

Differential pressure gauges

Model 712.15.160, Cu-alloy

Model 732.15.160, stainless steel version

WIKA data sheet PM 07.30

Cryo Gauge

Applications

- Level measurements in closed tanks, particularly in cryotechnology
- Filter monitoring
- Monitoring and control of pumps
- For gaseous and liquid media that are not highly viscous or crystallising and have no suspended solids

Special features

- Differential pressure measuring ranges from 0 ... 80 mbar to 0 ... 4000 mbar
- High working pressure (static pressure) of 50 bar
- Overpressure safe either side up to 50 bar
- Scaleable measuring ranges (maximum Turn Down of 1 : 3.5).
- Very compact design
- Optionally compact valve manifold with working pressure indication

Description

These high-quality gauges are characterised by their compact and robust design and are primarily used for level measurement on liquid gas tanks.

With only 4 different measuring elements all usual tank sizes in cryotechnology are covered. As a result of the large measuring range overlap of the respective measuring cells, the gauge installed on the tank can be adjusted to match a whole variety of gases such as Ar, O₂, N₂ or CO₂, with a full-scale deflection over a complete 270 degree sweep. The span adjustment is accessible from outside and does not affect the zero point. The mechanical display and the optional electrical output signal are calibrated simultaneously and easily.

An optional valve manifold for flange mounting with working pressure indication makes the central measurement of both level and working pressure possible in the one instrument.

Fig. top: Differential pressure gauge model 712.15.160
Fig. centre: Option valve manifold with working pressure indication
Fig. bottom: Option adapter for flange mounting

The level display can be supplied with an optional, integrated 4 ... 20 mA, 2-wire transmitter. Switch contacts for level and working pressure, as well as a transmitter for the working pressure can be retrofitted on site.

The standard centre distance of 37 mm between the process connections can be adapted to a custom centre distance of 31 mm or 54 mm using adapters for flange mounting.

Design and operating principle

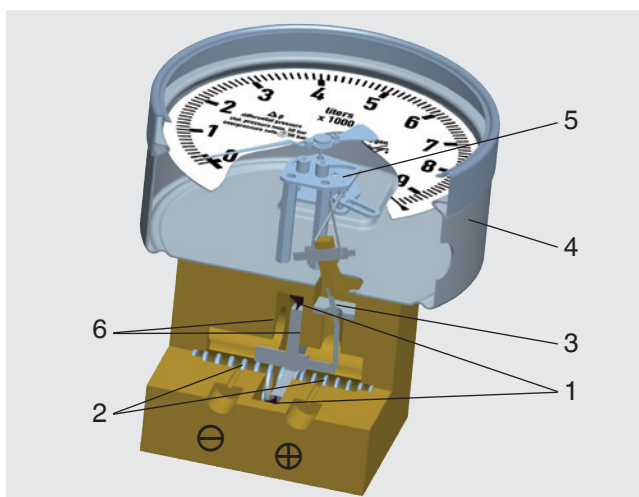
Pressures p_1 and p_2 act on the media chambers \oplus and \ominus , which are separated by an elastic diaphragm (1).

The differential pressure ($\Delta p = p_1 - p_2$) leads to an axial deflection of the diaphragm against the measuring range spring (2).

The deflection, which is proportional to the differential pressure, is transmitted to the movement (5) in the indicating case (4) via a pressure-tight and low friction lever mechanism (3).

Overpressure safety is provided by metal bolsters (6) resting against the elastic diaphragm.

Illustration of the principle



Mounting according to affixed symbols
 \oplus high pressure and \ominus low pressure

Standard version

Differential pressure gauge
 Model 712.15.160
 Model 732.15.160

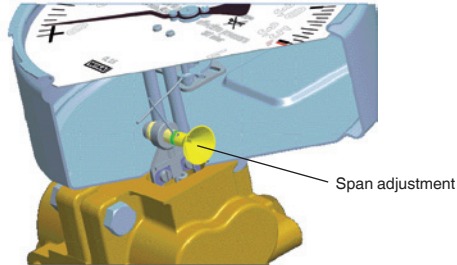


Specifications

| | |
|---|--|
| Nominal size | NS 160 (level indication) |
| Accuracy class | 2.5 (Option: Class 1.6 or class 1.0) |
| Scale ranges (see also span adjustment) | <ul style="list-style-type: none"> ■ Measuring cell 280 mbar: Adjustable range 0 ... 80 mbar to 0 ... 280 mbar ■ Measuring cell 560 mbar: Adjustable range 0 ... 160 mbar to 0 ... 560 mbar ■ Measuring cell 1130 mbar: Adjustable range 0 ... 320 mbar to 0 ... 1130 mbar ■ Measuring cell 2300 mbar: Adjustable range 0 ... 650 mbar to 0 ... 2300 mbar ■ Measuring cell 4000 mbar: Adjustable range 0 ... 1150 mbar to 0 ... 4000 mbar |
| Max. working pressure (static pressure) | 50 bar |
| Overpressure safety | either side up to 50 bar |
| Permissible ambient temperatures | -40 °C ... +80 °C, -40 °C ... +60 °C with oxygen |
| Permissible medium temperatures | -40 °C ... +80 °C, -40 °C ... +60 °C with oxygen |
| Ingress protection | IP 65 per EN 60529 / IEC 529 |
| Process connections (wetted) | |
| Standard | 2 x G 1/4, female, lower mount (LM), centre distance 37 mm |
| Option with adapter | see page 5 |
| Measuring cell flanges (wetted) | |
| Model 712.15: | Cu-alloy CW614N (CuZn39Pb3) |
| Model 732.15: | Stainless steel 316L |
| Pressure elements (wetted) | |
| | compression spring, stainless steel 1.4310 |
| | separation diaphragm, NBR |
| | transmission parts, stainless steel 1.4301 and 1.4305 |
| Movement | Stainless steel |
| Dial | white aluminium (see section 'Scale designs') |
| Pointer | adjustable pointer, black aluminium |
| Zero adjustment | by means of adjustable pointer |
| Case / slip-on bezel | stainless steel, with clip fasteners |
| Window | polycarbonate (PC) |

Span adjustment

The measuring span of the differential pressure gauge can, depending on the particular measuring cell used, be adjusted within the measuring range limits given in the previous specifications table. Ideally, this adjustment should be made on a test bench, though it can also be carried out at the measuring point using a hand test pump.



The span adjustment, situated at the 4 o'clock point on the case circumference, is accessible by removing the cover cap. With the gauge subject to the desired nominal pressure, insert a socket-head screwdriver (SW 3 mm) into the funnel guide, and adjust the pointer to the final value by turning it

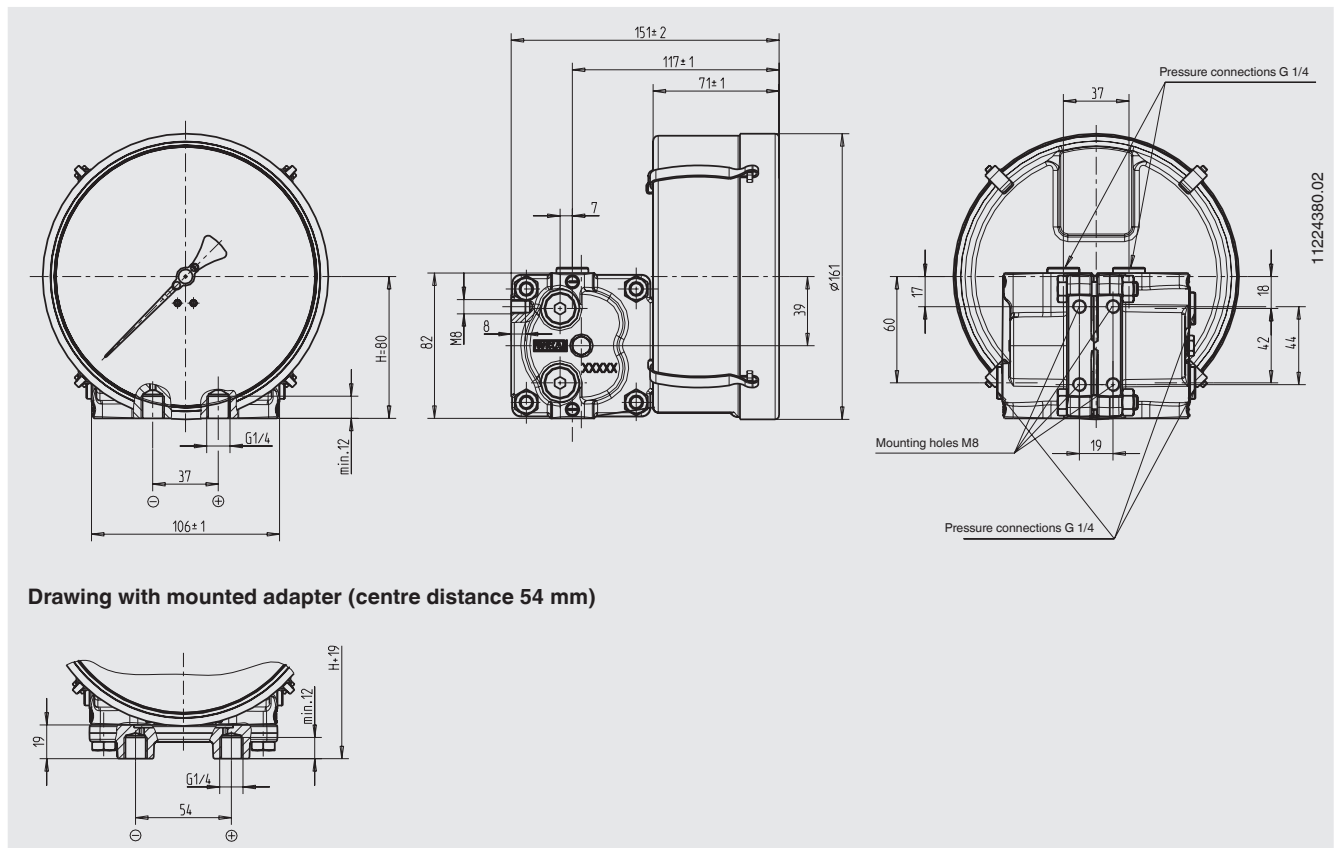
clockwise (for a lower measuring range) or anti-clockwise (for a greater measuring range). The gauge will then be fully adjusted to the required measuring range. If the gauge is equipped with a transmitter model 89X.44, then this procedure will also adjust the output signal to the new measuring range. After completing the adjustment the instrument should be re-sealed with the cover cap.

Scale designs

The dials can be made to customer's requirements and also with multiple scales. In addition, up to three different, interchangeable slip-on dials can be supplied, e.g. for measuring different media.

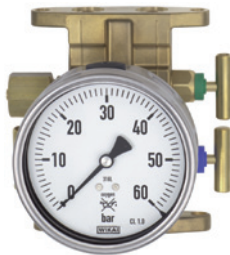
These can be printed with all usual units on them, e.g. kg, litre, m³, mmH₂O, inchH₂O, % etc.. Red marks for maximum fill level, customer logos and other custom printing are likewise possible. If desired, we can carry out the calculation for the tank fuel level from drawings of the tank geometry, and then make the appropriate scales.

Dimensions in mm



Option

Valve manifold (wetted)
with mounted working pressure gauge

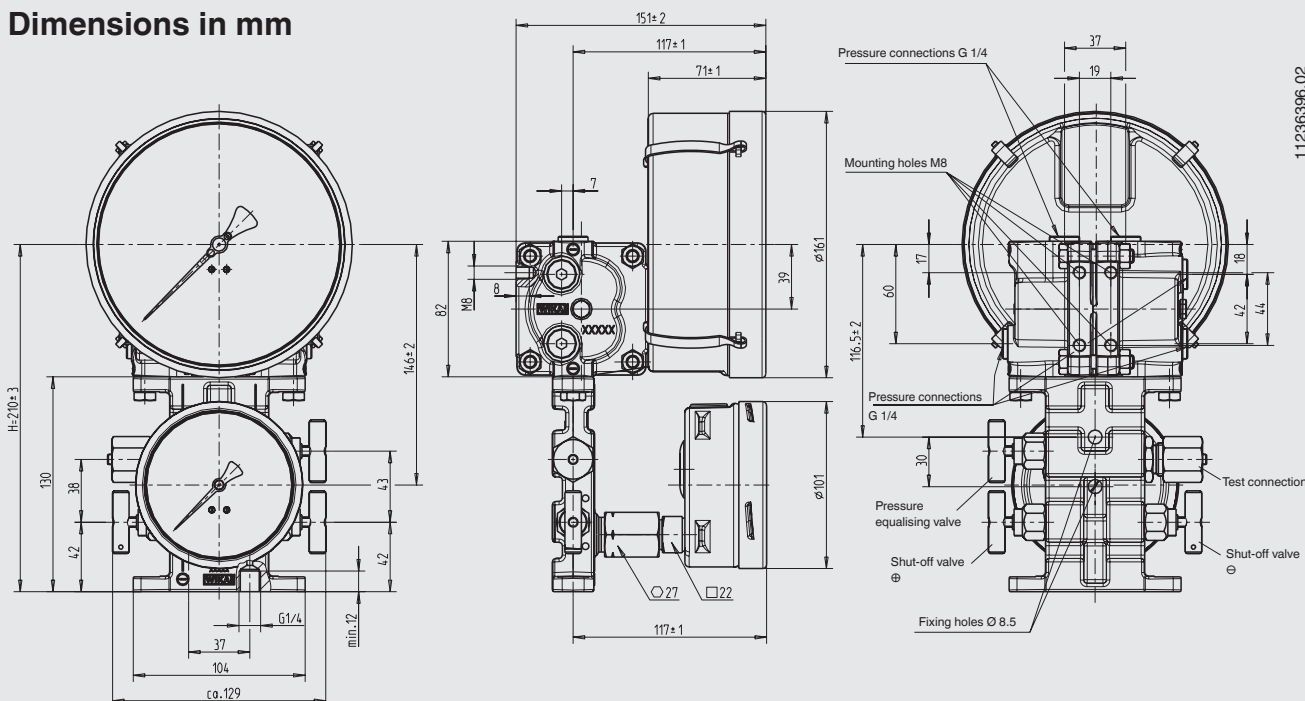


Specifications

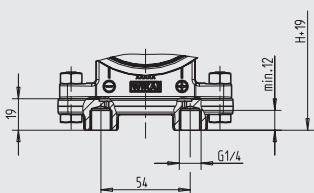
| | |
|------------------------------------|--|
| Valves | 2 x shut-off valve, 1 x pressure equalising valve |
| Test connection | M20 x 1.5 with sealing cap (DIN 16 287-A) |
| Valve body | Model 712.15: Cu-alloy CW614N (CuZn39Pb3); Model 732.15: Stainless steel 316L |
| Spindle with conical nipple | Model 712.15: Cu-alloy; Model 732.15: Stainless steel 316L |
| Packing/sealing | NBR/PTFE |
| | With the valve fully-opened, the spindle area is isolated from the process by a metallic seal, the packing is not loaded and the spindle thread is not in contact with the measured media. |
| Working pressure gauge | |
| Standard | Model 212.20.100, wetted parts Cu-alloy (for specifications and design details see data sheet PM 02.01) |
| Option | Model 232.50.100, wetted parts stainless steel (for specifications and design details see data sheet PM 02.02) |
| Option | Model 232.30.100, safety version, wetted parts stainless steel (for specifications and design details see data sheet PM 02.04) |

With a single order, all parts necessary for the fitting to the differential pressure gauge are included in the delivery: 4 x hexagon screws M8 x 16 , 2 x O-ring seal

Dimensions in mm



Drawing with mounted adapter (centre distance 54 mm)



Option

Adapter for process connection



The adapters can be flange mounted either directly to the differential pressure gauge or to the valve manifold.

Specifications

| | |
|-------------------------------------|--|
| Material | Model 712.15: Cu-alloy CW614N (CuZn39Pb3); Model 732.15: Stainless steel 316L |
| Process connections (wetted) | 2 x G 1/4, female, lower mount (LM), centre distance 31 mm or 54 mm or 2 x 1/4 NPT, female, centre distance 31 mm, 37 mm or 54 mm |

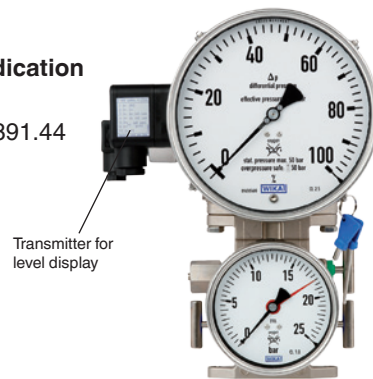
With a single order, all parts necessary for the fitting to the differential pressure gauge or to the valve manifold are included in the delivery:

2 x hexagon screws M8 x 16, 2 x hexagon screws M8 x 28, 2 x nut M8 and 2 x O-ring seal

Option

Transmitter for level indication

Standard version model 891.44
Ex version model 892.44



WIKA differential pressure gauges with an integrated model 89X.44 transmitter combine all the advantages of an on-site mechanical display with the demands modern industry makes for electrical signal transmission for the acquisition of measured values.

The transmitter is integrated into the case of the level display. The measurement span (electrical output signal) is set automatically by the mechanical display, i.e. the scale over a swept angle of 270 degrees corresponds to 4 ... 20 mA. With multiple scales or interchangeable dials (option) the output signal of 4 ... 20 mA corresponding to each, can be stored in a microprocessor. The output signal can be changed over to the desired fluid type by rotating the optional BCD switch (accessible through a cover cap on the left side of the case) using a screwdriver.

Specifications

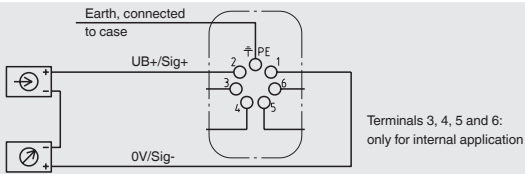
Model 891.44 and 892.44 (Ex version)

| | | |
|--|--------------------|--|
| Power supply U_B | | |
| for non-Ex versions | DC | $12\text{ V} < U_B \leq 30\text{ V}$ |
| for Ex versions | | see overleaf in the section 'Ex protection'! |
| Influence of power supply | % FS/10 V | ≤ 0.1 |
| Permissible residual ripple | % ss | ≤ 10 |
| Output signal | | 4 ... 20 mA, 2-wire |
| Permissible max. load R_A | | for non-Ex versions, model 891.44: $R_A \leq (U_B - 12\text{ V}) / 0.02\text{ A}$ with R_A in Ohm and U_B in Volt for Ex versions, model 892.44: $R_A \leq (U_B - 14\text{ V}) / 0.02\text{ A}$ with R_A in Ohm and U_B in Volt |
| Effect of load | % FS | ≤ 0.1 |
| Adjustment | | |
| Zero point, electrical | | Adjustment of the zero point through brief bridging of terminals 5 and 6 or using the 'scale selection switch' option, selectable via button 1) |
| Scale selection | | 4 scales selectable via BCD switch |
| Accuracy | % of span | $\leq 1.0\%$ (terminal method) |
| Permissible | | |
| ambient temperatures | $^{\circ}\text{C}$ | -40 ... +80, -40 ... +60 with oxygen |
| Compensated temp. range | $^{\circ}\text{C}$ | -40 ... +80 |
| Temperature coefficients in compensated temp. range | | |
| Mean T_k of zero | % of span / 10 K | ≤ 0.3 |
| Mean T_k of span | % of span / 10 K | ≤ 0.3 |

1) Only possible within 30 seconds of connecting the supply voltage

Further specifications

Model 891.44 and 892.44 (Ex version)

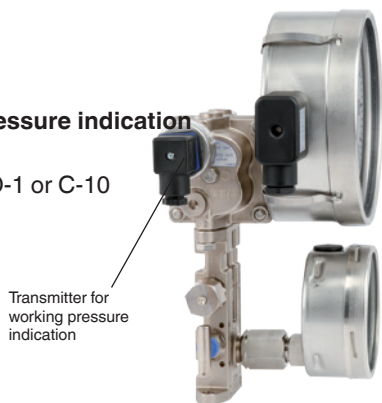
| | | |
|----------------------------------|----|--|
| Ex protection | | per EC-type examination certificate BSV 08 ATEX E 018 X for model 892.44 |
| Ignition protection type | | EEx II 2G EEx ia IIC T6 |
| Conformity specifications | | |
| Power supply U_B | DC | 14 ... 30 V |
| Short circuit rating | mA | 100 |
| Power | mW | 1000 |
| internal capacitance | nF | $C_i \leq 12$ nF |
| internal inductance | mH | negligible |
| Medium temperature | °C | -40 ... +80, -40 ... +60 with oxygen |
| Ambient temperature | °C | -40 ... +60 (T6) |
| CE-mark | | Interference emission and interference immunity per EN 61326 |
| Electrical connection | | L-connector (screw terminals up to 2.5 mm ²) |
| Wiring protection | | Protection against reverse polarity and overvoltage |
| Ingress protection | | IP 65 per EN 60529 / IEC 529 |
| Wiring details, 2-wire | |  |

Option

Transmitter for working pressure indication

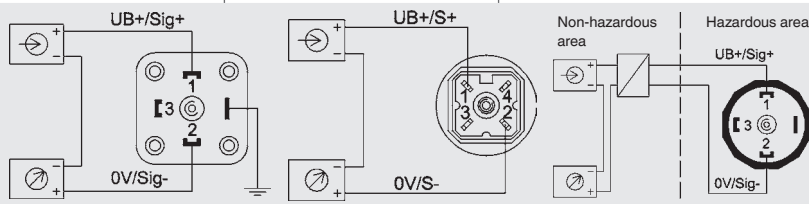
Standard version model ECO-1 or C-10

Ex version model IS-20



The transmitters for the working pressure are screwed in sideways, on the left side of the minus media chamber and can, if necessary, be retrofitted on site.

Pressure connection of the transmitter:
G 1/4 (male)

| Specifications | | ECO-1 | C-10 | IS-20 |
|---|-----------|--|--|--|
| Data sheet | | PE 81.14 | PE 81.12 | PE 81.50 |
| Design | | standard | compact | intrinsically safe |
| Measuring ranges | bar | 0 ... 16 to 0 ... 60 | 0 ... 6 and 0 ... 10 | 0 ... 6 to 0 ... 60 |
| Outputs | mA | 4 ... 20 | 4 ... 20 | 4 ... 20 (transmitter supply isolator) |
| Medium temperature | °C | -40 ... +100 | -30 ... +100 | -20 ... +80 |
| Ambient temperature | °C | -30 ... +80 | -30 ... +85 | -20 ... +80 |
| Wetted parts | | Stainless steel | Stainless steel | Stainless steel |
| Power supply U_B | DC | $10\text{ V} < U_B \leq 30\text{ V}$ | $10\text{ V} < U_B \leq 30\text{ V}$ | $10\text{ V} < U_B \leq 30\text{ V}$ |
| Permissible max. load R_A | Ohm | $R_A \leq (U_B - 10\text{ V}) / 0.02\text{ A}$ | $R_A \leq (U_B - 10\text{ V}) / 0.02\text{ A}$ | $R_A \leq (U_B - 10\text{ V}) / 0.02\text{ A}$ |
| Accuracy | | | | |
| Best Fit Straight Line, BFSL | % of span | ≤ 0.5 | ≤ 0.5 | ≤ 0.25 |
| Compensated | | | | |
| temperature range | °C | 0 ... +80 °C | 0 ... +80 °C | 0 ... +80 °C |
| T_k in compensated range | | | | |
| Mean T_k of zero | % of span | $\leq 0.4 / 10\text{ K}$ | $\leq 0.3 / 10\text{ K}$ | $\leq 0.2 / 10\text{ K}$ |
| Mean T_k of span | % of span | $\leq 0.3 / 10\text{ K}$ | $\leq 0.2 / 10\text{ K}$ | $\leq 0.2 / 10\text{ K}$ |
| Wiring details, 2-wire | |  | | |

Option

Switch contacts

for level and/or working pressure indicators

A modular system of electromechanical and electronic switch contacts with plug connectors, also suitable for retrofitting on site, can be fitted both to the level display and to the working pressure indication. They consist of self-contained units, which can be fitted to any pointer pressure gauge within a few minutes. The connection to the instrument pointer is made by means of a special yoke so that a carrier pin at the pointer itself is not needed. The set value pointer of the installed switch contacts are adjusted, from the outside, to the value at which the switching operation is to take place, using the adjustment lock with a separate or integral key. A coupler connector, an M3 x 20 centring screw and a seal are included in the delivery.

Selectable are the following single and double contact models built into a self-contained unit

- Model 828 ¹⁾, magnetic snap-action contact
- Model 838 ¹⁾, inductive contact gauge

Switching functions

The following applies, as a general rule, to the contact functions of the model 828 ¹⁾ in connection with our standard settings:

Index 1 according to the contact type no. means:

Contact closes the circuit when the set point is exceeded

Index 2 according to the contact type no. means:

Contact opens the circuit when the set point is exceeded

Index 3 according to the contact type no. means:

When the set value is exceeded, one circuit is opened and one circuit is closed **simultaneously** (change-over contact)

The following applies, as a general rule, to the contact functions of the model 828 magnetic snap-action contacts ¹⁾ in connection with our standard settings:

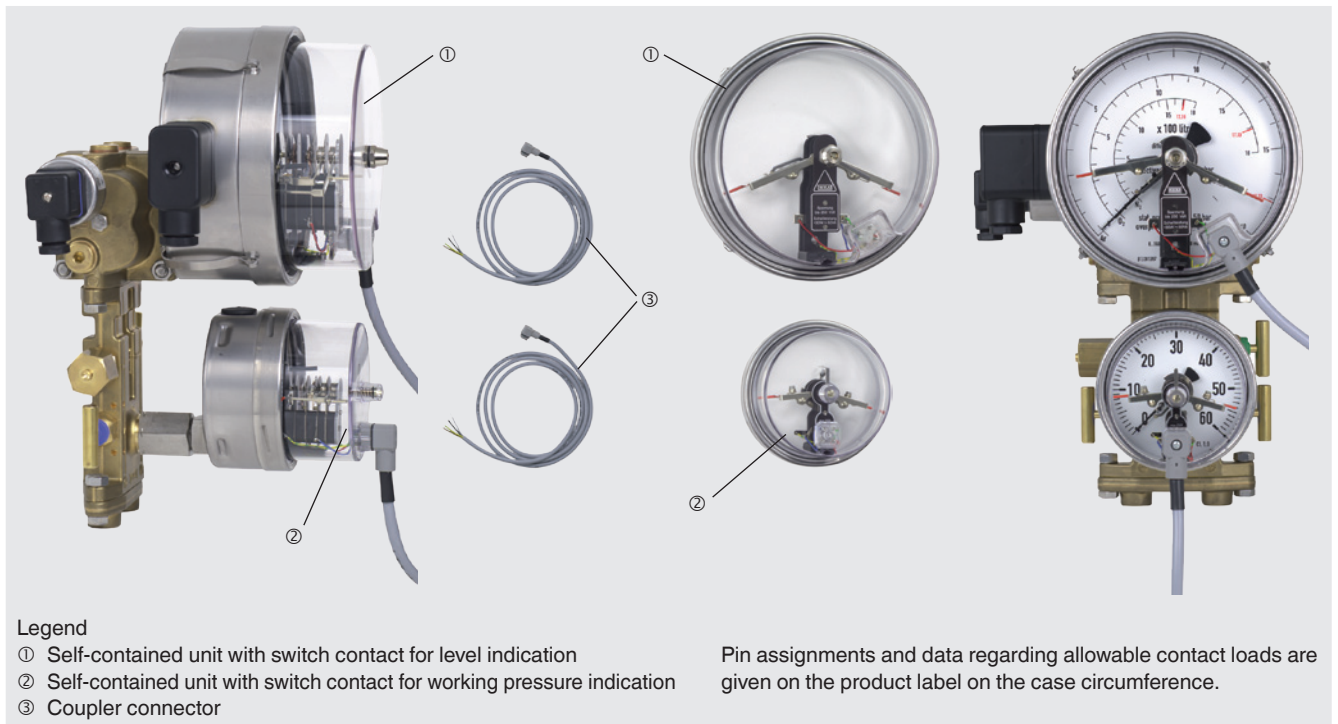
Index 1 according to the contact type no. means:

Contact closes the control circuit when the set point is exceeded (flag disengages **from control head**)

Index 2 according to the contact type no. means:

Contact opens the control circuit when the set point is exceeded (flag engages **with control head**)

The switching functions are based on a clockwise rotational motion of the instrument pointer.



Legend

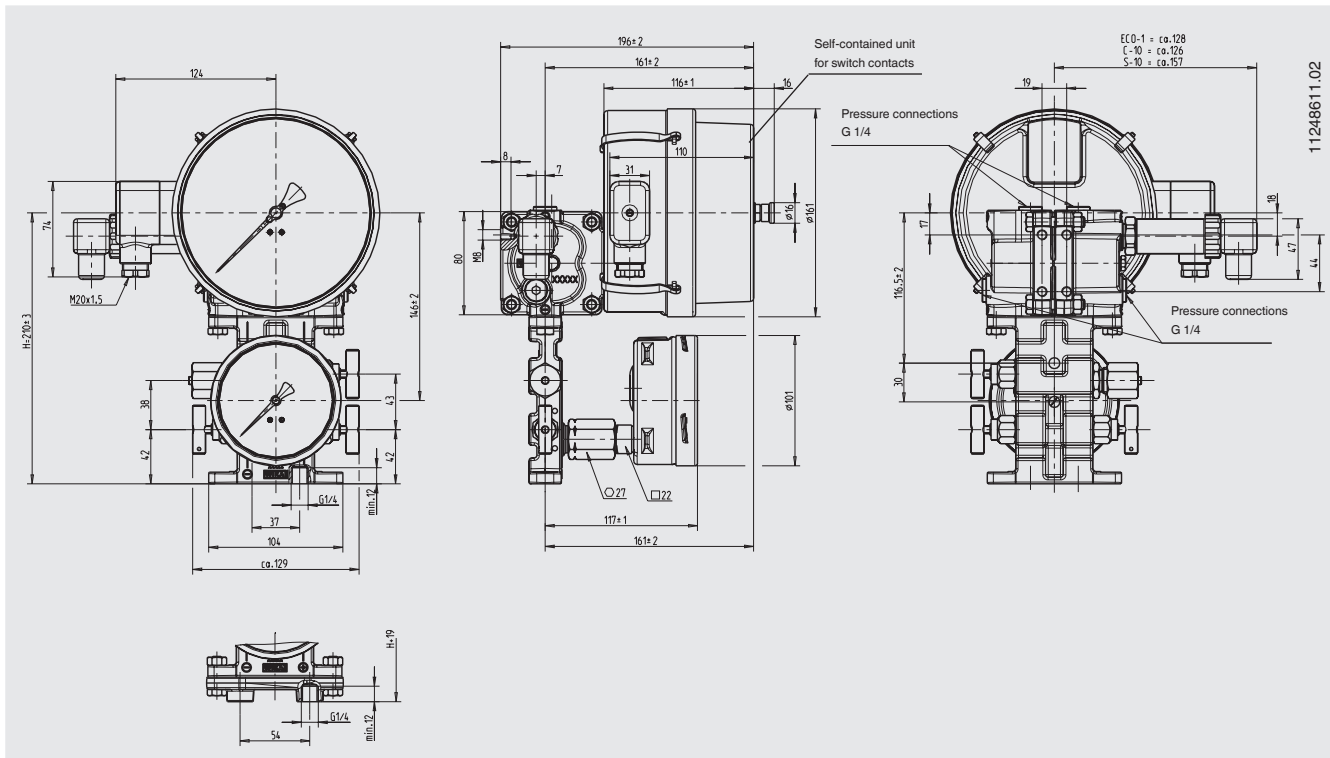
- ① Self-contained unit with switch contact for level indication
- ② Self-contained unit with switch contact for working pressure indication
- ③ Coupler connector

Pin assignments and data regarding allowable contact loads are given on the product label on the case circumference.

For further specifications and design details see data sheet AC 08.01 ¹⁾

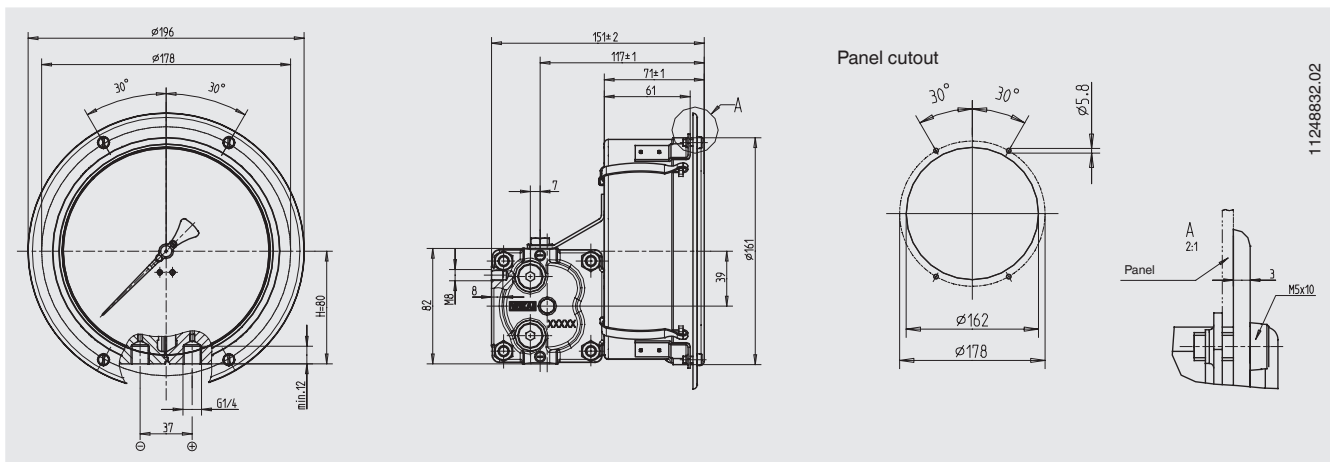
¹⁾ Specifications given in data sheet AC 08.01 for Model 821 correspond to model 828 (built into a self-contained unit) Model 831 correspond to model 838 (built into a self-contained unit)

Dimensions in mm



Option

Panel mounting



Ordering information

Model / Scale range (measuring cell) / Scale design / Process connections with centre distance / Options

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We reserve the right to make modifications to the specifications and materials.

