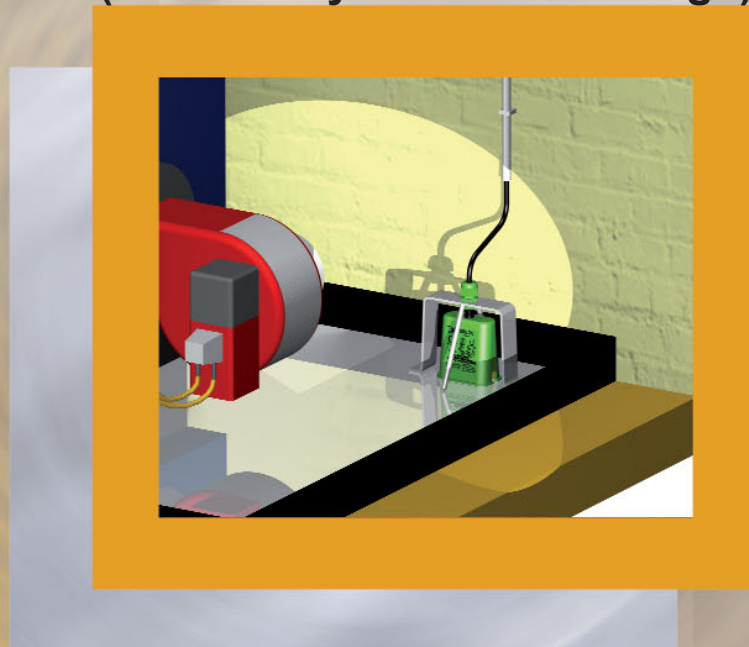


## Capacitive leakage detectors of the Liqui-Switch range

for extra low voltage SELV or PELV,  
with potential-free relay contact  
(for switching a safety extra low voltage),  
for connection to a PLC or DDC unit,  
a small controller, a fieldbus connector or  
a network connector,  
for switching a solenoid valve  
(with safety extra low voltage)



**Jola Spezialschalter K. Mattil & Co. KG**  
Klostergartenstraße 11-20 • D-67466 Lambrecht (Pfalz)  
P.O.B. 1149 • D-67460 Lambrecht (Pfalz) • Germany  
Phone +49 6325 188-01 • Fax +49 6325 6396  
kontakt@jola-info.de • www.jola-info.de

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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.**

# “Liqui-Switch” - general information

## Capacitive leakage detectors for extra low voltage SELV or PELV

- **with potential-free relay contact  
(for switching a safety extra low voltage)**
- **for connection to:  
a PLC or DDC unit,  
a small controller,  
a fieldbus connector or  
a network connector**
- **for switching a solenoid valve  
(with safety extra low voltage)**
- **with integrated galvanic separation of the capacitive sensor electronics**

### **Standard 4-wire version with quiescent current contact:**

2 wires for AC/DC 24 V (optional: 12 V), polarity-independent

2 wires for a potential-free quiescent current contact which is closed in standby status and open in the event of an alarm (leakage alarm, cable break in the voltage supply line, failure of the supply voltage). A cable break in the contact loop (quiescent current loop) also activates an alarm.

### **On request:**

#### **4-wire version with working current contact:**

2 wires for AC/DC 24 V (optional: 12 V), polarity-independent

2 wires for a potential-free working current contact which is open in standby status and closed in the event of an alarm (leakage alarm, cable break in the voltage supply line, failure of the supply voltage). A cable break in the contact line does not activate an alarm.

#### **5-wire version with changeover contact:**

2 wires for AC/DC 24 V (optional: 12 V), polarity-independent

3 wires for a potential-free changeover contact. The output relay with the changeover contact is energised in standby status and de-energised in the event of an alarm.

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 compatibility of the detector on the one hand and the actuator, 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.**



# Capacitive “Liqui-Switch” in standard 4-wire design with quiescent current contact

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 relay contact.

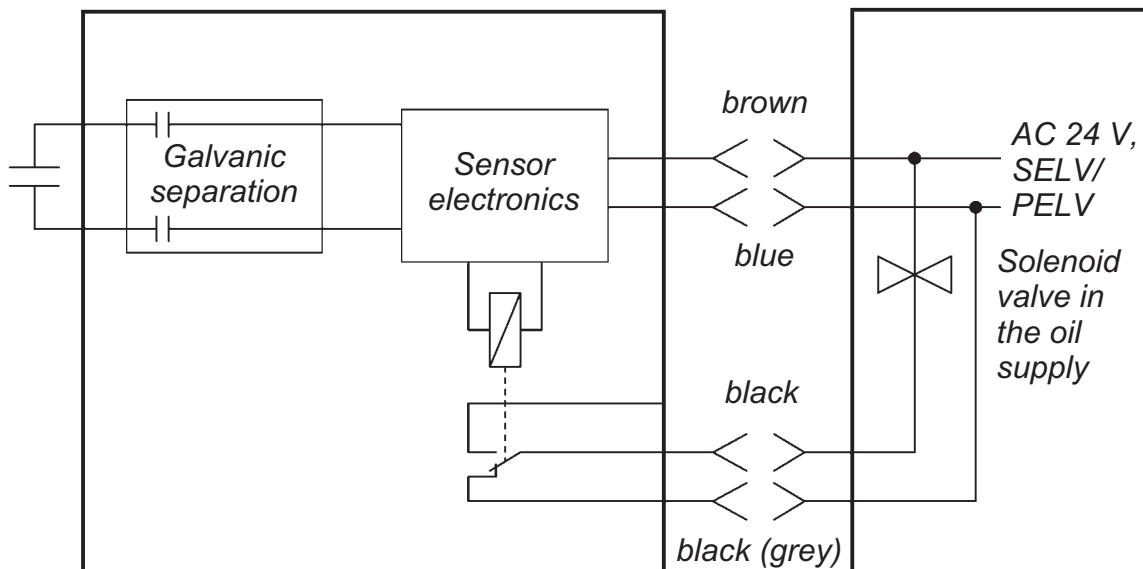
Supply voltage	SELV or PELV AC/DC 24 V ± 20 % on request: AC/DC 12 V ± 20 %		
Switching voltage	AC/DC 5 ... 24 V		
Switching current	AC/DC 1 mA ... 3 (1) A		
With integrated galvanic separation between the electrode circuit, the power supply and the potential-free output contact.			
Version	Without supply voltage	Sensor not activated	Sensor activated
Standard 4-wire version with quiescent current contact	Output relay de-energised, contact open	Output relay energised, contact closed	Output relay de-energised, contact open
On request: 4-wire version with working current contact	Output relay de-energised, contact closed	Output relay energised, contact open	Output relay de-energised, contact closed
On request: 5-wire version with changeover contact	Output relay de-energised, changeover contact in position 1	Output relay energised, changeover contact in position 2	Output relay de-energised, changeover contact in position 1
<b>The compatibility of the detector on the one hand and actuator, 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.</b>			

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 “Liqui-Switch” leakage detector, in standard 4-wire design

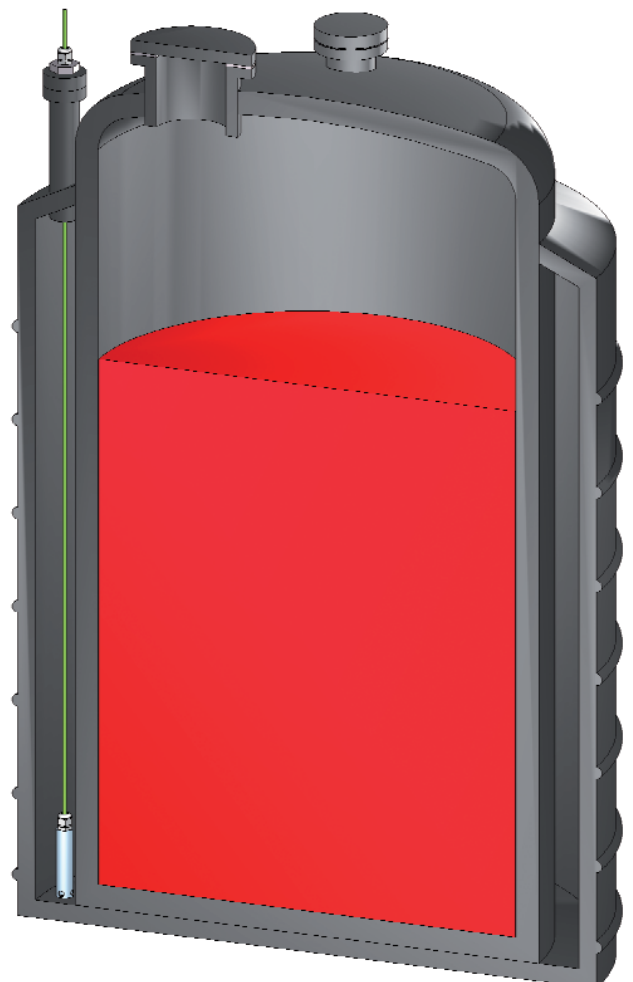
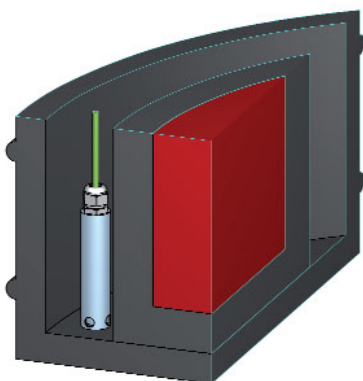
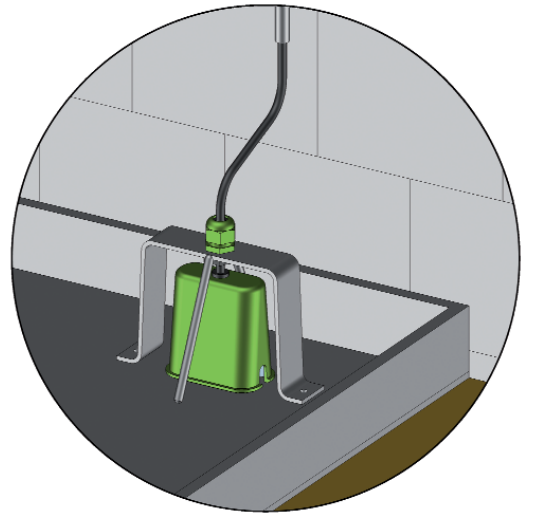
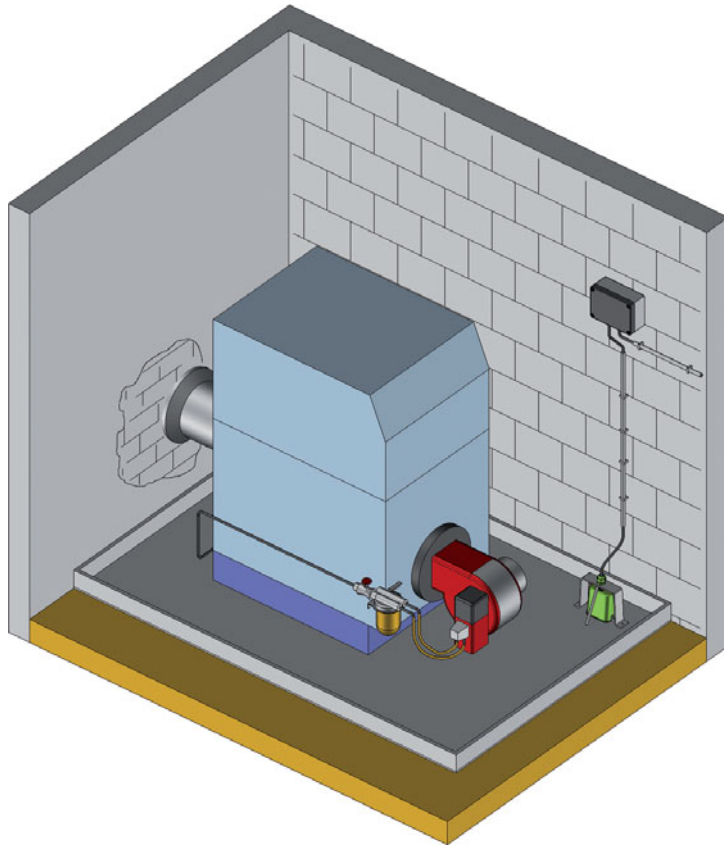
Follow-up circuit





# Leakage detection with “Liqui-Switch” capacitive sensors

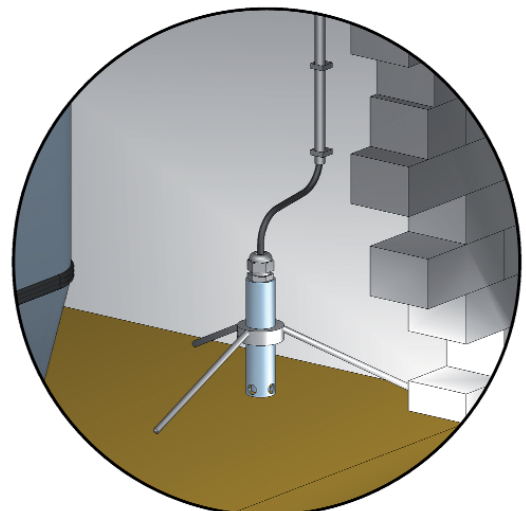
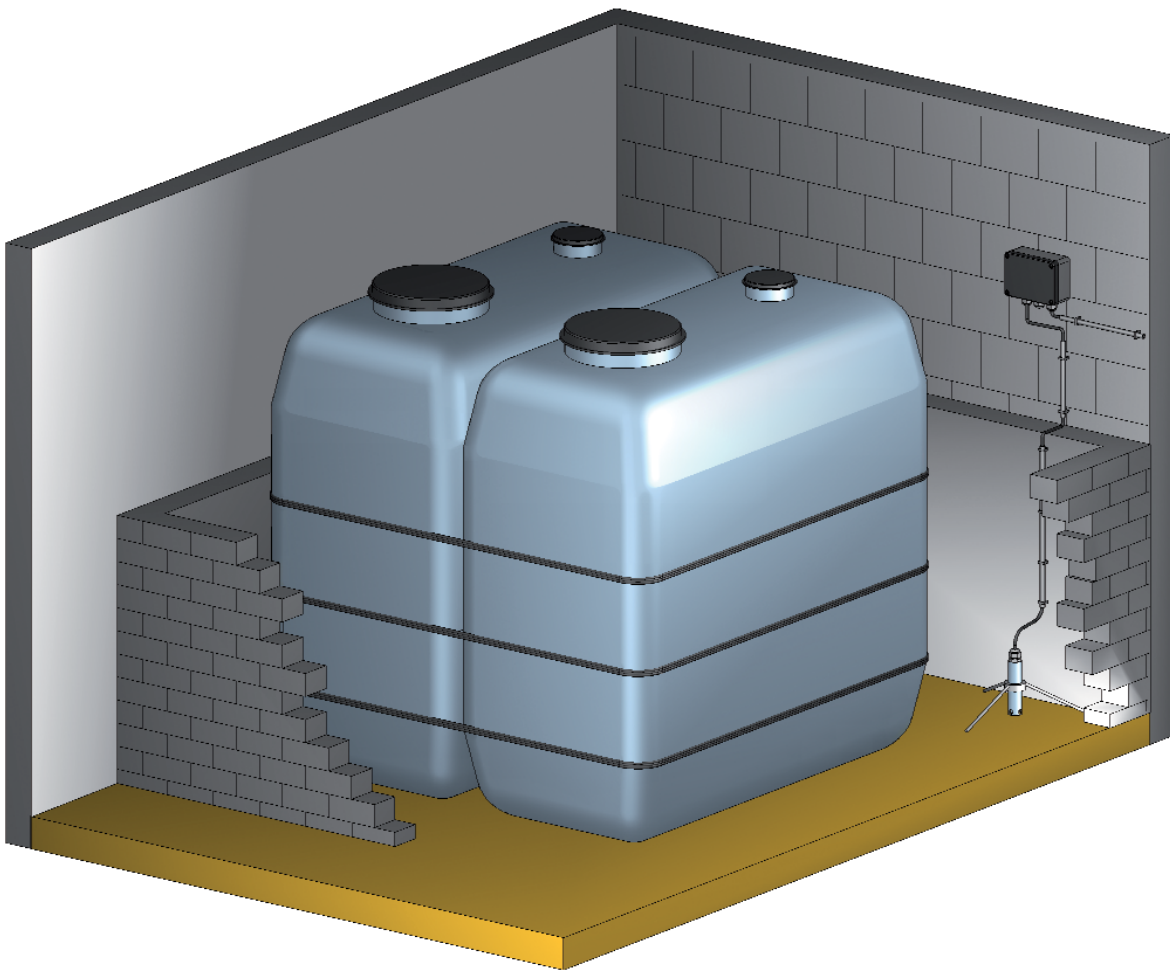
Application examples





# Leakage detection with “Liqui-Switch” capacitive suspension sensor COW-LS4 with stainless steel housing

Application example





# Capacitive suspension sensor COW-LS4 with stainless steel housing

**Capacitive leakage detector for extra low voltage SELV or PELV**

- **with potential-free relay contact (for switching a safety extra low voltage)**
- **for connection to:  
a PLC or DDC unit,  
a small controller,  
a fieldbus connector or  
a network connector**
- **for switching a solenoid valve (with safety extra low voltage)**
- **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**

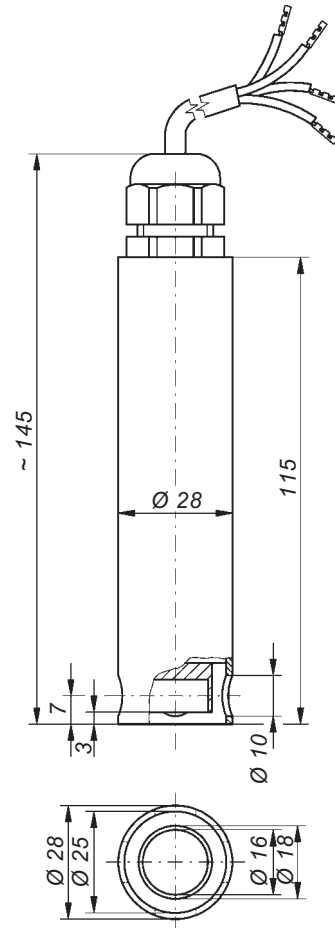
**- standing upright on the floor (preferably using the optional stand from Jola).**

A hollow stainless steel cylinder forming a cylindrical capacitor together with the stainless steel housing is integrated in the capacitive suspension sensor of the type COW-LS4. 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:**

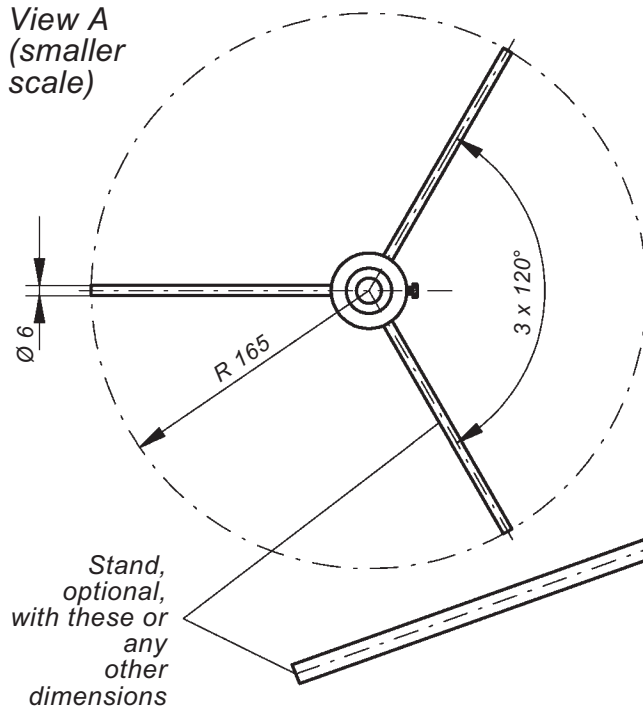
All non-conductive organic and inorganic liquids with a specific dielectricity constant of 1.8 or more and all conductive liquids.

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.

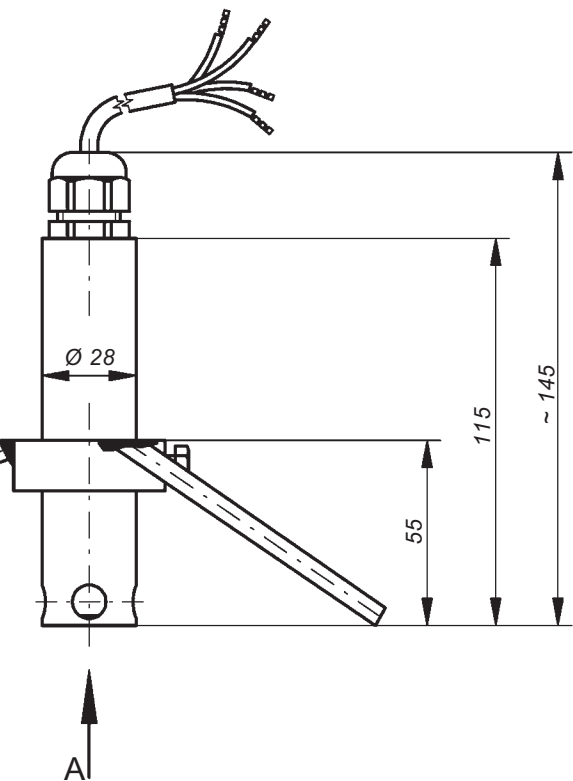


**Capacitive suspension sensor COW-LS4**

View A  
(smaller scale)




Stand,  
optional,  
with these or  
any other  
dimensions



**Capacitive suspension sensor COW-LS4,  
with mounting stand**

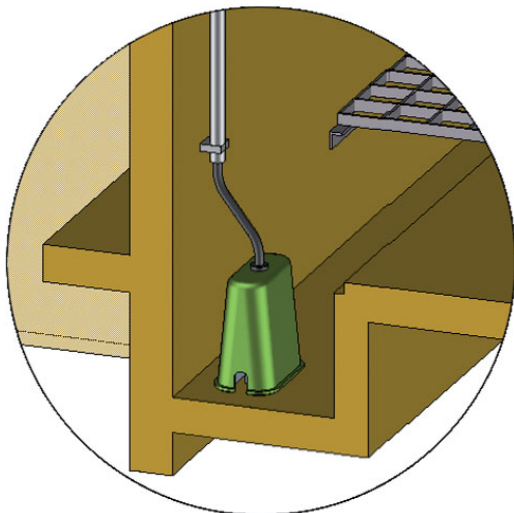
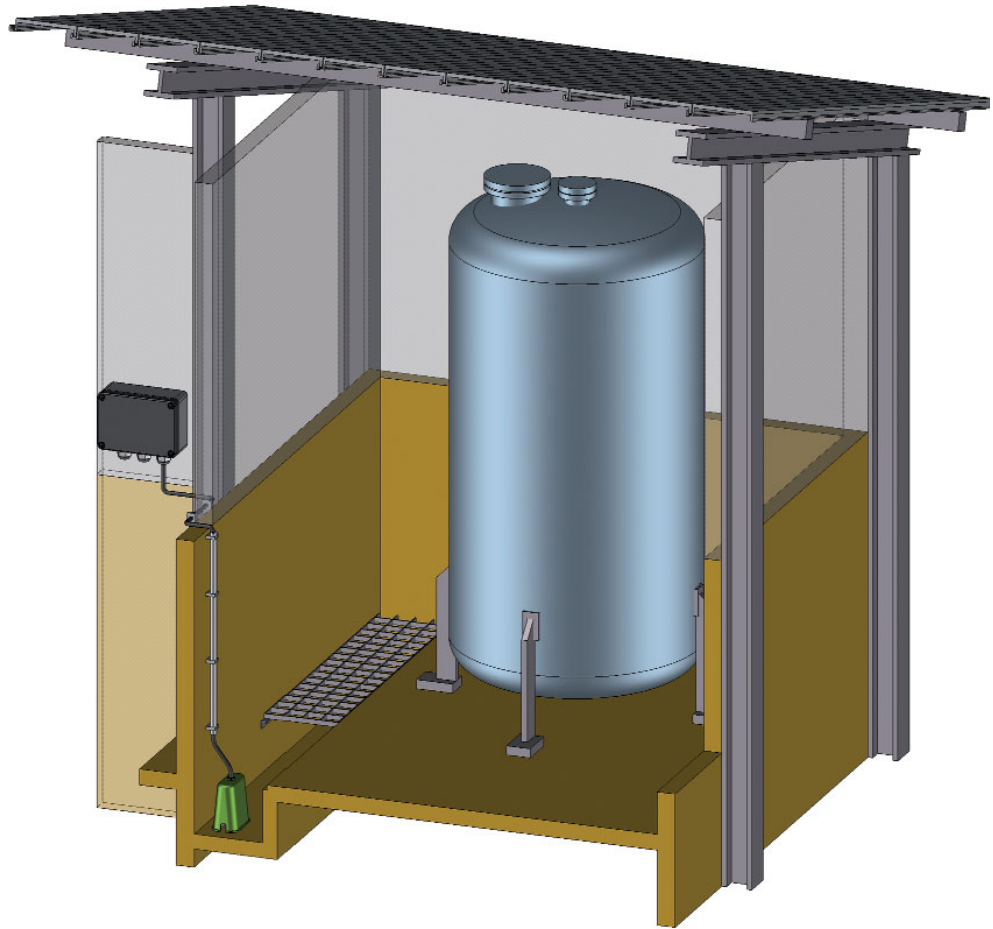


Technical data	COW-LS4
Design	leakage-detector with relay output with quiescent current contact
Sensor electrodes	stainless steel housing as screening electrode and inner cylinder as earth electrode serve as capacitive sensor electrodes
Housing	stainless steel 316 Ti, with PTFE insulator
<b>Electrical connection</b>	<b>four-wire connection</b> via connecting cable 4 x 0.5; five-wire connection for changeover contact output on request; length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request
Supply voltage	<b>only for connection to extra low voltage SELV or PELV!</b> AC/DC 24 V ± 20 %, on request AC/DC 12 V ± 20 % wire colours: brown and blue
Power consumption	approx. 0.5 VA
Output	potential-free quiescent current contact (working current contact or changeover contact on request) <b>max. load AC/DC 5 ... 24 V</b> <b>(extra low voltage SELV or PELV only);</b> <b>AC/DC 1 mA ... 3 (1) A</b> wire colours: black and black (grey)
Switching status when the capacitive sensor is not activated	output relay energised, output contact closed
Switching status when the capacitive sensor is activated	output relay de-energised, output contact open
Switching status without supply voltage	output relay de-energised, output contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current
Galvanic separation	<b>only for connection to extra low voltage SELV or PELV!</b> voltage resistance > 500 V between electrode circuit and supply circuit and output circuit
Max. no-load voltage at the electrodes	5 V <sub>eff</sub>  40 kHz (safety extra low voltage SELV)
Max. short-circuit current at the electrodes	0.2 mA
<b>Min. dielectricity constant of the liquid to be detected</b>	<b>1.8</b>
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 “Liqui-Switch” capacitive suspension sensor OWE-LS4 with plastic housing

Application example





# Capacitive suspension sensor OWE-LS4 with plastic housing

**Capacitive leakage detector for extra low voltage SELV or PELV**

- **with potential-free relay contact (for switching a safety extra low voltage)**
- **for connection to:  
a PLC or DDC unit,  
a small controller,  
a fieldbus connector or  
a network connector**
- **for switching a solenoid valve (with safety extra low voltage)**
- **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**

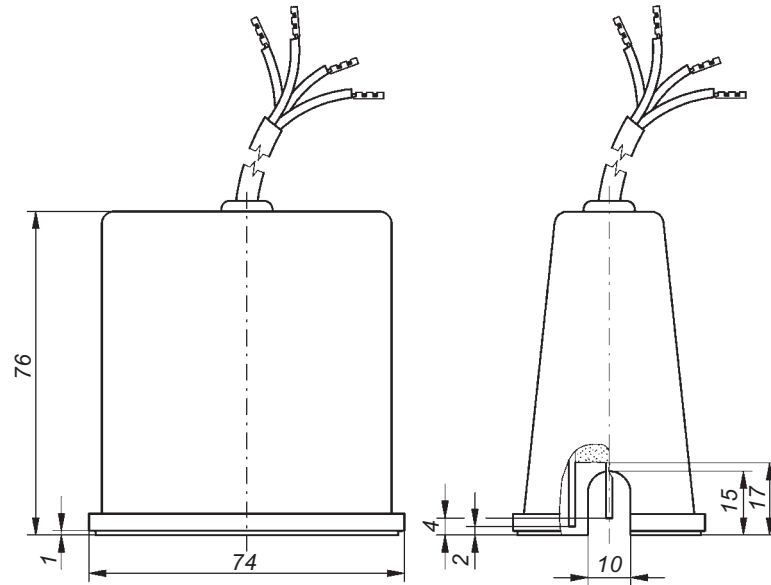
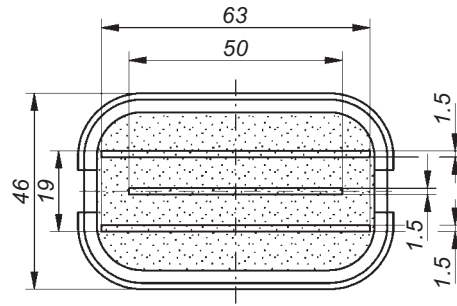
**- standing upright on the floor (preferably using the optional stand from Jola).**

Three gold-plated PCBs are integrated in the capacitive suspension sensor of the type OWE-LS4, 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.

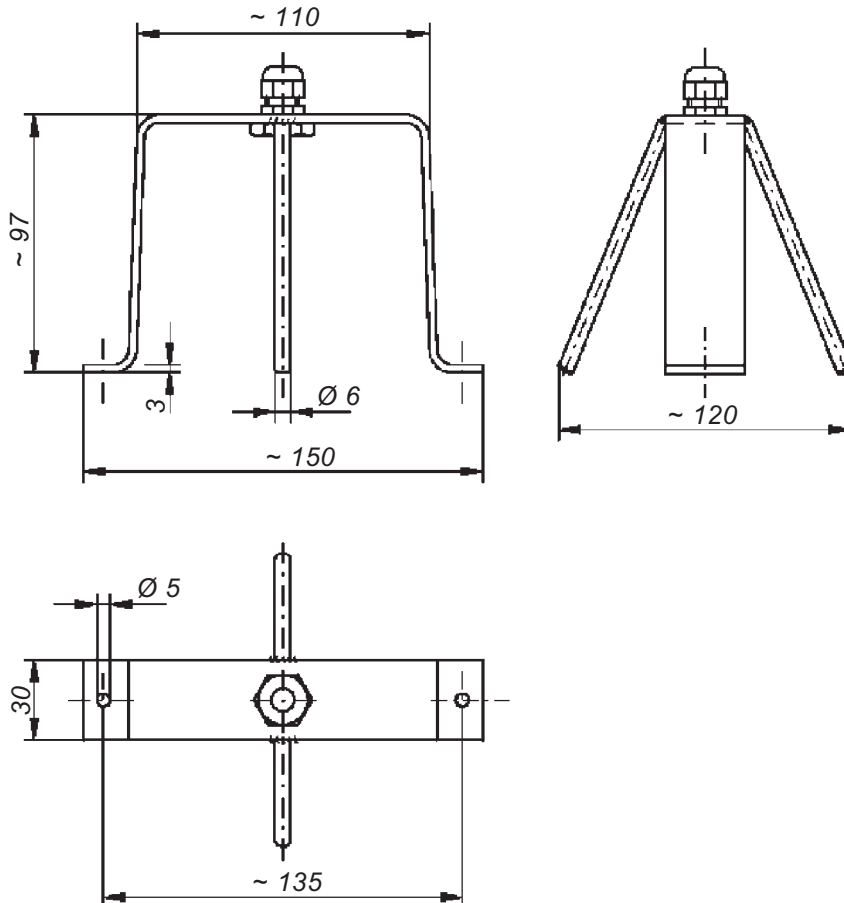
## **Areas of application:**

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.



**Capacitive suspension sensor OWE-LS4**



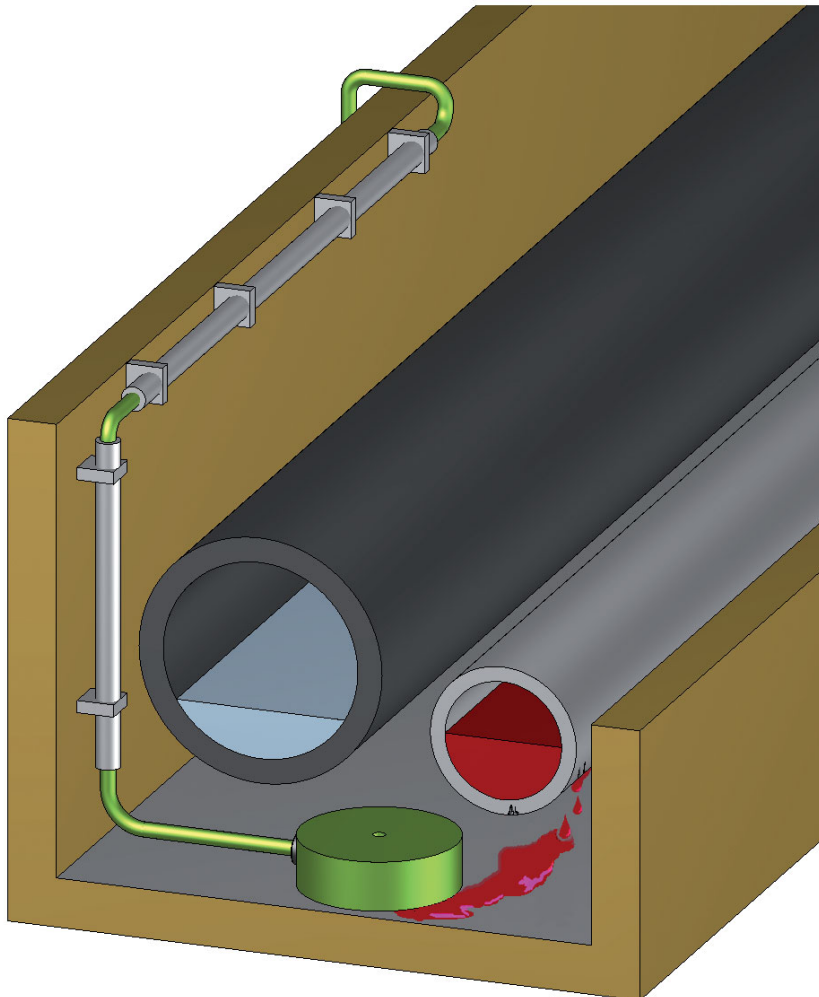
**Optional: mounting stand for capacitive suspension sensor OWE-LS4  
(Illustrations in a smaller scale than the drawings further above)**

Technical data	OWE-LS4
Design	leakage-detector with relay output with quiescent current contact
Sensor electrodes	2 outer one-side-gold-plated PCBs and 1 inner two-side-gold-plated PCB serve as capacitive sensor electrodes
Housing	PP and cast resin
<b>Electrical connection</b>	<b>four-wire connection</b> via connecting cable 4 x 0.5; five-wire connection for changeover contact output on request; length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request
Supply voltage	<b>only for connection to extra low voltage SELV or PELV!</b> AC/DC 24 V ± 20 %, on request AC/DC 12 V ± 20 % wire colours: brown and blue
Power consumption	approx. 0.5 VA
Output	potential-free quiescent current contact (working current contact or changeover contact on request) <b>max. load AC/DC 5 ... 24 V</b> <b>(extra low voltage SELV or PELV only);</b> <b>AC/DC 1 mA ... 3 (1) A</b> wire colours: black and black (grey)
Switching status when the capacitive sensor is not activated	output relay energised, output contact closed
Switching status when the capacitive sensor is activated	output relay de-energised, output contact open
Switching status without supply voltage	output relay de-energised, output contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current
Galvanic separation	<b>only for connection to extra low voltage SELV or PELV!</b> voltage resistance > 500 V between electrode circuit and supply circuit and output circuit
Max. no-load voltage at the electrodes	$5 V_{\text{eff}}$  40 kHz (safety extra low voltage SELV)
Max. short-circuit current at the electrodes	0.2 mA
<b>Min. dielectricity constant of the liquid to be detected</b>	<b>1.8</b>
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 “Liqui-Switch” capacitive plate sensor CPE-LS4 with plastic housing

Application example





# Capacitive plate sensor CPE-LS4 with plastic housing

**Capacitive leakage detector for extra low voltage SELV or PELV**

- **with potential-free relay contact  
(for switching a safety extra low voltage)**
- **for connection to:  
a PLC or DDC unit,  
a small controller,  
a fieldbus connector or  
a network connector**
- **for switching a solenoid valve  
(with safety extra low voltage)**
- **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 sensor of the type CPE-LS4 is 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**

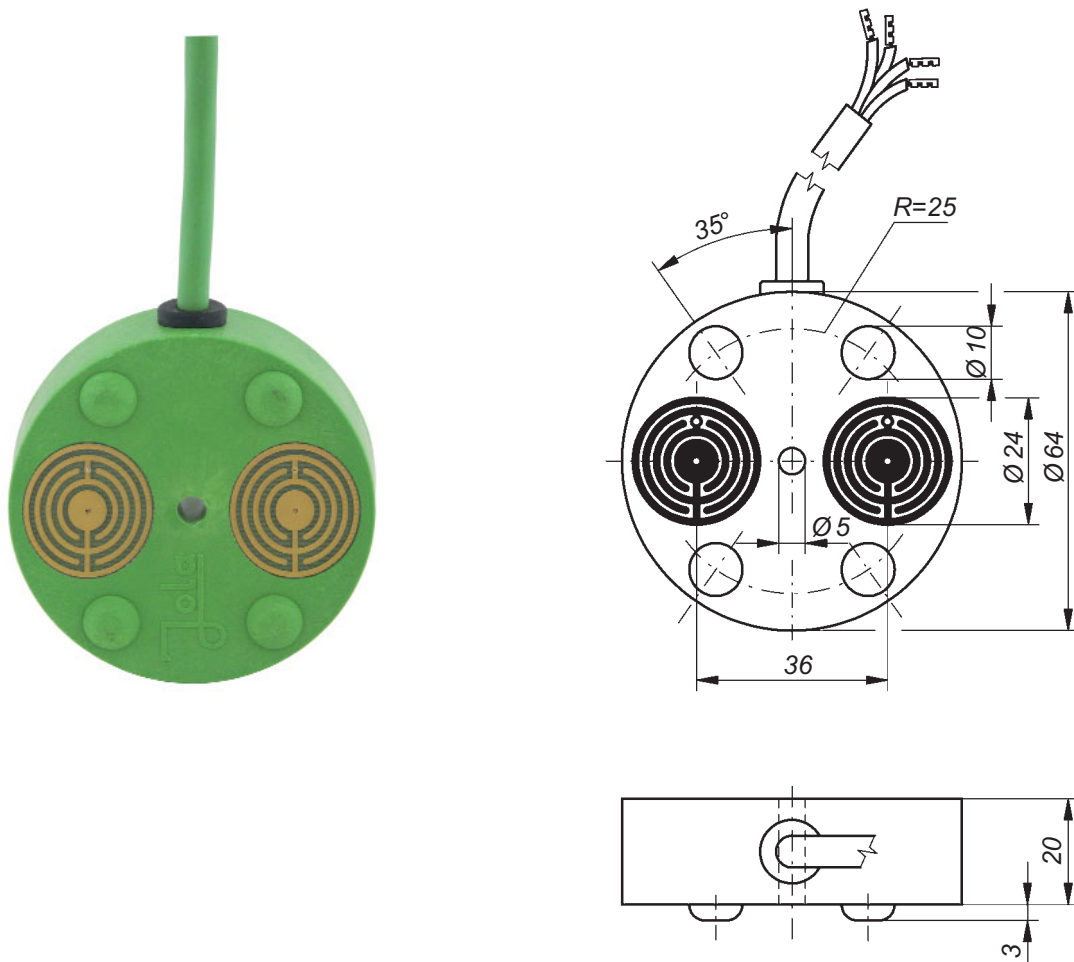
**- lying on the floor and secured by a central screw in the centre of the housing.**

Each capacitive plate sensor of the type CPE-LS4 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.

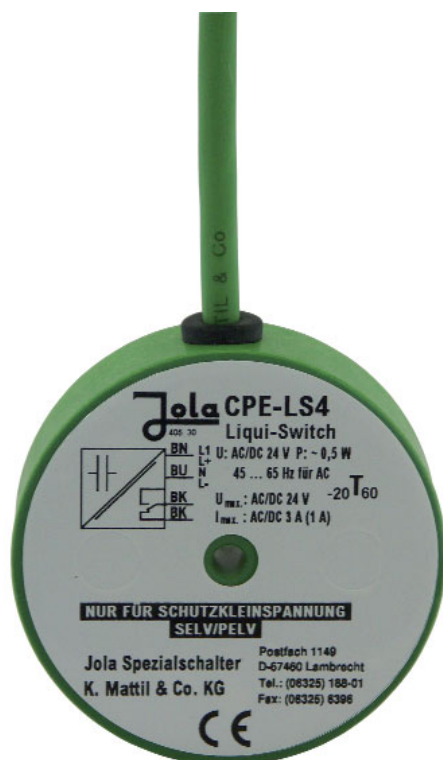
**Areas of application:**

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-LS4, sensor side



Capacitive plate sensor CPE-LS4, rating plate side



Technical data	CPE-LS4
Design	leakage-detector with relay output with quiescent current contact
Sensor electrodes	the gold-plated concentric rings (screening electrodes and earth electrodes) serve as capacitive sensor electrodes
Housing	PP and cast resin
<b>Electrical connection</b>	<b>four-wire connection</b> via connecting cable 4 x 0.5; five-wire connection for changeover contact output on request; length 5 m, longer connecting cable on request; fitted with halogen-free connecting cable on request
Supply voltage	<b>only for connection to extra low voltage SELV or PELV!</b> AC/DC 24 V ± 20 %, on request AC/DC 12 V ± 20 % wire colours: brown and blue
Power consumption	approx. 0.5 VA
Output	potential-free quiescent current contact (working current contact or changeover contact on request) <b>max. load AC/DC 5 ... 24 V</b> <b>(extra low voltage SELV or PELV only);</b> <b>AC/DC 1 mA ... 3 (1) A</b> wire colours: black and black (grey)
Switching status when the capacitive sensor is not activated	output relay energised, output contact closed
Switching status when the capacitive sensor is activated	output relay de-energised, output contact open
Switching status without supply voltage	output relay de-energised, output contact open
Cable break monitoring of connecting cable	cable break monitoring due to the quiescent current
Galvanic separation	<b>only for connection to extra low voltage SELV or PELV!</b> voltage resistance > 500 V between electrode circuit and supply circuit and output circuit
Max. no-load voltage at the electrodes	$5 V_{\text{eff}} \text{ } \square \text{ } 40 \text{ kHz}$ (safety extra low voltage SELV)
Max. short-circuit current at the electrodes	0.2 mA
<b>Min. dielectricity constant of the liquid to be detected</b>	<b>2.0</b>
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.