HOTTINGER BALDWIN MESSTECHNIK

HBM

Electrical measurement of mechanical quantities

# *Mounting Instructions*

## Load Cells for Official Calibration

# C2A

## Contents Page

## Notes on safety

The C2A... Load Cells can be used as machine components (e.g. with container weighing). In these cases please note that in order to obtain a high measurement sensitivity the load cells have not been designed with the safety factors usually encountered in machine design. If component fracture may lead to damage to property or injury to persons, safety measures according to the relevant accident prevention regulations (e.g. support against collapse, overload protection) must be taken by the user. In chapter 5 we provide important details in this respect, such as

– save load limit,

– side load limit,

– breaking loads and

– permissible dynamic loads.

The electronic system processing the measurement signal should be designed such that no consequential damage occurs as the result of a failure of the measurement signal.

## 1 Mounting information

- Handle the transducer carefully.
- Do not overload the transducer (e.g. by unevenly distributed loads); if necessary, provide overload protection (e.g. supports).
- The transducer seating must be horizontal, even and, together with the transducer mounting surface, it must be absolutely clean.
- Each transducer should be bridged by a copper wire (approx. 50mm$^2$) during or immedialitly after installation, so that no welding currents can flow across the transducer.
- Dust, dirt and other foreign matter must not be allowed to collect so that the deflection of the transducer is impaired, leading to possible erroneous measurements.

## 2 Load introduction

When applied in weighing equipment, load cells are subjected to unwanted side forces and moments. These may arise from deformation of the loaded weighing machine structure or through thermals strains. To keep the effects on the measurement resulting from these forces and moments as low as possible, HBM supplies pendle supports and elastomer bearings as load introduction components. Both types of load introduction components enable a design with a degree of horizontal movement with respect to the load cells. A deflection causes a reactive force which attempts to restore the weighing machine to its original position. With the pendle supports this restoring force is proportional to the deflection and the current loading and with elastomer bearings it is proportional to the deflection. This means that a different characterisic is obtained, particularly under partial loading conditions.

The elastomer bearing also possesses higher damping in the horizontal and vertical directions. In both cases no stay rods are needed. It is sufficent to limit the horizontal movement of the weighing machine structure using mechnical stops (take note of $s_{max}$ in chapter 6).

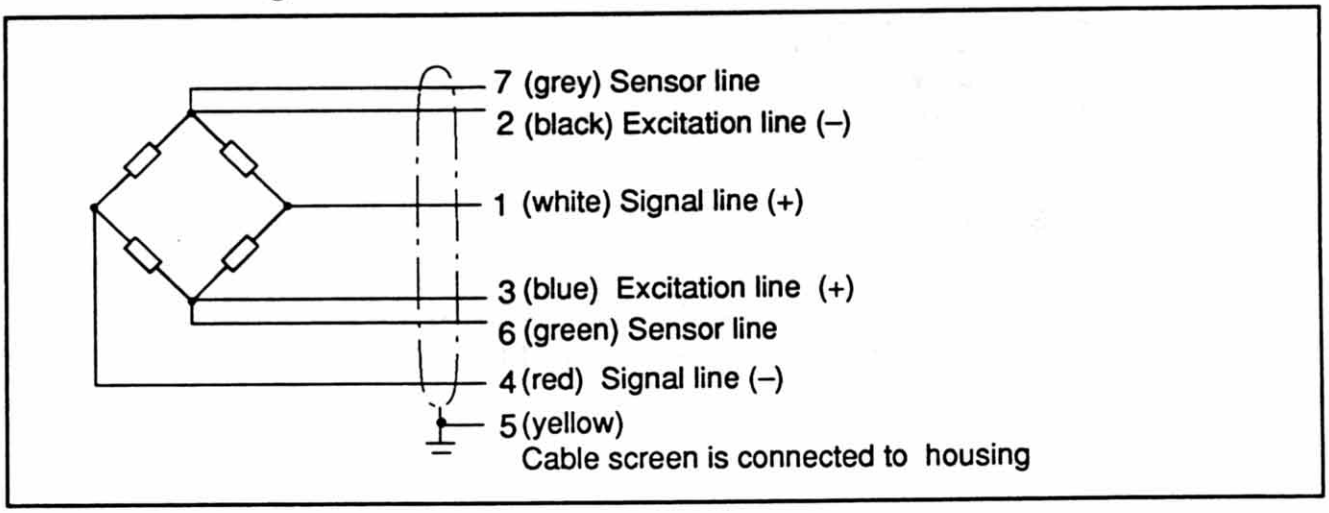
## 3 Connection

Strain-gauge based load cells can be connected to:

– carrier frequency or

– DC-measuring amplifiers.

The transducer connection is implemented using the six-wire technique. The connection assignment can be taken from the following illustration.



Electrical and magnetic fields often induce interference voltages in the measurement circuit.

Therefore:

- Use screened low-capacitance measurement cables only (HBM cables satisfy this criterion).
- Do not route the measuring cable parallel to power and control lines. If this is not possible, protect the measurement cable, e.g. with steel conduit.
- Avoid the stray fields of transformers, motors and contactors.

## 3.1 Parallel connection of several transducers

Transducers can be wired in parallel by joining the transducer cable core ends of the same colour.

**Caution:** Overloading in a single load cell can no longer be detected from the output signal.

## 3.2 Connections using the four-wire technique

With connections to amplifiers using the four-wire technique the cores BU (blue) and GN (green) should be connected together, as should BK (black) and GR (grey). Please take in accound that this causes deviations to the sensitivity and the temperature coefficient of sensitivity that this causes.

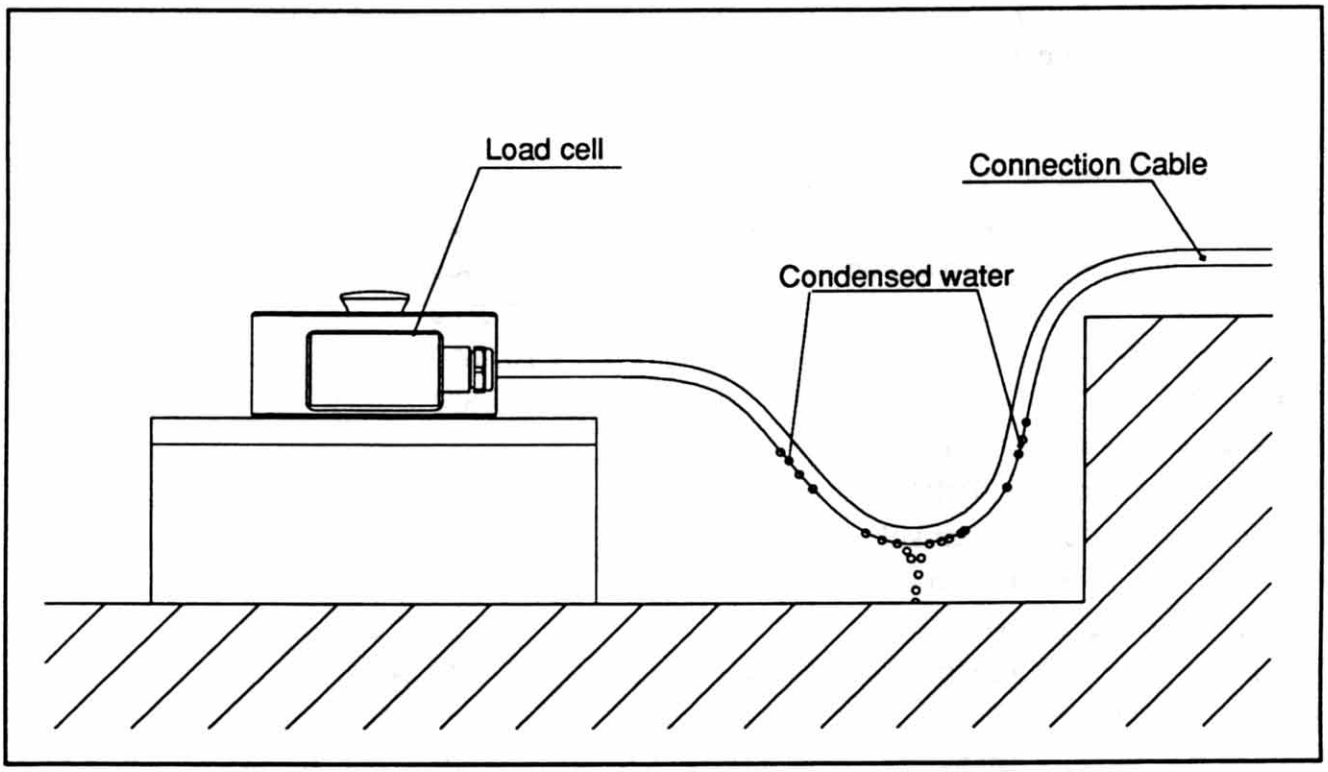
## 3.3 Cable extensions

Cable extensions must be screened and of low capacitance. We recommend the use of HBM cables which satisfy these requirements. With cable extensions it should be ensured that a proper connection is provided with low contact resistances and good insulation.

When using the six-wire technique, the effects of resistance changes in the extension cable are compensated. If you extend the cable with the four-wire technique, the sensitivity deviation can be rectified by adjustment. Temperature effects though are only compensated with the operation using the six-wire technique.

## 3.4 Notes on cable routing

The load cell connecting cable should be routed so that any condensed water or dampness forming on the cable can drip off. It must not be led to the load cell. In addition, it must be ensured that no dampness can penetrate the open end of the cable.




## 4 Special information

The C2A transducers are produced entirely from non-rusting materials (see Chapter 5). In cases of doupt the resistance to aggressive ambient conditions should be checked by the user.

# 5 Technical data

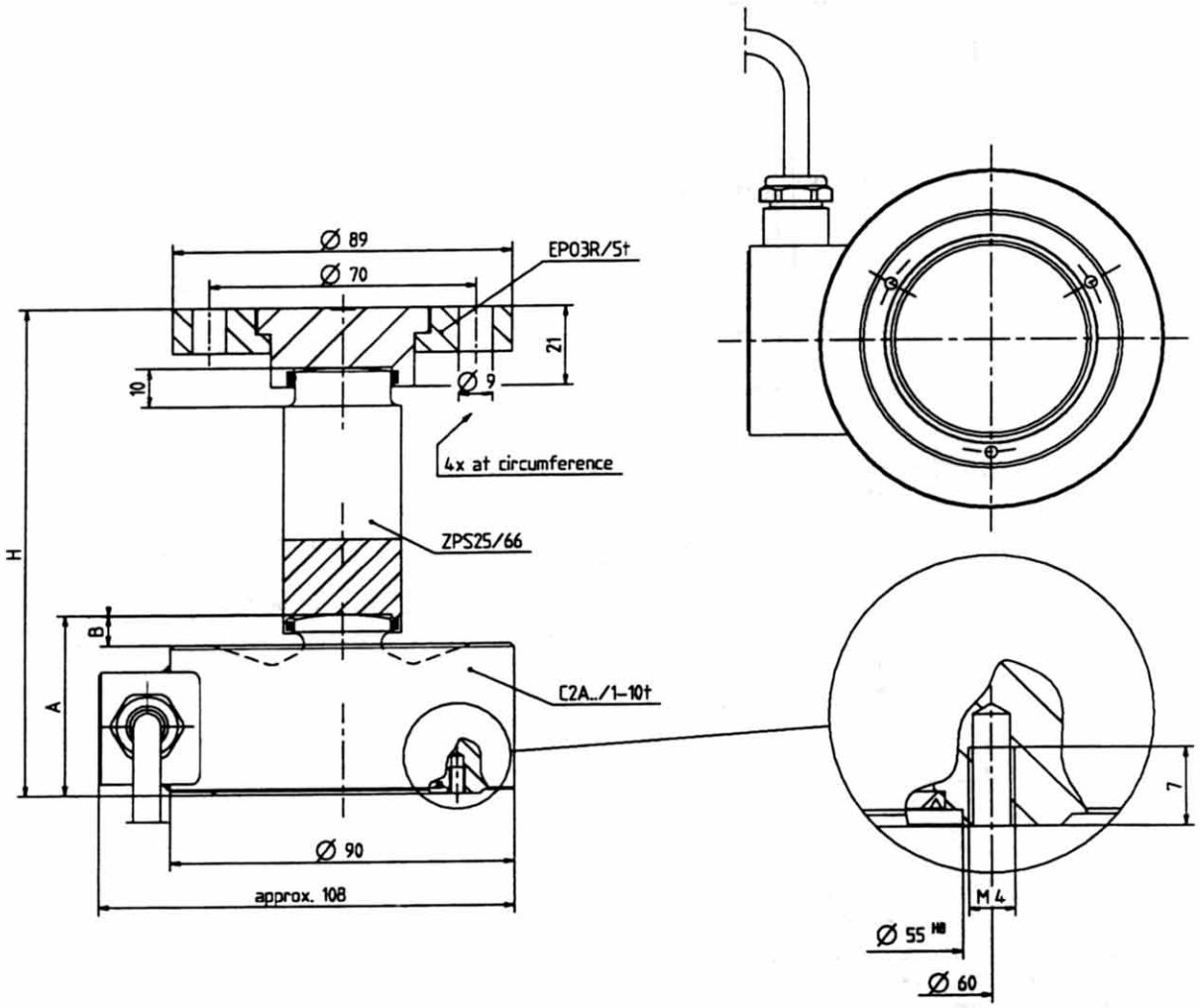
| Type | | C2AD1 | C2AC3 |
|---|---|---|---|
| **Accuracy class to OIML R60** | | D1 | C3 |
| **Max. number of load cell intervalls ($n_{LC}$)** | | 1000 | 3000 |
| **Rated capacity ($E_{max}$)** | t | 1, 2, 5, 10 | |
| **Min. load cell verification interval ($v_{min}$)** | ‰of rat. capacity | 0.0286 | 0.0100 |
| **Rated output** | mV/V | 2 | |
| **Tolerance on rated output** | % | <±0.1000 | <±0.0500 |
| **Temperature effect on sensitivity**[1] | %/10K | <±0.0500 | <±0.0080 |
| **Temperature effect on zero signal** | %/10K | < ±0.0400 | < ±0.0140 |
| **Hysteresis**[1] | % | < ±0.0500 | < ±0.0180 |
| **Non linearity**[1] | % | < ±0.0500 | < ±0.0170 |
| **Creep in 30 min** | % | < ±0.0500 | < ±0.0167 |
| **Input resistance (black-blue)** | Ω | 350...450 | |
| **Output resistance (red-white)** | Ω | 356±1.5 | 356±0.12 |
| **Nominal range of excitation volt.** | V | 0.5...12 | |
| **Max. permissible excitation volt.** | V | 18 | |
| **Reference temperature** | °C [°F] | + 23 [+73] | |
| **Nominal temperature range** | °C [°F] | −10...+40 [+15...105] | |
| **Service temperature range** | °C [°F] | −30...+70 [−20...+160] | |
| **Storage temperature range** | °C [°F] | −50...+85 [ −60...+185] | |
| **Save load limit** | ‰of rat. capacity | 150 | |
| **Breaking load** | ‰of rat. capacity | 300 | |
| **Side load limit** | ‰of rat. capacity | 50 | |
| **Permissible dynamic load** (Vibration amplitude to DIN 50100) | ‰of rat. capacity | 100[2] | |
| **Deflection at rated load,** approx. (± 15%) | mm | 0.15; 0.15; 0.17; 0.2 | |
| **Weight,** approx. | kg | 1.7; 1.8; 1.8; 1.8 | |
| **Protection class** to EN 60529 (IEC529) | | IP 67 (Test conditions:100h at 1m water column) | |
| **Materials** | | | |
| Measuring body | | Rust resistant | |
| Cable gland | | Nickel plated brass | |
| Cable sheath | | Silicone | |

[1] The data for deviation of non linearity, hysteresis and temperature effect on rated output are typical values. The sum of these data meets the requirements according to OIML R60.

[2] 70% with C2A../10t

# 6 Dimensions

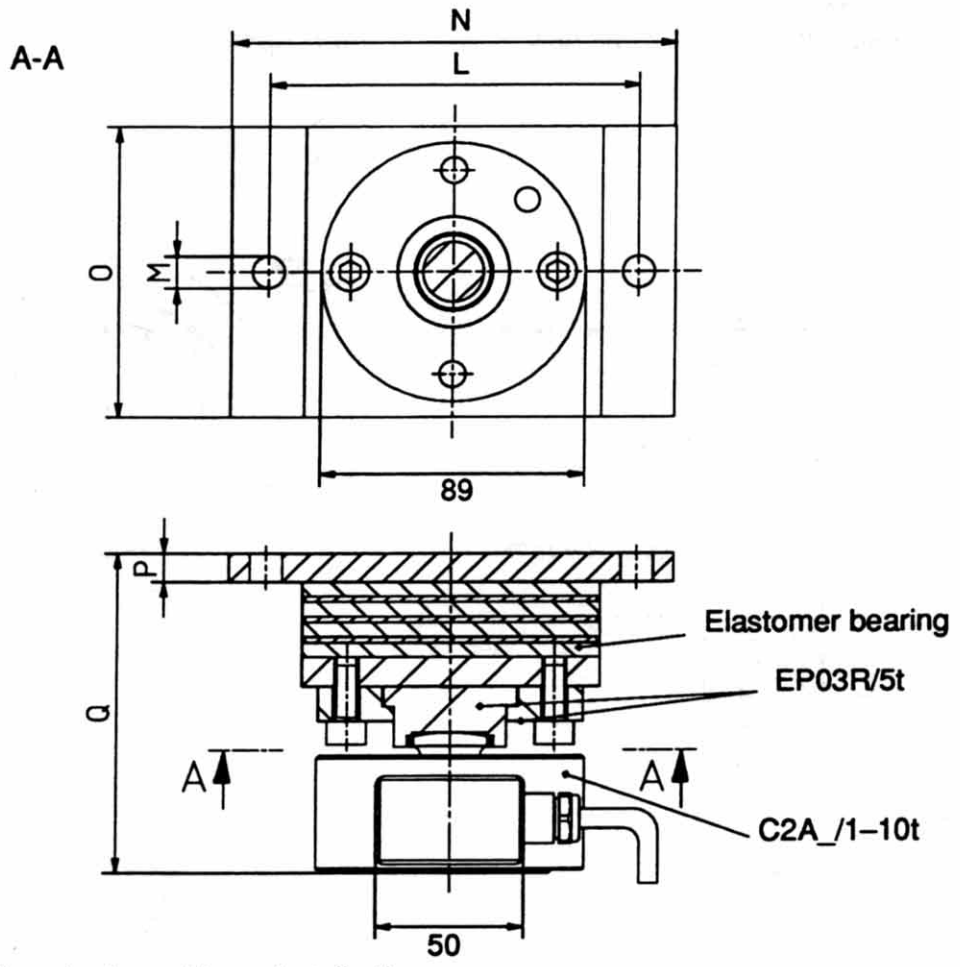
**C2A /1...10t, Pendle support ZPS25/66 and Pendle support upper part EPO3R/ST**




$F_R$: Restoring force for 1mm sidewards deflection
$S_{max.}$: Maximum permissible sidewards deflection at rated capacity

| Rated capacity | A | B | Pendle support | H | $S_{max}$ (mm) | $F_R$ (% of applied load) |
|---|---|---|---|---|---|---|
| 1t | 48 | 10 | ZPS25/66 | 130 | ± 5 | 1 |
| 2t | 48 | 10 | ZPS25/66 | 130 | ± 5 | 1.5 |
| 5t | 48 | 8 | ZPS25/66 | 130 | ± 5 | 1.7 |
| 10t | 53 | 8 | ZPS25/66 | 135 | ± 5 | 2.2 |

**C2A /1...10t, Elastomer Bearing ZELB and Pendle support upper part EPO3R/ST**




$F_R$: Restoring force for 1mm sidewards deflection
$S_{max.}$: Maximum permissible sidewards deflection at rated capacity

| Rated capacity | Elastomer-bearings | L | M | N | O | P | Q | $S_{max}$ (mm) | $F_R$ (N) |
|---|---|---|---|---|---|---|---|---|---|
| 1t | ZELB/2t | 100 | 9 | 120 | 60 | 10 | 103 | ± 4.5 | 400 |
| 2t | ZELB/2t | 100 | 9 | 120 | 60 | 10 | 103 | ± 4.5 | 400 |
| 5t | ZELB/5t | 125 | 11 | 150 | 100 | 10 | 110 | ± 8 | 620 |
| 10t | ZELB/10t | 175 | 13 | 200 | 100 | 12 | 124 | ± 9.5 | 810 |

## Accessories (not included in the supply):

Pendle support ZPS, Pendle support upper part EPO3R and Elastomer bearing ZELB.

**HOTTINGER BALDWIN MESSTECHNIK GMBH**
Postfach 10 01 51 • 64 201 Darmstadt 1
Im Tiefen See 45, 64 293 Darmstadt
Tel.: (0 61 51) 8 03–0 • Telefax: (0 61 51) 89 48 96



wt 07.95 – 0.5 HBM