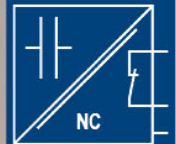
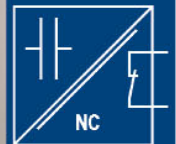


Capacitive leakage detectors of the Leckwatcher range

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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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

Capacitive 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 capacitive sensor electronics**

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 sensor 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:

Capacitive suspension sensors

with stainless steel housing: leakage detectors with a metal housing; the cable outlet is in a vertical position on the top of the housing. The leakage detectors can be mounted in suspended mode from above or in an upright position (preferably using a stand).

Capacitive suspension sensors

with plastic housing: leakage detectors with a plastic housing; the cable outlet is in a vertical position on the top of the housing. The leakage detectors can be mounted in suspended mode from above or in an upright position (preferably using a stand).

Capacitive plate sensors

with plastic housing: leakage detectors of flat design with a plastic housing; the cable outlet is in a horizontal position on the side of the housing. The leakage detectors can be pushed in sideways underneath areas that are difficult to access.



“Leckwatcher” with 2-wire technology

The capacitive leakage detectors with 2-wire technology are primarily designed for the detection of leakage of non-conductive liquids but can also be used for the detection 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 k Ω to 7.5 k Ω .

Supply voltage	Low signal	High signal
DC 24 V	Voltage drop at the input resistance $I_{Low} \times R_i < 5 \text{ V}$	Voltage drop at the input resistance $I_{High} \times R_i > 15 \text{ V}$

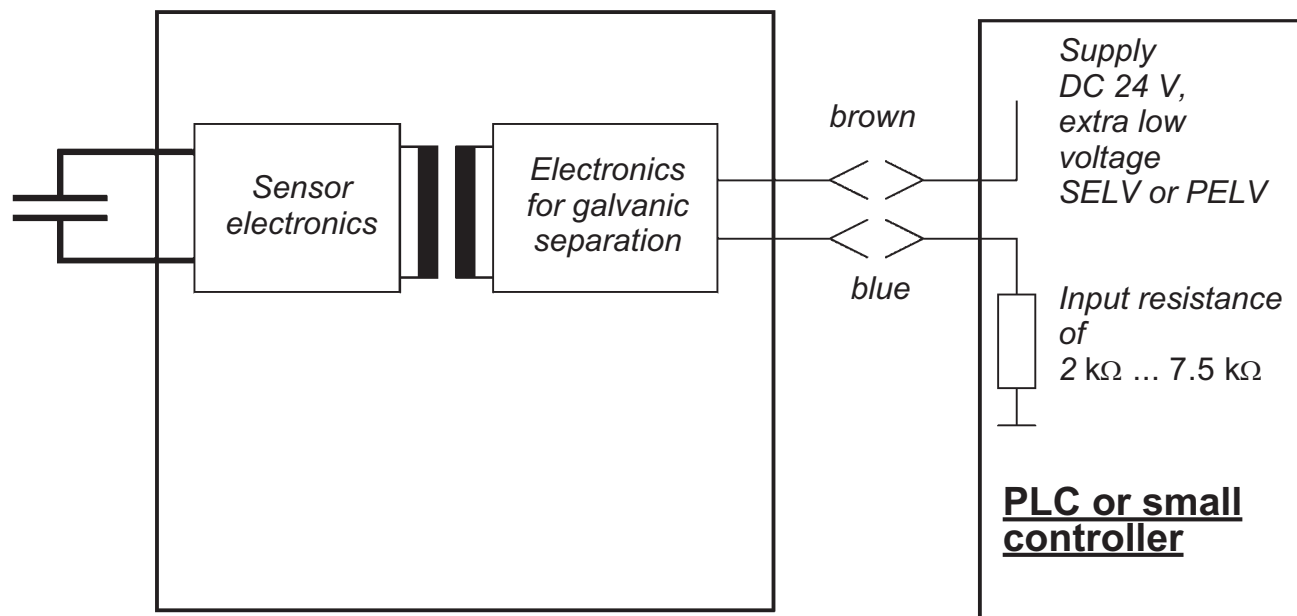
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.

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

Application example:

Capacitive leakage detector, 2-wire version

Follow-up circuit





“Leckwatcher” with 3-wire technology

The capacitive leakage detectors with 3-wire technology are primarily designed for the detection of leakage of non-conductive liquids but can also be used for the detection 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 k Ω to 7.5 k Ω .

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

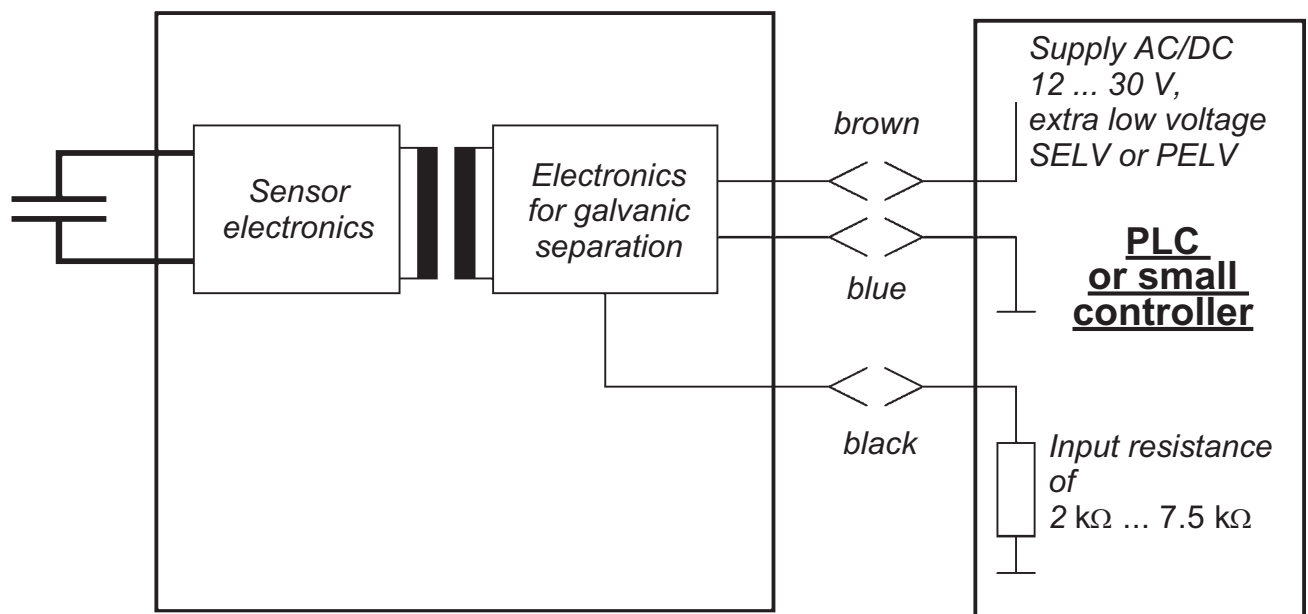
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.

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

Application example:

Capacitive leakage detector, 3-wire version

Follow-up circuit





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

The capacitive leakage detectors with 4-wire technology are primarily designed for the detection of leakage of non-conductive liquids but can also be used for the detection 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

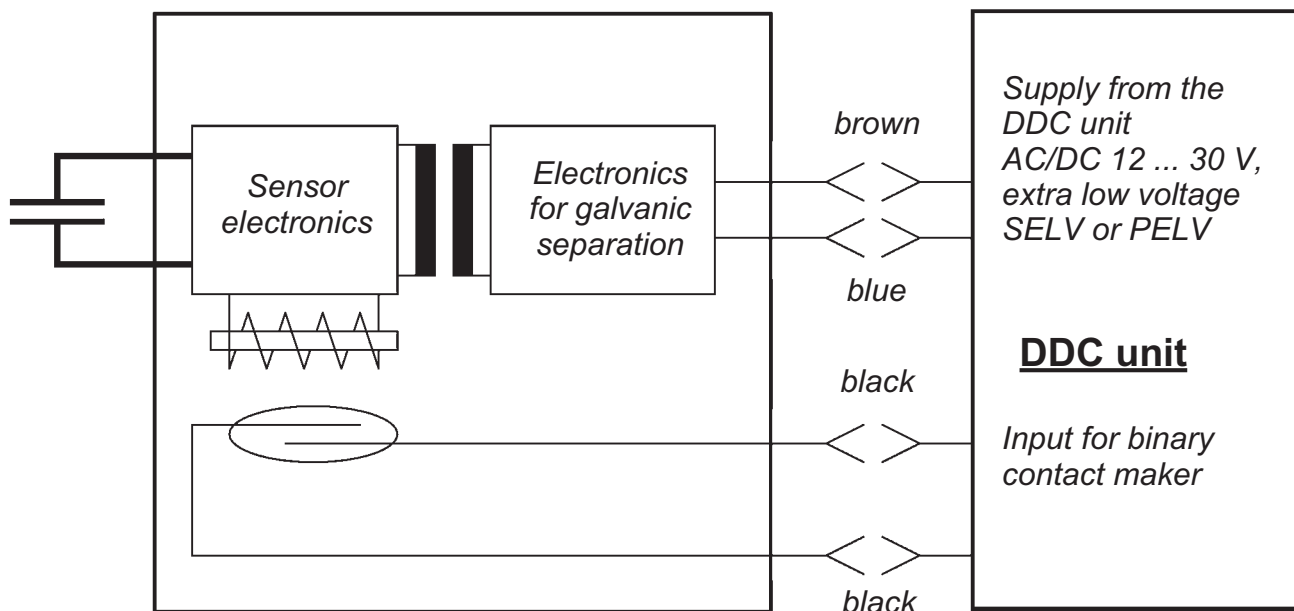
The compatibility of the detector on the one hand and the PLC, DDC unit, small controller, fieldbus connector or network connector on the other must be reviewed on case-to-case basis with regard to the extra low voltage SELV or PELV and the conformity of their signal parameters.

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:

Capacitive leakage detector, 4-wire version

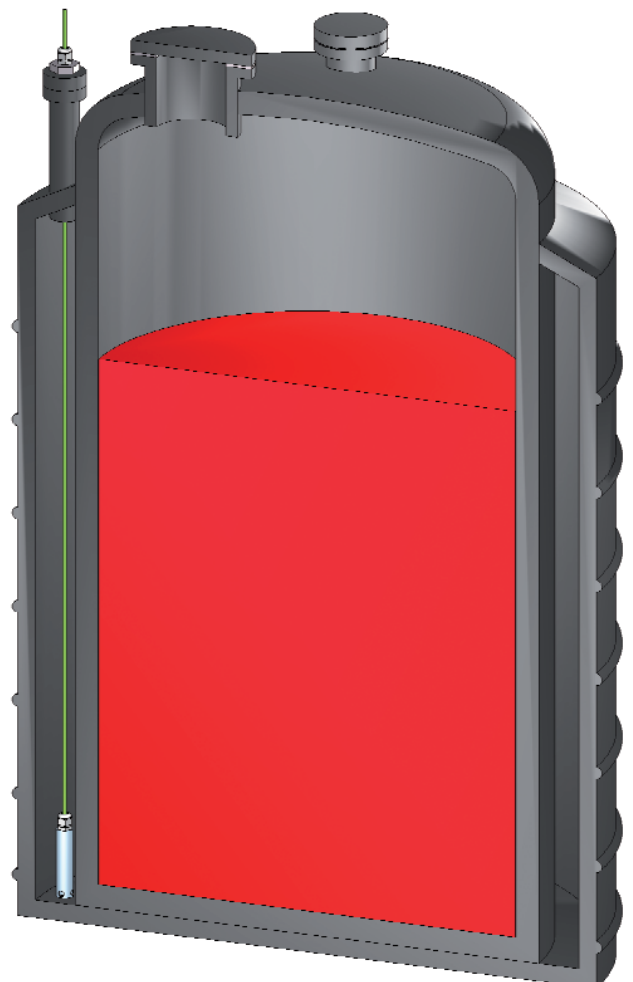
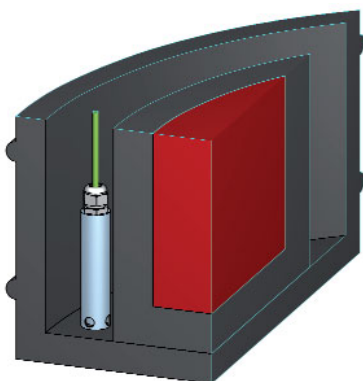
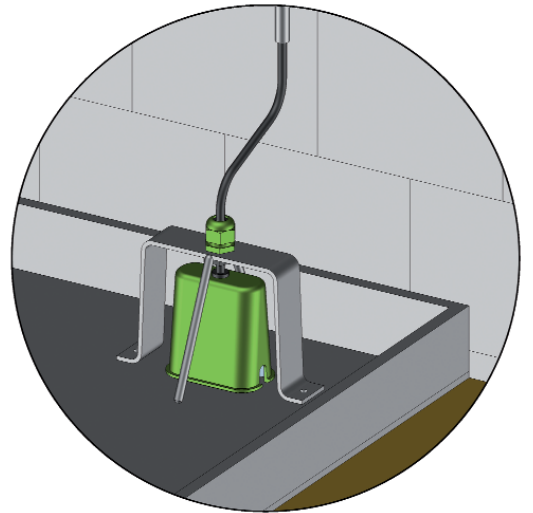
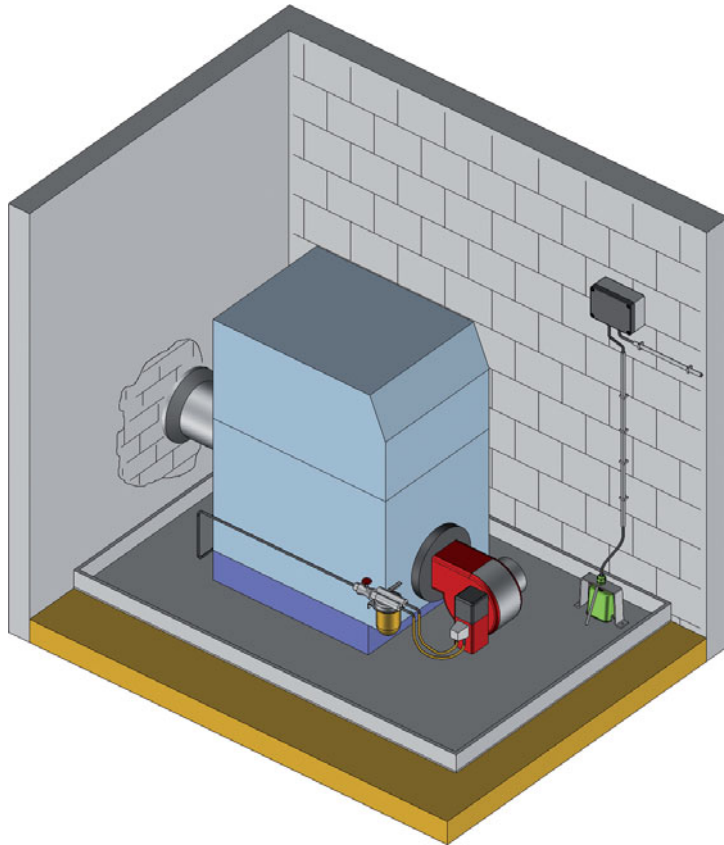
Follow-up circuit





Leakage detection with “Leckwatcher” capacitive sensors

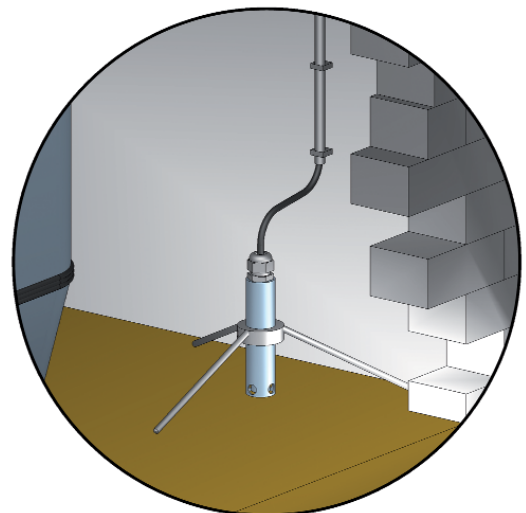
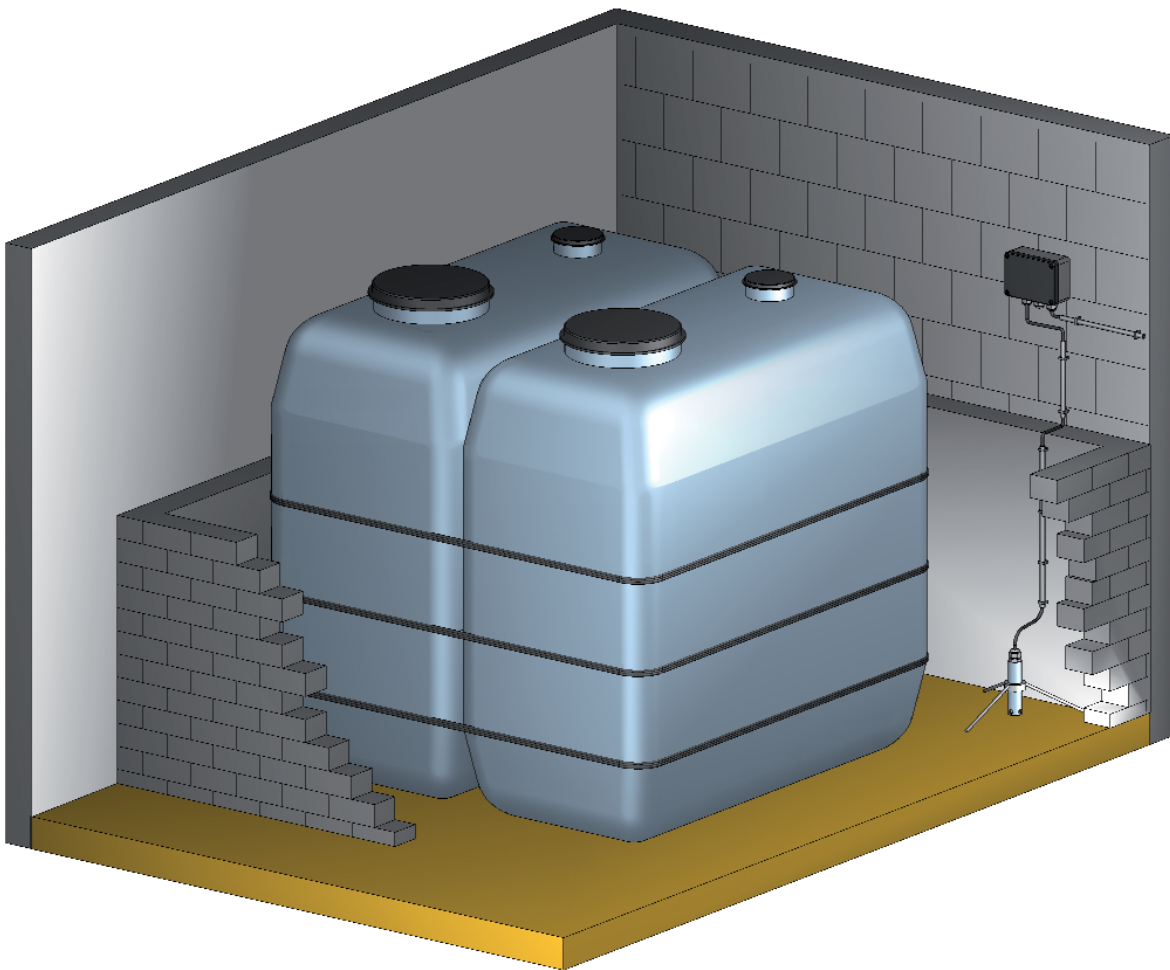
Application examples





Leakage detection with “Leckwatcher” capacitive suspension sensors COW-SPS. with stainless steel housing

Application example





Capacitive suspension sensors COW-SPS. with stainless steel housing

Capacitive 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 capacitive sensor electronics**

For signalling the presence of a non-conductive or conductive liquid. Can in principle be used for all low-viscosity media – e.g. for signalling the presence of heating oil on the floor of a tank room or in a collection tub located underneath a heating oil burner.

Capacitive suspension sensors should only be used in normally dry environments.

A sensor can be installed either

- suspended freely above the floor on its cable

or

- standing upright on the floor (preferably using the optional stand from Jola).

A hollow stainless steel cylinder forming a cylindrical capacitor together with the stainless steel housing is integrated in the capacitive suspension sensors of the type COW-SPS.. The stainless steel housing as screening electrode and the inner cylinder as earth electrode serve as capacitive sensor electrodes. As soon as a non-conductive liquid flows into the space between housing and inner cylinder, the capacitance between the electrodes changes and so does the switching status of the leakage detector. If a conductive liquid is present, the electrodes are conductively bridged, and this also results in a change in the switching status of the leakage detector.

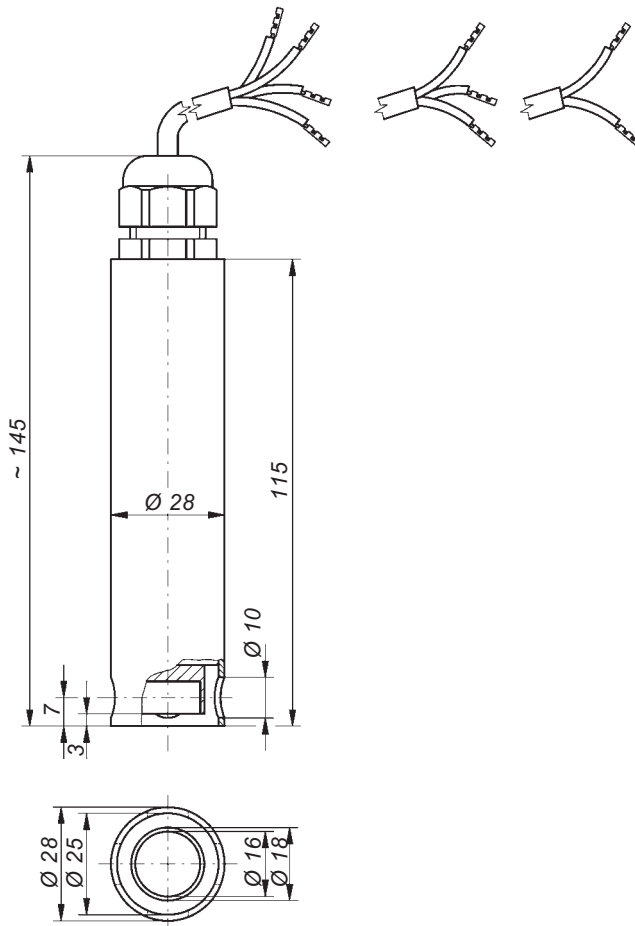
Areas of application:

All non-conductive organic and inorganic liquids with a specific dielectricity constant of 1.8 or more and all conductive liquids.

The precondition is that the ambient temperatures ensure that these liquids are present in liquid form and that the sensors used are reliably and sufficiently in contact with the liquid. The minimum liquid height is to be assumed as 12 mm from the bottom edge of the sensor housing.

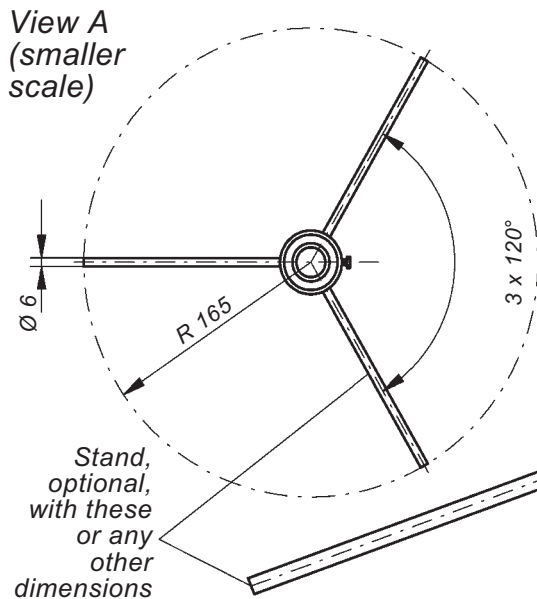


Version COW-SPS4 Version COW-SPS3 Version COW-SPS2



Capacitive suspension sensor COW-SPS.

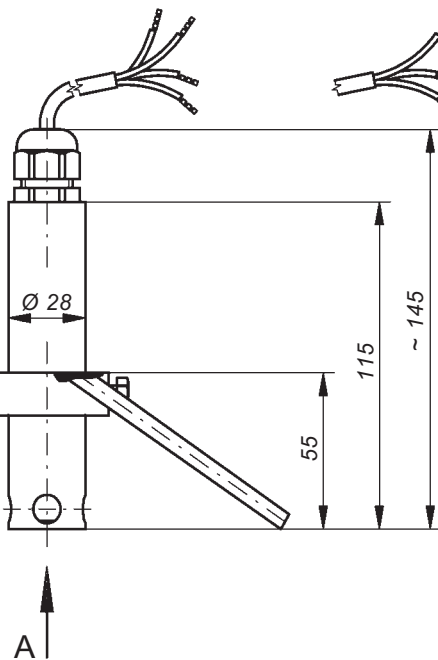
View A
(smaller scale)




Version COW-SPS4

Version COW-SPS3

Version COW-SPS2



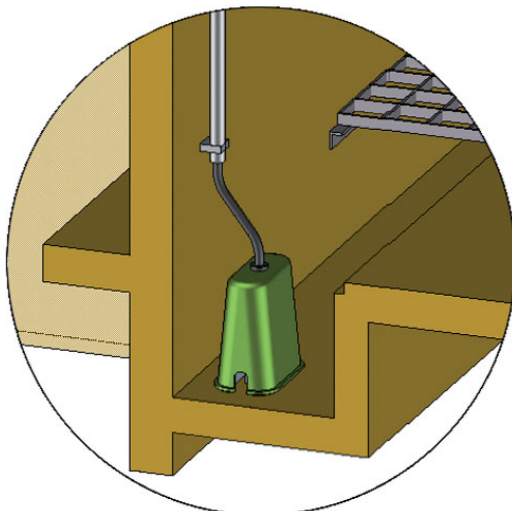
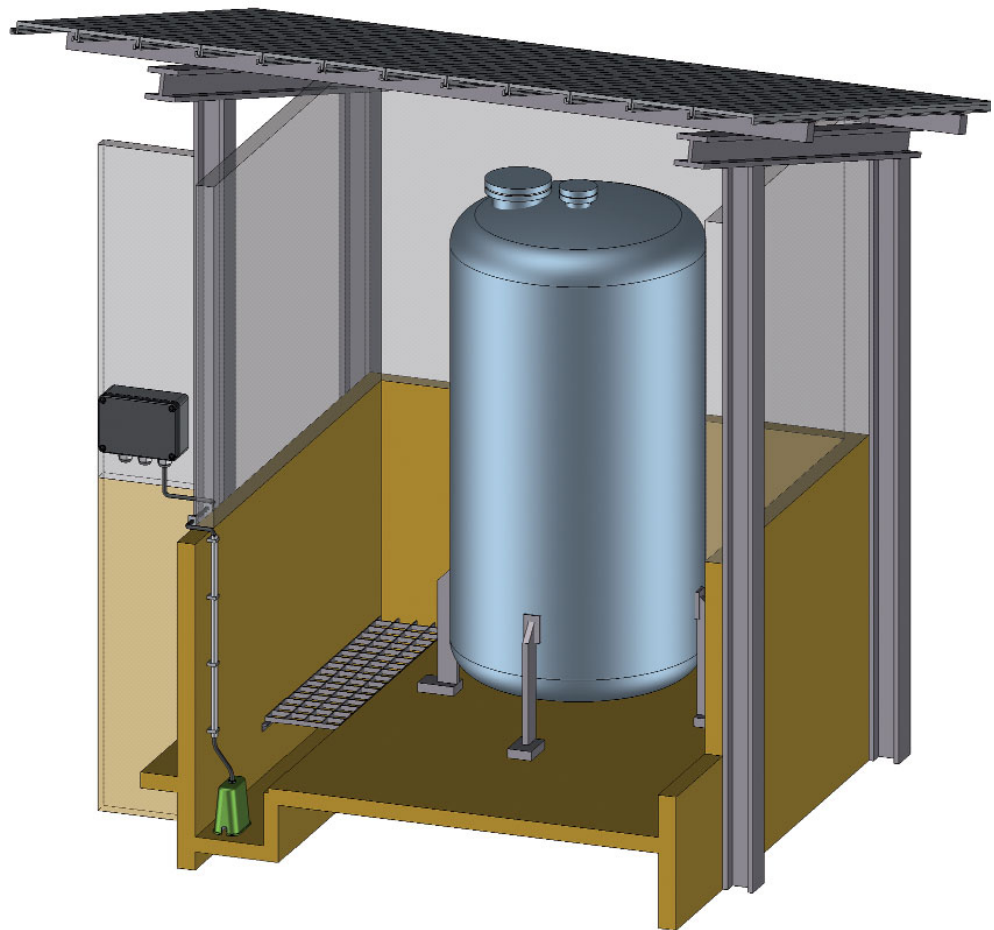
**Capacitive suspension sensor COW-SPS.,
with mounting stand**

Technical data	COW-SPS2	COW-SPS3	COW-SPS4
Design	quiescent current / NC (break) contact		
Sensor electrodes	stainless steel housing as screening electrode and inner cylinder as earth electrode serve as capacitive sensor electrodes		
Housing	stainless steel 316 Ti, with PTFE insulator		
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
Supply voltage	length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request only for connection to extra low voltage SELV or PELV! DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ max. 0.5 W		
Power consumption	evaluation based on the magnitude of power consumption	max. 0.5 W PNP transistor output; to be wired via the input resistance of the follow-up circuit of 2 kΩ ... 7.5 kΩ; wire colour: black	max. 0.5 W potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: black and black
Output			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
Short circuit protection	present, I _k < 30 mA	at transistor output, I _k < 30 mA	
Switching status when the capacitive sensor is not activated	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 when the capacitive sensor is activated	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		
Max. no-load voltage at the electrodes	5 V _{eff}  40 kHz (safety extra low voltage SELV)		
Max. short-circuit current at the electrodes	0.2 mA		
Min. dielectricity constant of the liquid to be detected	1.8		
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.		



Leakage detection with “Leckwatcher” capacitive suspension sensors OWE-SPS. with plastic housing

Application example





Capacitive suspension sensors OWE-SPS. with plastic housing

Capacitive 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 capacitive sensor electronics**

For signalling the presence of a non-conductive or conductive liquid. Can in principle be used for all low-viscosity media – e.g. for signalling the presence of heating oil on the floor of a tank room or in a collection tub located underneath a heating oil burner.

Capacitive suspension sensors should only be used in normally dry environments.

A sensor can be installed either

- suspended freely above the floor on its cable

or


- standing upright on the floor (preferably using the optional stand from Jola).

Three gold-plated PCBs are integrated in the capacitive suspension sensors of the type OWE-SPS., and these boards form a double plate capacitor. The two outer one-side-gold-plated PCBs as screening electrodes and the two-side-gold-plated inner PCB as earth electrode serve as capacitive sensor electrodes. As soon as a non-conductive liquid flows into the space between the PCBs, the capacitance between the electrodes changes and so does the switching status of the leakage detector. If a conductive liquid is present, the electrodes are conductively bridged, and this also results in a change in the switching status of the leakage detector.

Areas of application:

All non-conductive organic and inorganic liquids with a specific dielectricity constant of 1.8 or more and all conductive liquids.

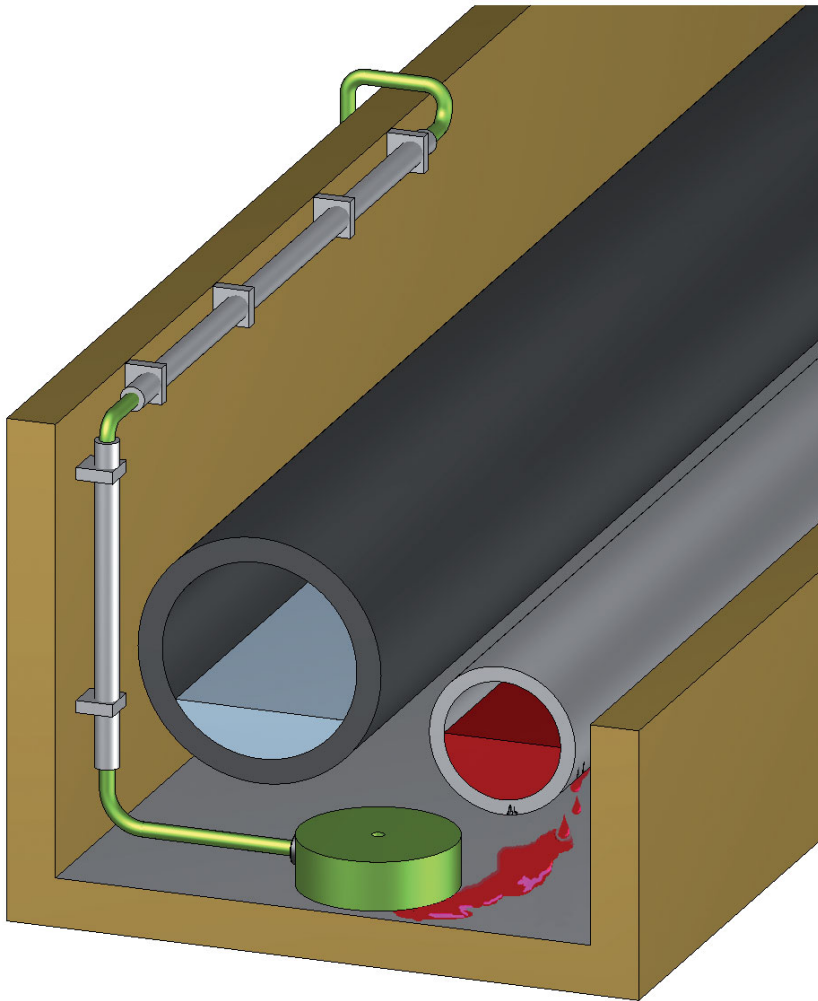
The precondition is that the ambient temperatures ensure that these liquids are present in liquid form and that the sensors used are reliably and sufficiently in contact with the liquid. The minimum liquid height is to be assumed as 12 mm from the bottom edge of the sensor housing.

Technical data	OWE-SPS2	OWE-SPS3	OWE-SPS4
Design	quiescent current / NC (break) contact		
Sensor electrodes	2 outer one-side-gold-plated PCBs and 1 two-side-gold-plated PCB serve as capacitive sensor electrodes		
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
Supply voltage	length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request only for connection to extra low voltage SELV or PELV! DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ		
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 when the capacitive sensor is not activated	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 when the capacitive sensor is activated	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		
Max. no-load voltage at the electrodes	5 V _{eff}  40 kHz (safety extra low voltage SELV)		
Max. short-circuit current at the electrodes	0.2 mA		
Min. dielectricity constant of the liquid to be detected	1.8		
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 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.		
EMC			



Leakage detection with “Leckwatcher” capacitive plate sensors CPE-SPS. with plastic housing

Application example





Capacitive plate sensors CPE-SPS. with plastic housing

Capacitive 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 capacitive sensor electronics**

For signalling the presence of a non-conductive or conductive liquid. Can in principle be used for all low-viscosity media – e.g. for signalling the presence of heating oil on the floor of a tank room or in a collection tub located underneath a heating oil burner.

Capacitive plate sensors should only be used in normally dry environments. The capacitive plate sensors of the type CPE-SPS. **are not suitable** for use in areas where temperature differentials can lead to **condensation**.

They must be installed on the floor in such a way that the sensor side faces downwards and the rating plate upwards.

A sensor can be installed either

- unsecured lying on the floor

or

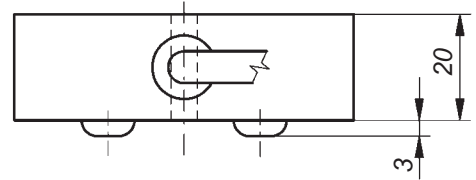
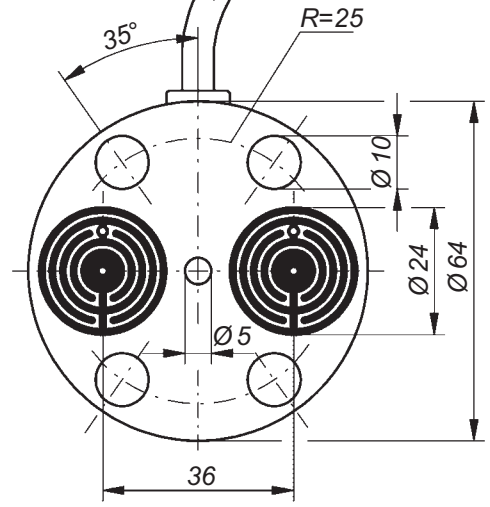
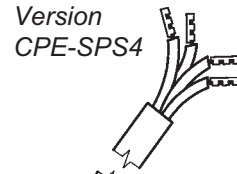
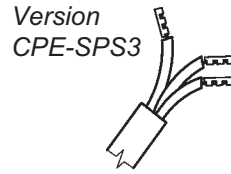
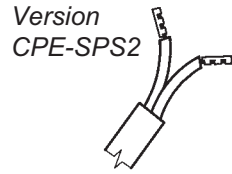
- lying on the floor and secured by a central screw in the centre of the housing.

Each capacitive plate sensor of the type CPE-SPS. is equipped with two round PCBs with gold-plated concentric strip conductor rings. Rings as screening electrodes and rings as earth electrodes serve as capacitive sensor electrodes. For reasons of symmetry, there are two such capacitive sensor elements. As soon as a non-conductive liquid comes into contact with the rings and the spaces of one or both capacitive sensor elements, the capacitance between the electrodes changes and so does the switching status of the leakage detector. If a conductive liquid is present, the rings of the capacitive sensor element are conductively bridged, and this also results in a change in the switching status of the leakage detector.

Areas of application:

All non-conductive organic and inorganic liquids with a specific dielectricity constant of 2.0 or more and all conductive liquids.


The precondition is that the ambient temperatures ensure that these liquids are present in liquid form and that the sensors used are reliably and sufficiently in contact with the liquid. The minimum liquid height is to be assumed as 3 mm from the contact surface of the sensor housing.



Capacitive plate sensor CPE-SPS., sensor side



Capacitive plate sensor CPE-SPS4, rating plate side

Technical data	CPE-SPS2	CPE-SPS3	CPE-SPS4
Design	quiescent current / NC (break) contact		
Sensor electrodes	the gold-plated concentric rings (screening electrodes and earth electrodes) serve as capacitive sensor electrodes		
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
Supply voltage	length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request only for connection to extra low voltage SELV or PELV! DC 24 V ± 20 % via input resistance 2 kΩ ... 7.5 kΩ max. 0.5 W		
Power consumption	evaluation based on the magnitude of power consumption	max. 0.5 W PNP transistor output; to be wired via the input resistance of the follow-up circuit from 2 kΩ ... 7.5 kΩ; wire colour: black	max. 0.5 W potential-free reed contact with protective resistance 62 Ω, max. load AC/DC 30 V, 100 mA, 3 W; wire colours: brown and blue
Output			black and black 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
Short circuit protection	present, I _k < 30 mA	at transistor output, I _k < 30 mA	
Switching status when both capacitive sensors elements are not activated	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 when one or both capacitive sensor elements is/are activated	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 only for connection to extra low voltage SELV or PELV! voltage resistance > 500 V between electrode circuit and supply circuit		
Galvanic separation		supply circuit and transistor output	supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V _{eff}  40 kHz (safety extra low voltage SELV)		
Max. short-circuit current at the electrodes	0.2 mA		
Min. dielectricity constant of the liquid to be detected	2.0		
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.		



Central unit group alarm relay Selektor 5

- For max. 5 sensors of the Jola “Leckwatcher” leakage detection system in the version ...-SPS3 or the sensors of the “Liqui-Switch” system
- Selective signalling via LEDs
- Group alarm output via potential-free changeover contact



For more information, please see pages 35-1-0 et seq.