

# Differential pressure gauge

## Cryo Gauge, copper alloy or stainless steel, NS 160

### Models 712.15.160 and 732.15.160

WIKA data sheet PM 07.30



for further approvals see page 4

## Cryo Gauge

### Applications

- Level measurements in closed tanks, particularly in cryotechnology
- Filter monitoring
- Pump monitoring and control
- 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 ... 40 mbar to 0 ... 4,000 mbar
- High working pressure (static pressure) of 50 bar
- Overpressure safety either side up to 50 bar
- Scalable measuring ranges (maximum turndown of 1 : 3.5)
- Compact valve manifold with working pressure indication (optional)



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

### Description

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

With 6 different measuring cells, all usual tank sizes in cryotechnology are covered. The large overlap in measuring ranges of the measuring cells enables the setting for gas types such as Ar, O<sub>2</sub>, N<sub>2</sub> or CO<sub>2</sub> over the entire scale with 270 angular degrees. The span adjustment is accessible from outside and does not affect the zero point.

The mechanical display and the integrated transmitter with 4 ... 20 mA output signal (optional) are calibrated simultaneously and easily. An optional valve manifold for flange mounting makes the central level measurement and working pressure indication possible in the one instrument. 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.

## Specifications

| Models 712.15.160 and 732.15.160                            |  |
|---|--|
| Nominal size in mm  | 160  |
| Accuracy class  | 2.5<br>Option:<br>■ 1.6<br>■ 1.0   |
| Scale ranges  | Measuring cell 140 mbar: Setting range 0 ... 40 mbar to 0 ... 140 mbar<br>Measuring cell 280 mbar: Setting range 0 ... 80 mbar to 0 ... 280 mbar<br>Measuring cell 560 mbar: Setting range 0 ... 160 mbar to 0 ... 560 mbar<br>Measuring cell 1,130 mbar: Setting range 0 ... 320 mbar to 0 ... 1,130 mbar<br>Measuring cell 2,300 mbar: Setting range 0 ... 650 mbar to 0 ... 2,300 mbar<br>Measuring cell 4,000 mbar: Setting range 0 ... 1,150 mbar to 0 ... 4,000 mbar |
| Scale   | Single scale<br>Option:<br>Individual scale design   |
| Zero point setting  | By means of adjustable pointer   |
| Overload safety and max. working pressure (static pressure) | Either side max. 50 bar  |
| Connection location   | Lower mount (radial)   |
| Process connection  | ■ 2 x G ¼, female, centre distance 37 mm<br>■ 2 x ¼ NPT, female, centre distance 37 mm<br>others on request<br>Option:<br>Adapter for process connection, see page 6   |
| <b>Wetted materials</b>                                     |  |
| Measuring cell flanges                                      | Model 712.15: Copper alloy CW614N (CuZn39Pb3)<br>Model 732.15: Stainless steel 316L  |
| Compression spring  | Stainless steel 1.4310   |
| Separating diaphragm  | NBR  |
| Transmission parts  | Stainless steel 1.4301 and 1.4305  |
| <b>Non-wetted materials</b>                                 |  |
| Case  | Stainless steel  |
| Bayonet ring  | Stainless steel  |
| Movement  | Stainless steel  |
| Dial  | Aluminium, white   |
| Pointer   | Adjustable pointer, black aluminium  |
| Window  | Polycarbonate (PC)   |
| Ingress protection per IEC/EN 60529                         | IP65   |
| Mounting  | According to affixed symbols<br>⊕ high pressure, ⊖ low pressure  |

### Permissible temperature ranges

|                | Non-Ex version:<br>Models 712.15.160 and 732.15.160 optionally<br>with model 891.44 <sup>1)</sup> | Ex version:<br>Models 712.15.160 and 732.15.160 with<br>model 892.44 <sup>1)</sup>                                      |
|----------------|---|---|
| <b>Ambient</b> | -40 ... +60 °C with oxygen<br>-40 ... +80 °C  | -40 ... +60 °C for temperature class T6 and T5<br>-40 ... +80 °C for temperature class T4                               |
| <b>Medium</b>  | -40 ... +60 °C with oxygen<br>-40 ... +80 °C  | -40 ... +60 °C with oxygen<br>-40 ... +60 °C for temperature class T6 and T5<br>-40 ... +80 °C for temperature class T4 |

1) Integrated transmitter electronics see page 7

## Design and operating principle

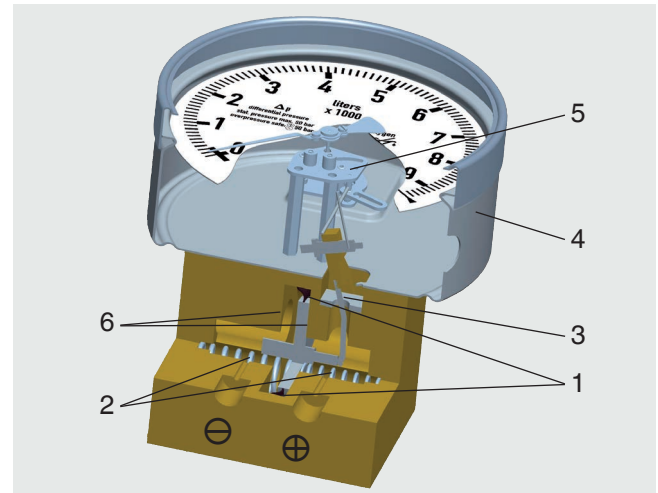
Pressures  $p_1$  and  $p_2$  act on the media chambers  $\oplus$  and  $\ominus$ , which are separated by an elastic diaphragm (1).

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).

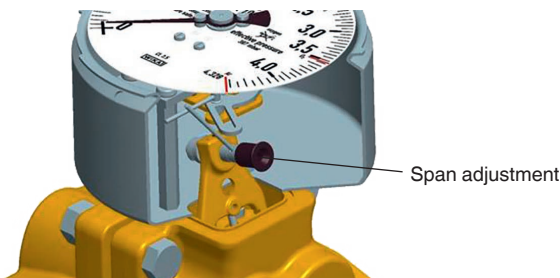
Overload safety is provided by metal bolsters (6) resting against the elastic diaphragm.

## Illustration of the principle



## Span adjustment

The measuring span of the differential pressure gauge can, depending on the measuring cell, be adjusted within the setting range specified to the left. Ideally, this adjustment to the setting range 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 sealing cap. Pressurise the instrument with the required nominal pressure and, with a hexagon screwdriver (SW 3 mm) inserted into the funnel guide, adjust the pointer to the end value by turning it clockwise (smaller measuring range) or anti-clockwise (larger measuring range). If the instrument is equipped with a model 89x.44 transmitter, then this procedure will also adjust the output signal to the new measuring range. The instrument will then be fully adjusted to the required measuring range. After completing the adjustment the instrument should be re-sealed with the sealing cap.

## Scale designs

The dials can be made to customer's requirements and also with multiple scales.

These can be printed with all usual units on them, e.g. kg, litre,  $m^3$ ,  $mmH_2O$ ,  $inchH_2O$ , %, 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.

## Approvals

| Logo  | Description   | Country                     |
|---|---|-----------------------------|
|  | <b>EU declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive</li> <li>■ Pressure equipment directive</li> <li>■ ATEX directive (option) <sup>1)</sup></li> </ul> Hazardous areas<br>- Ex ia Gas [II 2G Ex ia IIC T6/T5/T4 Gb] | European Union              |
|  | <b>IECEx (option) <sup>1)</sup></b><br>Hazardous areas<br>- Ex ia Gas [Ex ia IIC T6/T5/T4 Gb]   | International               |
|  | <b>EAC (option)</b> <ul style="list-style-type: none"> <li>■ EMC directive</li> <li>■ Pressure equipment directive</li> <li>■ Low voltage directive</li> <li>■ Hazardous areas <sup>1)</sup></li> </ul>   | Eurasian Economic Community |
|  | <b>GOST (option)</b><br>Metrology, measurement technology   | Russia                      |
|  | <b>KazInMetr (option)</b><br>Metrology, measurement technology  | Kazakhstan                  |
| -   | <b>MTSCHS (option)</b><br>Permission for commissioning  | Kazakhstan                  |
|  | <b>BelGIM (option)</b><br>Metrology, measurement technology   | Belarus                     |
|  | <b>Uzstandard (option)</b><br>Metrology, measurement technology   | Uzbekistan                  |
| -   | <b>CPA</b><br>Metrology, measurement technology   | China                       |
| -   | <b>CRN</b><br>Safety (e.g. electr. safety, overpressure, ...)   | Canada                      |
|   | <b>BAM</b><br>Oxygen application  | Germany                     |

1) Only for instruments with integrated transmitter model 892.44

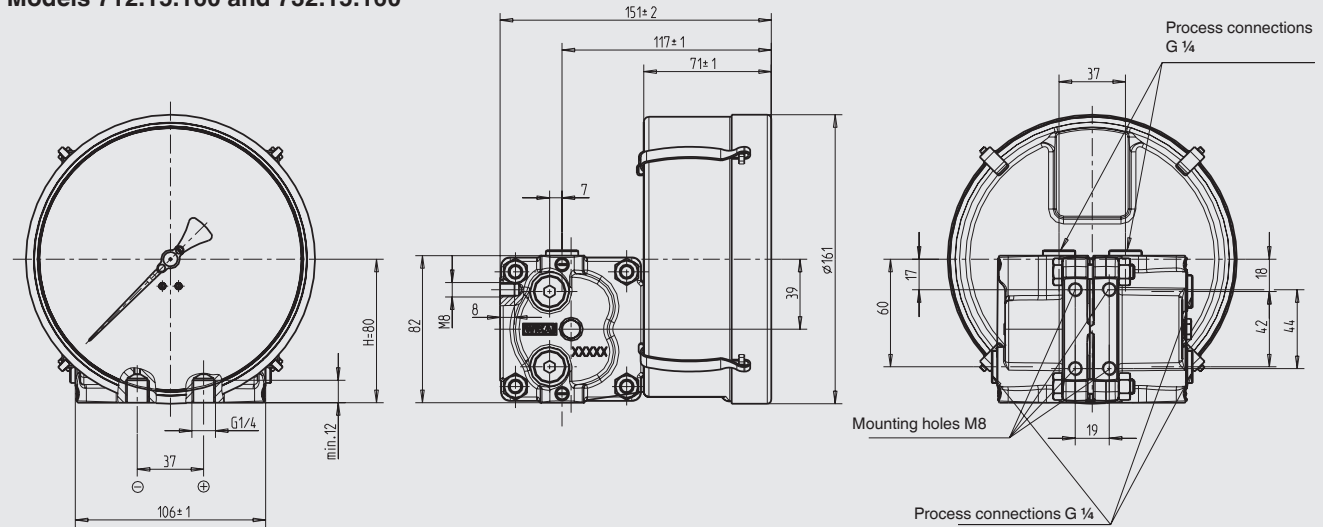
## Certificates (option)

- 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, indication accuracy)
- 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)

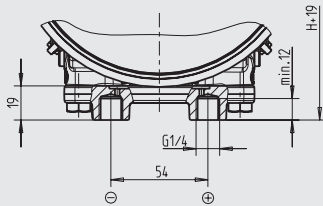
Approvals and certificates, see website

## Dimensions in mm

### Models 712.15.160 and 732.15.160



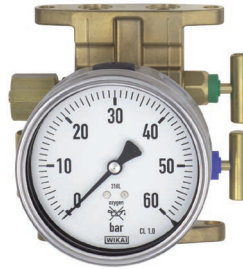
### Drawing with optional mounted adapter (centre distance 54 mm)



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## Option

### Valve manifold (wetted) with working pressure indication



### Specifications

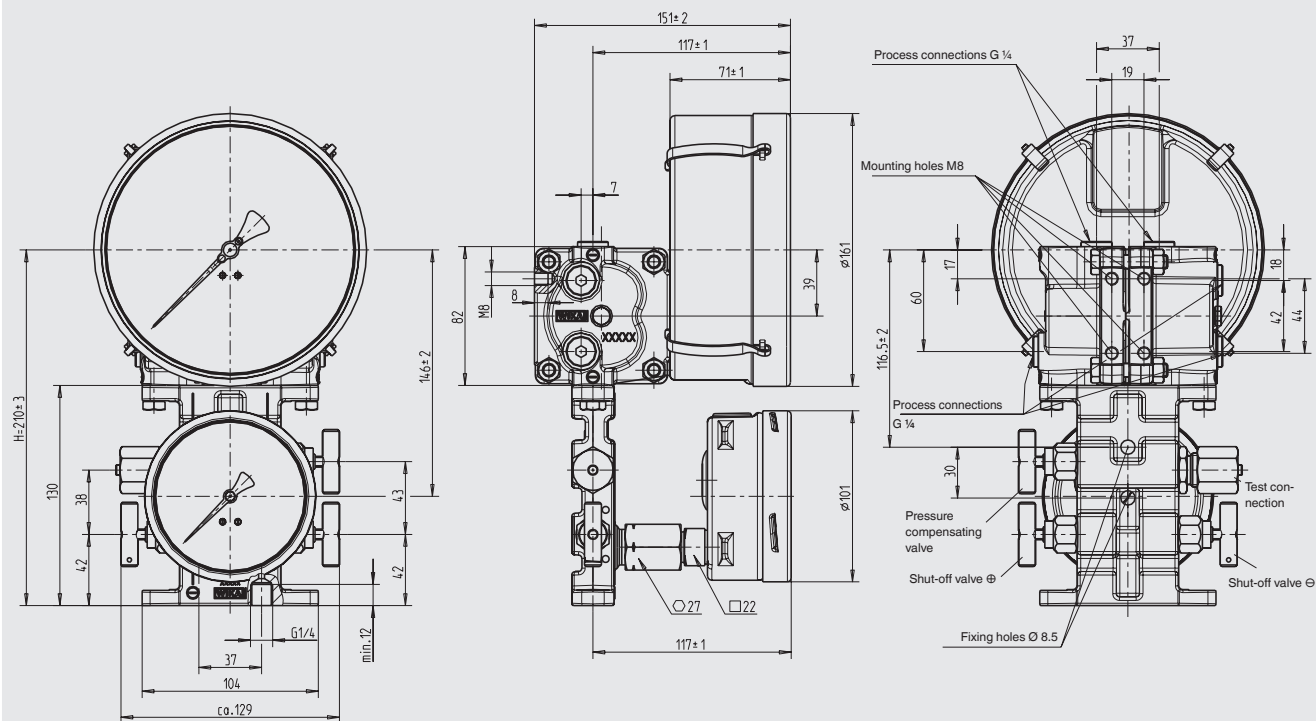
|                                    |  |
|------------------------------------|--|
| <b>Valves</b>                      | 2 x shut-off valve, 1 x pressure compensating valve  |
| <b>Test connection</b>             | M20 x 1.5 with sealing cap (DIN 16287-A)   |
| <b>Valve body</b>                  | <ul style="list-style-type: none"> <li>■ Copper alloy CW614N (CuZn39Pb3) for model 712.15</li> <li>■ Stainless steel 316L for model 732.15</li> </ul>  |
| <b>Spindle with conical nipple</b> | <ul style="list-style-type: none"> <li>■ Copper alloy for model 712.15</li> <li>■ Stainless steel 316L for model 732.15</li> </ul>   |
| <b>Packing/sealing</b>             | NBR/PTFE<br>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.   |
| <b>Working pressure indication</b> | <ul style="list-style-type: none"> <li>■ Bourdon tube pressure gauge, copper alloy; model 212.20.100; see data sheet PM 02.01</li> <li>■ Bourdon tube pressure gauge, stainless steel, model 232.50.100, see data sheet PM 02.02</li> <li>■ Bourdon tube pressure gauge, stainless steel, safety version; model 232.30.100; see data sheet PM 02.04</li> </ul> |

All parts necessary for installation are included in the scope of delivery:

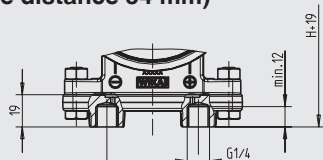
- 4 x hexagon screws M8 x 16
- 2 x O-ring sealing

## Dimensions in mm

Models 712.15.160 or 732.15.160 mounted to the valve manifold with working pressure indication (option)



Drawing with optional mounted adapter (centre distance 54 mm)



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## Option

Adapter for process connection



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

### Specifications

|                                     |   |
|-------------------------------------|---|
| <b>Material</b>                     | <ul style="list-style-type: none"> <li>■ Copper alloy CW614N (CuZn39Pb3) for model 712.15</li> <li>■ Stainless steel 316L for model 732.15</li> </ul>               |
| <b>Process connections (wetted)</b> | <ul style="list-style-type: none"> <li>2 x G 1/4, female, centre distance 31 mm or 54 mm or</li> <li>2 x 1/4 NPT, female, centre distance 31 mm or 54 mm</li> </ul> |

All parts necessary for installation are included in the scope of delivery:

- 2 x hexagon screws M8 x 16
- 2 x hexagon screws M8 x 28
- 2 x nut M8
- 2 x O-ring sealing

# Option

## Integrated transmitter electronics

Non-Ex 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 detection of measured values.

The transmitter electronics are integrated into the case of the level indicator. The measuring span (electrical output signal) is adjusted automatically with the mechanical display, i.e. the scale over 270 angular degrees corresponds to 4 ... 20 mA.

The output signal can be changed over to the desired gas type by rotating the optional BCD switch (accessible through a sealing cap on the left side of the case) using a screwdriver.



| Specifications   | Models 891.44 and 892.44 (Ex version)   |
|--|---|
| <b>Output signal</b>   | 4 ... 20 mA, 2-wire   |
| <b>Supply voltage <math>U_B</math></b>                               | Non-Ex version, model 891.44: DC 12 V < $U_B$ ≤ 30 V<br>Ex version, model 892.44: DC 14 V < $U_B$ ≤ 30 V  |
| <b>Influence of supply voltage</b>                                   | ≤ 0.1 % of full scale/10 V  |
| <b>Permissible residual ripple</b>                                   | ≤ 10 % ss   |
| <b>Permissible max. load <math>R_A</math></b>                        | $R_A \leq (U_B - 12 \text{ V})/0.02 \text{ A}$ with $R_A$ in $\Omega$ and $U_B$ in V, however max. 600 $\Omega$   |
| <b>Effect of load</b>  | ≤ 0.1 % of full scale   |
| <b>Adjustability</b>   |   |
| 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 <sup>1)</sup>  |
| Scale selection  | 4 scales selectable via BCD switch  |
| <b>Linear error</b>  | ≤ 1.0 % of span (terminal method)   |
| <b>Compensated temperature range</b>                                 | -40 ... +80 °C  |
| <b>Temperature coefficients in the compensated temperature range</b> |   |
| Mean TC zero point   | ≤ 0.3 % of span/10 K  |
| Mean TC span   | ≤ 0.3 % of span/10 K  |
| <b>Electrical connection</b>   | Cable socket PA 6, black<br>Per VDE 0110 insulation group C/250 V<br>Cable gland M20 x 1.5<br>Strain relief<br>6 screw terminals + PE for conductor cross-section 2.5 mm <sup>2</sup>   |
| <b>Electrical safety</b>   | Protection against reverse polarity and overvoltage   |
| <b>Ingress protection</b>  | IP65 per EN/IEC 60529   |
| <b>Safety-related maximum values for Ex version, model 892.44</b>    |   |
| Supply voltage $U_i$   | DC 14 ... 30 V  |
| Short-circuit current $I_i$  | ≤ 100 mA  |
| Power $P_i$  | ≤ 720 mW  |
| Internal capacitance $C_i$   | ≤ 17.5 nF   |
| Internal inductance $L_i$  | negligible  |
| <b>Designation of connection terminals, 2-wire</b>                   | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; padding-left: 20px;"> <p>Terminals 3, 4, 5 and 6: For internal use only</p> <p>Connection 1 must not be used for equipotential bonding. The instrument must be incorporated in the equipotential bonding via the process connection.</p> </div> </div> |

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

## Option

### Pressure sensor for working pressure

Non-Ex version: Model A-10

Ex version: Model IS-3

Pressure sensor for working pressure



The pressure sensors for the working pressure are screwed into the minus media chamber on the left side and can also be mounted on-site, if required.

Process connection, pressure sensor: G 1/4 male



| Specifications                              | A-10  | IS-3   |
|---|---|--|
| Data sheet                                  | PE 81.60  | PE 81.58   |
| Ex version                                  | No  | Yes, intrinsically safe                          |
| Measuring ranges                            | 0 ... 2.5 bar to 0 ... 60 bar                   | 0 ... 2.5 bar to 0 ... 60 bar                    |
| Outputs                                     | 4 ... 20 mA                                     | 4 ... 20 mA (repeater power supply required)     |
| Medium temperature                          | -30 ... +100 °C                                 | -20 ... +60 °C                                   |
| Ambient temperature                         | -30 ... +80 °C                                  | -20 ... +60 °C                                   |
| Wetted parts                                | Stainless steel                                 | Stainless steel                                  |
| Supply voltage $U_B$                        | DC 10 V < $U_B$ ≤ 30 V                          | DC 10 V < $U_B$ ≤ 30 V                           |
| Permissible max. load $R_A$                 | $R_A \leq (U_B - 8 \text{ V}) / 0.02 \text{ A}$ | $R_A \leq (U_B - 10 \text{ V}) / 0.02 \text{ A}$ |
| Accuracy, best fit straight line, BFSL      | ≤ 0.5 % of span                                 | ≤ 0.2 % of span                                  |
| Compensated temperature range               | 0 ... +80 °C                                    | 0 ... +60 °C                                     |
| Designation of connection terminals, 2-wire |   |  |

For dimensions see page 10



## Option

### Switch contacts

Single and double magnetic snap-action contact, model 828<sup>1)</sup> for level indicator and/or working pressure.

A modular system of electromechanical switch contacts with plug connection, also suitable for retrofitting on-site, can be fitted both to the level indicator and to the working pressure indicator. The add-on unit can be fitted in just a few minutes to any pointer measuring instrument. The connection to the actual value 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.

1) For specifications and further information, see data sheet AC 08.01 under the identically constructed magnetic snap-action contact, model 821

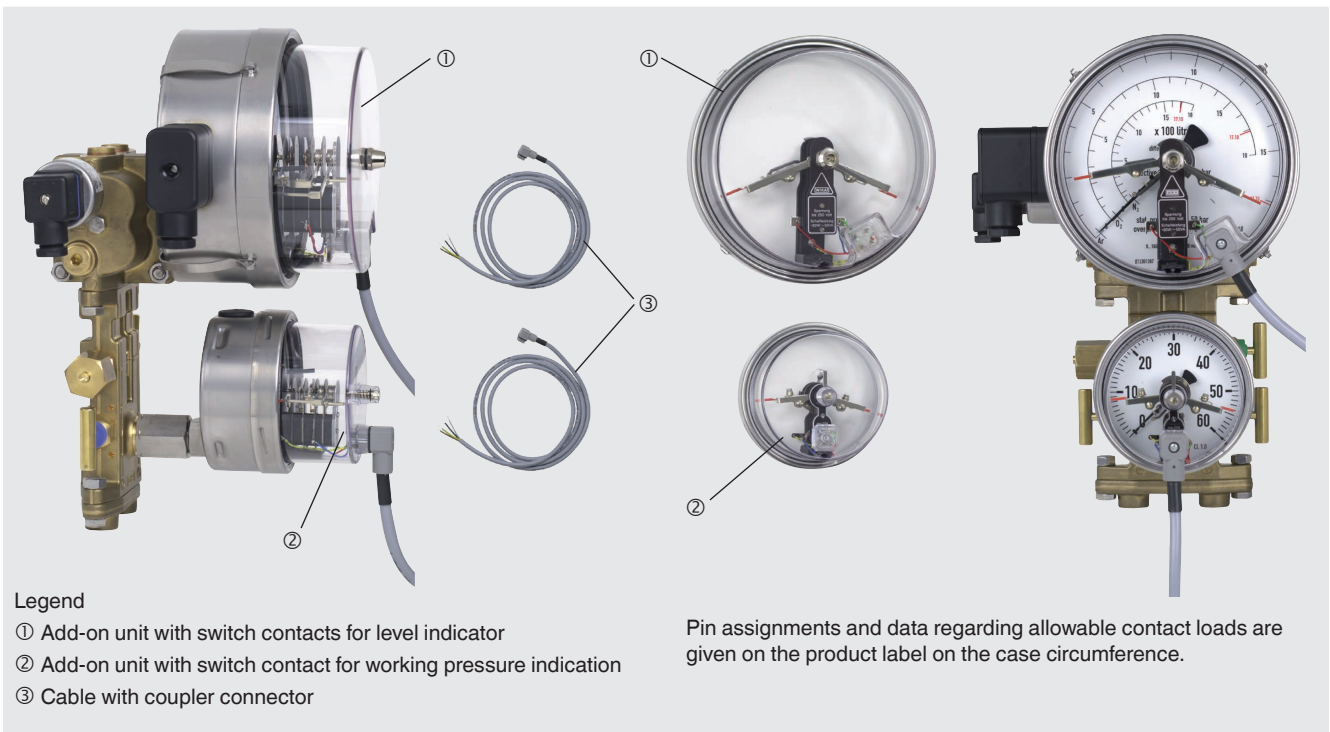
### Switching functions

**Index 1** behind the contact model no. means: **Contact makes** the circuit when the set point is exceeded.

**Index 2** behind the contact model no. means: **Contact breaks** the circuit when the set point is exceeded.

**Index 3** behind the contact model no. means: When the set value is exceeded, one circuit breaks and one circuit makes **simultaneously** (change-over contact).

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



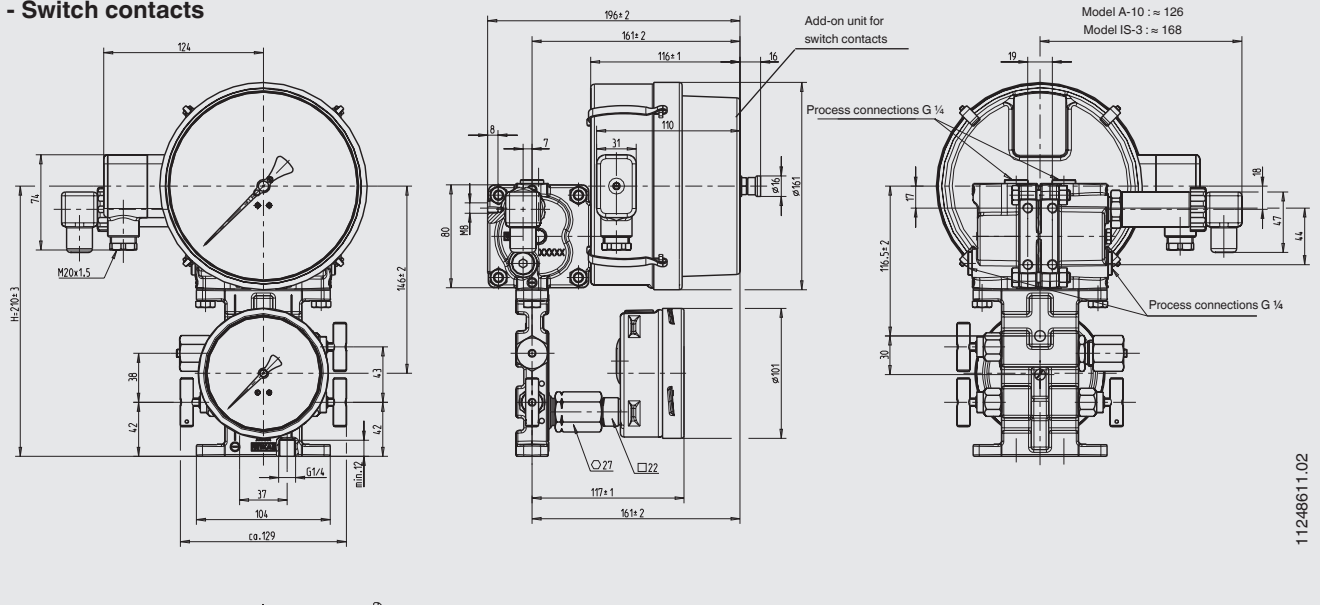
All parts necessary for installation are included in the scope of delivery:

- Cable with coupler connector
- Centring screw M3 x 20
- Sealing

## Dimensions in mm

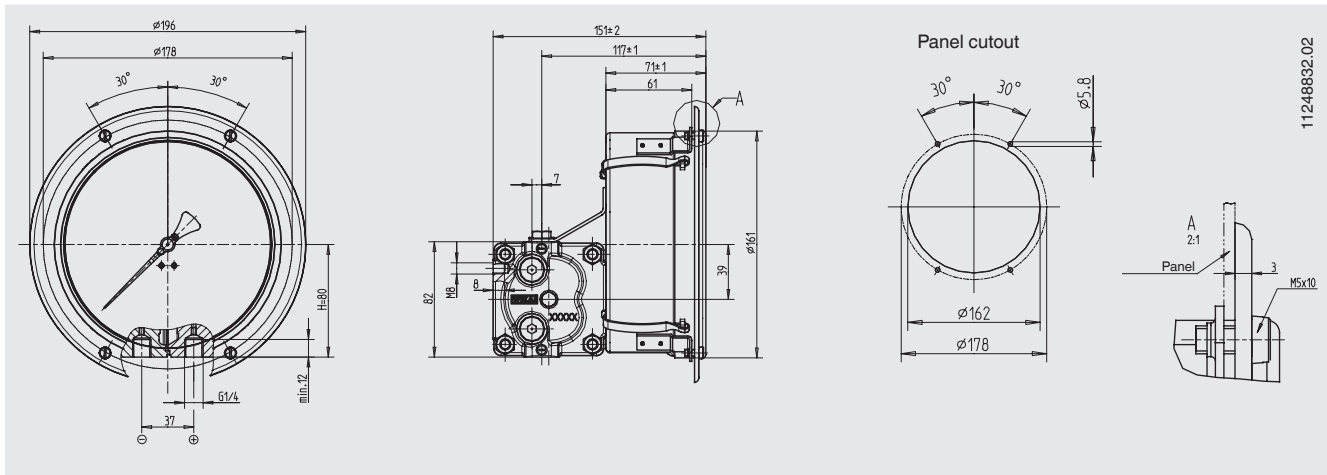
Models 712.15.160 or 732.15.160 with options:

- Valve block with working pressure indication
- Pressure sensor for working pressure
- Switch contacts



## Option

### Panel mounting



## Ordering information

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