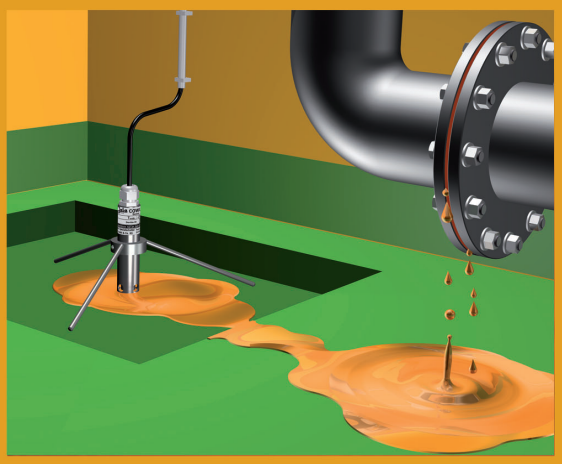
Capacitive leakage detectors of the Leckmaster range

with sensor and relay



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Jola Spezialschalter GmbH & Co. KG sells only business-to-business (B2B).

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

Subject to deviations from the diagrams and technical data.

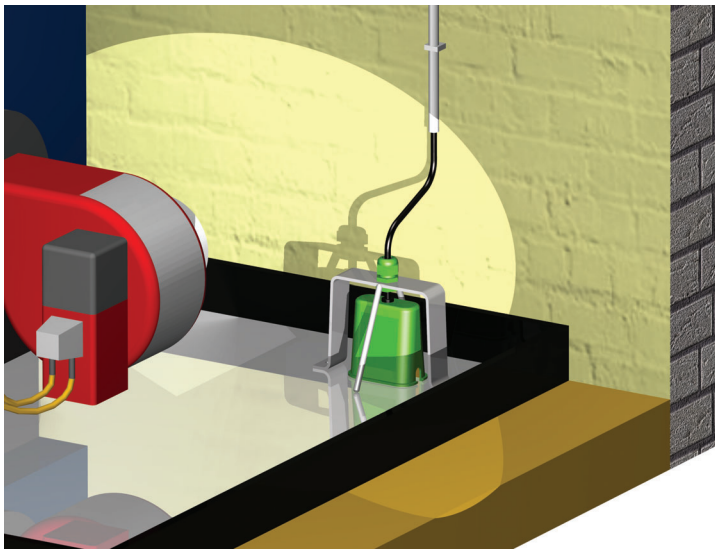
The details in this brochure are product specification descriptions and do not constitute assured properties in the legal sense.

Capacitive leakage detectors of the Leckmaster range

Capacitive leakage detectors of the Leckmaster range – General

- **with integrated cable break monitoring**
- **for the detection of electrically non-conductive and electrically conductive low-viscosity liquids**

Application example: use of an OWE 2/C capacitive sensor with mounting stand for the detection of a leakage in a collection tub underneath a fuel oil burner



The leakage-detectors of the Leckmaster range consist of:

- **1 CPE**, **OWE 2/C** or **COW** capacitive sensor
  and
  1 Leckmaster 101, **Leckmaster 101/G** or **Leckmaster 171/.** capacitive relay

  or
- **up to 5 CPE**, **OWE 2/C** or **COW** capacitive sensors
  and
  1 Leckmaster 155 capacitive relay.

The **CPE** sensor must be installed on the floor in such a way that the sensor side faces downwards.

The **OWE 2/C** and **COW** sensors can be mounted either
- upright on the floor (using a Jola mounting stand)
  or
- freely suspended by their cable above the floor.

The CPE, OWE 2/C and COW sensors should only be used in normally dry surroundings.

The **Leckmaster 101** relay is designed for mounting on DIN rail or fastening via 2 boreholes.

The **Leckmaster 101/G**, **Leckmaster 171/.** and **Leckmaster 155** relays are designed for wall mounting.

Areas of application:

All organic and inorganic liquids with specific dielectric constants between 2 (CPE) or 1.8 (OWE 2/C and COW) and 109.

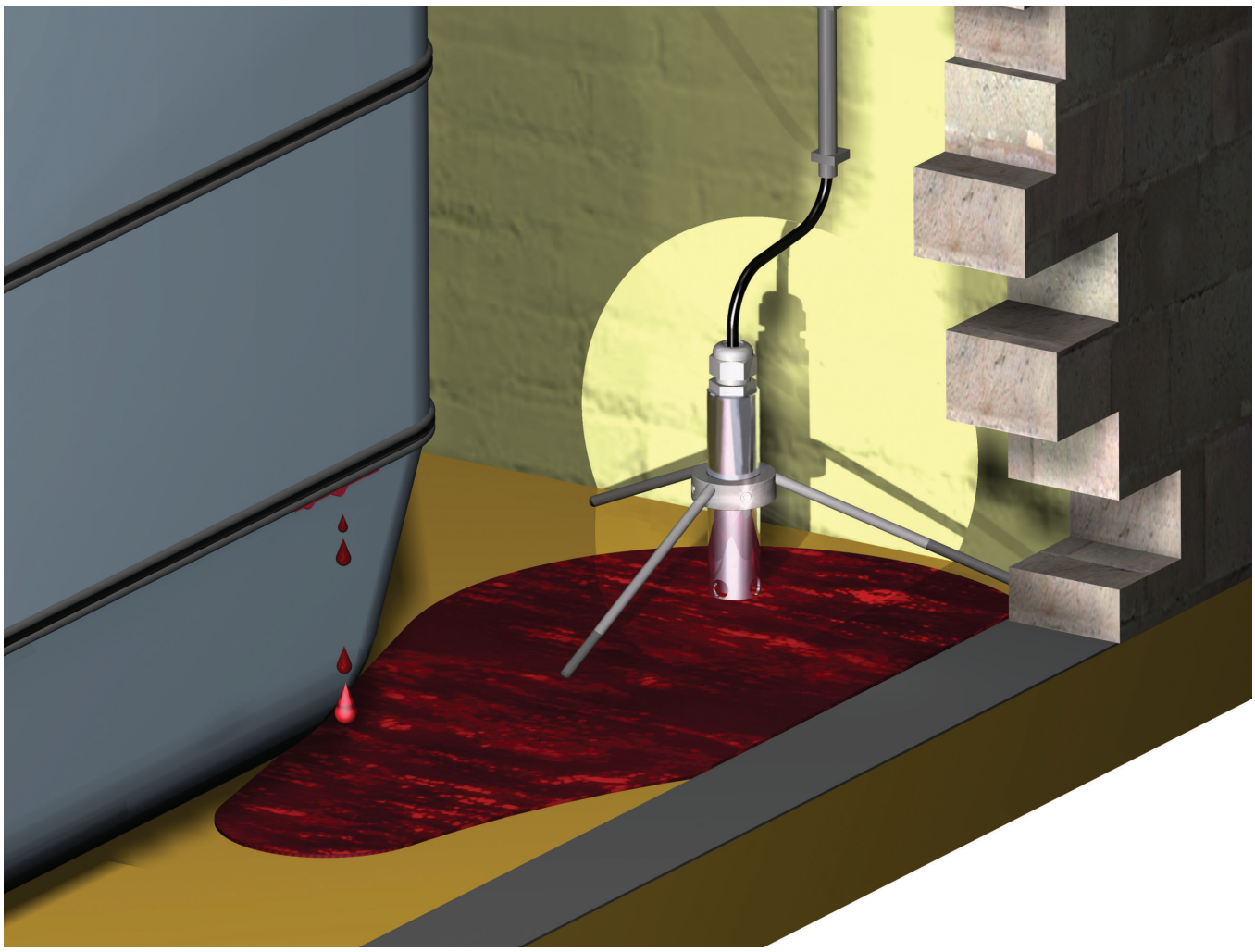
Prerequisite is that these liquids are present in fluid form, and that the sensors are installed in such a way that they will be sufficiently wetted in the event of a leakage.

The capacitive measuring principle

The capacitive measuring principle is mainly used for the detection of **electrically non-conductive (insulating) liquids**, but it can also be used to detect electrically conductive liquids.

Electrically non-conductive liquids are generally organic liquids like oils and solvents. An electrode assembly forms a measuring capacitor, and the dielectric is either air or liquid. The dielectric constant of air is 1. The dielectric constant of the liquid to be detected is higher. For our capacitive sensors, the dielectric constant has to be higher than 2 (type CPE) or 1.8 (types OWE 2/C and COW).

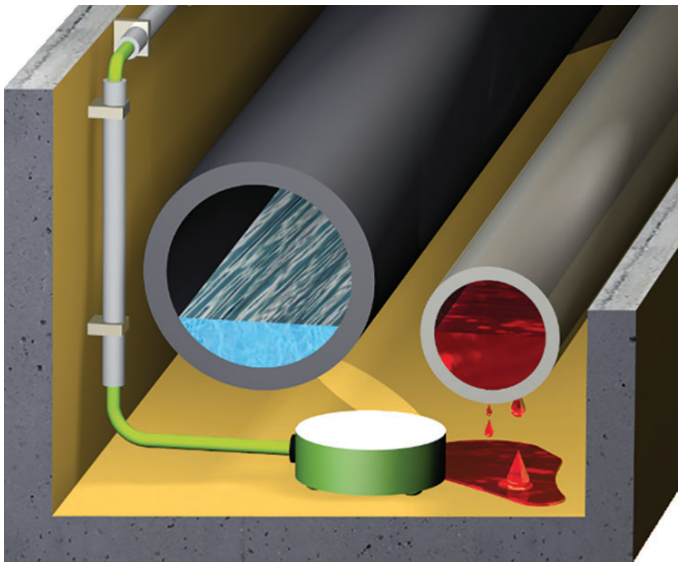
The capacitive leakage detector recognises a change in the dielectric constant at the measuring capacitor, and an alarm signal is emitted. The design of the measuring capacitor allows direct mounting of the sensor on the floor and, as far as possible, rules out interference effects due to different subsurfaces.



Application example:
use of a COW capacitive sensor with mounting stand for the detection of an oil leakage in a collection room

CPE capacitive sensor

with housing made of PP

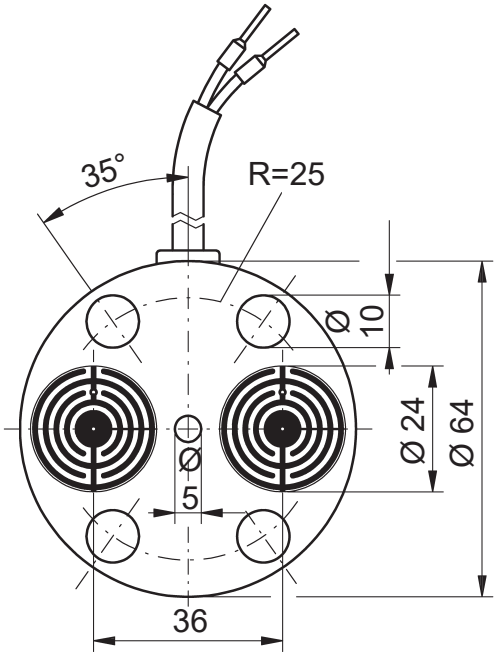


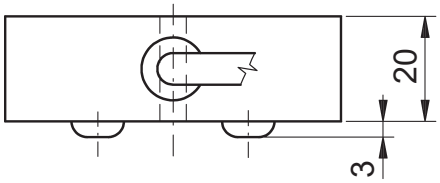
Application example: use of a CPE capacitive sensor for the detection of a liquid leakage in a pipe duct

Technical data	CPE
Housing	PP and cast resin
Electrical connection	cable made of TPK, 2X0.75 mm² length 5 m on request: • longer • made of PTFE
Sensitive elements	2 round PCBs with gold-plated concentric strip conductors form 2 detection capacitors
Protection class of the electronics sealed in the housing	IP65
Response height from the ground	approx. 3 mm
Min. required dielectric constant of the liquid to be detected	**2.0**
Temperature resistance	– 20°C to + 60°C
Max. length of connecting cable	1,000 m between sensor and relay
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies

Top side

Sensor side



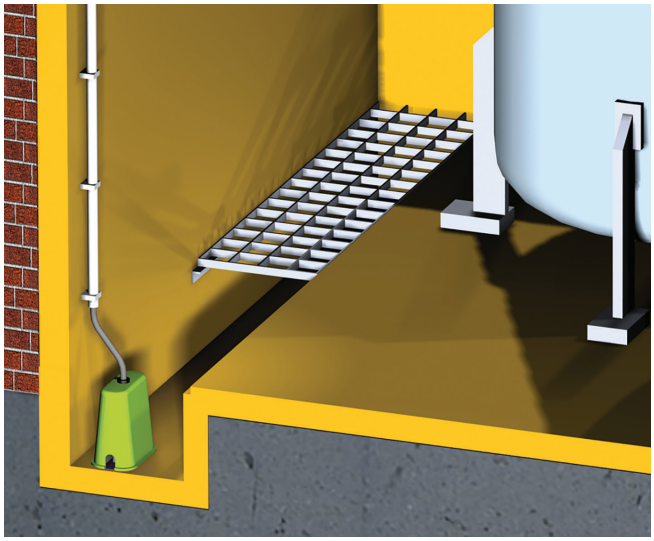


Dimensions in mm

OWE 2/C capacitive sensor

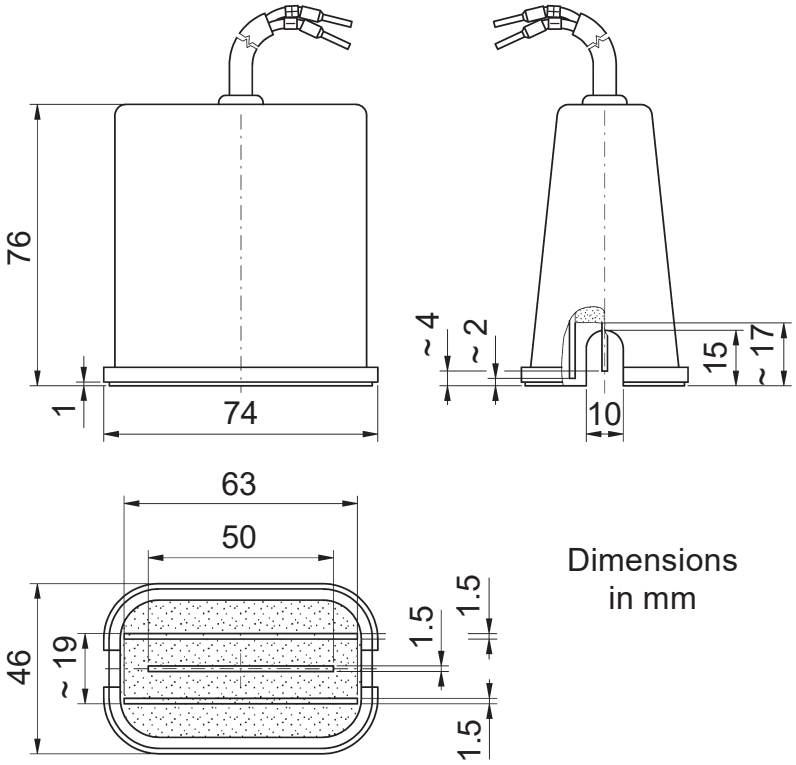
with housing made of PP

with Z-65.40-297 DIBt certificate



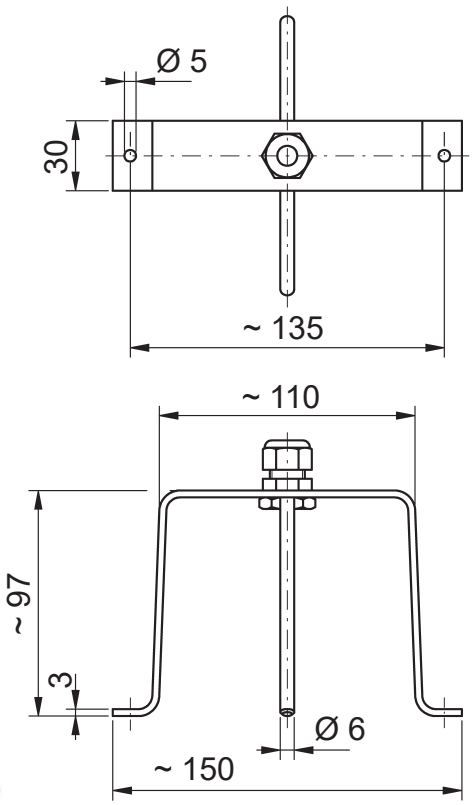
Application example: use of an OWE 2/C capacitive sensor for the detection of a liquid leakage at the lowest point (groove in the picture) of a collection room

Technical data	OWE 2/C
Housing	PP and cast resin
Electrical connection	cable made of TPK, 2X0.75 mm² length 5 m on request: • longer • made of PTFE
Sensitive elements	2 outer gold-plated capacitor plates and 1 double-sided inner gold-plated capacitor plate form 2 detection capacitors
Protection class of the electronics sealed in the housing	IP65
Response height from bottom edge of housing	≥ 12 mm possibly smaller depending on the dielectric constant of the liquid
Min. required dielectric constant of the liquid to be detected	**1.8**
Temperature resistance	– 20°C to + 60°C
Max. length of connecting cable	1,000 m between sensor and relais
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies
Mounting stand (option)	MB MI/E made of stainless steel 316Ti



Dimensions in mm

Option:
MB MI/E mounting stand for OWE 2/C
(diagrams with smaller scale compared to the drawings above)



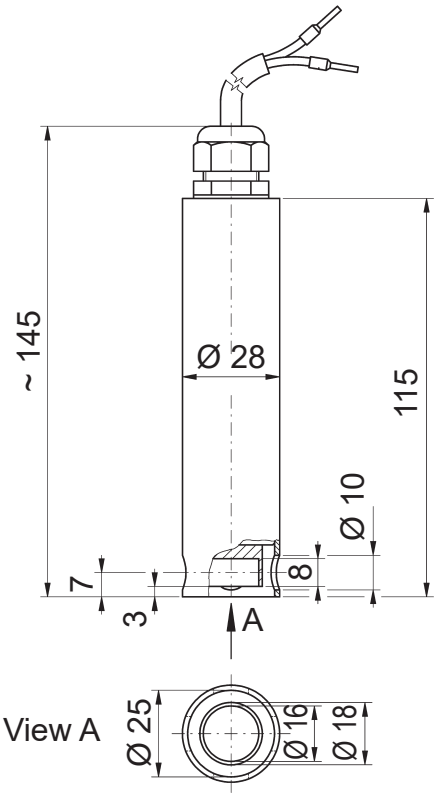
Dimensions in mm

COW capacitive sensor

with housing made of stainless steel 316Ti

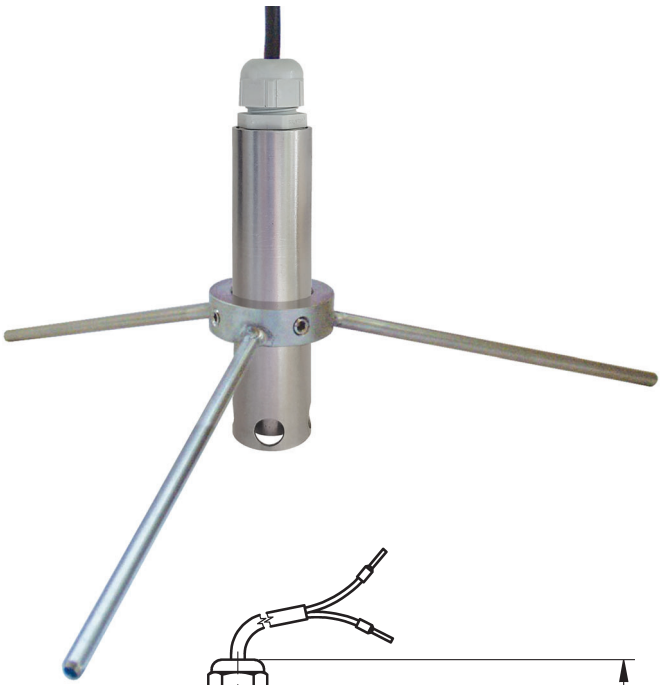
Application example:
use of a COW capacitive sensor
for the detection of a leakage
in the collection tub of a storage tank
for water-polluting liquids

Technical data	COW
Housing	stainless steel 316Ti and PTFE
Electrical connection	cable made of TPK, 2X0.75 mm² length 5 m on request: • longer • made of PTFE
Sensitive elements	a stainless steel housing used as a guard electrode and an inner cylinder used as a measuring electrode form a detection capacitor
Protection class of the electronics sealed in the housing	IP65
Response height from bottom edge of housing	≥ 12 mm possibly smaller depending on the dielectric constant of the liquid
Min. required dielectric constant of the liquid to be detected	**1.8**
Temperature resistance	– 20°C to + 60°C
Max. length of connecting cable	1,000 m between sensor and relay
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies
Mounting stand (option)	MB KL/E made of stainless steel 316Ti

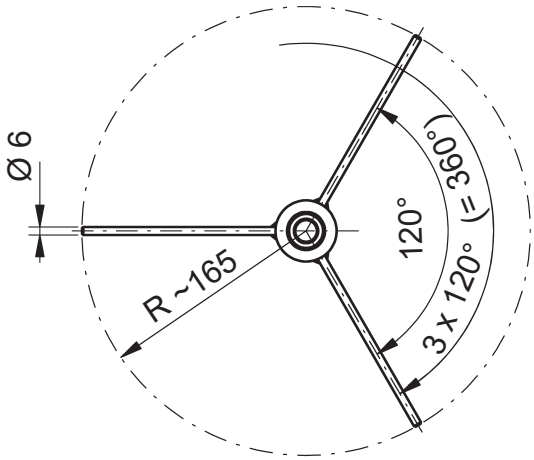


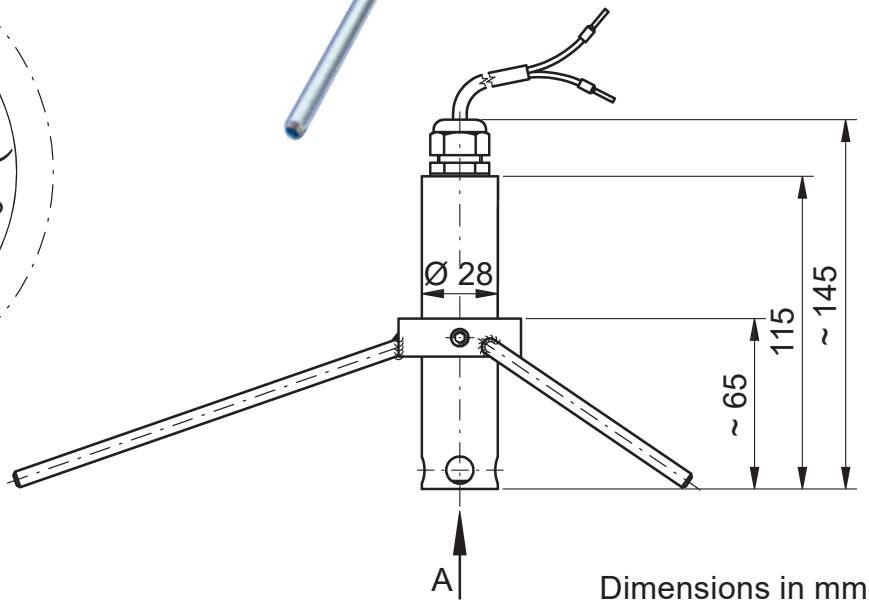
Dimensions in mm

Option:
MB KL/E mounting stand for COW (diagram/photo with smaller scale compared to the drawing/photo above)



View A (smaller scale)





Dimensions in mm

Leckmaster 101 capacitive relay

with Z-65.40-297 DIBt certificate

- **for the connection of 1 CPE, OWE 2/C or COW capacitive sensor**
- **with cable break monitoring**
- **with switchable self-hold**
- **with 1 potential-free changeover contact at the output**

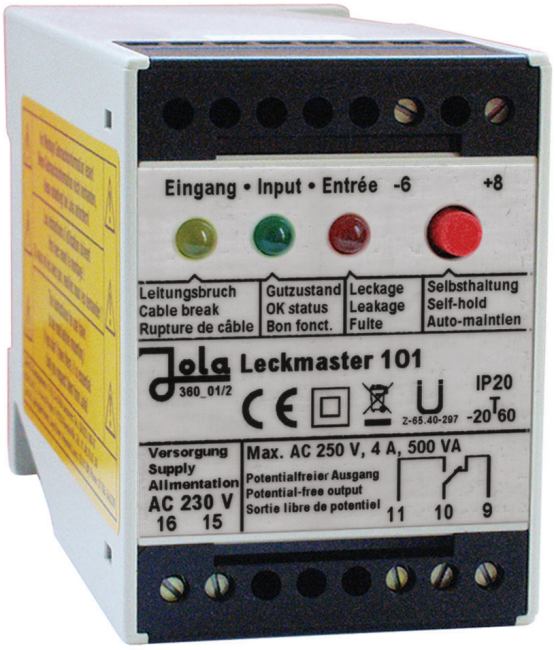
Capacitive relay for DIN rail mounting or fastening via 2 boreholes,
with connection terminals on top and with 3 LEDs for signalling the operating statuses

The Leckmaster 101 relay possesses 1 output for only 1 CPE, OWE 2/C or COW capacitive sensor. The sensor is supplied with a safety extra low voltage (SELV) generated in the Leckmaster 101 relay. The safety extra low voltage is reliably galvanically separated from the mains circuit of the Leckmaster 101 and the potential-free changeover contact of the output relay.

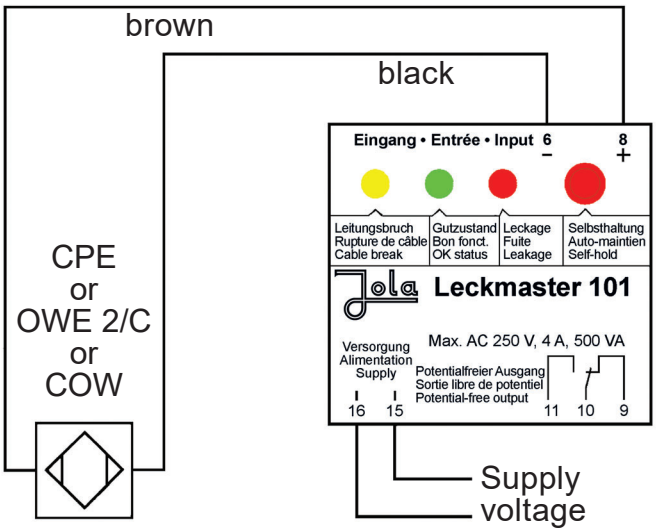
Self-hold (via push button):

- If the **self-hold is switched on, an alarm is stored**. The relay continues to signal the alarm even if the cause of the alarm is no longer present (e.g. the presence of oil or a cable break). The alarm is no longer stored by switching off the self-hold.
- If the **self-hold is not switched on, the alarm is not maintained** when the cause of the alarm has been remedied but is terminated.

Technical data	Leckmaster 101
Supply voltage (AC versions: terminals 15 and 16, DC versions: • terminal 15: – • terminal 16: +)	AC 230 V on request: AC 240 V, AC 115 V, AC 24 V, DC 24 V or DC 12 V DC versions only for connection to a safety extra low voltage according to the safety regulations relating to the application
Power consumption	approx. 3 VA
Sensor circuit (terminals 6 and 8)	2 terminals (under SELV), acting on 1 output relay with switchable self-hold
No-load voltage	DC 8.4 V (SELV)
Short circuit current	< 10 mA
Response hysteresis	1.5 mA ⎍⎍ 1.8 mA
Cable break monitoring	I < 0.15 mA
Power circuit (terminals 9, 10, 11)	1 single-pole potential-free changeover contact based on the closed-circuit principle
Operating status indication	via 3 LEDs (see page 31-3-12)
Switching voltage	max. AC 250 V
Switching current	max. AC 4 A
Switching capacity	max. 500 VA
Housing	insulating material, 75 x 55 x 110 mm
Connection	terminals on top of housing
Protection class	IP20
Mounting	on 35 mm DIN rail or fastening via 2 boreholes
Mounting orientation	any
Temperature resistance	– 20°C to + 60°C
Max. length of connecting cable	1,000 m between relay and sensor
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies

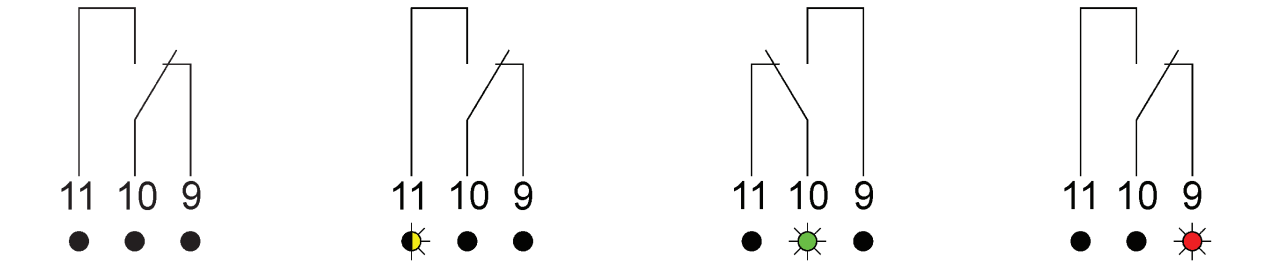


Connection diagram



Position of contact when relay without voltage

Position of the output contact



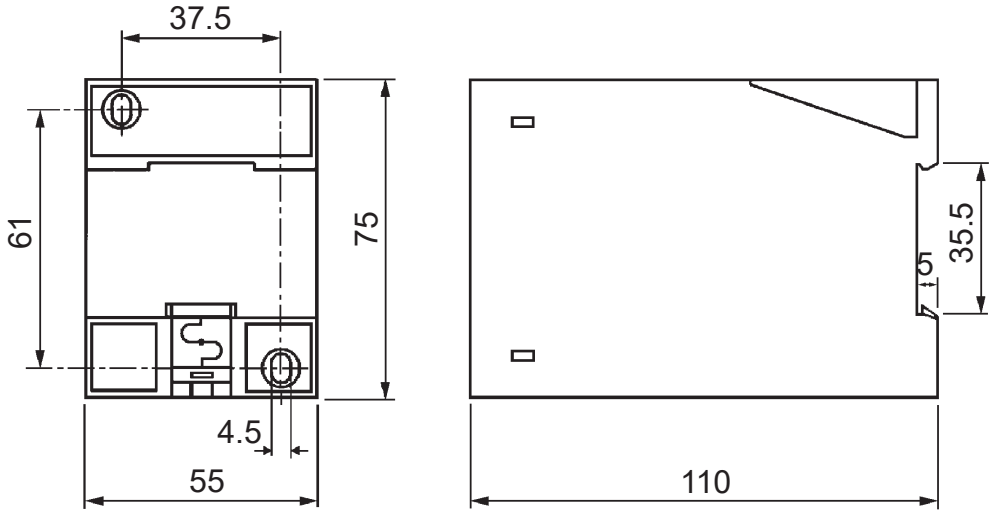
LEDs dark
output relay
not energised

yellow LED flashes
output relay
not energised

green LED lights up
output relay
energised

red LED lights up
output relay
not energised

Dimensions in mm



The unit is designed for switch cabinet mounting or installation in a suitable protective housing and may therefore only be installed in these locations. It is suitable for use in clean environments only.

Leckmaster 101/G capacitive relay

- **for the connection of 1 CPE, OWE 2/C or COW capacitive sensor**
- **with cable break monitoring**
- **with automatic self-hold in the event of leakage alarm**
- **with 2 potential-free changeover contacts at the output**
- **with touch sensor button for alarm acknowledgement**
- **with DC 20 V binary output for the building management system (BMS)**

Capacitive relay for wall mounting, with transparent cover and with, inside the housing, 3 LEDs for operating status indication and with 1 LED for acknowledgement status indication

♦ **Sensor input with common ground with the binary output for the building management system**

The Leckmaster 101/G relay possesses 1 input for the connection of only 1 CPE, OWE 2/C or COW capacitive sensor.

The sensor is supplied with a safety extra low voltage (SELV) generated in the Leckmaster 101/G. The SELV is reliably galvanically separated from the mains circuit of the Leckmaster 101/G and the potential-free changeover contacts of the two output relays.

The sensor input and the binary output for the BMS have a common ground, which means there is no galvanic separation between them.
This factor must always be taken into account in the case of long electrical circuit connection extending into a different part of a building.

There is a risk of formation of ground loops by detection of electrically conductive liquids.
There is a also a risk of formation of ground loops if the COW capacitive sensor is installed in such a way that the sensor stainless steel housing can take on ground potential.
It may be necessary to perform local potential equalisation in order to avoid potential equalisation currents via the sensor circuit.

In case of using the binary output for the BMS, please refer to the relevant standards and directives for insulation coordination and surge protection.

♦ Optical indicators

A group of 3 LEDs of different colours is assigned to the sensor.

Operating status	Optical indication
Under voltage	When the supply voltage is switched on, the relay first indicates the OK status. If the sensor is in a different operating state, this is indicated by the corresponding LED.
Leakage or **wrong polarity connection of the sensor**	Red LED lights up • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS
OK status	Green LED lights up • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS
Cable break	Yellow LED flashes • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS

♦ Outputs

Two potential-free changeover contacts are available at the output, one based on the open-circuit principle and the other on the closed-circuit principle.
In addition, there is a DC 20 V binary output signal based on the closed-circuit principle for the BMS.
In the event of an alarm, the potential-free changeover contact based on the open-circuit principle can be acknowledged via a touch sensor button acting through the housing cover of the unit and by that reset to its initial position.

Output	Switching statuses
Output relay 1 (based on the open-circuit principle)	When Leckmaster 101/G is without voltage and in the OK status of the sensor, output relay 1 is not energised. In the event of leakage or cable break, output relay 1 is energised if the alarm has not been acknowledged. Output relay 1 can be acknowledged using the touch sensor button and by that reset to its initial position.
Output relay 2 (based on the closed-circuit principle)	Output relay 2 is energised in OK status of the sensor. Output relay 2 is not energised when Leckmaster 101/G is without voltage and in the case of leakage or cable break.
DC 20 V binary output for the BMS (based on the closed-circuit principle)	High signal, DC 20 V = OK status of the sensor Low signal, DC 0 V = • Leckmaster 101/G without voltage or • leakage or • cable break The binary output is short circuit-protected and has a common ground with the sensor input. There is therefore no galvanic separation between the sensor input and the binary output.

Technical data	Leckmaster 101/G
Supply voltage (terminals 1 and 2)	AC 230 V other supply voltage, e.g. DC 24 V, on request
Power consumption	approx. 3 VA
Sensor circuit (E1 = control input and 1 of the 2 ground terminals = ground)	2 terminals (under SELV): • 1 for the control input • 1 for the ground. The ground is the same as the one for the binary output. Local potential equalisation has to be performed to avoid ground loops in critical installations.
No-load voltage	DC 8.4 V (SELV)
Short circuit current	< 10 mA
Response hysteresis	1.5 mA ⎍ 1.8 mA
Cable break monitoring	I < 0.15 mA
1st power circuit (output relay 1 – terminals 3, 4, 5)	1 single-pole potential-free changeover contact based on the open-circuit principle for alarm in the event of leakage (with self-hold) or cable break (without self-hold) can be acknowledged via the touch sensor button
2nd power circuit (output relay 2 – terminals 6, 7, 8)	1 single-pole potential-free changeover contact based on the closed-circuit principle for alarm in the event of leakage (with self-hold, if output relay 1 has not been acknowledged yet) or cable break (without self-hold)
Electrical values of the potential-free change-over contacts:	**Due to the compact design and the resulting low clearance and creepage distances between the two output relays, only voltages with the same protection class are permitted to be connected to both changeover contacts: either only the same mains voltage or only the same extra low voltage, however not combined.**
• switching voltage • switching current • switching capacity	max. AC 250 V max. AC 4 A max. 500 VA
Binary output for the BMS (A1 = control output and 1 of the 2 ground terminals = ground)	2 terminals (under SELV): • 1 for the DC 20 V binary output signal without galvanic separation to the sensor circuit • 1 for the ground **For connection to the BMS (e.g. PLC), opto-couplers should be fitted for the purpose of galvanic separation.** OK status: high signal (DC 20 V) leakage or cable break: low signal (DC 0 V)
No-load voltage	DC 20 V (sufficient for 24 V inputs, as at least 15 V are normally required for high signal)
Short circuit protection	short circuit current limitation at ≤ 30 mA

Technical data	Leckmaster 101/G
Operating status indication	via 3 LEDs
• the red LED lights up output relay 1 output relay 2 binary output signal	**leakage** or **wrong polarity connection of the sensor** energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
• the green LED lights up output relay 1 output relay 2 binary output signal	**OK status** not energised (open-circuit principle) energised (closed-circuit principle) high signal (closed-circuit principle)
• the yellow LED flashes output relay 1 output relay 2 binary output signal	**cable break** energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
Housing	insulating material, 130 x 94 x 57 mm, with 3 M20 cable glands Special seals are delivered for introduction of 2 cables of Ø 5 mm each in one cable gland.
Connection	screw terminals inside the housing
Protection class	IP54
Mounting	wall mounting using 4 screws
Mounting orientation	any
Temperature resistance	– 20°C to + 60°C
Max. length of connecting cable	1,000 m between relay and sensor
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies

♦ **Automatic self-hold function**

In the event of leakage: a leakage alarm is stored. The relay continues to signal the alarm even if the presence of a leakage liquid is no longer present, in other words if the capacitive sensor is dry again.

In the event of cable break: a cable break alarm is not stored, that means that the alarm signal will automatically be cancelled as soon as the cable is reconnected.

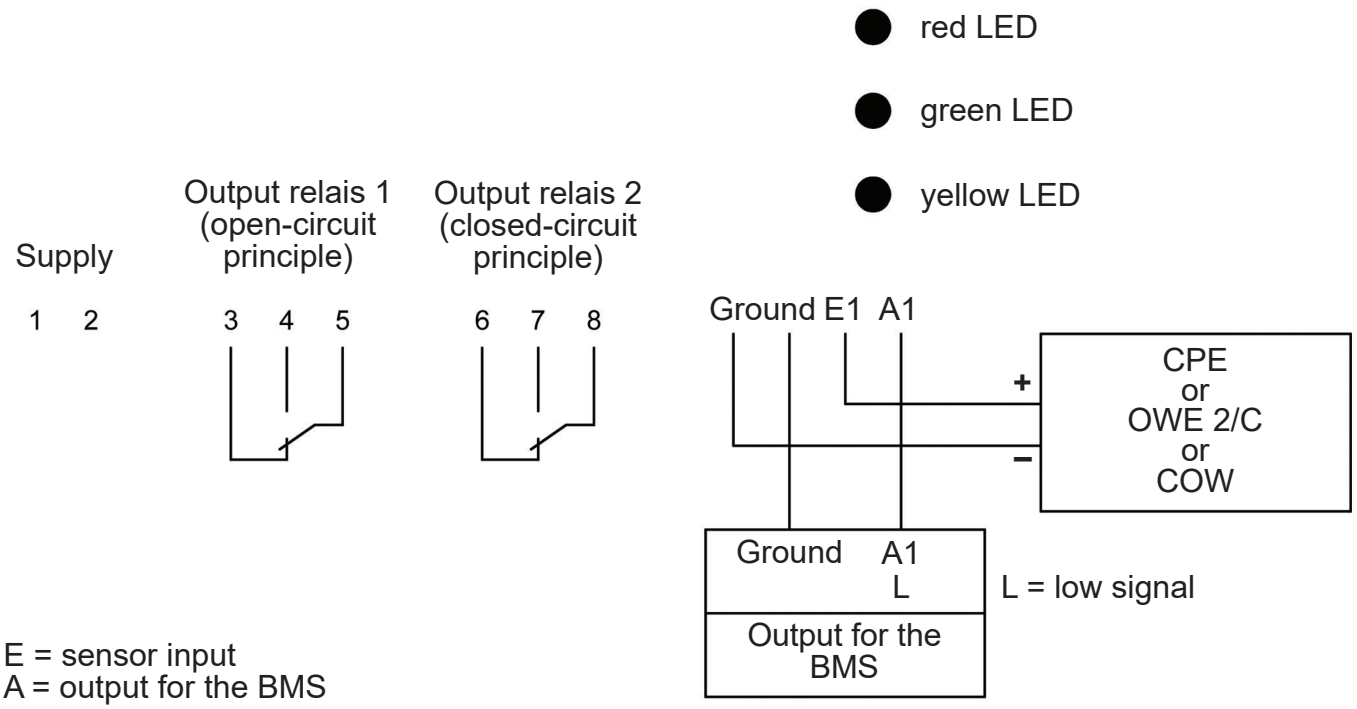
♦ **Acknowledgement via touch sensor button**

In the event of leakage: if there is a leakage alarm (the red acknowledgement LED flashes), output relay 1 can be acknowledged. After the acknowledgement the red acknowledgement LED lights up and output relay 1 is reset to its initial position. Output relay 2 remains in its position.
If there is no longer an alarm reason, both output relays can be acknowledged. After the acknowledgement, the red acknowledgement LED is dark and both output relays are reset to their initial positions.
If output relay 1 has already been acknowledged during an alarm status, output relay 2 will then automatically be reset as soon as the alarm reason disappeares.

In the event of cable break: in this case (the red acknowledgement LED flashes) output relay 1 can be acknowledged. After the acknowledgement, the red acknowledgement LED lights up and output relay 1 is reset to its initial position. Output relay 2 remains in its position. Both output relays are automatically reset when the cause of the alarm is no longer present (the red acknowledgement LED is then dark).

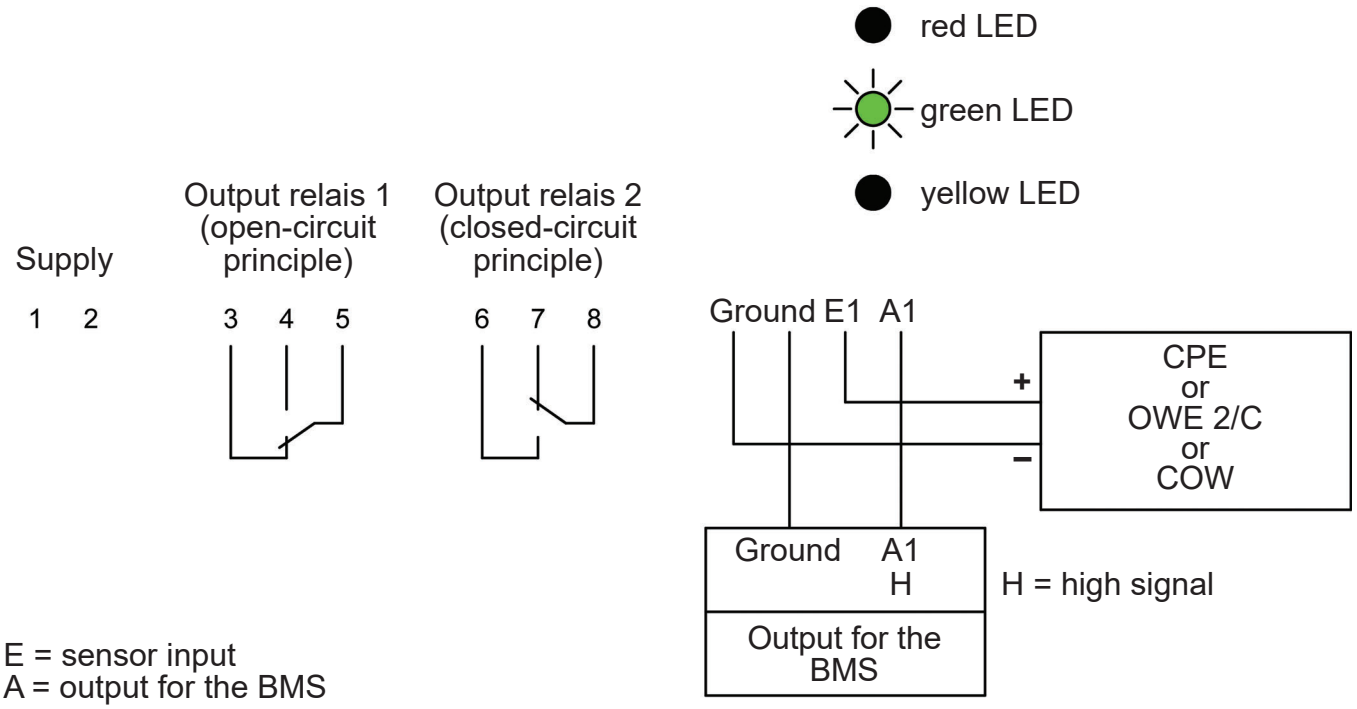
Position of the output statuses

Leckmaster 101/G without voltage



E = sensor input
A = output for the BMS

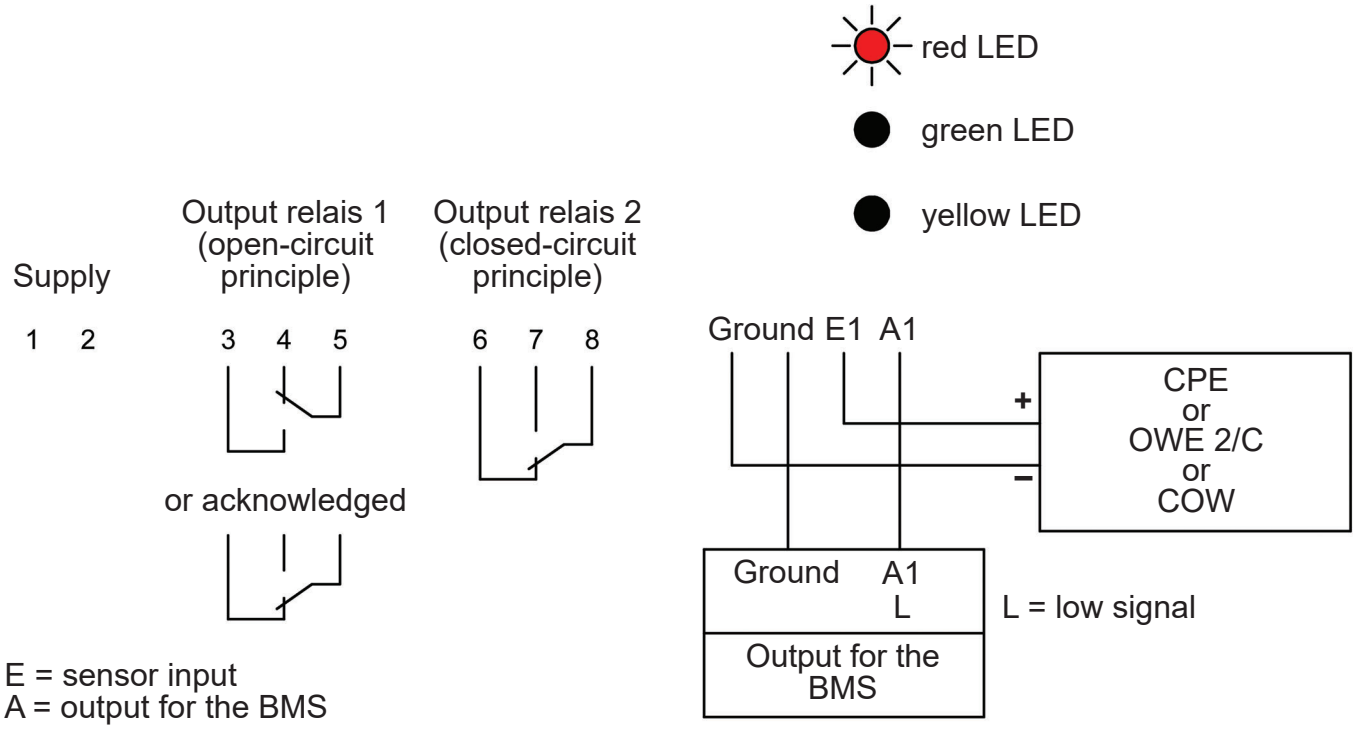
Leckmaster 101/G under voltage – OK status



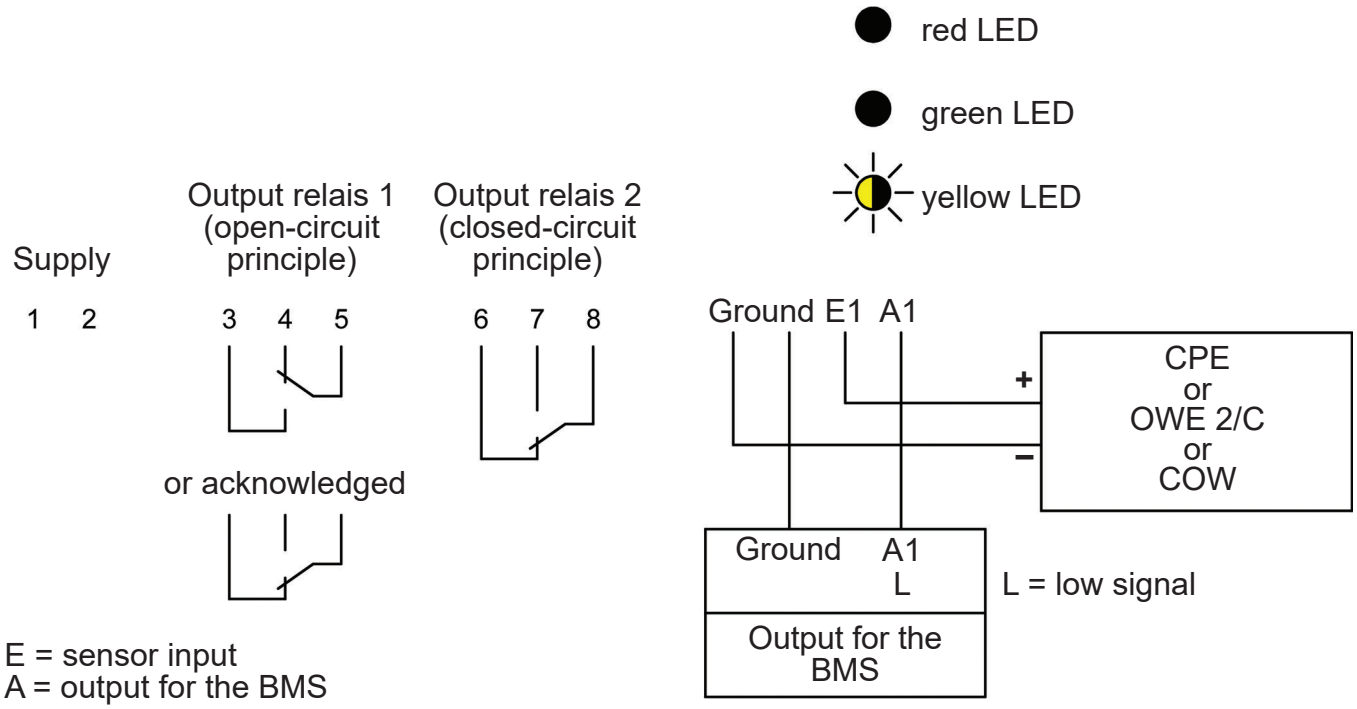
E = sensor input
A = output for the BMS

Position of the output statuses

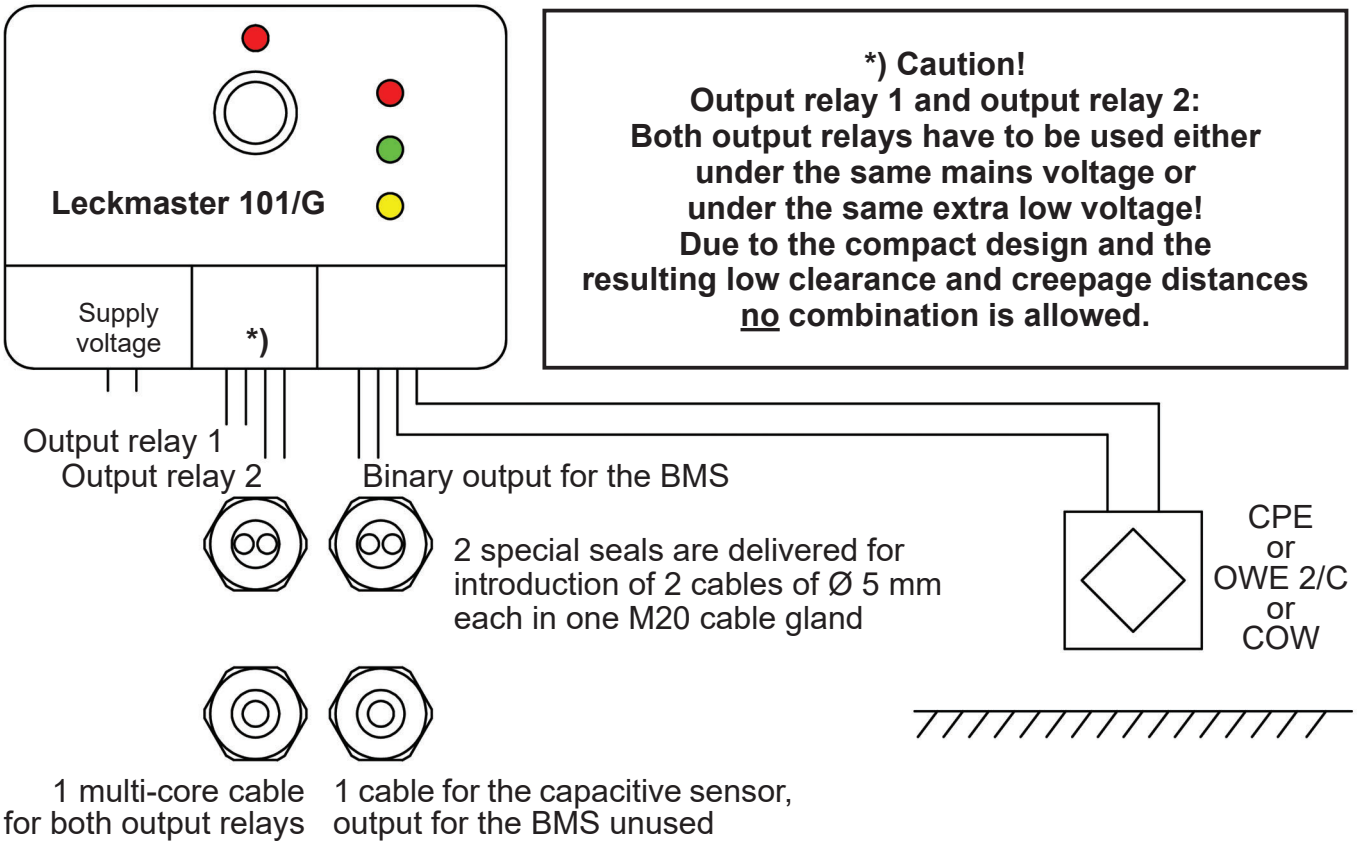
Leckmaster 101/G under voltage – Leakage or wrong polarity connection of the sensor

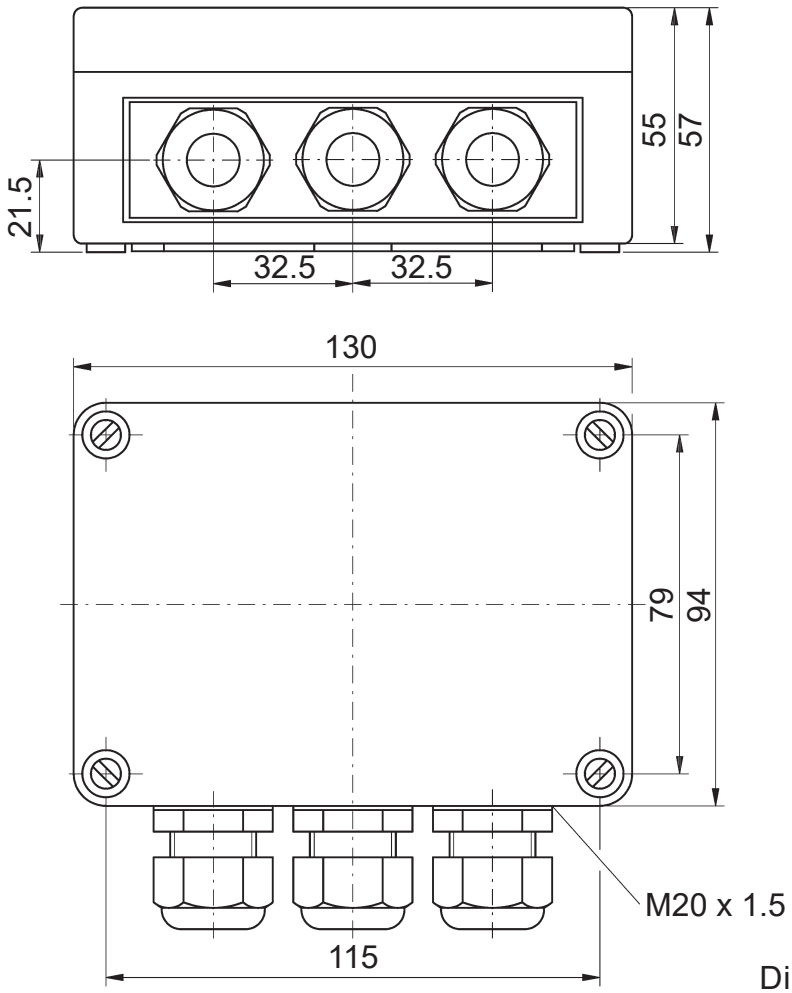


Leckmaster 101/G under voltage – cable break



Connection diagram





Dimensions in mm

Leckmaster 171/1 and Leckmaster 171/2 capacitive relays

- **for the connection of 1 CPE, OWE 2/C or COW capacitive sensor**
- **with cable break monitoring**
- **with built-in battery for emergency power supply in the event of a mains failure**
- **with 2 potential-free changeover contacts at the output**
- **with integrated buzzer**
- **with 1 optional external horn power circuit**
- **with push button for alarm acknowledgement**

Capacitive relay for wall mounting,
with 3 LEDs for signalling the operating statuses

The Leckmaster 171/. relays possess 1 input for only 1 CPE, OWE 2/C or COW capacitive sensor.

The sensor is supplied with a safety extra low voltage (SELV) generated in the Leckmaster 171/..

The SELV is reliably galvanically separated from the mains circuit of the Leckmaster 171/. and the potential-free changeover contacts of the two output relays.

♦ Optical indicators

The various operating statuses are indicated by one bi-colour LED and two single-colour LEDs.

Operating status	Meaning of the optical indications	
Under voltage	Optical indication **without** effect on the power circuits: bi-coloured LED	
	lights up green:	mains operation, battery fuse OK
	flashes green:	mains failure, battery operation
	lights up red:	mains operation, defective or absent battery fuse
Cable break	Optical indication **with** effect on the power circuits:	
	yellow LED flashes:	cable break alarm (not acknowledged)
	yellow LED lights up:	cable break alarm acknowledged • alarm reason still present or • alarm reason no longer present and acknowledged alarm in self-hold
Leakage	Optical indication **with** effect on the power circuits:	
	rote LED flashes:	leakage alarm (not acknowledged)
	rote LED lights up:	leakage alarm acknowledged • alarm reason still present or • alarm reason no longer present and acknowledged alarm in self-hold

♦ **Outputs**

A buzzer is integrated in the relay for the purpose of acoustic signalling at intervals in the event of an alarm. An optional external horn (DC 12 V, max. 1 A) may be installed additionally. It is fed in the event of an alarm via an internal relay contact with the supply voltage of DC 12 V generated in the relay as a permanent signal.

Two potential-free changeover contacts are available at the output for the connection of additional signalling devices. The switching function of these contacts is different in the two unit versions.

Output	Leckmaster 171/1	Leckmaster 171/2
Output relay 1 (based on the closed-circuit principle)	for cable break alarm, with self-hold, can be acknowledged when the reason for the alarm is no longer present	for any alarm, with self-hold, can be acknowledged when the reason for the alarm is no longer present
Output relay 2 (based on the closed-circuit principle)	for leakage alarm, with self-hold, can be acknowledged when the reason for the alarm is no longer present	for any alarm, with self-hold, can always be acknowledged
Optional external horn (based on the open-circuit principle)	for any alarm, with self-hold, can always be acknowledged	

♦ **Alarm acknowledgement via push button**

A built-in push button is fitted in the relay for the acknowledgement of a cable break alarm or a leakage alarm.

If a new alarm is emitted, all power circuits are once again set to alarm status with new optical indication, regardless of whether an alarm has already been acknowledged.

If acknowledgement has also to be possible via an external push button, it must be connected in parallel to the built-in push button to terminals 11 and 12.

For your attention

The fuse (1 A fast) next to the connecting terminals serves to protect the battery circuit.

If this fuse is defective or missing, the battery is not charged during mains operation and is not available as an emergency power supply in the event of a mains failure.

Moreover, problems may occur with the operation of an external horn with higher loudness levels. You should therefore always ensure that a functioning fuse is inserted.

In the event of mains failure, the built-in battery permits operation of the relay for approx. 24 hours in OK status. Operating times when the alarm is sounding depend on the power consumption of the connected optional horn. The battery capacity is 1.8 Ah, its lifetime is approx. 4 to 5 years.

When the relay is not connected to the mains supply, the fuse is to be removed, as the battery will otherwise discharge via the relay, thereby reducing its service life.

Caution!
Fully disconnect the unit from the mains voltage before inserting or replacing the fuse!
When the fuse is inserted, the unit is operated off the battery:
a false alarm may be activated, and buzzer and external horn may sound!
Increased risk of accident “due to fright”!

Technical data	Leckmaster 171/1	Leckmaster 171/2
Supply voltage (terminals 1 and 2)	AC 230 V other supply voltage, e.g. DC 24 V, on request	
Optical indication showing the type of power supply	via a bi-colour LED without effect on the power circuits: • lights up green = mains operation and battery fuse OK • flashes green = mains failure and battery operation • lights up red = mains operation and defective or absent battery fuse	
Power consumption	approx. 3 VA	
Sensor circuit (terminals 13 and 14)	2 terminals (under SELV), acting on the 2 potential-free changeover contacts, the buzzer circuit and the circuit of the optional external horn	
No-load voltage	DC 8.2 V (SELV)	
Short circuit current	< 10 mA	
Response hysteresis	1.5 mA ⎍ 1.8 mA	
Cable break monitoring	I < 0.15 mA	
1st power circuit (output relay 1 – terminals 3, 4, 5)	1 single-pole potential-free changeover contact based on the closed-circuit principle for cable break alarm | for any alarm with self-hold can be acknowledged when the reason for the alarm is no longer present	
2nd power circuit (output relay 2 – terminals 6, 7, 8)	1 single-pole potential-free changeover contact based on the closed-circuit principle for leakage alarm | for any alarm with self-hold	
	can be acknowledged when the reason for the alarm is no longer present	can always be acknowledged
Electrical values of the potential-free changeover contacts: • switching voltage • switching current • switching capacity	 max. AC 250 V max. AC 4 A max. 500 VA	
3rd power circuit (internal buzzer and optional external horn – terminals 9, 10)	• internal buzzer in interval mode • optional external horn without interval mode for any alarm, with self-hold, can always be acknowledged	
Electrical values of the optional external horn: • supply voltage • current consumption	 DC 12 V max. 1 A	
Battery: • capacity • lifetime	 1.8 Ah approx. 4 - 5 years	

Technical data	Leckmaster 171/1	Leckmaster 171/2
Operating status indication	via 2 LEDs	
• yellow and red LEDs dark	supply voltage OK output relays 1 and 2 energised	
• yellow LED flashes	**cable break alarm**	
output relay 1	not energised	not energised
output relay 2	energised	not energised
buzzer and external horn	active	
• yellow LED lights up	cable break alarm acknowledged, alarm reason still present (or alarm reason no longer present and acknowledged alarm in self-hold)	
output relay 1	not energised	not energised
output relay 2	energised	energised
buzzer and external horn	inactive	
• red LED flashes	**leakage alarm**	
output relay 1	energised	not energised
output relay 2	not energised	not energised
buzzer and external horn	active	
• red LED lights up	leakage alarm acknowledged, alarm reason still present (or alarm reason no longer present and acknowledged alarm in self-hold)	
output relay 1	energised	not energised
output relay 2	not energised	energised
buzzer and external horn	inactive	
Housing	insulating material, 190 x 167 x 72 mm, with 5 Pg11 cable glands	
Connection	screw terminals inside the housing: • supply and power circuits for max. 4 mm² solid or max. 2.5 mm² flexible cable • sensor circuit for max. 2.5 mm² solid or max. 1.5 mm² flexible cable	
Mounting	wall mounting using 4 screws	
Mounting orientation / Protection class	any position: IP40, vertical: IP41 to maintain the protection class, cable glands that are not used are to be sealed using the supplied sealing plugs, and a double-used cable gland has to be fitted with the supplied double sealing insert	
Temperature resistance	0°C to + 50°C	
Max. length of connecting cable	1,000 m between relay and sensor	
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies	

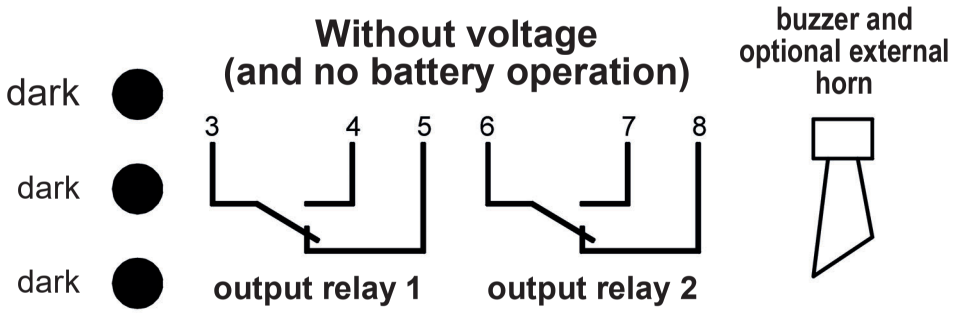
Optional external horn

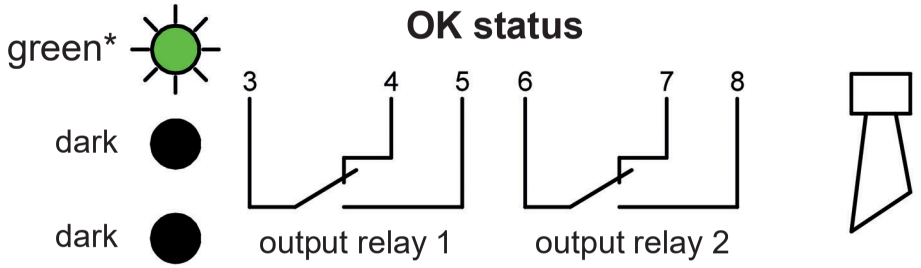
for the connection to a **Leckmaster 171/1** or **Leckmaster 171/2** relay

Technical data	HU 1
Use	indoors
Supply voltage	DC 12 V
Current consumption	DC 120 mA
Power consumption	1.44 W
Noise level at a distance of 1 m	approx. 92 dB (A)
Dimensions	Ø approx. 75 x 152 mm
Protection class	IP43

Depiction of switching statuses of the Leckmaster 171/1 relay

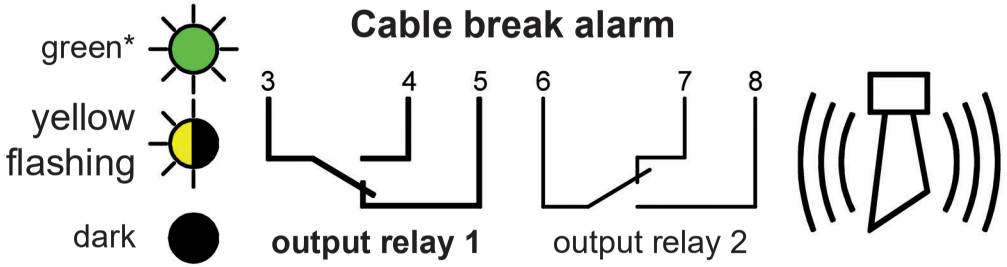
Symbols in bold indicate alarm status

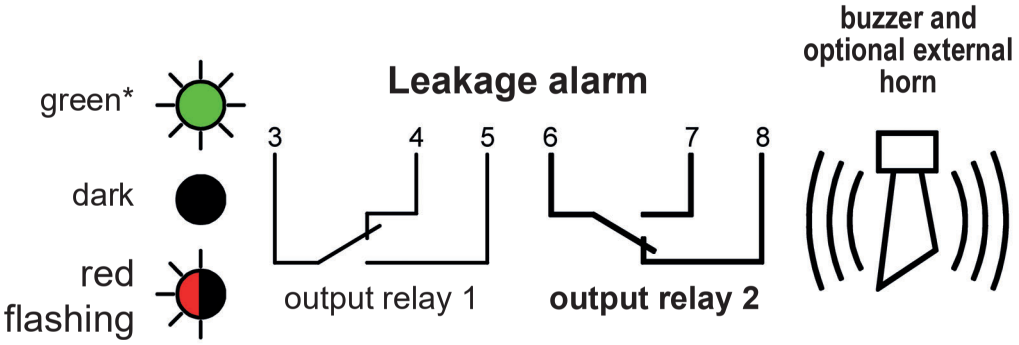


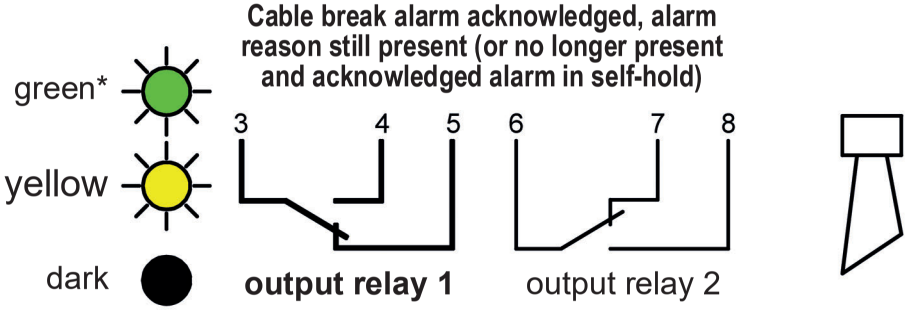


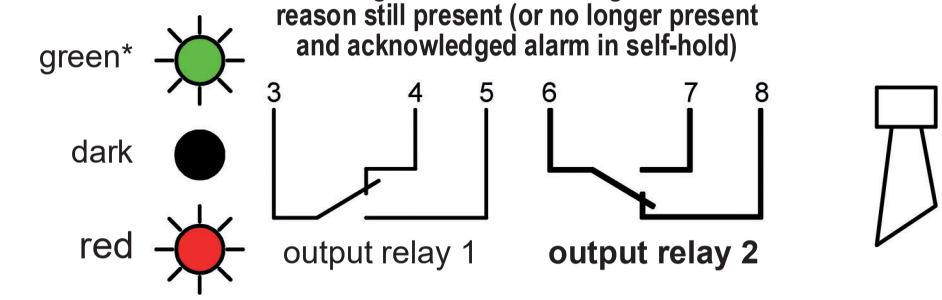
*** lights up green with mains operation and battery fuse OK, but:**

- **flashes green in the event of mains failure and battery operation or**
- **lights up red in the event of mains operation and defective or absent battery fuse**



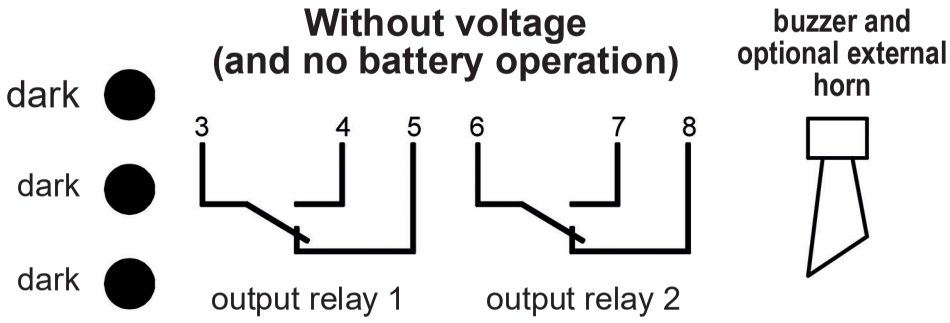


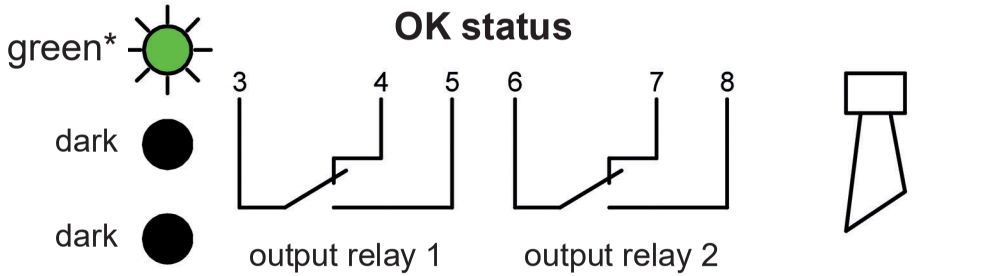


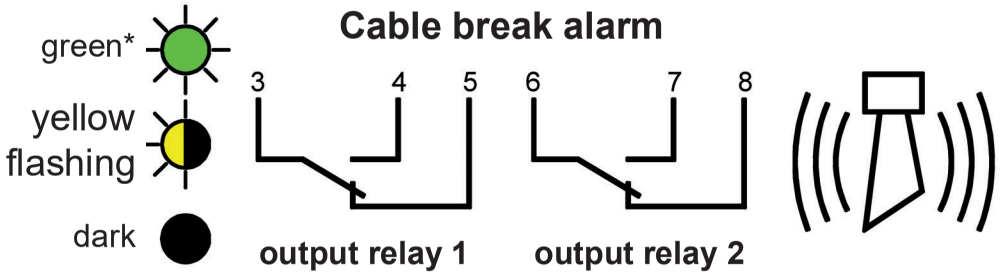


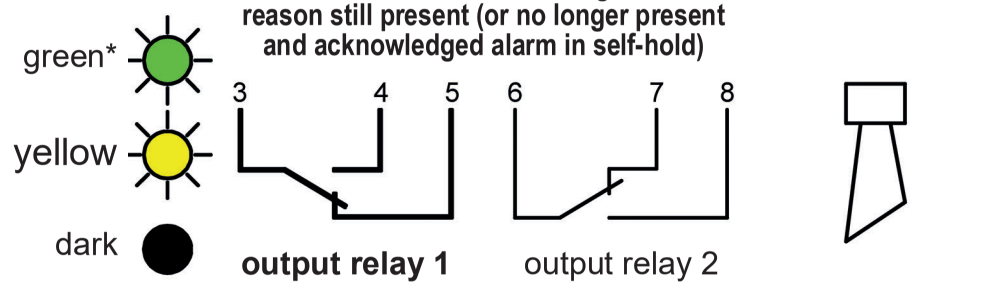
Depiction of switching statuses of the Leckmaster 171/2 relay

Symbols in bold indicate alarm status



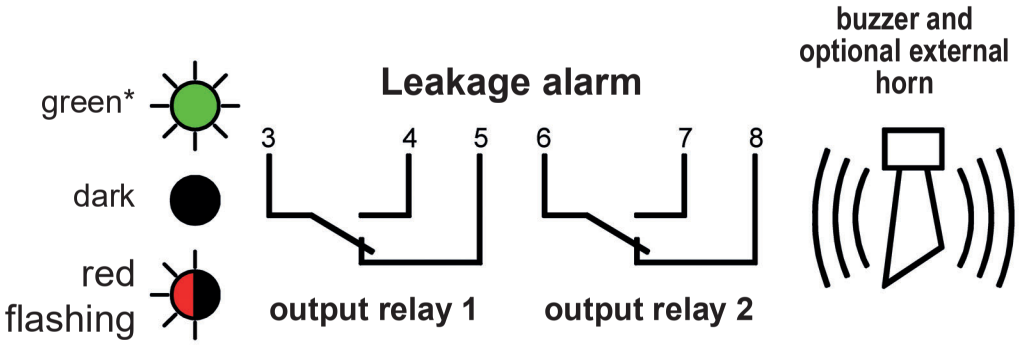


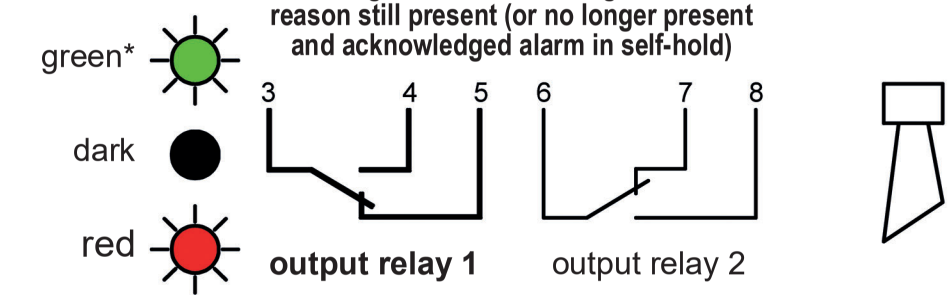




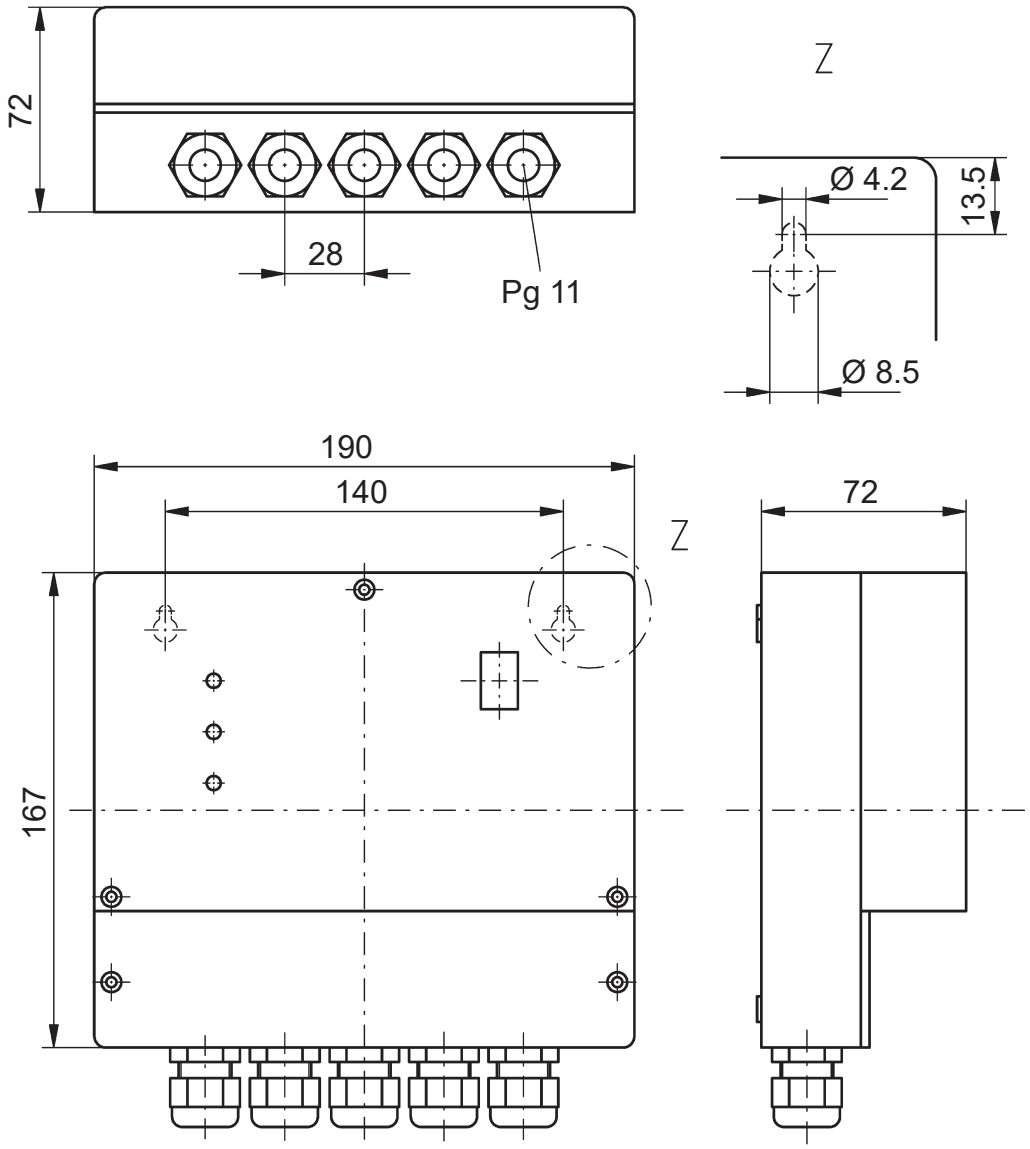
*** lights up green with mains operation and battery fuse OK, but:**

- **flashes green in the event of mains failure and battery operation or**
- **lights up red in the event of mains operation and defective or absent battery fuse**

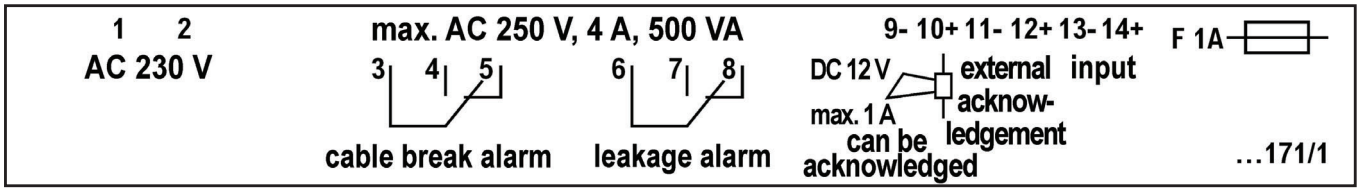




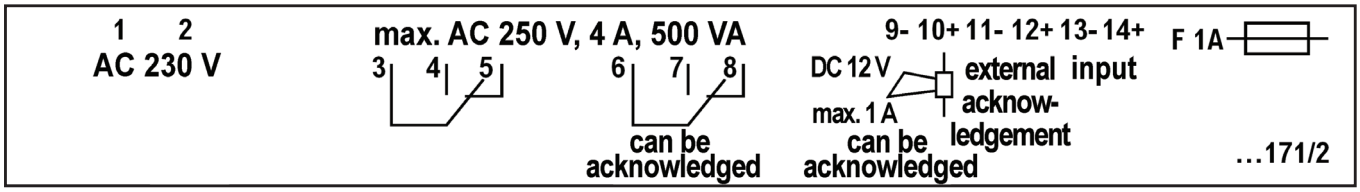
Dimensional drawing of Leckmaster 171/1 and Leckmaster 171/2 (dimensions in mm)



Connection diagram of Leckmaster 171/1



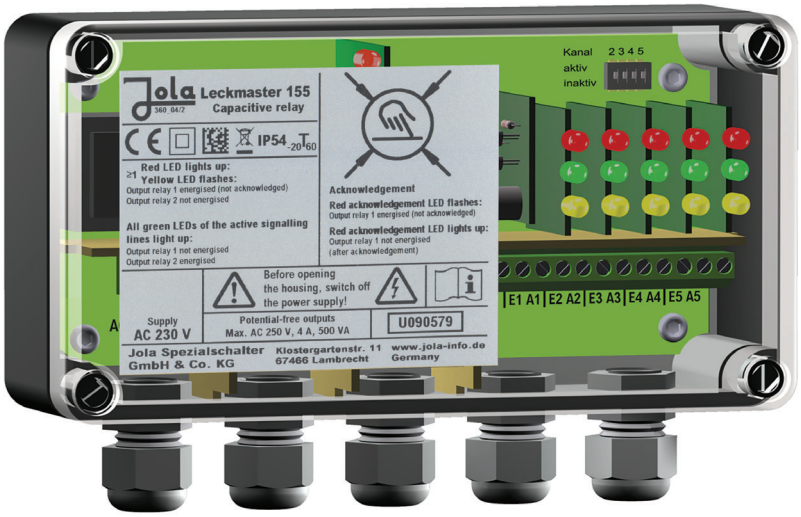
Connection diagram of Leckmaster 171/2



Leckmaster 155 capacitive relay

- **for the connection of up to 5 CPE, OWE 2/C or COW capacitive sensors**
- **with cable break monitoring**
- **with 2 potential-free changeover contacts at the output**
- **with touch sensor button for alarm acknowledgement**
- **with 5 DC 20 V binary outputs for the building management system (BMS)**

Capacitive relay for wall mounting, with transparent cover and with, inside the housing, 5 x 3 LEDs for operating status indication and 1 LED for acknowledgement status indication



♦ Signalling lines

The Leckmaster 155 relay possesses 5 inputs for 5 signalling lines. Each line allows the connection of only 1 CPE, OWE 2/C or COW capacitive sensor.

The 5 sensors are supplied with a safety extra low voltage (SELV) generated in the Leckmaster 155. The SELV is reliably galvanically separated from the mains circuit of the Leckmaster 155 and the potential-free changeover contacts of the 2 output relays.

All 5 signalling lines and the binary outputs for the BMS have a common ground, which means there is no galvanic separation between them.
This factor must always be taken into account in the case of long signalling lines extending into different parts of the building.

There is a risk of formation of ground loops by detection of electrically conductive liquids.
There is a also a risk of formation of ground loops if the COW capacitive sensors are installed in such a way that the sensor stainless steel housings can take on ground potential.
It may be necessary to perform local potential equalisation in order to avoid potential equalisation currents via the signalling lines.

In case of using the binary outputs for the BMS, please refer to the relevant standards and directives for insulation coordination and surge protection.

♦ Individual activation of the signalling lines

If not all 5 signalling lines are to be used, the signalling lines 2 to 5 can be activated (dip switch in active position) or deactivated (dip switch in inactive position) individually via 4 dip switches. Signalling line 1 is always activated.

Activation / Deactivation may only be performed in currentless status.

♦ **Optical indicators**

A group of 3 LEDs of different colours is assigned to each signalling line.

Operating status	Optical indication for each signalling line
Under voltage	When the supply voltage is switched on, one of the three LEDs on each active signalling line lights up to indicate the operating status
Leakage in 1 signalling line	Red LED lights up • with effect on the 2 power circuits • with effect on the corresponding DC 20 V binary output for the BMS
OK status	Green LED lights up • with effect on the 2 power circuits **but only if all** active signalling lines indicate OK status • with effect on the corresponding DC 20 V binary output for the BMS
Cable break in 1 signalling line	Yellow LED flashes • with effect on the 2 power circuits • with effect on the corresponding DC 20 V binary output for the BMS
Signalling line switched to inactive (possible for signalling lines 2 to 5)	None of the 3 LEDs lights up

♦ **Outputs**

Two potential-free changeover contacts are available at the output, one based on the open-circuit principle and the other on the closed-circuit principle.
In addition, there is a DC 20 V binary output signal based on the closed-circuit principle for each signalling line for the BMS.
In the event of an alarm, the potential-free changeover contact based on the open-circuit principle can be acknowledged via a touch sensor button acting through the housing cover of the unit and by that reset to its initial position.

Output	Switching statuses
Output relay 1 (based on the open-circuit principle)	When Leckmaster 155 is without voltage and in the OK status of all active signalling lines, output relay 1 is not energised. In the event of leakage or cable break in one or more active signalling lines, output relay 1 is energised if the alarm has not been acknowledged. Output relay 1 can be acknowledged using the touch sensor button and by that reset to its initial position.
Output relay 2 (based on the closed-circuit principle)	Output relay 2 is energised in OK status of all active signalling lines. Output relay 2 is not energised when Leckmaster 155 is without voltage and in the case of leakage or cable break in one or more active signalling lines.
5 DC 20 V binary outputs for the BMS (based on the closed-circuit principle)	High signal, DC 20 V = OK status of an active signalling line Low signal, DC 0 V = • Leckmaster 155 without voltage or • leakage in an active signalling line or • cable break in an active signalling line or • signalling line switched inactive The 5 binary outputs are short circuit-protected. They have a common ground with each other and with the sensor inputs. There is therefore no galvanique separation between the sensor inputs and the binary outputs.

Technical data	Leckmaster 155
Supply voltage (terminals 1 and 2)	AC 230 V other supply voltage, e.g. DC 24 V, on request
Power consumption	approx. 3 VA
Sensor circuits (terminals E1 to E5 = control inputs and 1 of the 2 ground terminals = ground)	6 terminals (under SELV): • 5 for the 5 control inputs without galvanic separation between them • 1 for the ground The ground is the same as the one for the binary outputs. Connection of the signalling lines is to be made via a 6-core cable and a VK 1/5 connection box (see 31-3-34). Local potential equalisation has to be performed to avoid ground loops in critical installations
No-load voltage	DC 8.2 V (SELV)
Short circuit current	< 10 mA
Response hysteresis	1.5 mA ⎍ 1.8 mA
Cable break monitoring	I < 0.15 mA
1st power circuit (output relay 1 – terminals 3, 4, 5)	1 single-pole potential-free changeover contact based on the open-circuit principle for any alarm in the event of leakage or cable break, can be acknowledged via the touch sensor button
2nd power circuit (output relay 2 – terminals 6, 7, 8)	1 single-pole potential-free changeover contact based on the closed-circuit principle for any alarm in the event of leakage or cable break
Electrical values of the potential-free change-over contacts: • switching voltage • switching current • switching capacity	 max. AC 250 V max. AC 4 A max. 500 VA
Binary outputs for the BMS (terminals A1 to A5 = control outputs and 1 of the 2 ground terminals = ground)	6 terminals (under SELV): • 5 for the DC 20 V binary output signal of each of the 5 signalling lines without galvanic separation between them and to the sensor circuits • 1 for the ground **For connection to the BMS (e.g. PLC) opto-couplers should be fitted for the purpose of galvanic separation.** OK status: high signal (DC 20 V) Leakage or cable break or deactivated line: low signal (DC 0 V)
No-load voltage	DC 20 V (sufficient for 24 V inputs, as at least 15 V are normally required for high signal)
Short circuit protection	short circuit current limitation at ≤ 30 mA

Technical data	Leckmaster 155
Operating status indication	for each active signalling line by 3 LEDs
• the red LED of one or more signalling lines lights up output relay 1 output relay 2 binary output signal(s)	**leakage** energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
• the green LED of each signalling line lights up output relay 1 output relay 2 binary output signals	**OK status** not energised (open-circuit principle) energised (closed-circuit principle) high signal (closed-circuit principle)
• the yellow LED of one or more signalling lines flashes output relay 1 output relay 2 binary output signal(s)	**cable break** energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
Housing	insulating material, 180 x 94 x 57 mm, with 5 M16 cable glands (external dimensions as for connection box VK 1/5, see page 31-3-34)
Connection	screw terminals inside the housing
Protection class	IP54
Mounting	wall mounting using 4 screws
Mounting orientation	any
Temperature resistance	– 20°C to + 60°C
Max. length of signalling lines	each 1,000 m
EMC	• for interference emission in accordance with the appliance-specific requirements for households, business and commerce as well as small companies • for interference immunity in accordance with the appliance-specific requirements for industrial companies

♦ **Acknowledgement via touch sensor button**

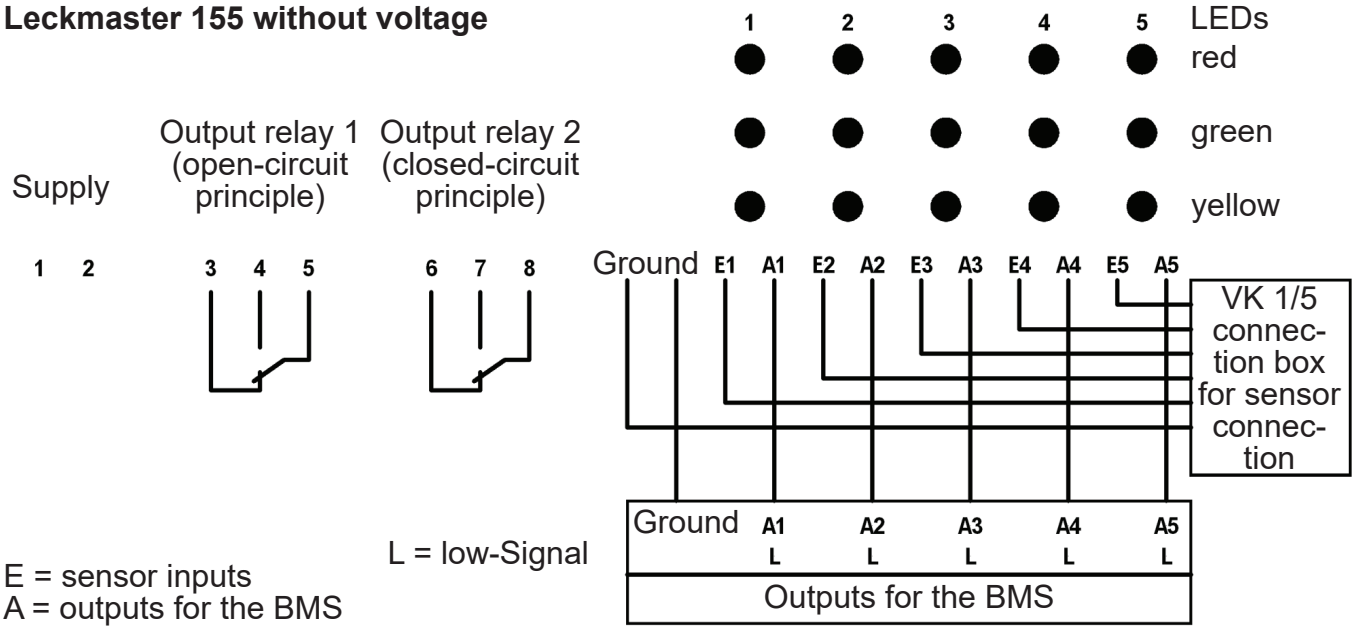
In the event of leakage or cable break in one of more active signalling lines, the output relay 1 is energised and the red acknowledgement LED flashes. The operator has to touch the sensor button if he wants to acknowledge the signal. Output relay 1 is then de-energised and the red acknowledgement LED reverts to steady.

In this status, new alarms from other signalling lines are signalled only via the optical indicators and the binary output signals for the BMS of the affected signalling lines.
In these cases, however, output relay 1 is not re-activated.

Acknowledgement has no effect whatsoever on output relay 2.

Position of the output statuses

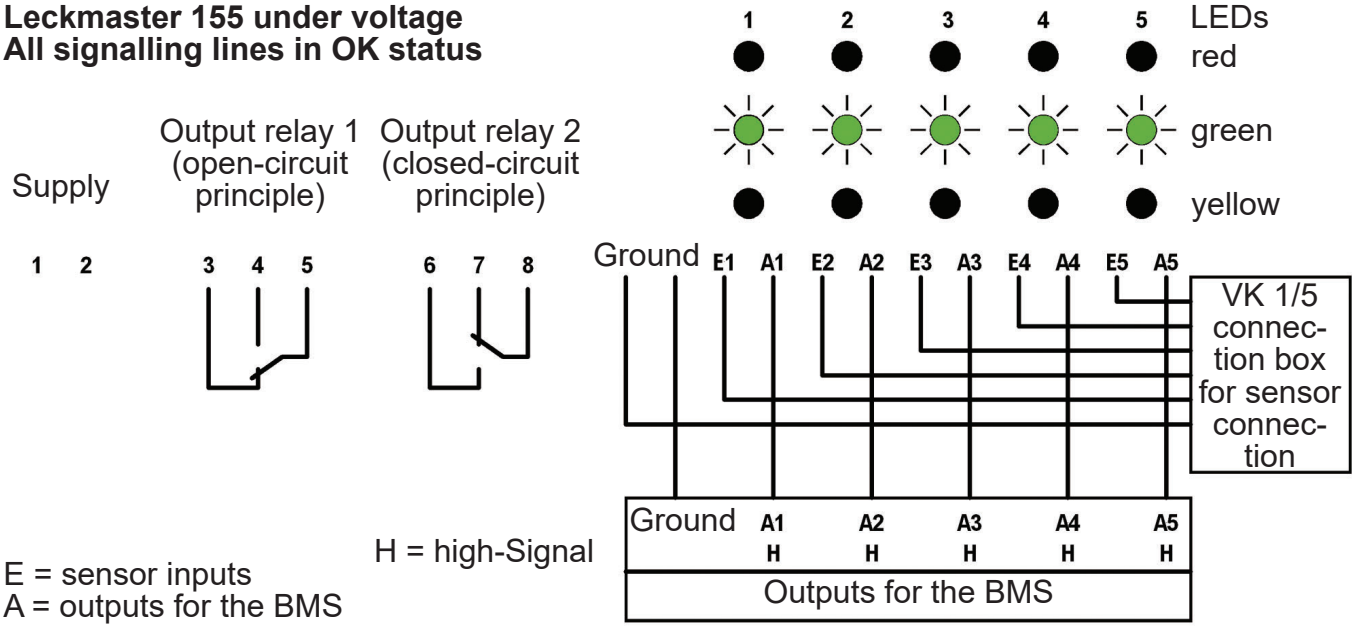
Leckmaster 155 without voltage



L = low-Signal

E = sensor inputs
A = outputs for the BMS

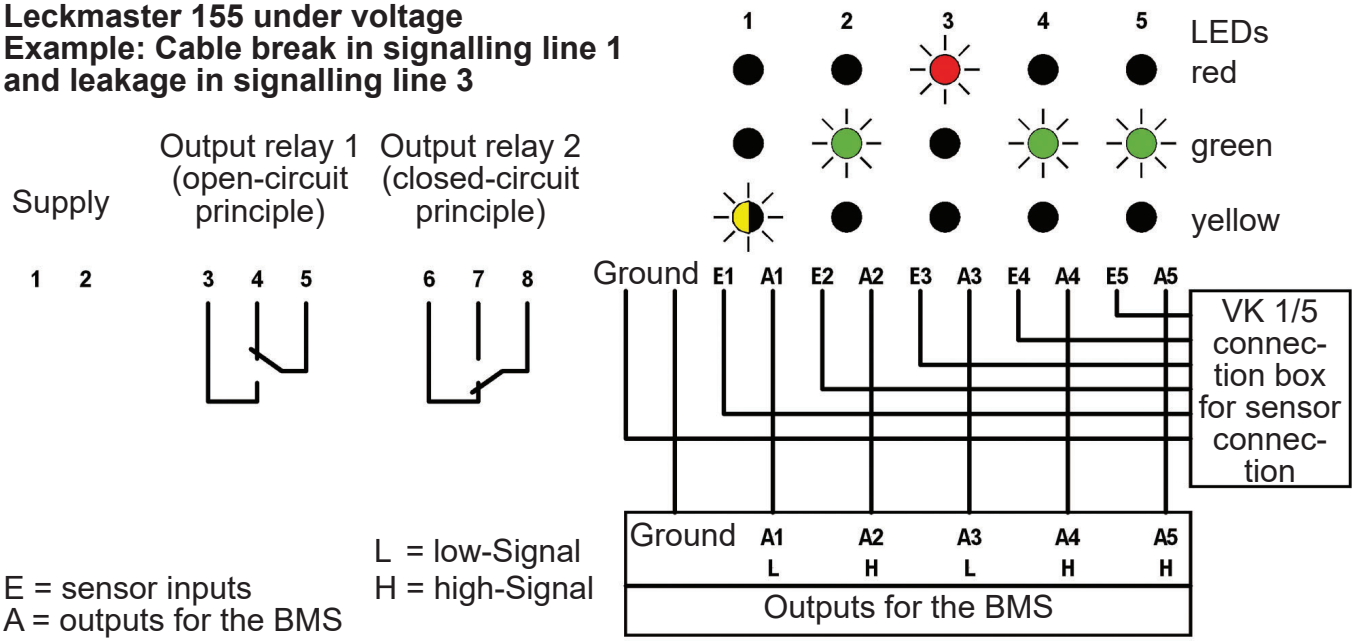
Leckmaster 155 under voltage
All signalling lines in OK status



H = high-Signal

E = sensor inputs
A = outputs for the BMS

Leckmaster 155 under voltage
Example: Cable break in signalling line 1 and leakage in signalling line 3

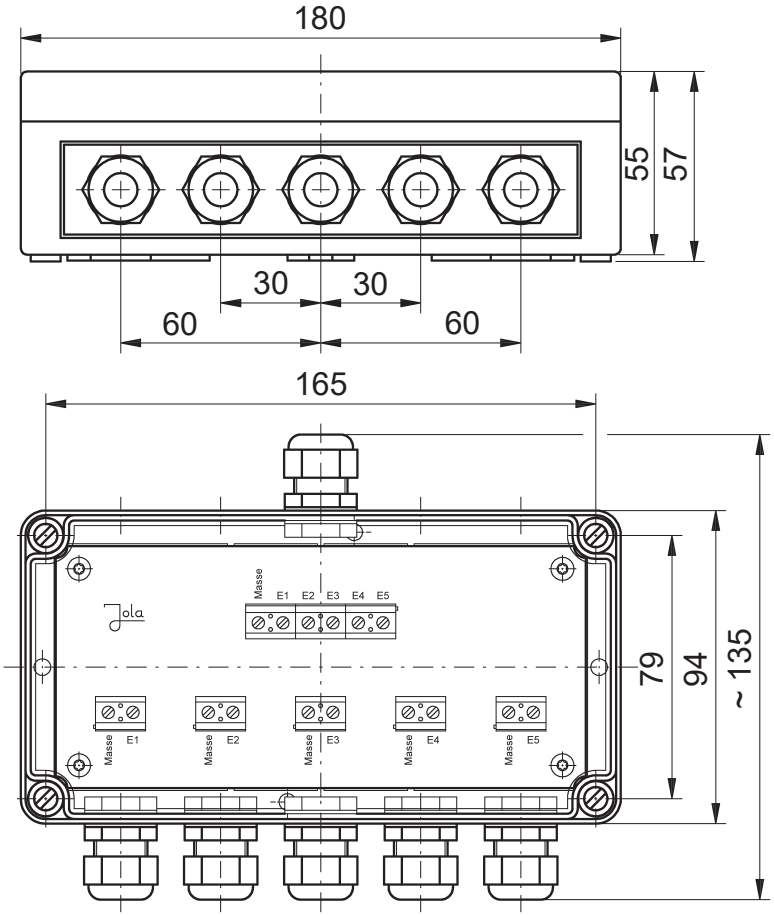


L = low-Signal
H = high-Signal

E = sensor inputs
A = outputs for the BMS

VK 1/5 connection box

Technical data	VK 1/5
Application	for fast and easy connection of up to 5 sensors to a Leckmaster 155 relay
Supply voltage	only for SELV or PELV
Housing	insulating material, 180 x 94 x 57 mm, with 6 M16 cable entries
Connection	screw terminals inside the housing
Protection class	IP54
Mounting	wall mounting using 4 screws
Mounting orientation	any
Temperature resistance	– 20°C to + 60°C



Dimensions in mm

Connection example with a VK 1/5 connection box