



fill level



water level



pressure



temperature



flow



visualization



signal converter



sensoric



PUKK

Leakage probe

*Leakage monitoring
of electrical conductive filling materials*

Technical manual
09.15



Main features

Wide application range

- conductivities with a minimum of 5µS/cm resp. 200kΩ, adjustable
- process temperatures from -20 °C to +60 °C
- materials for aggressive filling materials

Useable for leakage protection

Integrated electronic

- PNP switching output
- Relay output

ACS-CONTROL-SYSTEM
knowledge and systems



Your partner for measuring technology and automation

You have purchased a high-grade and modern measuring device of ACS-CONTROL-SYSTEM GmbH.

We want to give thanks for your purchase and for your confidence to us.

The actual technical manual includes instructions for installation, electrical connection and inauguration, as well as the technical data of the device.

Modifications, that answer the purpose of the technical progress, are reserved by ACS-CONTROL-SYSTEM GmbH without prior notice.

If a question occurs, that can't be answered by the listed informations, please call on our technicians team in Eggenfelden Tel: +49 8721/ 9668-0 or info@acs-controlsystem.de

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Application

The device is a conductive electrode probe and is used for conductive leakage monitoring of electrically conductive filling materials.

The device is constructed for a broad range of application possibilities like e.g. at aggressive process materials or also at very low conductivities.

Function

Signal evaluation

The alternating voltage that is generated by the integrated electronic is applied between the two electrode contacts of the leakage probe.

Due to the use of an alternating voltage the corrosion at the electrodes resp. the electrolytic decomposition of the filling material is avoided.

As soon as the electrically conductive filling material makes a connection between the electrodes, a measurable alternating current flows.

An evaluation circuit supervises this alternating current. A current variation is detected and the evaluation circuit switches the relay resp. the PNP switching output, depending on the set safety function.

The switching state of the output is indicated within the device by an yellow resp. at the version with PNP switching output by one red LED's.

For the adjustment of the response threshold to the conductivity of the liquid the leakage probe can be adjusted by a multi-turn-trimmer.

Safety notes

Each person that is engaged with inauguration and operation of this device, must have read and understood this technical manual and especially the safety notes.

Installation, electrical connection, inauguration and operation of the device must be made by a qualified employee according to the informations in this technical manual and the relevant standards and rules.

The device may only be used within the permitted operation limits that are listed in this technical manual.

Every use besides these limits as agreed can lead to serious dangers.

The materials of the device must be chosen resp. checked for compatibility with the respective application requirements (contacting materials, process temperature). An unsuitable material can lead to damage, abnormal behavior or destruction of the device and to the resulting dangers.

The sensors may not be used as sole device for prevention of dangerous conditions in machines and plants.

The device meets the legal requirements of all relevant EC directives.



Using the device in a manner that does not fall within the scope of its intended use, disregarding this instruction, using under-qualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

Installation

The correct function of the device within the specific technical data can only be guaranteed, if the permitted environmental temperatures (see chapter „Technical data“) will not be exceeded.

Installation notes

The device is intended for floor installation. The device can be fixed at the required installation position by two drill holes.

Install the device at a position or a deepening, where enough filling material can build up in the case of leakage.

The filling material height at the installation place must be minimum 2mm.

Electrical connection

The electrical connection of the device must be carried out according to the respective country specific standards.

Incorrect installation or adjustment could cause applicationally conditioned risks.

For inauguration it is suggested, to deactivate all connected control devices, to avoid unwanted control reactions.

Connection cable

Electrical connection type K – terminal box

For the connection only suitable cables may be used, that fulfills the requirements e.g. regarding temperature, chemical resistance or laying at the place of installation.

The cable gland is suitable for the use of cable diameters 4,5...10mm.

The maximum permitted connection cross-section per terminal is:

Version type GA	1x 2,5 mm ² rigid/ flexible
Version type UB	1x 1,5 mm ² rigid/ flexible

At presence of strong electromagnetic influences a shielded measurement wire should be used resp. installed separated from power leading wires. The cable shield of the connected cable must be connected to earth at one side.

After the installation of the connection cable the cable gland must be fix screwed to ensure the tightness of the enclosure.

After the electrical connection both screws of the cover must be tightened firmly to ensure the tightness of the enclosure.

Supply voltage

The voltage applied to the terminal contacts may not exceed the maximum permitted supply voltage to avoid damage of the electronic.

The maximum permitted supply voltage range is:

Version type GA	21,6...26,4V _{DC}
Version type UB	20...30V _{AC/DC}

All connections are reverse polarity protected.

Switch output

Version type GA - PNP switching output

Inductive loads at the PNP switching output, e.g. relays or contactors may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.

The load at the PNP switching output will be connected to the terminal +terminal of the supply voltage by a semiconductor switch contactless and by this bounce-free.

At an activated switching state a positive signal near supply voltage is feed to the output.

At deactivated switching state and at failure of supply voltage the semiconductor switch is shut off.

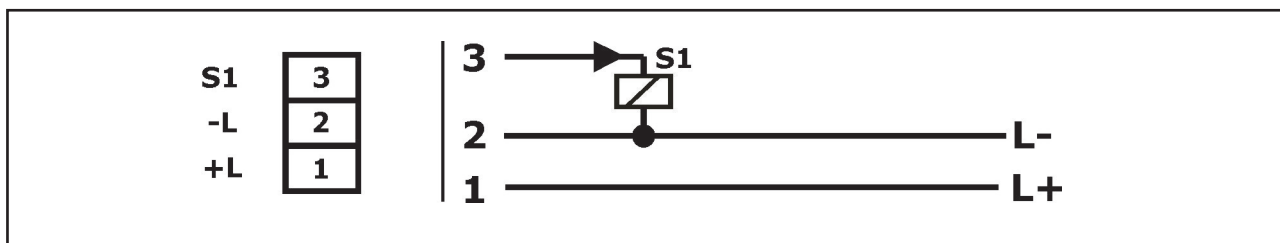
The PNP switching output is current limited to 0,5 A and is overload and short circuit protected.

Version type UB - Relay output

Inductive loads at the relay contacts, e.g. auxiliary contactors or magnetic vents may only be used with a free-wheeling diode or a RC protection circuit to avoid high voltage peaks.

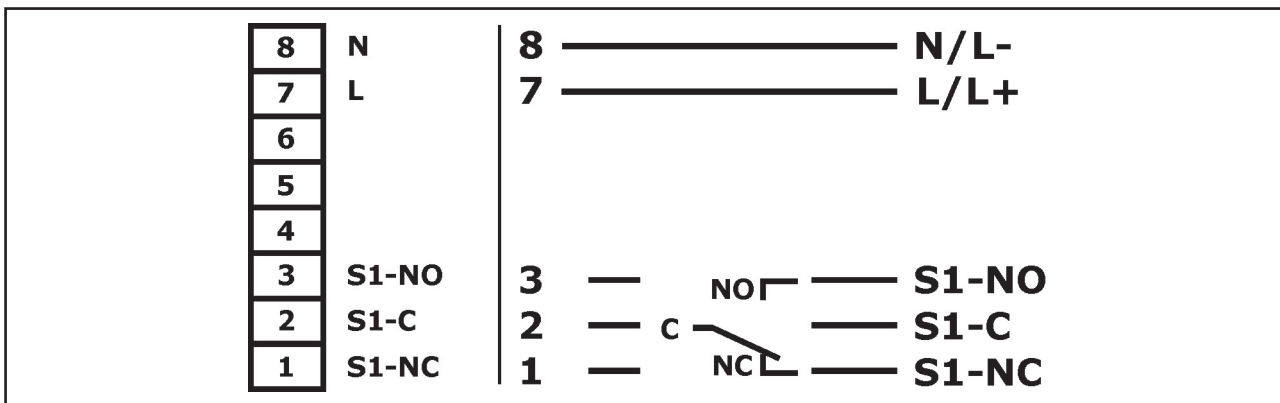
Connection scheme

Version type GA –PNP switching output



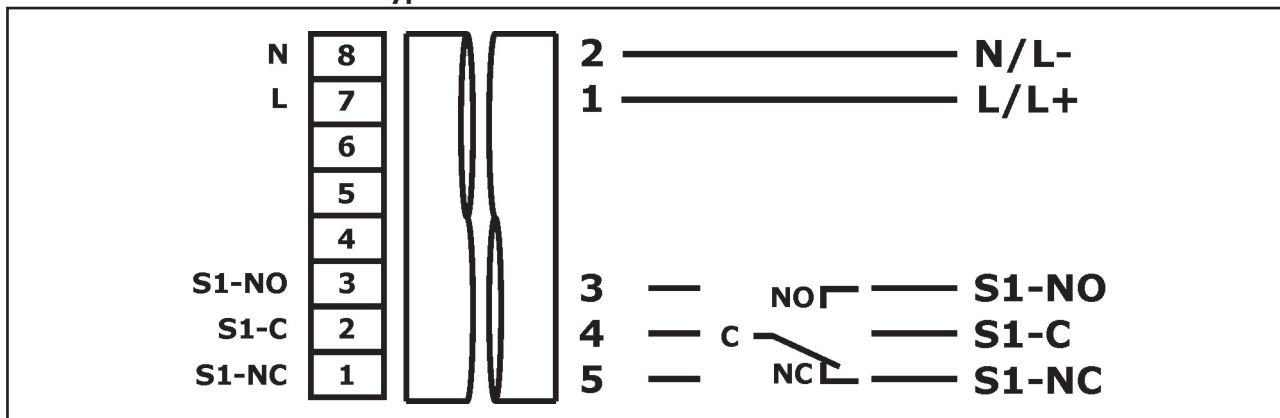
Version type UB –Relay output

- Electrical connection type K – terminal box



The relay contacts shows the contact state at power off

- Electrical connection type V – cable

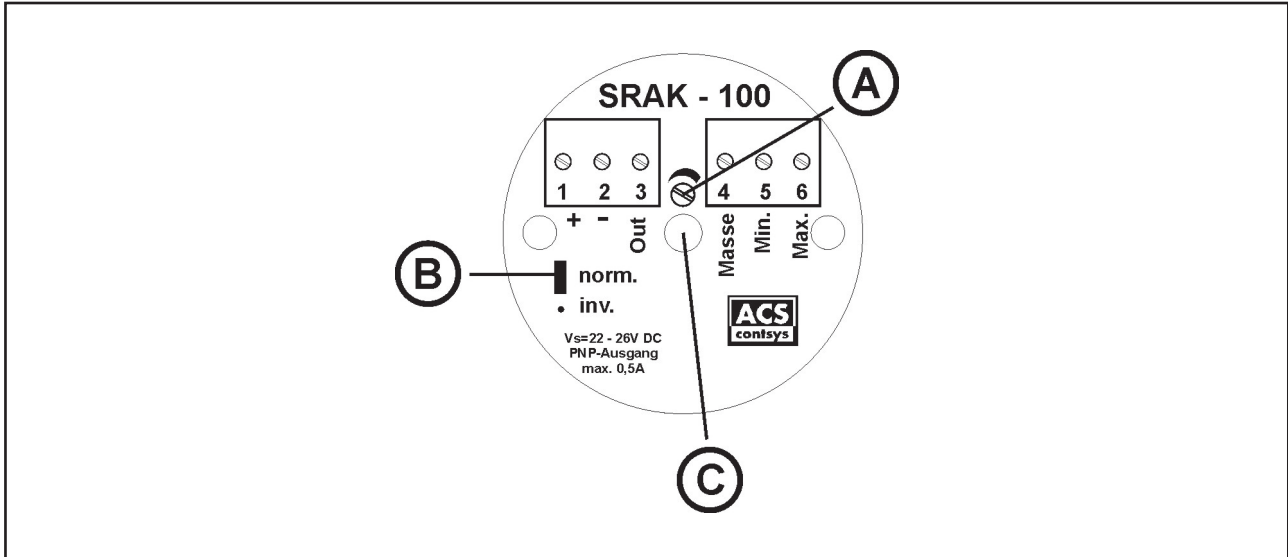


The relay contacts shows the contact state at power off

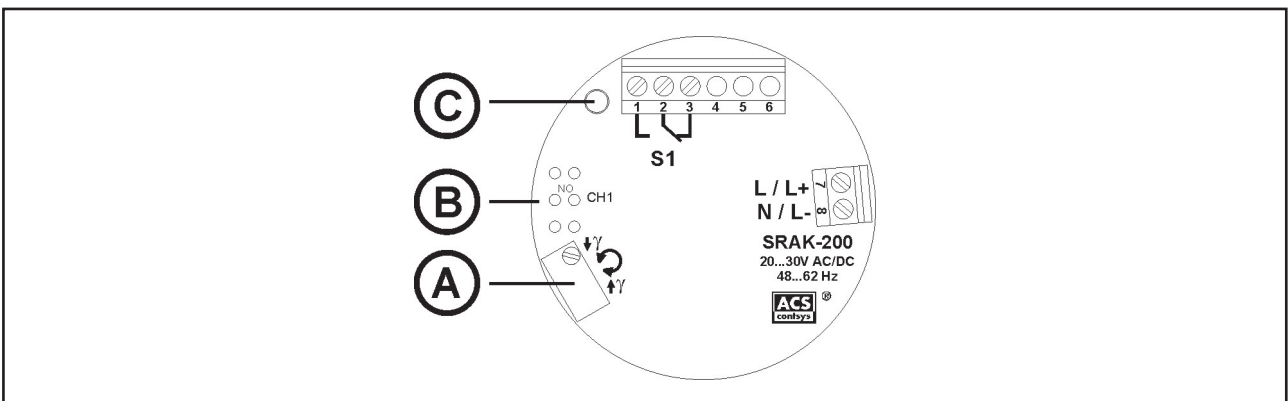
Operation

Operation and display parts

- Version GA – PNP switching output



- Version type UB – Relay output



- A – Adjustment trimmer
- B – Configuration jumper
- C – Function indicator output S1

Adjustment

The adjustment trimmer is used for fine adjustment of the response sensitivity within the sensitivity range.

A turn to the right leads to a switching reaction at the output relays resp. PNP switching output at a higher liquid resistance resp. lower conductivity.

For adjustment proceed like follows (Operation mode no):

- Liquid must create an electrically conductive connection between measuring and reference electrode.
- Turn adjustment trimmer to the left (counterclockwise), till the output switches off.
- Turn adjustment trimmer to the right (clockwise), till the output switches on.
- Turn adjustment trimmer by an additional half turn to the right (clockwise).

Operation mode

The operating mode defines the function direction of the switch output normal no or inverse in.









Normal mode - no

The output signal switches off, if the switching level is underrun (no liquid connection between both electrodes) or the power supply fails.

Inverse mode - in









The output signal switches off, if the switching level is exceeded (liquid connection between both electrodes) or the power supply fails.

- Version type GA – PNP switch output
 - Normal mode no = Jumper Norm. plugged
 - Inverse mode in = Jumper Inv. plugged

	S1 - no		S1 - in	
	LED	S1	LED	S1
$U_s = 0V$	●		●	
$L \leq SP$	●		 RD	
$L \geq SP$	 RD		●	

U_s = supply voltage / L = filling level / SP = switch level
LED color: RD = red

- Version type UB – Relay output
 - Normal mode no = Jumper no plugged
 - Inverse mode in = Jumper no not plugged

	S1 - no		S1 - in	
	LED	S1	LED	S1
$U_s = 0V$	●		●	
$L \leq SP$	●		 YE	
$L \geq SP$	 YE		●	

U_s = supply voltage / L = filling level / SP = switch level
LED color: YE = yellow

Maintenance

The device is free of maintenance.

Special substances can lead to solid coatings.

Seized depositions can lead to faulty measurement results.

In the case of coat forming liquids the probe must be regularly cleaned e.g. with clear water or a common vinegar cleaning agent (lime).

Repair

A repair may only be carried out by the manufacturer.

If the device must be sent back for repair, the following informations must be enclosed:

- An exact description of the application.
- The chemical and physical characteristics of the product.
- A short description of the occurred error.

Before returning the device for repair, the following measures must be proceeded:

- All adhesive product residues must be removed. This is especially important, if the product is unhealthily, e.g. caustic, toxic, carcinogenic, radioactive etc.
- A returning must be refrained, if it is not possible by 100% to remove the unhealthily product completely, because e.g. it is penetrate into cracks or is diffused through plastic.

Technical Data

Auxiliary power supply

Version type GA – DC voltage 24V

Supply voltage U_s	16..45 V _{DC} , reverse polarity protected
Residual ripple U_{pp}	$\leq 0,5 V_{pp} / U_{Smin} \leq U_s \leq U_{Smax}$
Supply power P_{in}	$\leq 1 W$ Switch output with no load
Overvoltage category	II (EN/IEC 61010-1)
Protection classification	II (double or reinforced isolation)
Isolation voltage	1kV~ Auxiliary power / PNP switching output to electrodes

Version type UB – AC/DC voltage 24V

Supply voltage U_s	20..30 V _{AC/DC} , 48...62 Hz, reverse polarity protected
Supply power P_{in}	$\leq 1,75 VA / 1 W$
Overvoltage category	II (EN/IEC 61010-1)
Protection classification	II (double or reinforced isolation)
Isolation voltage	2,5kV~ Auxiliary power to relay output to electrodes

Input

Conductivity	<u>Version type GA</u> $\geq 10\mu S/cm$ resp. $\leq 100k\Omega$ <u>Version type UB</u> $\geq 5\mu S/cm$ resp. $\leq 200k\Omega$
Electrode signal	$9V_{SS} \pm 1V / 90Hz \pm 15Hz / \leq 1,5mA$

Output Switch output

Start-up time t_{on}	$\leq 1s$
Step response time t_r	1...2s

Version type GA – PNP switch output

Function	PNP switching to L+
Output voltage U_{out}	$U_{out} \geq U_s - 2V$
Output current I_l	$0... \leq 500mA$, current limited, short circuit protected
Cutoff current I_{l-off}	$\leq 100\mu A$
Rise time T_{90}	$< 30\mu s$ ($R_l < 3k\Omega / I_{out} > 4,5mA$)
Switch cycles	$\geq 100.000.000$

Version type UB – Relay output

Function	Changing contact
Contact data	$\leq 30V_{AC/DC} - 2A - 62,5VA / 60W$ (at ohmic load) $\geq 100\mu V$
Switch cycles	≥ 100.000 at maximum contact load

Measuring accuracy

Reference conditions	EN/IEC 60770-1 resp. EN/IEC 61003-1
	T = 25 °C, relative humidity 45...75 %, environmental air pressure 860...1060 kPa
Calibration conditions	Test medium water Mounting position horizontal Supply voltage 24 V _{DC}
Warm-up time	≤ 60 s
Temperature deviation	≤ ±0,5% FS ²⁾ / 10K

²⁾ Referring to nominal measuring span resp. full scale (FS)

Process conditions

Process temperature	-20°C...+60°C
Process pressure	pressureless

Environmental conditions

Environmental temperature	-20°C...+60°C
Protection	IP68 [≤ 1 mWs-1h] (EN/IEC 60529)
Climatic classification	4K4H [-20...+55°C / 4...100%] (EN/IEC 60721-3-4)
Shock classification	15g [11ms] (EN/IEC 60068-2-27)
Vibration classification	4g [10...500Hz] (EN/IEC 60068-2-6)
EM compatibility	Operation device class B / Industrial range (EN/IEC 61326)
Weight	0,25kg

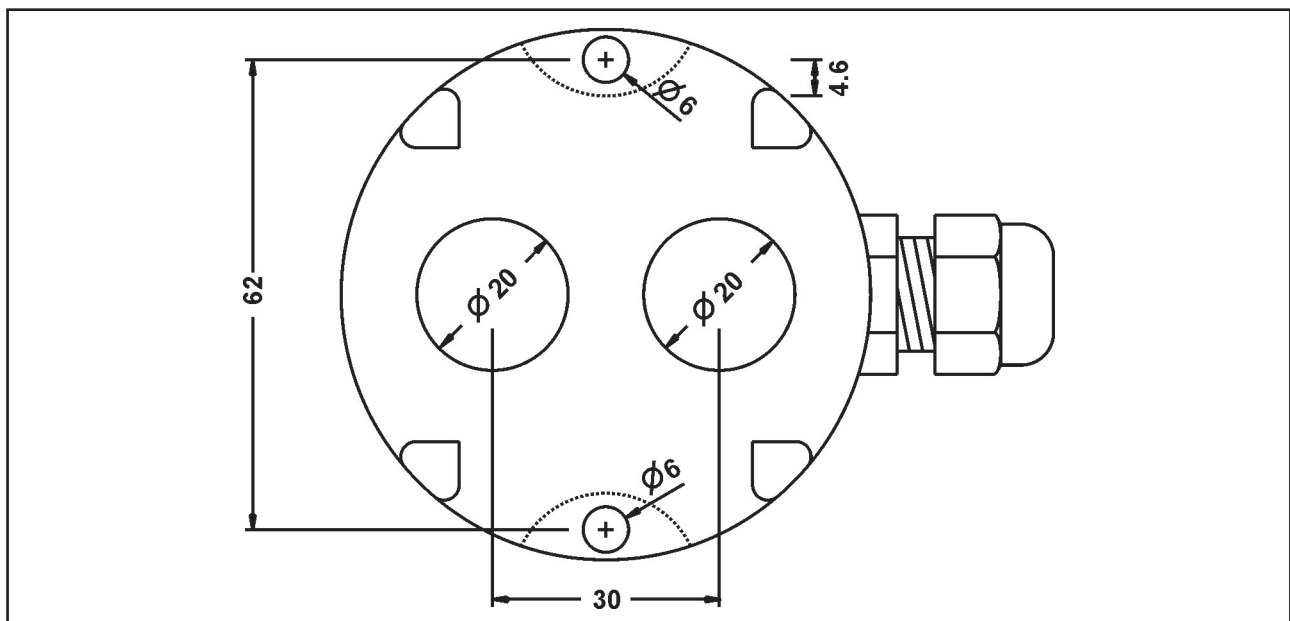
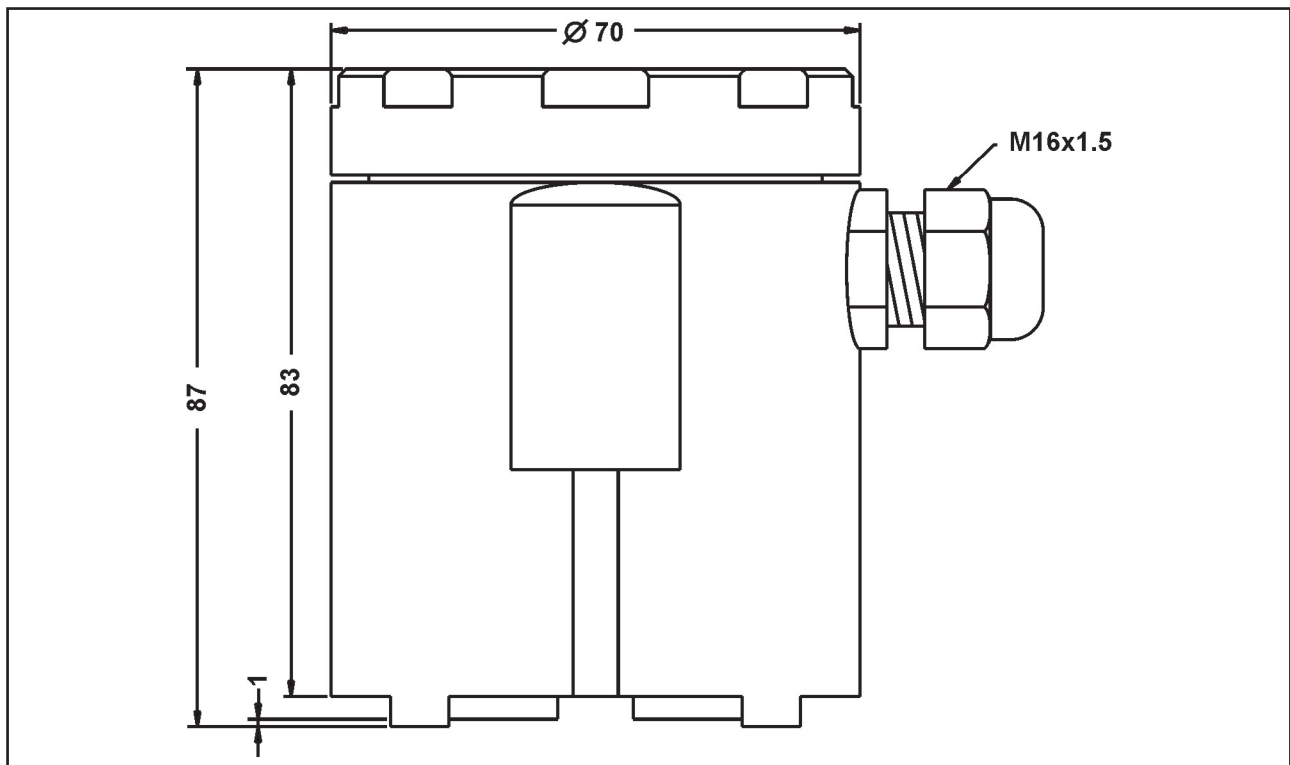
Materials - process wetted

Electrodes	Steel 1.4404 (316L) / 1.4571 (316Ti) Hastelloy C4
Enclosure	POM – polyoxymethylene (Delrin®) PP – polypropylene PTFE – polytetrafluorethylene (Teflon®)
Gaskets	<i>Material enclosure type D - POM / type P - PP</i> NBR –nitril-butadien-rubber <i>Material enclosure type T - PTFE</i> FFKM – perfluorelastomere (Kalrez®)

Materials - not process wetted

Cable gland	<i>Electrical connection type K – terminal box</i> Cable gland PA Gasket CR / NBR <i>Electrical connection type V - cable</i> Cable gland PA Potting PUR
Gaskets	NBR –nitril-butadien-rubber
Cable	<i>Electrical connection type V - cable</i> Silicone

Dimension drawings



Order Code

- Electrical connection**
K Terminal box
V Cable 5m - silicone
Y Cable other length
- Electronic supply**
G DC voltage 24V
U AC / DC voltage 20 ... 30V AC / DC
- Electronic output**
A 1x PNP switching output (only at Electronic supply type G)
B 1x Relay output (only at Electronic supply type U)
- Type**
2 2 electrodes, 1 limit value
- Process connection**
A Screw mounting
- Material electrodes** (process wetted)
A Steel 1.4404 (316L) / 1.4571 (316Ti)
D Hastelloy C4
Y others
- Material enclosure** (process wetted)
D POM – polyoxymethylene (Delrin®)
P PP – polypropylene
T PTFE – polytetrafluorethylene (Teflon®)

PUKK

2 A

Installation material and connection cable are not enclosed in contents of delivery.

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