only be correctly transported, stored, sited and mounted but must also be carefully operated and maintained.

It is essential to comply with the relevant accident prevention regulations. In particular you should take into account the limit loads quoted in the specifications.

### Appropriate use

Load cells are designed for metrological applications. Use for any additional purpose shall be deemed to be **not** appropriate.

In the interests of safety, load cells should only be operated as described in the Mounting Instructions. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

Load cells can be used as machine elements (for container and silo weighing, for example). In these situations, you must make sure that for greater sensitivity, the load cells are not constructed with the customary safety factors found in machine design. Load cells are not safety elements within the meaning of appropriate use. The layout of the electronics conditioning the measurement signal should be such that measurement signal failure does not cause damage.

### General dangers of failing to follow the safety instructions

Load cells are state-of-the-art and reliable. Load cells can give rise to remaining dangers if they are inappropriately installed and operated by untrained personnel.

Everyone involved with siting, starting up, maintaining or repairing a load cell must have read and understood the Mounting Instructions and in particular the technical safety instructions.

## Remaining dangers

The scope of supply and performance of the load cells covers only a small area of weighing technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of the weighing technology in such a way as to minimize remaining dangers. Prevailing regulations must be complied with at all times. Reference must be made to the remaining dangers associated with the weighing technology.

In this Manual, remaining dangers are pointed out by symbols (see below):



### CAUTION

Symbol:

**Possibly dangerous situation**

Meaning:

Warns of a **potentially** dangerous situation in which failure to comply with safety requirements could lead to damage to property, slight or moderate physical injury.

### Symbols for application instructions and useful information:



### NOTE

Symbol:

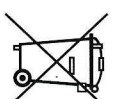
Means that important information about the product or its handling is being given.

Symbol:



Meaning: **CE mark**

The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant EC directives (the declaration of conformity is available at <http://www.hbm.com/HBMdoc>).



Symbol:

Meaning: **Statutory waste disposal mark**

In accordance with national and local environmental protection and material recovery and recycling regulations, old devices that can no longer be used must be disposed of separately and not with normal household garbage.

If you need more information about waste disposal, please contact your local authorities or the dealer from whom you purchased the product.



### Ambient conditions

In the context of your application, please note that because of the alloy elements used, the high-strength aluminum alloy only has limited corrosion resistance if it comes into contact with electrolytes or if there are high and low pH values. With stainless steel single point load cells, please note that acids and all materials which release ions will also attack all grades of stainless steel and their welded seams.

Should there be any corrosion, this could cause the load cell to fail. If this is the case, the operator must take appropriate protective measures.

### Unauthorized conversions and modifications are prohibited

Load cells must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

### Qualified personnel

Load cells must only be installed by qualified personnel, strictly in accordance with the specifications in conjunction with the safety requirements and regulations listed below. It is also essential to observe the appropriate legal and safety regulations for the application concerned. The same applies to the use of accessories.

Qualified personnel means persons entrusted with siting, mounting, starting up and operating the product, who possess the appropriate qualifications for their function.

### Accident prevention

The prevailing accident prevention regulations must be taken into account, even though the breaking load is well in excess of the full scale value. Pay particular attention to the following data from the specifications

- limit load ( $E_L$ )
- limit load at max. eccentricity
- limit lateral loading ( $E_{Lq}$ )
- breaking load.



### CAUTION

Load cells are precision measuring elements and must be handled carefully during mounting and transportation. Knocking or dropping the load cells can damage them. Suitable retainers must be used during installation and operation to protect the load cells against overloading. No forces or moments must be directed via the spring area during mounting.

### Explosion-proof version (option)

- When installing this version, it is essential to comply with the relevant installation regulations.
- There must be compliance with the installation conditions cited in the Declaration of Conformity and/or the Type Examination Certificate.
- The connection cable of the explosion-proof single point load cells features free ends (cable configuration see chapter 2.1).

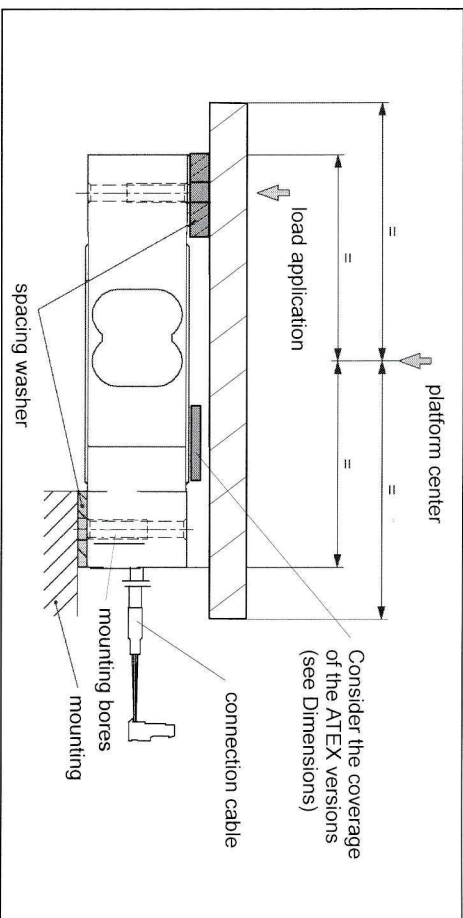
## 1 Mounting and Load application

The load cells are fixed at the mounting bores. For the recommended screws and tightening torques refer to the table below:

Max. capacity	Thread	Min. property class	Tightening torque*)
1...36 kg	M6	8.8	6 N·m
50...200 kg	M6	10.9	14 N·m

\*) Recommended value for the stated property class. For screw dimensioning please refer to the appropriate information given by the screw manufacturers.

**Load must not be applied to the side where the cable connection is located, as this would cause a force shunt.**



## 2 Electrical connection

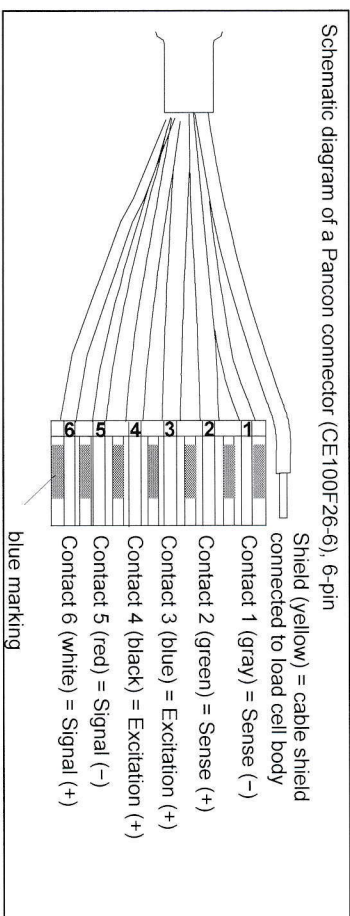
The following can be connected for measurement signal conditioning:

- carrier-frequency amplifier
  - DC amplifier
- designed for strain gage measurement systems.

## 2.1 Connecting in four-wire and six-wire configurations

When load cells in a six-wire configuration are connected to amplifiers with a four-wire configuration, the sense leads of the load cells must be connected to the corresponding excitation leads.

### 6-wire cable connection (a choice of lengths: 1.5 m; 3 m; 6 m; 12 m)



## 2.2 Shortening the cable

When the 6-wire configuration is used, the load cell's 6-wire cable can be cut off without impairing measurement accuracy.

## 2.3 Cable extensions

You must only use shielded, low-capacitance measurement cables to extend the cables, making sure that there is a proper connection with minimal contact resistance.

The cable of a six-wire load cell can be extended with a cable of the same type.



## 2.4 Parallel connection (option)

Only single point load cells with an aligned output (nominal (rated) sensitivity and output resistance) are suitable for parallel connection. Many of HBM's single point load cell types are available with this option.

## 2.5 EMC protection

Electrical and magnetic fields often induce interference voltages in the measuring circuit. Therefore:

- Use shielded, low-capacitance measurement cables only (HBM cables fulfill both conditions)
- Do not route the measurement cables parallel to power lines and control circuits.  
If this is not possible, protect the measurement cable, in rigid steel conduits, for example
- Avoid stray fields from transformers, motors and contact switches

To ensure the best EMC protection, the load cell, together with the connection cable and the subsequent electronics, should be placed in a shielded housing.

### Exception:

Load cells with shielded, round cables are EMC-tested in accordance with EC directives and identified by CE certification. But you must make sure that the shield of the connection cable is connected to the shielding housing of the electronics.

## 3 Specifications

Type	SP4M...													
Accuracy class <sup>1)</sup>	C3MR													
Max. number of load cell intervals (n <sub>LC</sub> )	3000													
Max. capacity (E <sub>max</sub> ) <sup>2)</sup>	kg	1	3	5	7	10	15	20	30	50	75	100	150	200
Minimum LC verification interval (V <sub>min</sub> )	g	0.1	0.2	0.5	0.5	1	1	2	2	5	5	10	10	20
Temperature effect on zero balance (TK <sub>0</sub> )	% of C <sub>n</sub> /10 K	±0.0140	±0.0093	±0.0140	±0.0100	±0.0140	±0.0093	±0.0140	±0.0093	±0.0140	±0.0093	±0.0140	±0.0093	±0.0140
Maximum platform size	mm	300 × 300			450 × 450			600 × 600						
Sensitivity (C <sub>n</sub> )	mV/V	1.8 +15 %; - 10 % (Aligned output, suitable for connection in parallel: 1.8 mV/V ± 0.1 %)												
Max. capacity 1 kg	V	2.0 ± 10 % (Aligned output, suitable for connection in parallel: 2 mV/V ± 0.1 %)												
Max. cap. 3 kg...200 kg		0 ± 0.1												
Zero balance														
Temperature effect on sensitivity (TK <sub>C</sub> ) <sup>3)</sup>	% of C <sub>n</sub> /10 K	± 0.0175												
Temperature range	°C	+20 ... +40 °C [+68... +104 °F]												
	°C	-10... +20 °C [+14...+68 °F]												
Non-linearity (d <sub>lin</sub> ) <sup>3)</sup>	% of C <sub>n</sub>	± 0.0166												
Hysteresis error (d <sub>hy</sub> ) <sup>3)</sup>	% of C <sub>n</sub>	± 0.0166												
Minimum dead load output return (MDLOR)		± 0.0166												
Off center load error <sup>4)</sup>		± 0.0233												
Input resistance (R <sub>LC</sub> )	Ω	300...500												
Output resistance (R <sub>0</sub> )	Ω	300...500 (Aligned output, suitable for connection in parallel: 410 Ω ± 0.2 Ω)												
Reference excitation voltage (U <sub>ref</sub> )	V	5												
Nominal range of excitation voltage (E <sub>U</sub> )	V	1 ... 12												
Max. excitation voltage	V	15												
Insulation resistance (R <sub>is</sub> ) at 100 V <sub>DC</sub>	GΩ	>2												
Nominal temperature range (B <sub>T</sub> )	°C	-10 ... +40 [+14 ... +104]												
Operating temperature range (B <sub>tu</sub> )	°C	-20 ... +50 [-4 ... +122]												
Storage temperature range (B <sub>st</sub> )	°C	-30 ... +70 [-22 ... +158]												

<sup>1)</sup> According to OIML R60 with P<sub>LC</sub> = 0.7.

<sup>2)</sup> Max. eccentric load according to OIML R76.

<sup>3)</sup> The data for Non-linearity (d<sub>lin</sub>), Hysteresis error (d<sub>hy</sub>) and Temperature effect on sensitivity (TK<sub>C</sub>) are typical values. The sum of these data meets the requirements according to OIML R60.

<sup>4)</sup> According to OIML R76.

**Specifications (Continuation)**

Max. capacity (E <sub>max</sub> )	kg	1	3	5	7	10	15	20	30	50	75	100	150	200
Safe load limit (E <sub>L</sub> )								150						
Lateral load limit (E <sub>lq</sub> ), static	% of E <sub>max</sub>							300						
Breaking load (E <sub>d</sub> )								300						
Nom displacement with E <sub>max</sub> (S <sub>nom</sub> ), approx.	mm	< 0.5		< 0.3						< 0.25				
Weight (G), approx.	kg							0.45						
Degree of prot. to EN 60 529 (IEC 529)								IP67						
Material:								Aluminum						
Meas. element								Silicone rubber						
Coating								PVC						
Cable sheath														

Type	<b>SP4M6MR</b>														
Accuracy class <sup>1)</sup>	C6MR														
Max. number of load cell interv. (n <sub>LC</sub> )	6000														
Max. capacity (E <sub>max</sub> ) <sup>2)</sup>	kg	7	10	15	18	36									
Minimum LC verification interval (V <sub>min</sub> )	g	0,5	0,5	1	1	2									
Temperature effect on zero balance (TK <sub>0</sub> )	% of C <sub>n</sub> / 10 K	± 0,0100		± 0,0070		± 0,0093		± 0,0070		± 0,0070					
Max. platform size	mm	300x300				450x450									
Sensitivity (C <sub>n</sub> )	mV/V	2.0 ± 10 %				1.8 ± 10 %				2.4 ± 10 %					
Zero signal		0 ± 0.10													
Temperat. effect on sensitivity (TK <sub>C</sub> ) in the temperature range <sup>3)</sup>	% of C <sub>n</sub> / 10 K	± 0.0087 ± 0.0058													
Rel. reversibility error (d <sub>hy</sub> ) <sup>3)</sup>		± 0.0083													
Non-linearity (d <sub>lin</sub> ) <sup>3)</sup>		± 0.0166													
Minimum dead load output return (MDLOR)	% of C <sub>n</sub>	± 0.0083													
Off-center load error <sup>4)</sup>		± 0.0116													

<sup>1)</sup> According to OIML R60 with P<sub>LC</sub> = 0.7.

<sup>2)</sup> Max. eccentric loading according to OIML R76.

<sup>3)</sup> The values for linearity deviation (d<sub>lin</sub>), relative reversibility error (d<sub>hy</sub>) and temperature effect on sensitivity (TK<sub>C</sub>) are recommended values. The sum of these values remain within the cumulated error limit to OIML R60.

<sup>4)</sup> According to OIML R76.

For more specifications, see table SP4M..., accuracy class C3MR (page 11)

**4 Dimensions (in mm; 1 mm = 0,03937 inches)**

