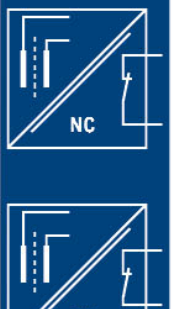
Conductive leakage detectors of the Leckwatcher range

for extra low voltage SELV or PELV, for connection to a PLC or DDC unit, a small controller, a fieldbus connector or a network connector



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Contents

The units described in this documentation may only be installed, connected and started up by suitably qualified personnel!

Subject to deviations from the diagrams and technical data.

The details in this brochure are product specification descriptions and do not constitute assured properties in the legal sense.

“Leckwatcher” - general information

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

2-wire version: direct current voltage supply and switching signal via a two-wire cable

3-wire version: 2 wires for direct or alternating supply voltage and 1 wire for PNP transistor output

4-wire version: 2 wires for direct or alternating supply voltage and 2 wires for potential-free output via reed contact

The integrated galvanic separation avoids interconnection of the electrode circuits and the formation of ground loops if more than one detector is connected to a single supply current circuit.

The detectors are designed in line with the peripheral interface standard for electronic controllers (power supply and binary interfaces).

The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.

Types of detectors:

Point sensors: leakage detectors which can detect leakage at a specific point:
- plate electrodes
- wall-mounted electrodes
- rod electrodes
- suspension electrodes

Line sensors: leakage detectors which can detect a leakage over the entire length of their electrode leads:
- cable electrodes
- tape electrodes

Surface sensors: leakage detectors which can detect a leakage over the entire surface area of a network of interconnected electrode leads:
- sleeve electrodes

“Leckwatcher” with 2-wire technology

The conductive leakage detectors with 2-wire technology are designed for the detection of leakage of conductive liquids.

Connection: **Only for connection to extra low voltage SELV or PELV!**
2 wires for the supply of direct voltage; fully functional with any polarity and short-circuit proof.

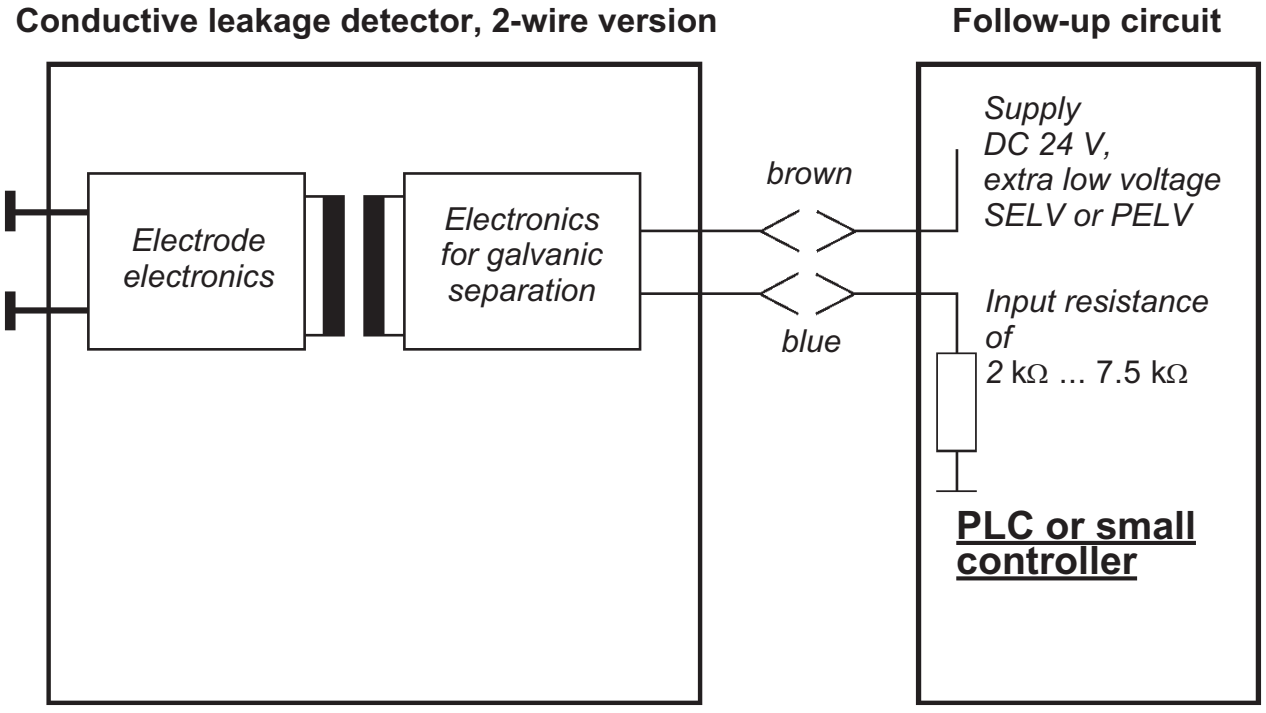
Power consumption differs depending on whether the detector is in activated or non-activated status. This differential is used to generate the corresponding binary switching signal at the input resistance of the follow-up circuit.

The input resistance must be in the range from 2 kΩ to 7.5 kΩ.

Supply voltage	Low signal	High signal
DC 24 V	Voltage drop at the input resistance $I_{Low} \times R_i < 5$ V	Voltage drop at the input resistance $I_{High} \times R_i > 15$ V
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.		

Series or parallel connection of detectors of this type is not permitted.

Application example:



“Leckwatcher” with 3-wire technology

The conductive leakage detectors with 3-wire technology are designed for the detection of leakage of conductive liquids.

Connection: **Only for connection to extra low voltage SELV or PELV!**
2 wires for the supply of direct or alternating voltage; fully functional with any polarity;
1 wire for the PNP transistor output, reverse polarity protected and short-circuit proof.

The PNP transistor output is in a different switching status depending on whether the detector is in activated or non-activated status.

With a Low signal, there is no voltage at the PNP transistor output; with a High signal, the rectified supply voltage is present at the output.

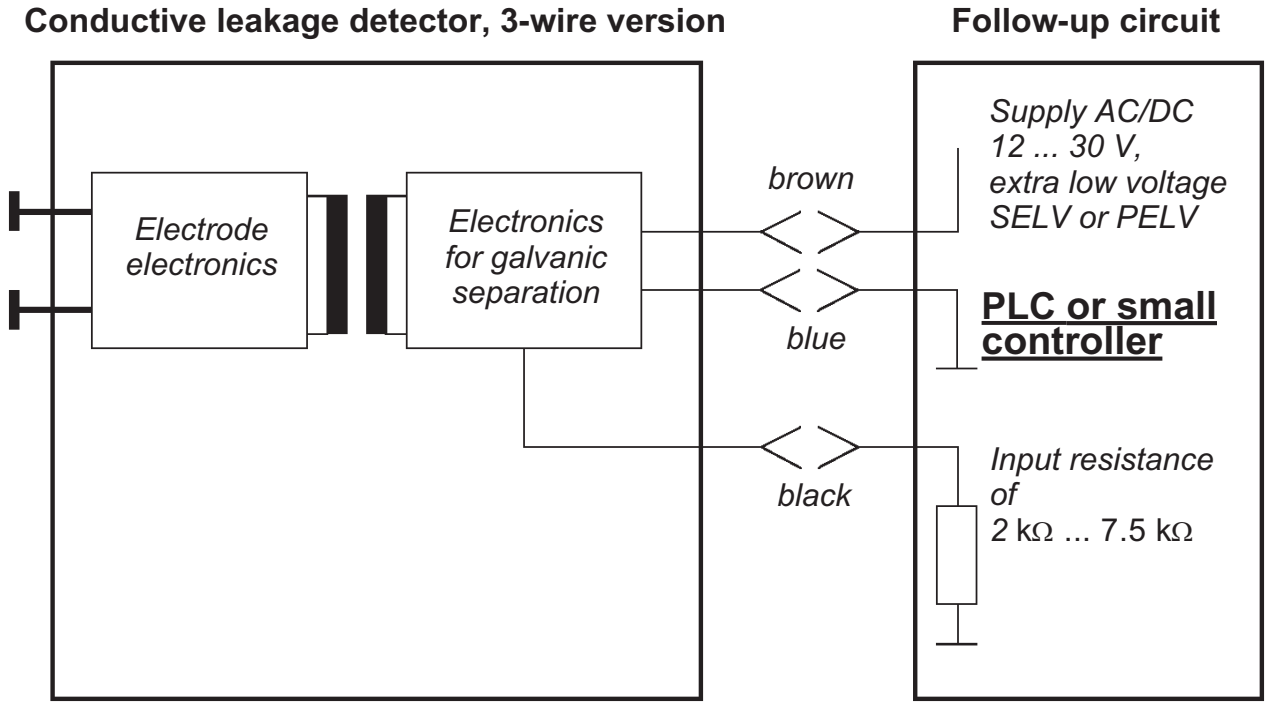
This binary switching signal is implemented accordingly at the input resistance of the follow-up circuit.

The input resistance must be in the range from 2 kΩ to 7.5 kΩ.

Supply voltage	Low signal	High signal
AC/DC 12 ... 30 V	No voltage at the PNP transistor output	Rectified supply voltage at the PNP transistor output
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.		

Series or parallel connection of detectors of this type is not permitted.

Application example:



“Leckwatcher” with 4-wire technology (with potential-free reed contact output)

The conductive leakage detectors with 4-wire technology are designed for the detection of leakage of conductive liquids.

Connection: **Only for connection to extra low voltage SELV or PELV!**
2 wires for the supply of direct or alternating voltage; fully functional with any polarity;
2 wires for the potential-free reed contact output.

The reed contact is open or closed depending on whether the detector is in activated or non-activated status, respectively.

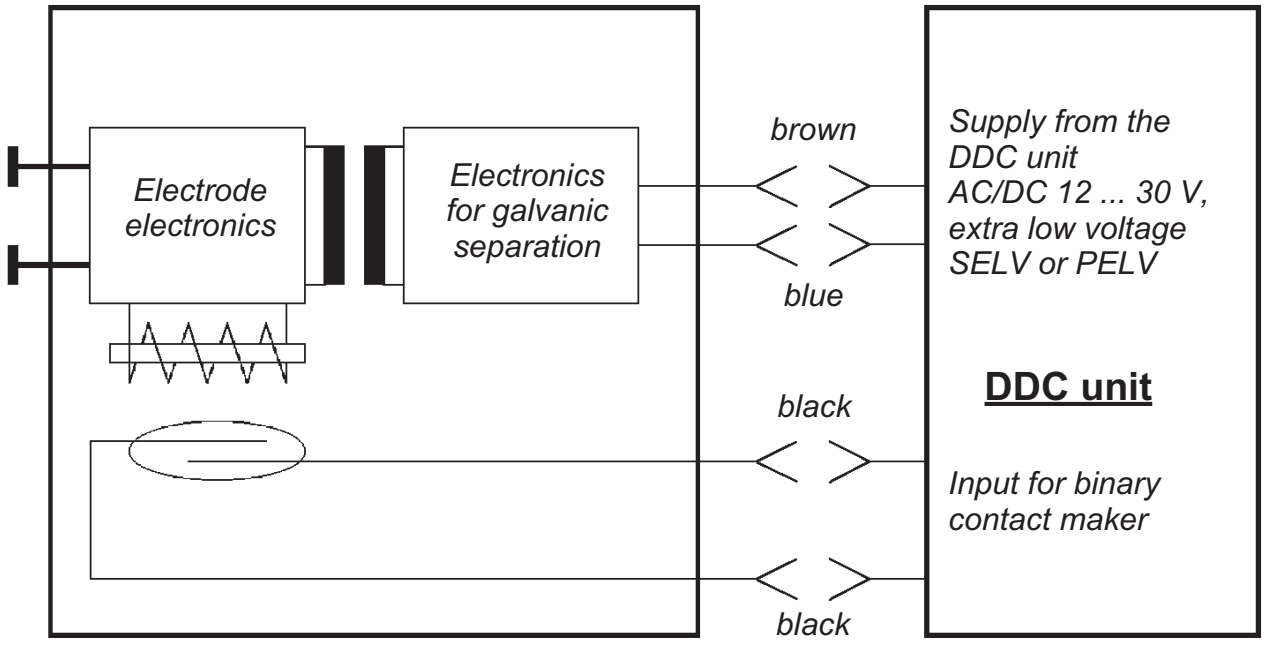
The reed contact is an NO (make) contact, and its switching status is implemented in the follow-up circuit.

Supply voltage	Low signal	High signal
AC/DC 12 ... 30 V	Potential-free reed contact open	Potential-free reed contact closed
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.		

Series or parallel connection of these detectors is possible, also in combination with other potential-free contacts. In such cases, you must observe the relevant technical data and safety regulations.

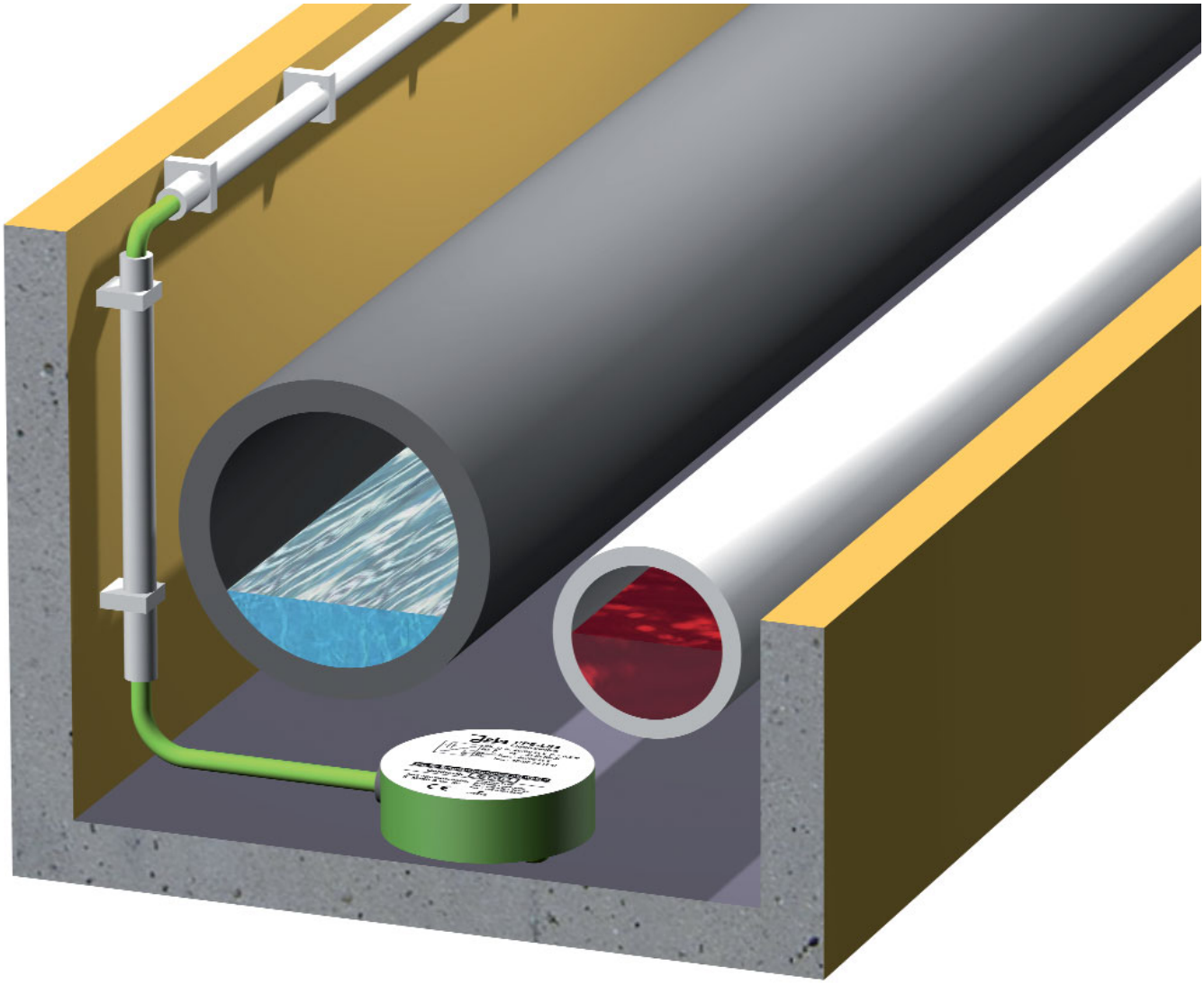
Application example:

Conductive leakage detector, 4-wire version **Follow-up circuit**



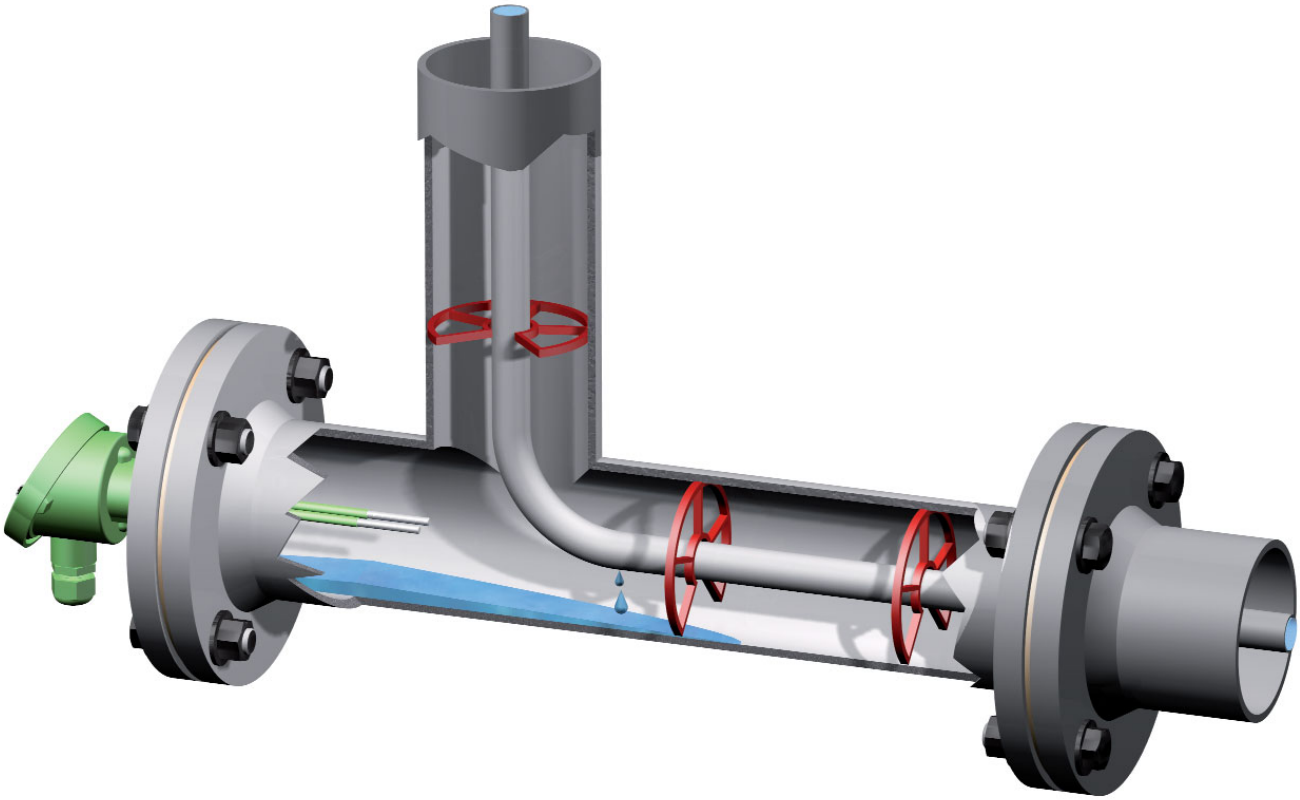
Leakage detection with “Leckwatcher” point sensors

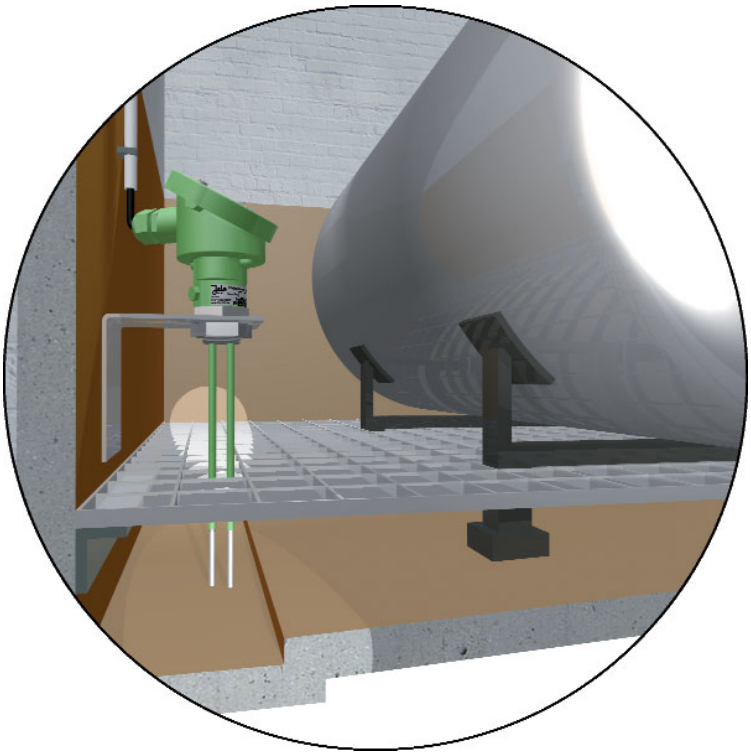
Application example for plate electrodes



Leakage detection with “Leckwatcher” point sensors

Application examples for rod electrodes





Leakage detection with “Leckwatcher” point sensors

Application example for suspension electrodes

Plate electrodes PEK-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

Plate electrodes should only be used in normally dry environments. They must be installed on the floor in such a way that the sensor side faces downwards and the label side upwards.

The plate electrodes PEK-SPS. are fitted with two separate electrodes in the form of two electrode plates: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the two electrode plates, the switching status of the leakage detector changes.

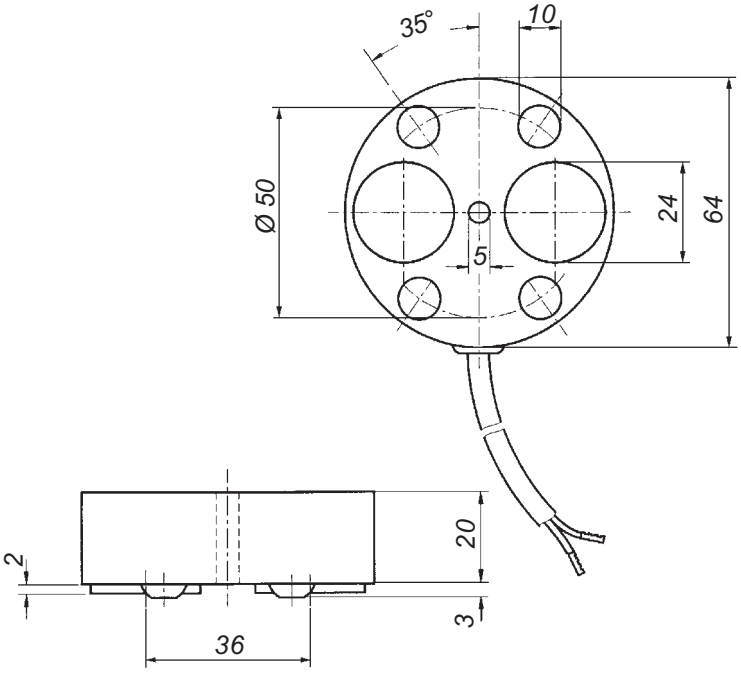


Plate electrode PEK-SPS., sensor side

Plate electrode PEK-SPS., label side

Technical data	PEK-SPS2	PEK-SPS3	PEK-SPS4
Design	quiescent current or NC (break) contact		
Electrode plates	2 plates made of stainless steel 316 Ti, each with 24 mm dia.		
Housing	PP and cast resin		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 m, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; however, the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode plates	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode plates	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V_{eff} ⊓⊔ 600 Hz		
Max. short-circuit current at the electrodes	0.2 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting cable between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

Plate electrodes WDX-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

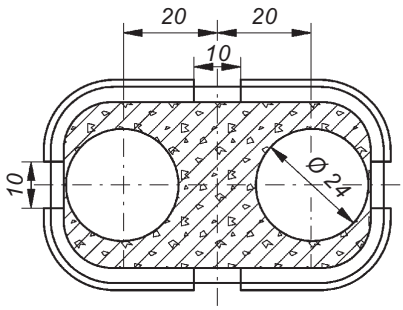
- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

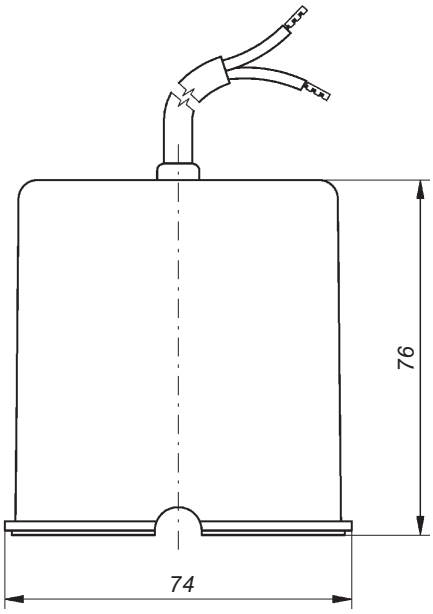
Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

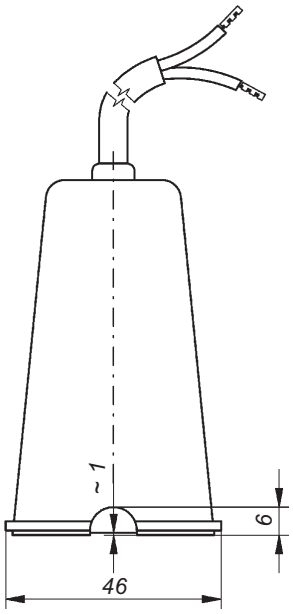
Plate electrodes should only be used in normally dry environments. They must be installed on the floor in such a way that the sensor side faces downwards and the connection side upwards.

The plate electrodes WDX-SPS. are fitted with two separate electrodes in the form of two electrode plates: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the two electrode plates, the switching status of the leakage detector changes.

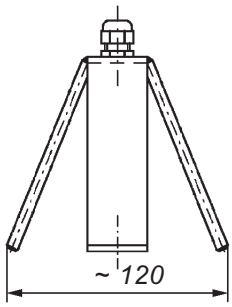
Plate electrode WDX-SPS.

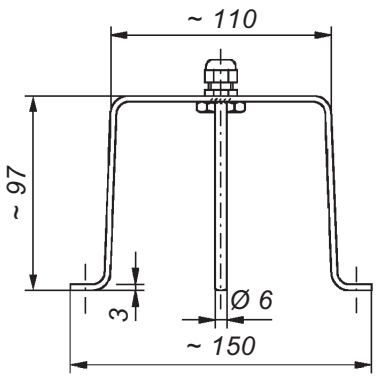


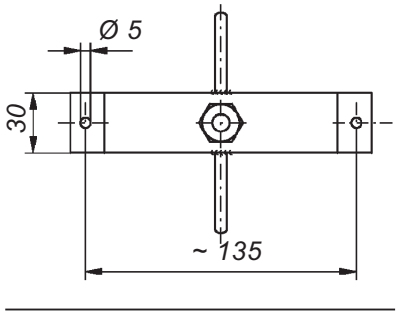




Optional: mounting stand
(diagrams with smaller scale compared to below drawings)







Technical data	WDX-SPS2	WDX-SPS3	WDX-SPS4
Design	quiescent current or NC (break) contact		
Electrode plates	2 plates made of stainless steel 316 Ti, each with 24 mm dia.		
Housing	PP and cast resin		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 m, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode plates	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode plates	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V_{eff} ⊓⊔ 600 Hz		
Max. short-circuit current at the electrodes	0.2 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting lead between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

Wall-mounted electrodes WAE1-SPS.

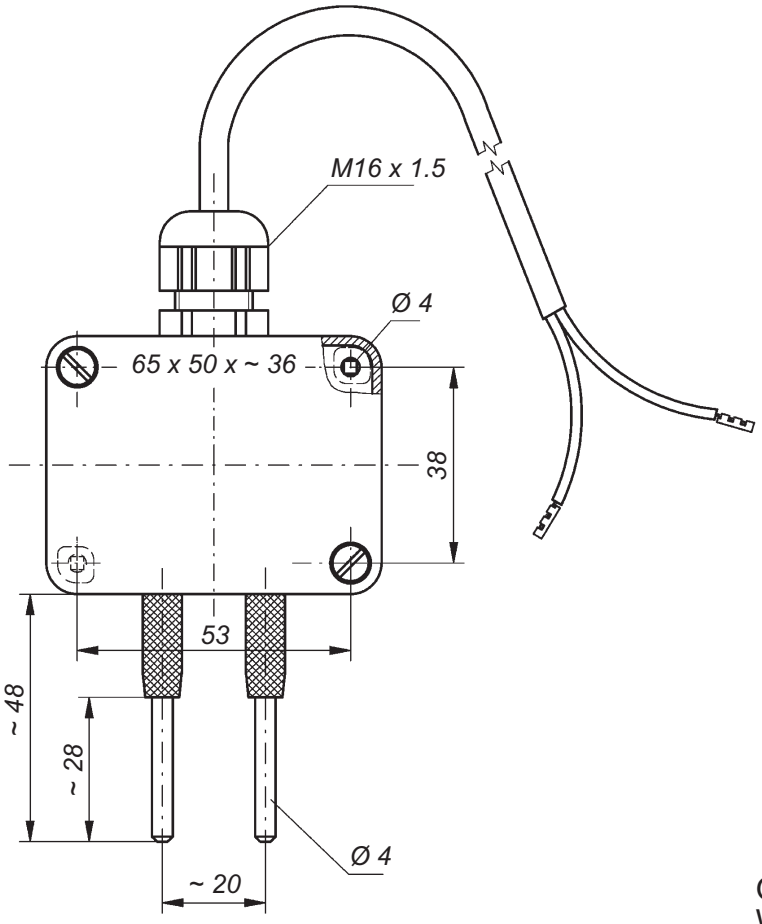
Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

Wall-mounted electrodes should only be used in normally dry environments. They must be mounted on the wall in such a way that the electrode tips are just slightly above the floor to be monitored.

The wall-mounted electrodes WAE1-SPS. are fitted with two separate electrodes in the form of two electrode rods: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the two electrode rods, the switching status of the leakage detector changes.



On request:
WAE2-SPS. with bigger housing and internal connection terminals (without connecting cable)

Technical data	WAE1-SPS2	WAE1-SPS3	WAE1-SPS4
Design	quiescent current or NC (break) contact		
Electrode rods	2 rods made of stainless steel 316 Ti, each with 4 mm dia.		
Housing	PC or PP		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 m, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode rods	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode rods	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	10 V_{eff} ⊓⊔ 60 Hz		
Max. short-circuit current at the electrodes	0.1 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting lead between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

Rod electrodes S 2 M/PP-SPS., S 2 M/PVDF-SPS. and S 2 AM-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

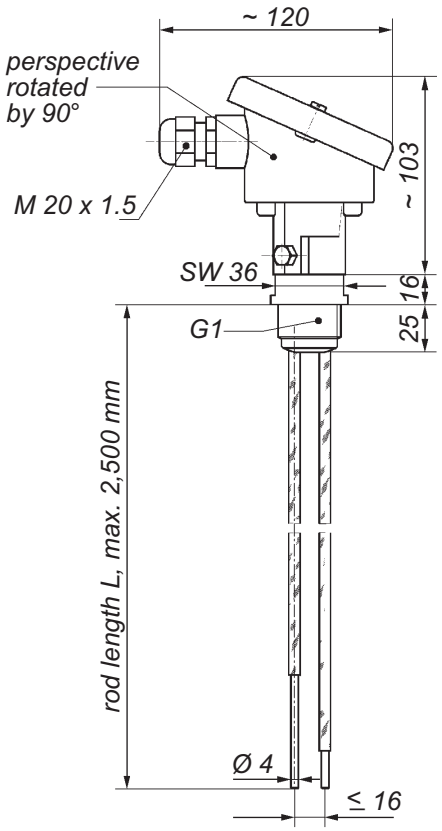
Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

Rod electrodes should only be used in normally dry environments. They can be installed from the top or from the side. In both cases, it must be ensured that the rod tips are just slightly above the floor to be monitored.

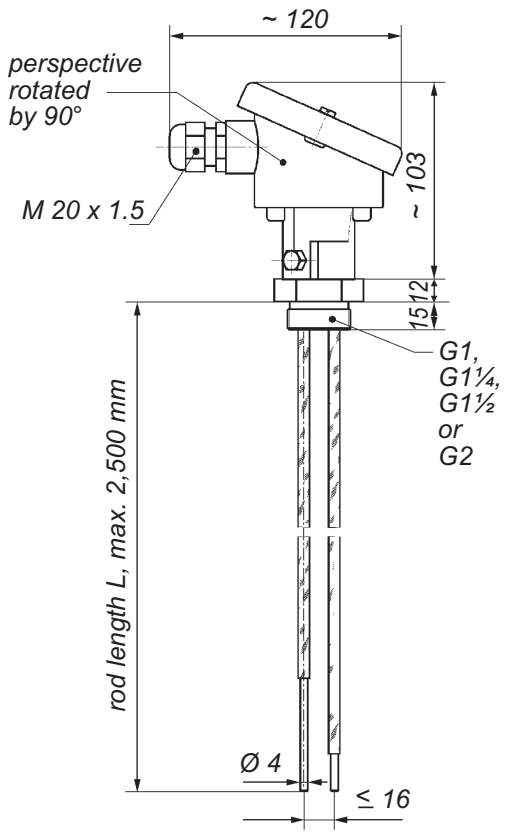
The rod electrodes S 2 M/PP-SPS., S 2 M/PVDF-SPS. and S 2 AM-SPS. are fitted with two separate electrodes in the form of two electrode rods: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the two electrode rods, the switching status of the leakage detector changes.

S 2 AM-SPS.

S 2 M/PP-SPS. or
S 2 M/PVDF-SPS.



S 2 AM-SPS.



Technical data	**S 2 M/PP-SPS2 S 2 M/PVDF-SPS2 S 2 AM-SPS2**	**S 2 M/PP-SPS3 S 2 M/PVDF-SPS3 S 2 AM-SPS3**	**S 2 M/PP-SPS4 S 2 M/PVDF-SPS4 S 2 AM-SPS4**
Design	quiescent current or NC (break) contact		
Electrode rods	2 rods made of stainless steel 316 Ti; other materials (e.g. titanium, Hastelloy, Monel or tantalum) on request; each with 4 mm dia., covered with polyolefin shrinkdown tubing (shrinkdown tubing made of PVDF or PTFE on request)		
Lengths	on request (measured from nipple sealing surface)		
Max. lengths	2,500 mm		
Screw-in nipple	S 2 M/PP-SPS.: PP, G1; S 2 M/PVDF-SPS.: PVDF, G1; S 2 AM-SPS.: stainless steel 316 Ti, other materials on request, G1		
Electrical connection	**two-wire connection** via 2-pole terminal block for max. 2.5 mm²	**three-wire connection** via 3-pole terminal block for max. 2.5 mm²	**four-wire connection** via 4-pole terminal block for max. 2.5 mm²
	in the PP connection head with cable entry M 20 x 1.5, protection class IP 54		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V	AC/DC 12 ... 30 V
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W;
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode rods	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode rods	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V_{eff} ⊓⊔ 600 Hz		
Max. short-circuit current at the electrodes	0.2 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting lead between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

Suspension electrodes EHE-SPS. and EHW3-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

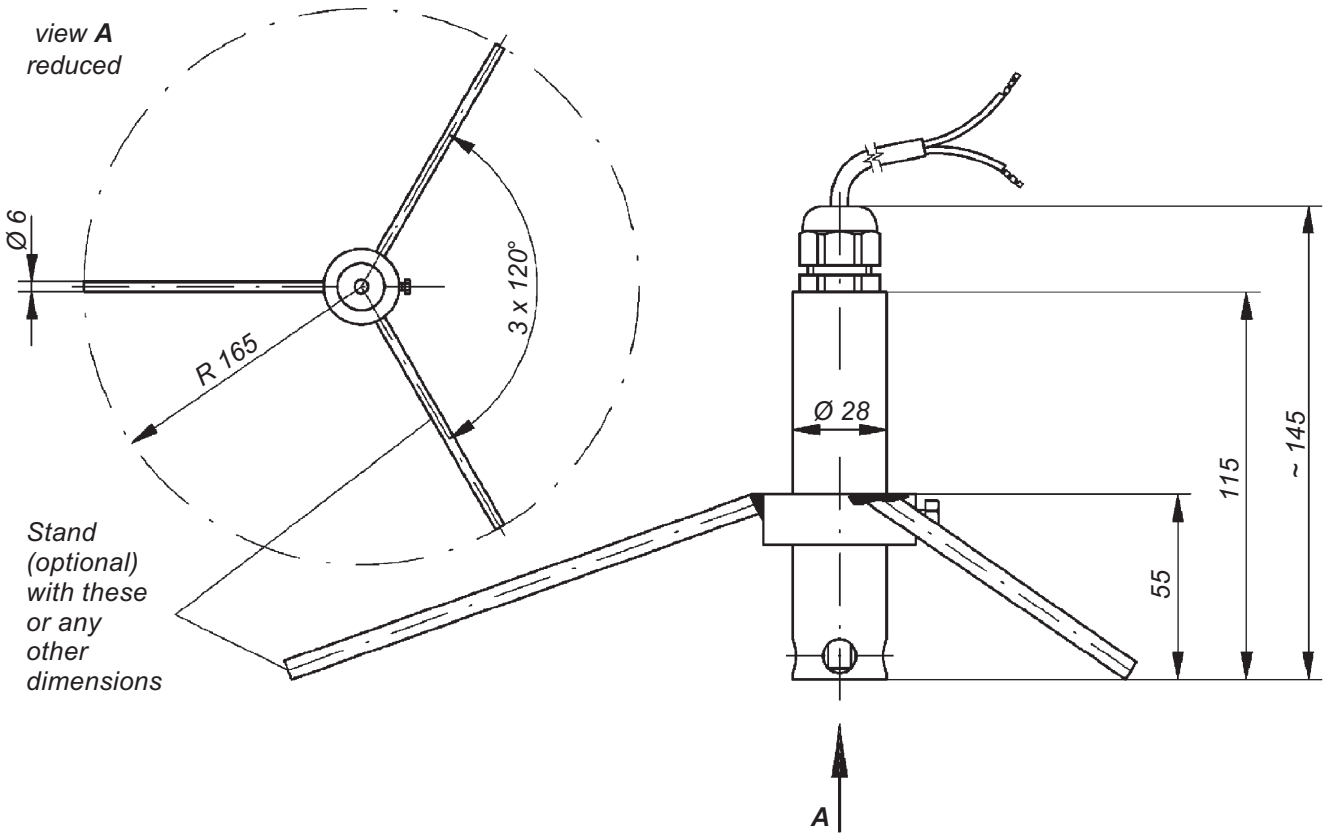
Suspension electrodes should only be used in normally dry environments. They must be mounted in suspended mode from above (or in the case of the types EHE-SPS. in an upright position using a mounting stand) in such a way that the sensor electrodes are just slightly above the floor to be monitored.

In the suspension electrodes EHE-SPS., the metal housing and a concentrically positioned electrode rod in the housing form an electrode pair; the suspension electrodes EHW3-SPS. are fitted with two separate electrodes in the form of two electrode rods: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the control electrode and the earth electrode, the switching status of the leakage detector changes.

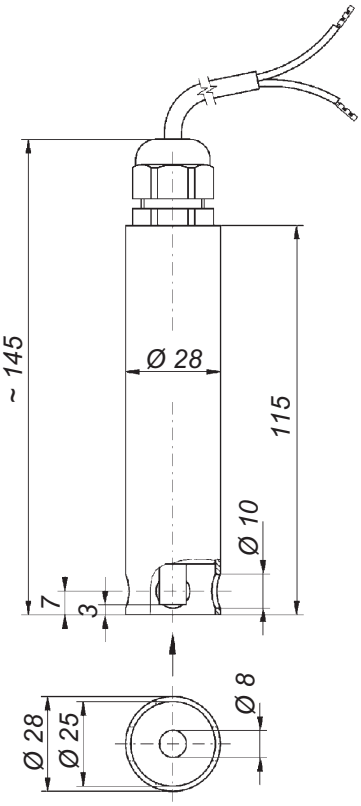
EHE-SPS. **EHE-SPS. with mounting stand** **EHW3-SPS.**

Technical data	EHE-SPS2	EHE-SPS3	EHE-SPS4
Design	quiescent current or NC (break) contact		
Electrode rod	1 rod made of stainless steel 316 Ti, with 8 mm dia.		
Housing	stainless steel 316 Ti and PTFE		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 m, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode rod + housing	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode rod + housing	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V_{eff} ⊓⊔ 600 Hz		
Max. short-circuit current at the electrodes	0.2 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting lead between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

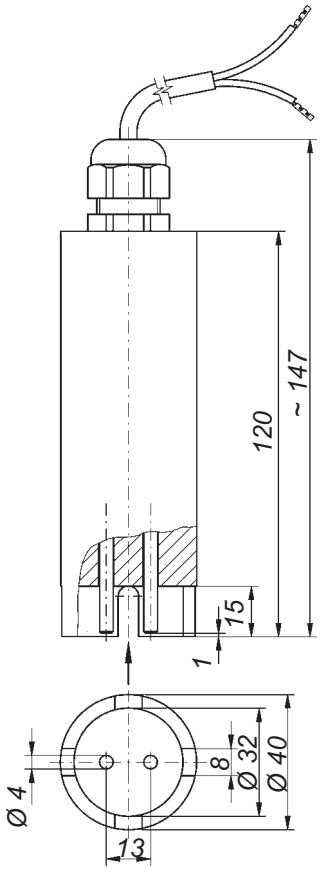
Technical data	EHW3-SPS2	EHW3-SPS3	EHW3-SPS4
Design	quiescent current or NC (break) contact		
Electrode rods	2 rods made of stainless steel 316 Ti, each with 4 mm dia., other materials (e.g. titanium, Hastelloy, Monel or tantalum) on request		
Housing	PP; other materials (e.g. PVC, PVDF or PTFE) on request		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 m, longer connecting cable on request; connecting cable made of CM or PTFE on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry electrode rods	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet electrode rods	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V_{eff} ⊓⊔ 600 Hz		
Max. short-circuit current at the electrodes	0.2 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting lead between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		



EHE-SPS. with mounting stand



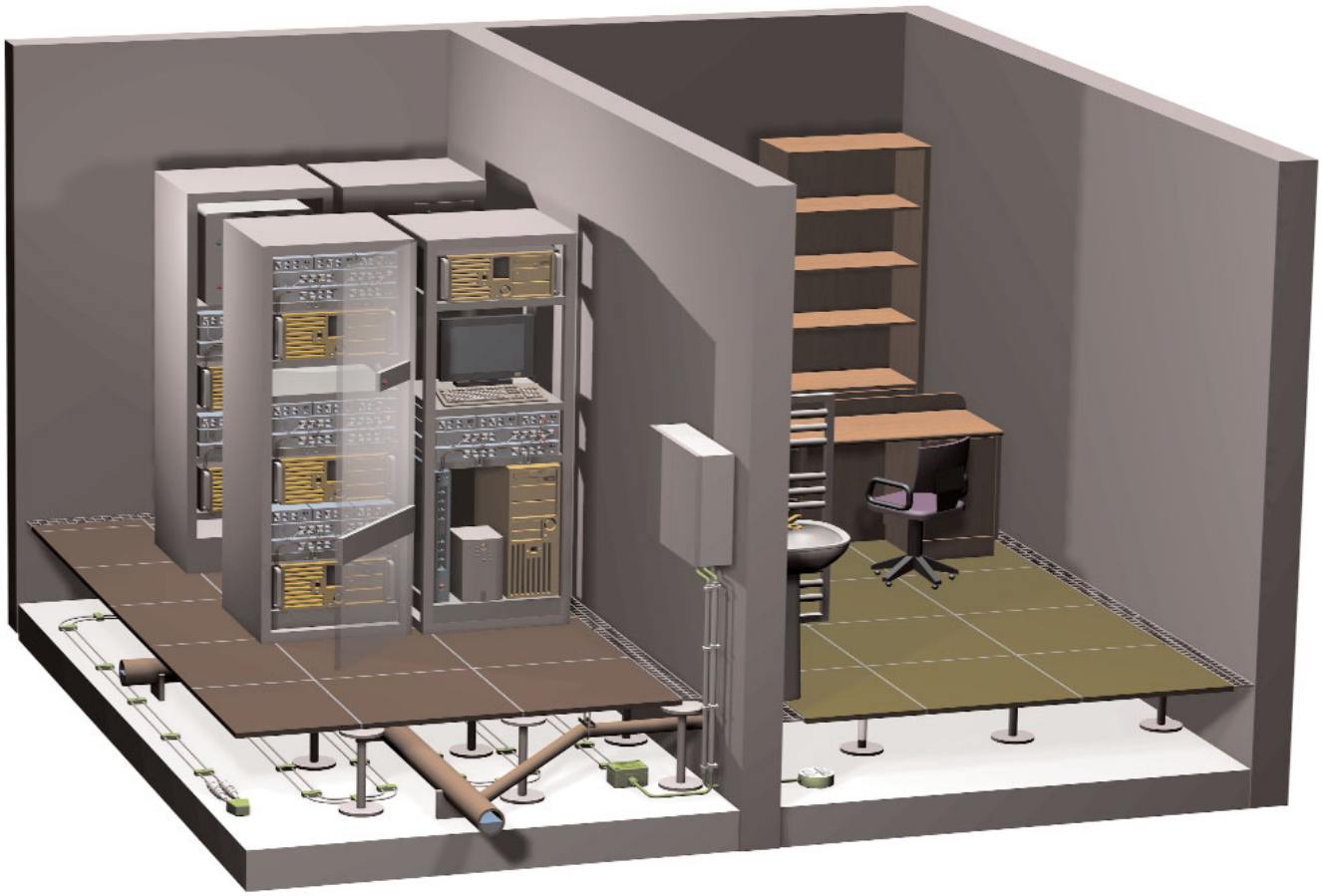
EHE-SPS.



EHW3-SPS.

Leakage detection with “Leckwatcher”- line sensors

Application example for cable electrodes (and for plate electrodes)

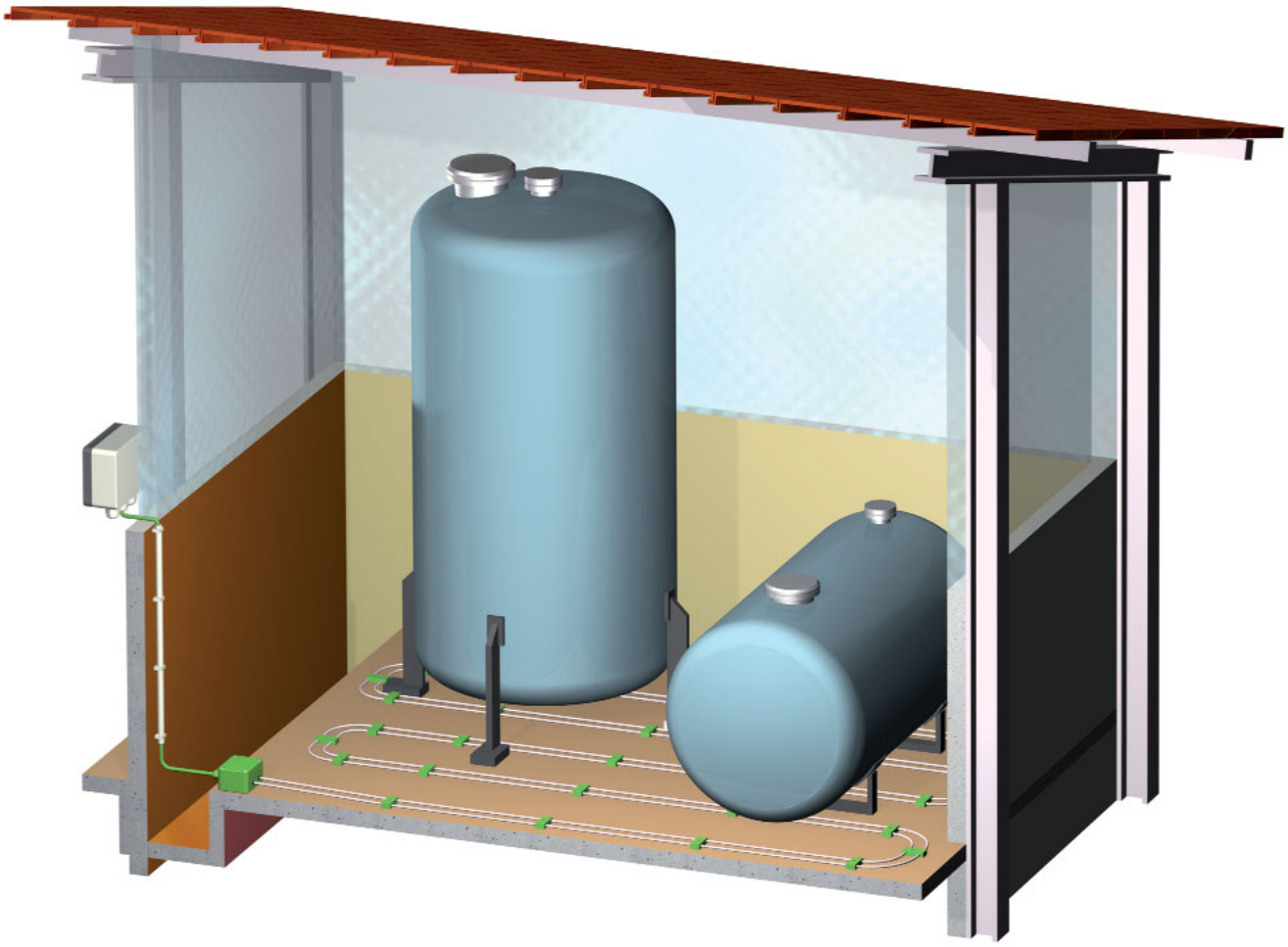


cable electrode
KE-SPS.

plate electrode
PEK-SPS.

Leakage detection with “Leckwatcher”-line sensors

Application example for cable electrodes



Cable electrodes KE-SPS.

Conductive leakage detectors for safety extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

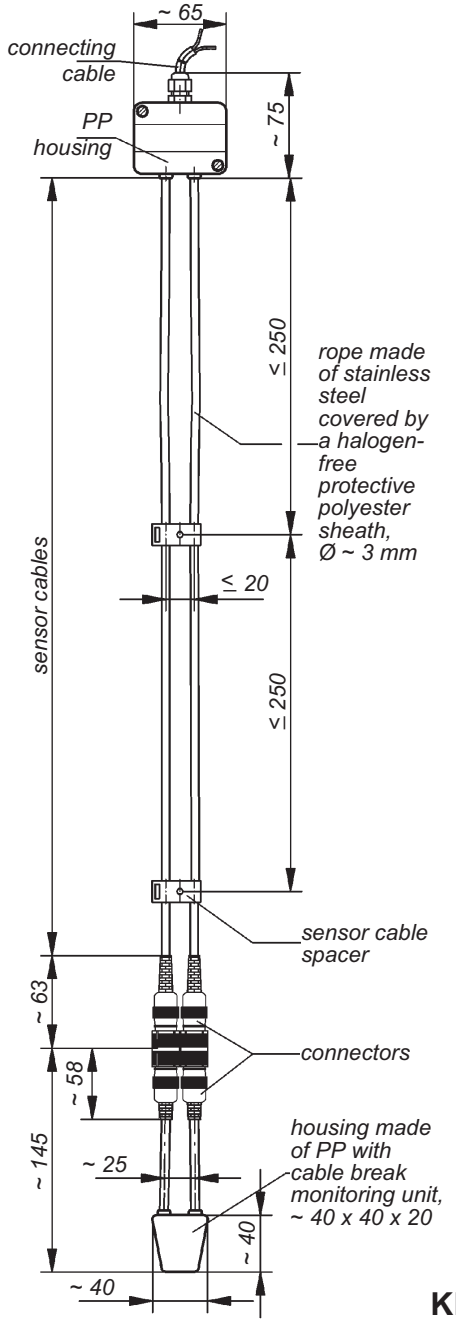
Designed to signal the presence of a conductive liquid caused, for example, by burst pipes.

Cable electrodes should only be used in normally dry environments. They can be used on floors, false ceilings, alongside pipes or in double-pipe systems. They should be installed at the lowest point of the potential hazard area which they are intended to monitor.

The cable electrodes KE-SPS. are fitted with two separate electrodes in the form of two sensor cables: 1 control electrode and 1 earth electrode. As soon as a conductive liquid creates a conductive path between the two sensor cables, the switching status of the leakage detector changes.

Each of the two sensor cables consists of a stainless steel rope core and a protective sheath made of polyester. This protective sheath is designed to prevent contact of the stainless steel ropes with one another or with an electrically conductive surface (e.g. steel tub, steel pipe etc.) and thus to avoid false alarms, whilst allowing leakage liquid to penetrate throught to the stainless steel ropes.

The two sensor cables of the cable electrode must be mounted parallel to one another at a distance ≤ 2 cm using the sensor cable spacers, as a greater or lesser spacing affects the response level of the system in the event of leakage.



KE-SPS.

Technical data	KE-SPS2	KE-SPS3	KE-SPS4
Design	quiescent current or NC (break) contact		
Sensor cables	2 ropes made of stainless steel 316 Ti or 316, each with 3 mm dia., each covered by a halogen-free protective polyester sheath; length: 2 metres each, longer on request		
Max. length of sensor cables when laid in a relatively straight line	100 metres, if the sensor cables are wound around a pipe or tank, the possible length may be considerably shorter depending on the type and method of laying		
Electrode head	PC or PP		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 metres, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!** DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, I_k < 30 mA	at transistor output, I_k < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry sensor cables	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet sensor cables	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	via cable break monitoring unit Z-4V7 at the end of the sensor cable		
Switching status with break in sensor line	power consumption < 0.7 mA, generates Low signal at input resistance of follow up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	10 V_{eff} ⊓⊔ 60 Hz		
Max. short-circuit current at the electrodes	0.1 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting cable between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

Tape electrodes BAE-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

Tape electrodes are designed to signal the presence of a conductive liquid caused, for example by burst pipes.

Tape electrodes should only be used in normally dry environments. They can be used on floors, false ceilings, alongside pipes or in double-pipe systems. They should be installed at the lowest point of the potential hazard area which they are intended to monitor.

The BAE-SPS. tape electrodes are fitted with two separate electrodes in the form of two stainless steel ropes: 1 control electrode and 1 earth electrode. As soon as a trace of a conductive liquid creates a conductive path between the two stainless steel ropes, the switching status of the leakage detector changes.

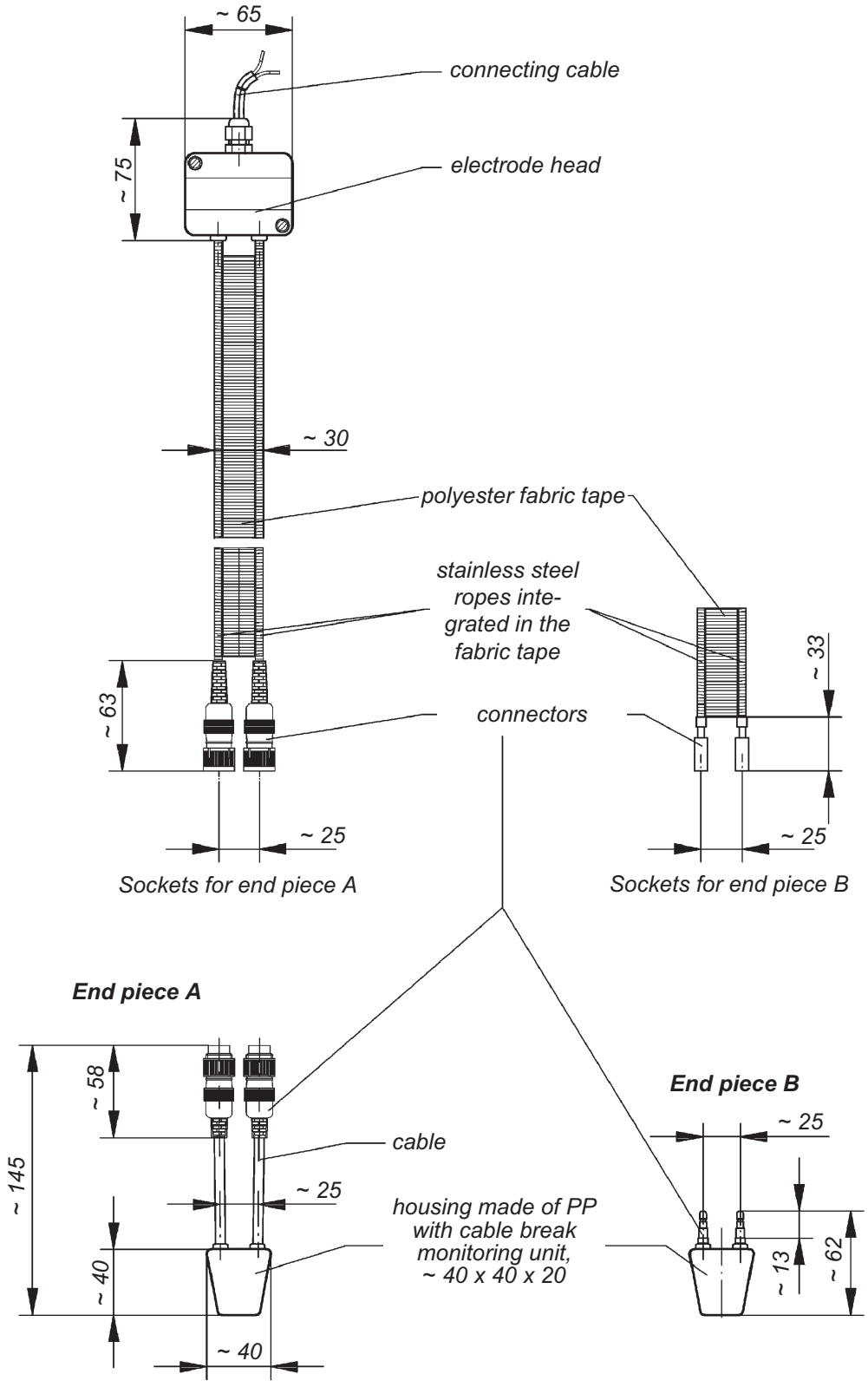
In contrast to the cable electrodes on the previous pages, the tape electrodes are **not fitted with** two **separate** sensor cables. The two stainless steel ropes are integrated in a halogen-free polyester fabric tape which ensures that the spacing between them remains constant. This plastic fabric tape is designed to prevent contact of the stainless steel ropes with one another or with an electrically conductive surface (e.g. steel tub, steel pipe etc.) and thus to avoid false alarms, whilst allowing leakage liquid to penetrate through to the stainless steel ropes.

To avoid false alarms, it is essential that the surroundings of the tape electrodes are absolutely dry under normal circumstances, as the tape electrodes have the ability to bind moisture (including high levels of air humidity).

BAE-SPS.

Technical data	BAE-SPS2	BAE-SPS3	BAE-SPS4
Design	quiescent current or NC (break) contact		
Sensor band	2 ropes made of stainless steel 316 Ti or 316, each with 1.5 mm dia., woven into a halogen-free approx. 30 mm-wide polyester fabric tape at a spacing of approx. 24-25 mm; length: 2 m, longer on request		
Max. length of sensor band when laid in a relatively straight line	30 metres, if the sensor band is wound around a pipe or tank, the possible length may be considerably shorter depending on the type and method of laying		
Electrode head	PC or PP		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**tour-wire connection** via connecting cable 4 x 0.5
	length 2 metres, longer connecting cable on request; fitted with halogen-free connecting cable on request		
Supply voltage	**only for connection to extra low voltage SELV or PELV!**		
	DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ	AC/DC 12 ... 30 V; wire colours: brown and blue	AC/DC 12 ... 30 V; wire colours: brown and blue
Power consumption	max. 0.5 W	max. 0.5 W	max. 0.5 W
Output	evaluation based on the magnitude of power consumption	PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Short circuit protection	present, Ik < 30 mA	at transistor output, Ik < 30 mA	reed contact at output short-circuit proof for short periods via integrated protective resistance of 62 Ω; the reed contact is open if the supply voltage of the sensor is incorrectly connected
Switching status with dry sensor band	power consumption > 2 mA, generates High signal at input resistance of follow-up circuit	PNP transistor output carries rectified supply voltage = High signal	reed contact closed
Switching status with wet sensor band	power consumption < 0.7 mA, generates Low signal at input resistance of follow-up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Switching status without supply voltage	Low signal	Low signal	reed contact open
Cable break monitoring of connecting cable	via cable break monitoring unit Z-4V7 at the end of the sensor cable		
Switching status with break in sensor line	power consumption < 0.7 mA, generates Low signal at input resistance of follow up circuit	PNP transistor output carries no voltage = Low signal	reed contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current		
Galvanic separation	**only for connection to extra low voltage SELV or PELV!** voltage resistance > 500 V between electrode circuit and		
	supply circuit	supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	10 Veff ⊓⊔ 60 Hz		
Max. short-circuit current at the electrodes	0.1 mA		
Response sensitivity	approx. 30 kΩ or approx. 33 µS (conductance)		
Temperature range	– 20°C to + 60°C		
Max. length of connecting cable between leakage detector and follow-up circuit	depends on the technical data of the follow-up circuit		
EMC	for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies, and for interference immunity in accordance with the appliance-specific requirements for industrial companies.		

BAE-SPS.


~ 65
connecting cable
~ 75
electrode head
~ 30
polyester fabric tape
stainless steel ropes integrated in the fabric tape
~ 63
connectors
~ 33
~ 25
~ 25
Sockets for end piece A
Sockets for end piece B
End piece A
End piece B
~ 58
~ 145
cable
~ 25
housing made of PP with cable break monitoring unit, ~ 40 x 40 x 20
~ 25
~ 40
~ 40
~ 13
~ 62

Sleeve electrodes MAE 6-SPS.

Conductive leakage detectors for extra low voltage SELV or PELV

- **for connection to:**
  a PLC or DDC unit,
  a small controller,
  a fieldbus connector or
  a network connector
- **with integrated galvanic separation of the electrodes**

Designed to signal the presence of a conductive liquid caused, for example; by burst pipes.

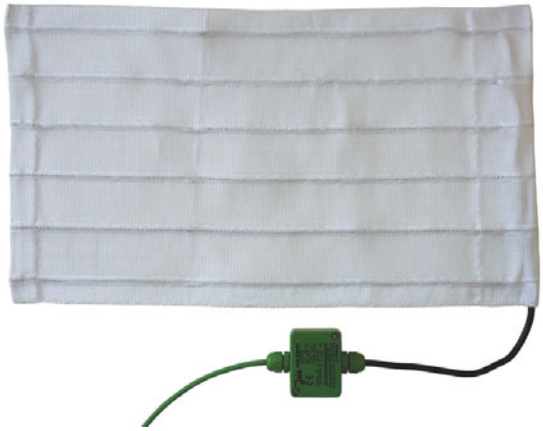
Sleeve electrodes should only be used in normally dry environments. They can be wrapped fully around pipes or small tanks.

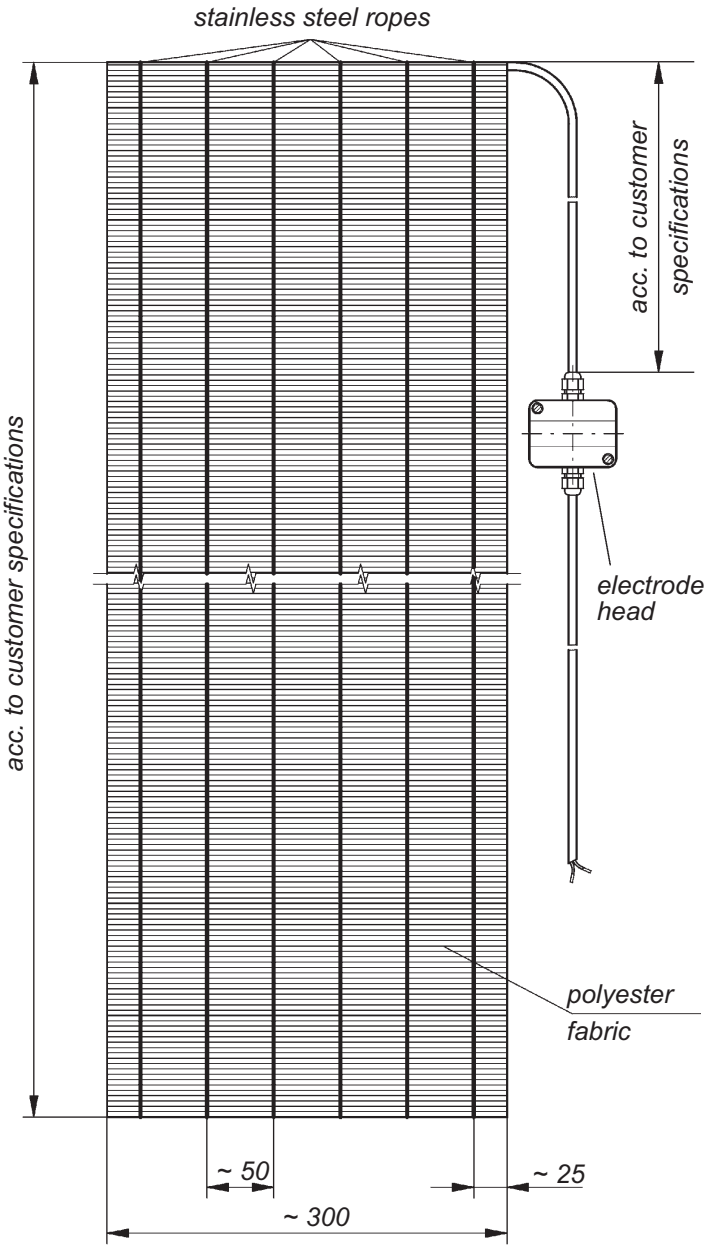
Sleeve electrodes allow full-surface pipe monitoring not only underneath the pipes in question (e.g. in collection tubs) but also **directly on the pipe in question**. Sleeve electrodes have a halogen-free polyester fabric structure with good capillary effect. Sensor cables are fitted in this polyester fabric as part of the chain; half of them are connected as control electrodes, the other half as earth electrodes.

The sleeve electrodes MAE 6-SPS. are each fitted with 6 separate electrodes in the form of 6 stainless steel ropes: 3 control electrodes and 3 earth electrodes. An earth electrode is always positioned next to a control electrode, an earth electrode next to a control electrode and so on. As soon as a trace of a conductive liquid creates a conductive path between the control electrode and the earth electrode, the switching status of the leakage detector changes.

The 6 stainless steel ropes of the sleeve electrode are woven into a halogen-free, approx. 30 cm wide polyester fabric as part of the chain, and the polyester fabric keeps them permanently equidistant from one another. This polyester fabric is designed to almost totally prevent contact of the stainless steel ropes with one another or with an electrically conductive surface (e.g. steel pipe etc.) and thus to avoid false alarms, whilst allowing leakage liquid to penetrate through to the stainless steel ropes.

To avoid false alarms, it is essential that the surroundings of the sleeve electrodes are absolutely dry under normal circumstances, as the sleeve electrodes have the ability to bind moisture (including high levels of air humidity), and this can lead to false alarms in environments that are not absolutely dry, particularly with long sleeve electrodes.

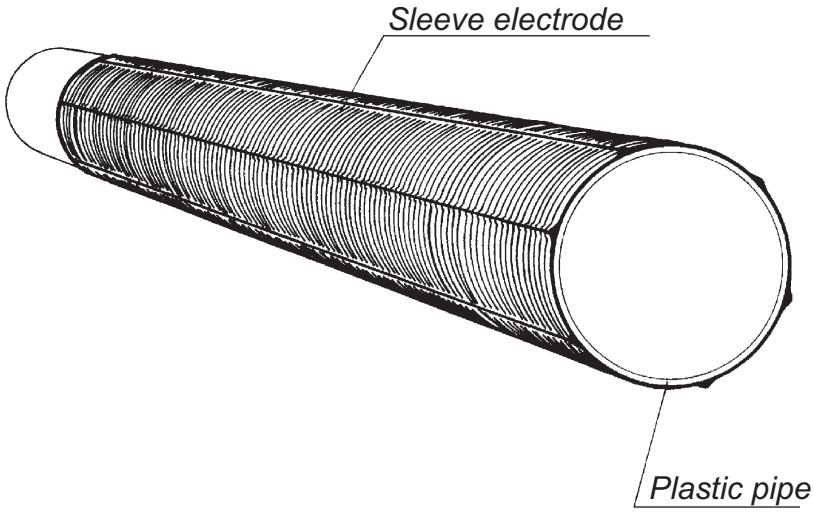




Technical data	MAE 6-SPS2	MAE 6-SPS3	MAE 6-SPS4
Design	quiescent current or NC (break) contact		
Sensor carpet	6 ropes made of stainless steel 316 Ti or 316, each with 1.5 mm dia., woven into halogen-free approx. 300 mm-wide polyester fabric at spacings of approx. 50 mm, length: 2 metres, longer on request		
Max. length of sensor sleeve	10 metres		
Electrode head	PC or PP		
Electrical connection	**two-wire connection** via connecting cable 2 x 0.75	**three-wire connection** via connecting cable 3 x 0.75	**four-wire connection** via connecting cable 4 x 0.5
	length 2 metres, longer connecting cable on request; fitted with halogen-free connecting cable on request		

For more technical data, see under BAE-SPS. on page 32-1-26

Application example for sleeve electrode



The sleeve electrodes MAE 6-SPS. are installed lengthwise on the pipe to be monitored – in other words, so that the sensor cables run parallel to the pipe.