



**Leakage detection with
conductive line sensors
(BTE-Z5V6/3 and ZE-Z5V6/3
electrodes)
+
Localizer 255/2
conductive electrode relay
with leakage location function**



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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
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in the legal sense.**



Leakage detection with conductive line sensors (BTE-Z5V6/3 and ZE-Z5V6/3 electrodes) + Localizer 255/2 conductive electrode relay with leakage location function

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**For leakage detection
with liquid accumulation inside an insulation or on the floor.
A brief and minor presence of moisture does not trigger an
alarm, provided that no conductive bridge is made between
the 2 sensitive elements of the electrode.**

Application example



**Use of a BTE-Z5V6/3 conductive electrode
for leakage detection of electrically conductive water
inside the insulation of a water pipe**

**For the detection of a leakage
in a completely dry environment**

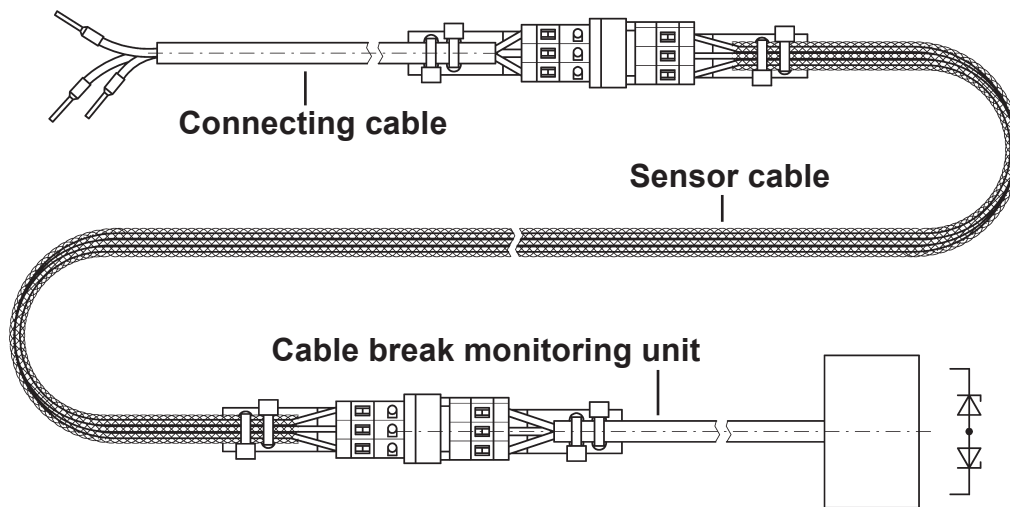
Application example



**Use of a ZE-Z5V6/3 electrode
for leakage detection of electrically conductive heating water
under pipes behind skirting boards**

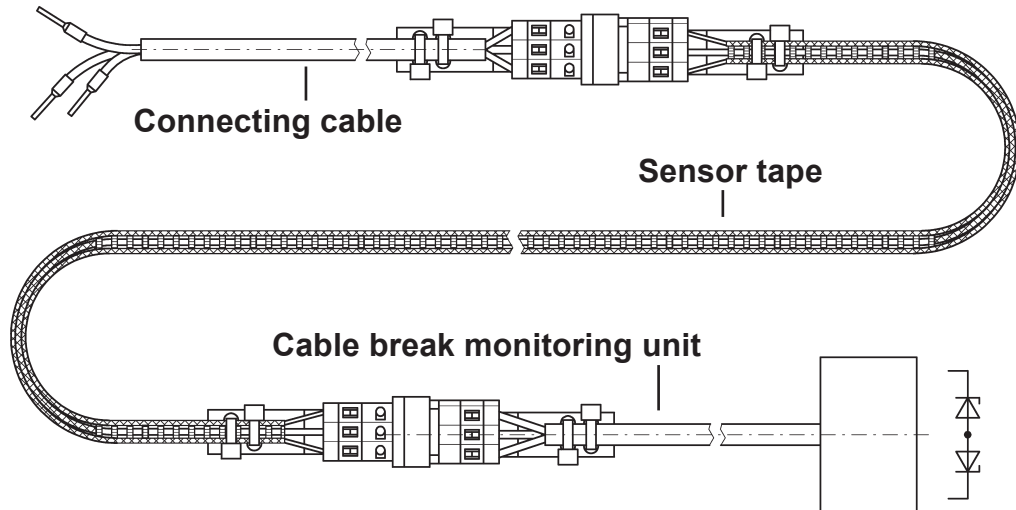
For leakage detection

with liquid accumulation inside an insulation or on the floor.
 A brief and minor presence of moisture does not trigger an alarm, provided that no conductive bridge is made between the 2 sensitive elements of the electrode.



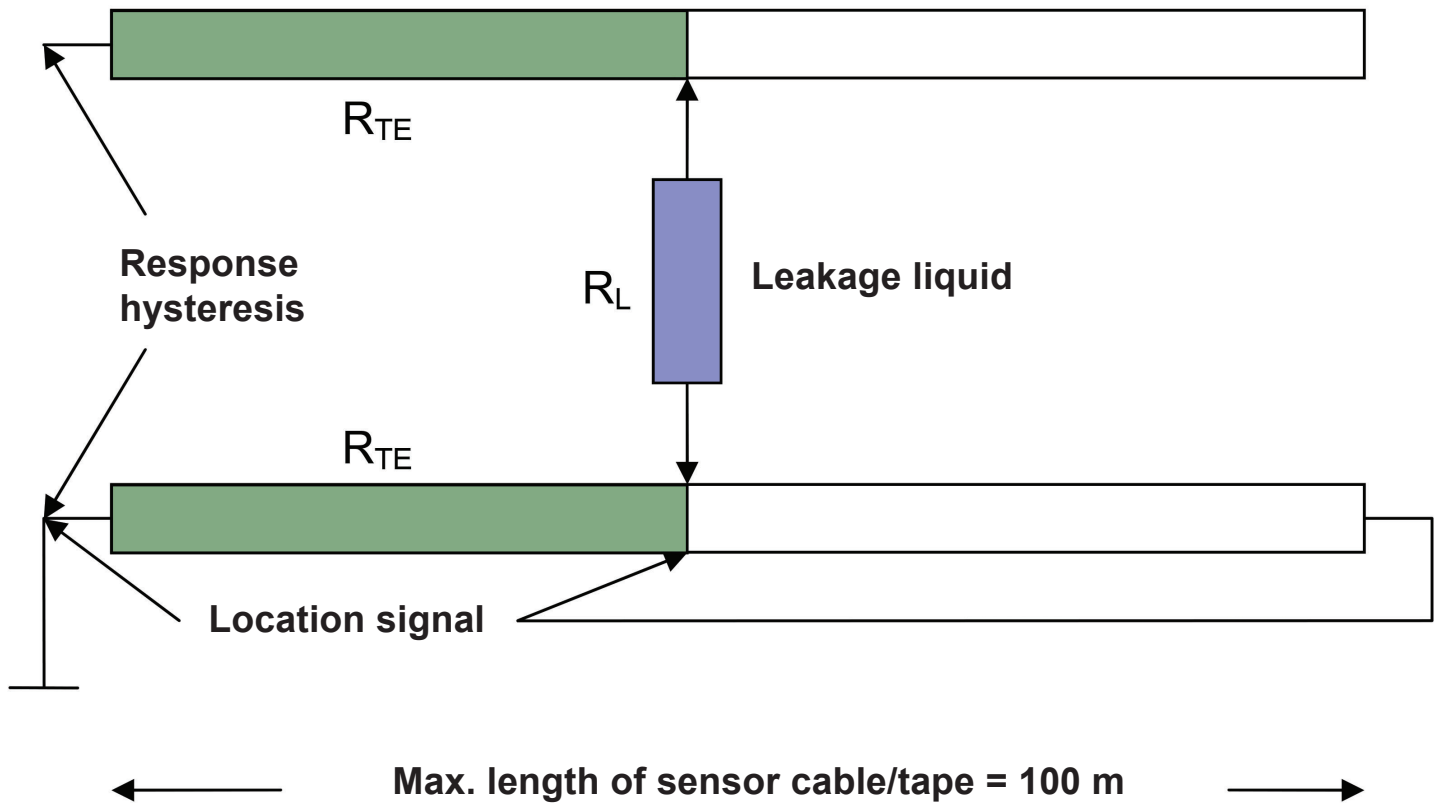
Technical data	BTE-Z5V6/3
Design	1 control electrode and 1 ground electrode
Sensitive elements	2 wire ropes made of stainless steel 316Ti, each 0.8 mm in dia. and in between 1 insulated cable for length/location display held together at equal distances in a non-absorbent monofil polyester braided sleeve, form a flat sensor cable, width approx. 7 mm Resistance each 100 m of stainless steel ropes = 250 Ω Temperature coefficient approx. 0.08 %/K: it may result a possible inaccuracy of the location signal of - 3% to + 5% Standard length 2 m, shorter or longer on request
Max. sensor cable length	100 m
Electrical connection	3X0.75 cable with connector length 2 m, on request: <ul style="list-style-type: none"> • longer • halogen-free
Temperature resistance	- 20°C to + 60°C, higher temperatures on request
Cable break monitoring	Z5V6/3 cable break monitoring unit (removable for test purpose)
Max. length of connecting line	500 m between Localizer 255/2 and electrode

**For the detection of a leakage
in a completely dry environment**



Technical data	ZE-Z5V6/3
Conception	1 control electrode and 1 ground electrode
Sensitive elements	<p>2 wire ropes made of stainless steel 316Ti, each 0.8 mm in dia., protected by a polyester sheath and in between 1 insulated cable for length/location display held together at equal distances in an absorbent multifilament polyester bread form a sensor tape, width approx. 6 mm</p> <p>Resistance each 100 m of stainless steel ropes = 250 Ω</p> <p>Temperature coefficient approx. 0.08 %/K: it may result a possible inaccuracy of the location signal of - 3% to + 5%</p> <p>Standard length 2 m, shorter or longer on request</p>
Max. sensor tape length	100 m
Electrical connection	<p>3X0.75 cable with connector</p> <p>length 2 m, on request:</p> <ul style="list-style-type: none"> • longer • halogen-free
Temperature resistance	- 20°C to + 60°C, higher temperatures on request
Cable break monitoring	Z5V6/3 cable break monitoring unit (removable for test purpose)
Max. length of connecting line	500 m between Localizer 255/2 and electrode

Operating principle of the conductive line sensors designed to detect and locate leakage of electrically conductive liquids



◆ Leakage detection

A leakage alarm is triggered when the resistance between the two stainless steel ropes (R_L) of the BTE-Z5V6/3 or ZE-Z5V6/3 electrode falls below 3 k Ω .

This value corresponds to the response sensitivity when the leakage is located at the beginning of the sensor cable/tape. It decreases by a maximum of 15% due to the resistance of the sensor cable/tape if the leakage is located at the end.

The maximum total length of the sensor cable/sensor tape is 100 m.

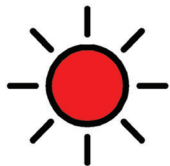
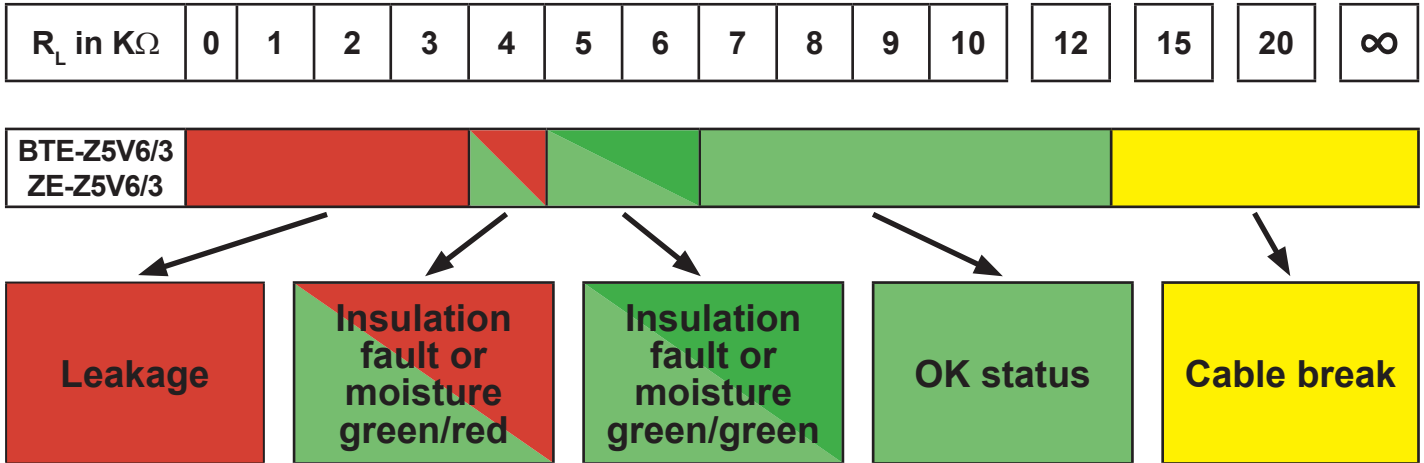
From this result the following maximum partial resistances (R_{TE}) $2 \times 250 \Omega = 500 \Omega$, which means for R_L approx. 2.5 k Ω .

◆ Leakage location

The voltage drop at the partial resistance of the returning stainless steel rope corresponds to the distance between the beginning of the sensor cable/tape and the location of the leakage.



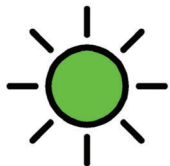
Graphical depiction of the response sensitivity of the conductive line sensors connected to the Localizer 255/2 electrode relay



Red LED lights up = leakage



Two-color LED lights up
red = critical moisture
green = uncritical moisture



Green LED lights up = OK status



Yellow LED lights up = cable break



The conductive measuring principle with the Localizer 255/2 electrode relay

The conductive measuring principle is used for the detection of **electrically conductive liquids**.

It is not suitable for the detection of electrically non-conductive liquids (e.g. oils, diesel, fuel oil, demineralised water...).

The measurement is done in the Localizer 255/2 electrode relay using a constant alternating current and indicates:

◆ **Cable break**

No current can flow and the voltage rises above the response limit for signalling a cable break.

◆ **OK status**

When the BTE-Z5V6/3 or ZE-Z5V6/3 electrode is correctly connected, the current at the cable break monitoring unit generates a voltage that is evaluated as OK status.

◆ **Display of the cable/tape length in OK status**

Under the effect of the resistance of the sensor cable/tape, the returning constant alternating current generates a voltage which corresponds to the connected sensor cable/tape length. This voltage is converted and then displayed on the digital display in metres.

◆ **OK status + indication of an insulation fault or moisture presence**

In the case of an insulation fault or moisture presence at one or more locations on the sensor cable/tape, the voltage drops below the value corresponding to the OK status (electrode completely dry).

◆ **Display of the cable/tape length in case of an insulation fault or moisture presence**

In the case of an insulation fault or moisture presence, the returning constant alternating current takes a shorter way. The value displayed in metres is therefore \leq to the length of the sensor cable/tape. If insulation faults or moisture occur in several places, the length display will be wrong.

◆ **Leakage**

A contact with an electrically conductive liquid leads to a significantly drop of the resistance between the two stainless steel ropes. The constant alternating current generates a voltage that is evaluated as a leakage alarm.

◆ **Display of the leakage location in the case of a leakage alarm**

The constant alternating current flows to the leakage location and flows back. At this location, it generates a voltage which corresponds to the distance from the beginning of the sensor cable/tape to the leakage location. This voltage is converted and then displayed on the digital display in metres.

In the event of a leakage due to liquid accumulation inside an insulation or on the floor located in **a single** spot, the location signal generated clearly corresponds to the distance in metres between the beginning of the sensor cable/tape and the leakage location.

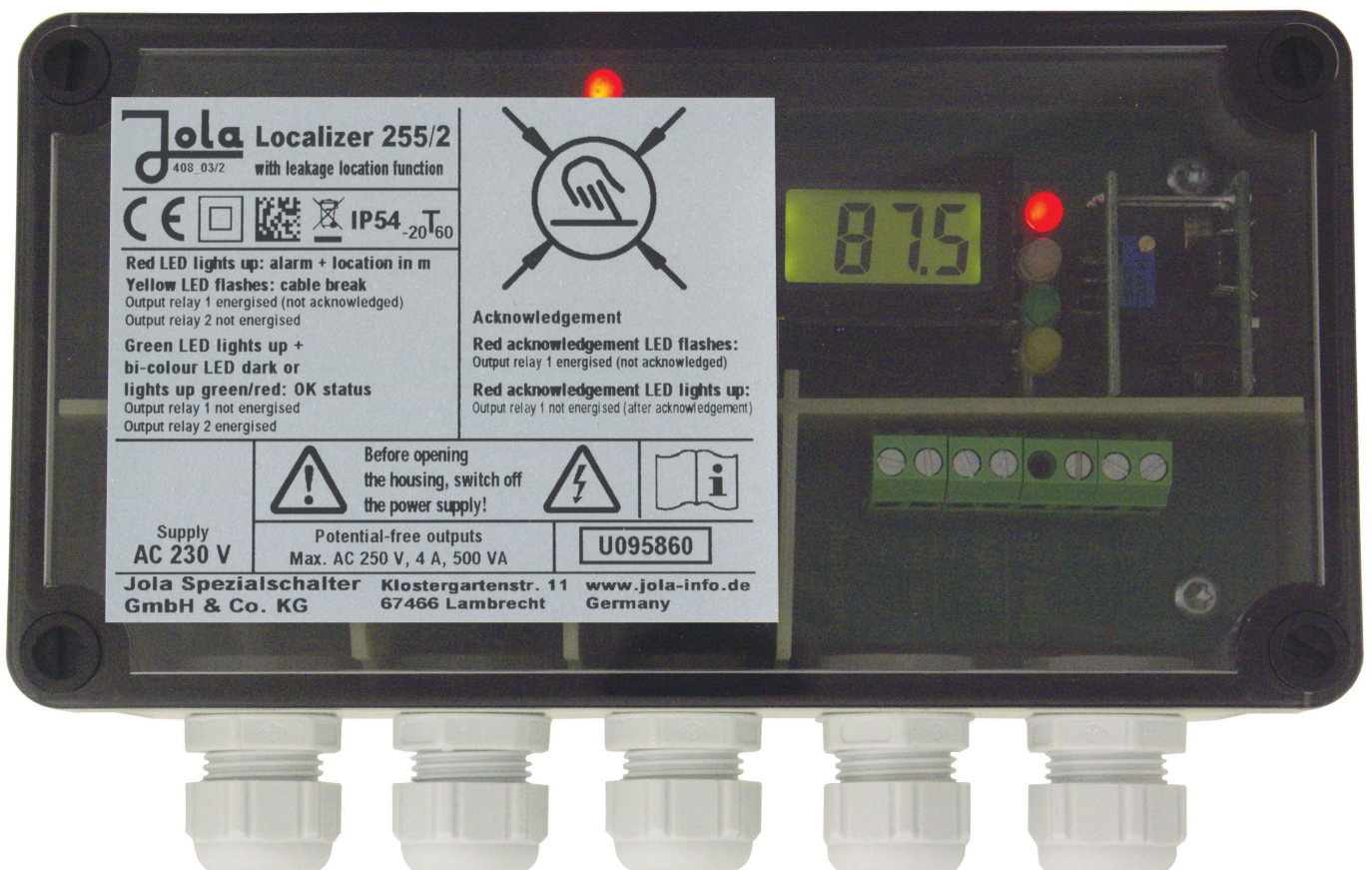
The presence of a high level of moisture along the entire length or of several leakages makes it impossible to determine the location.



Localizer 255/2 conductive electrode relay with leakage location function

- for the connection of 1 BTE-Z5V6/3 or ZE-Z5V6/3 conductive electrode
- with display of the sensor cable/tape length
- with display of the distance to the location of the leakage
- with indication of the various statuses: leakage, insulation fault or moisture presence, OK status and cable break
- with touch sensor button for alarm acknowledgement
- with 2 potential-free changeover contacts at the output
- with DC 20 V binary output for the building management system (BMS)
- with voltage output for external display of the cable/tape length or the location of the leakage

Conductive electrode relay for wall mounting, with transparent cover and with, inside the housing, 4 LEDs for operating status indication, with 1 LED for acknowledgement status indication and with a digital display to indicate the cable/tape sensor length or the leakage location



♦ Optical indicators

A group of 4 LEDs of different colours is assigned to the electrode.


Operating status	Optical indication						
Under voltage	When the supply voltage is switched on, one or two LEDs light up and indicate the operating status						
Leakage	Red LED lights up <ul style="list-style-type: none"> • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS Digital display: Display in metres of the distance between the beginning of the sensor cable/tape and the leakage location, in the case of a <u>single</u> major leakage						
Insulation fault or moisture presence	Two-color LED <table style="margin-left: 20px; border: none;"> <tr> <td style="padding-right: 20px;">dark:</td> <td>OK status</td> </tr> <tr> <td>lights up green:</td> <td>non-critical status</td> </tr> <tr> <td>lights up red:</td> <td>critical status</td> </tr> </table> <ul style="list-style-type: none"> • without effect on the 2 power circuits • without effect on the DC 20 V binary output for the BMS Digital display: Display in metres \leq the total length of the sensor cable/tape. When moisture starts to develop, the displayed value may differ from the total length even before the electrode relay signals an insulation fault or moisture presence via the two-color LED	dark:	OK status	lights up green:	non-critical status	lights up red:	critical status
dark:	OK status						
lights up green:	non-critical status						
lights up red:	critical status						
OK status	Green LED lights up <ul style="list-style-type: none"> • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS Digital display: Display in meters of the total length of the sensor cable/tape length when the whole sensor cable/tape is absolutely dry						
Cable break	Yellow LED flashes <ul style="list-style-type: none"> • with effect on the 2 power circuits • with effect on the DC 20 V binary output for the BMS 						

♦ Outputs

2 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 be reset to its initial position.

Output	Operating statuses
<p>Output relay 1 (based on the open-circuit principle)</p>	<p>When Localizer 255/2 is without voltage and in the OK status of the signalling line, output relay 1 is not energised.</p> <p>In the event of leakage or cable break, output relay 1 is energised if the alarm has not been acknowledged.</p> <p>Output relay 1 can be acknowledged using the touch sensor button and by that reset to its initial position.</p>
<p>Output relay 2 (based on the closed-circuit principle)</p>	<p>Output relay 2 is energised in OK status of the signalling line. Output relay 2 is not energised when Localizer 255/2 is without voltage and in the case of leakage or cable break.</p>
<p>DC 20 V binary output for the BMS (based on the closed-circuit principle)</p>	<p>High signal, DC 20 V = OK status of the signalling line Low signal, DC 0 V =</p> <ul style="list-style-type: none"> • Localizer 255/2 without voltage or • leakage in the signalling line or • cable break in the signalling line <p>This output is short-circuit protected. It has a common ground with the electrode input and with the output for external digital display.</p> <p>There is no galvanic separation between this output, the electrode input and the output for external digital display.</p>
<p>0...10.0 V = 0...100.0 m output for external digital display</p>	<p>In addition to the built-in digital display, it is possible to add an external digital display to indicate the leakage location or the sensor cable/tape length, or to connect to a measurement and control system.</p> <p>The output voltage signal corresponds to the sensor cable/tape length or to the distance between the beginning of the sensor cable/tape and the leakage location.</p> <p>This output is short circuit protected. It has a common ground with the electrode input and the binary output for the BMS.</p> <p>There is therefore no galvanic separation between this output, the electrode input and the binary output for the BMS.</p>

Technical data	Localizer 255/2
Supply voltage (terminals 1 and 2)	AC 230 V, further supply voltage, e.g. DC 24 V, on request
Power consumption	approx. 3 VA
Electrode circuit (terminals ⊥, In, Out)	<p>3 terminals (under SELV):</p> <ul style="list-style-type: none"> • 1 for the ground • 2 for the electrode input and output <p>The ground is common with the binary output for the BMS and with the output for external digital display.</p> <p>Local potential equalisation is to be performed or opto couplers are to be used to avoid ground loops in critical installations.</p>
No-load voltage	12 V _{eff} (SELV)
Constant alternating current	0.635 mA  25 Hz
Short circuit current	0.635 mA
Response sensitivity: <ul style="list-style-type: none"> • leakage • insulation fault or moisture presence green/red • insulation fault or moisture presence green/green • OK status 	<p>≤ 3 kΩ</p> <p>> 3...4 kΩ</p> <p>> 4...6 kΩ</p> <p>minimal condensation formation (> 6...12 kΩ) and presence or absence of the cable break monitoring unit Z5V6/3 or minimal condensation formation (> 12 kΩ) or no condensation (∞ kΩ) and presence of the cable break monitoring unit Z5V6/3</p> <p>> 12...∞ kΩ</p>
• cable break	
Cable break monitoring	via Z5V6/3 cable break monitoring unit
1 st 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 or cable break, can be acknowledged via the touch sensor button
2 nd 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 or cable break
Electrical values of the potential-free changeover contacts: <ul style="list-style-type: none"> • switching voltage • switching current • switching capacity 	<p>max. AC 250 V</p> <p>max. AC 4 A</p> <p>max. 500 VA</p>
Binary output for the BMS (terminals ⊥, pnp Out)	<p>2 terminals (under SELV):</p> <ul style="list-style-type: none"> • 1 for the ground • 1 pour the binary output DC 20 V <p>The ground is common with the electrode circuit and with the output for external digital display.</p> <p>There is no galvanic separation between the electrode input, the binary output for the BMS and the output for external digital display.</p> <p>For connection to the BMS (e.g. PLC), opto-couplers should be fitted for the purpose of galvanic separation.</p> <p>OK status: high signal (DC 20 V) leakage or cable break: low signal (DC 0 V)</p>
No-load voltage	DC 20 V (sufficient for the 24 V inputs, because the high signal normally requires at least 15 V)
Short circuit protection	short circuit current limitation at ≤ 30 mA

Technical data	Localizer 255/2
Operating status indication of the signalling line	via 4 differently coloured LEDs
<ul style="list-style-type: none"> • red LED lights up <ul style="list-style-type: none"> output relay 1 output relay 2 binary output signal for the BMS	<p style="text-align: center;">leakage</p> energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
<ul style="list-style-type: none"> • two-colour LED (+ green LED lights up) <div style="text-align: right; padding-right: 20px;"> dark lights up green lights up red lights up </div>	<p style="text-align: center;">insulation fault or moisture presence</p> without effect on the 2 power circuits and on the binary output for the BMS OK status uncritical status critical status
<ul style="list-style-type: none"> • green LED lights up <ul style="list-style-type: none"> output relay 1 output relay 2 binary output signal for the BMS	<p style="text-align: center;">OK status</p> not energised (open-circuit principle) energised (closed-circuit principle) high signal (closed-circuit principle)
<ul style="list-style-type: none"> • yellow LED flashes <ul style="list-style-type: none"> output relay 1 output relay 2 binary output signal for the BMS	<p style="text-align: center;">cable break</p> energised (open-circuit principle) not energised (closed-circuit principle) low signal (closed-circuit principle)
Indication to see if output relay 1 is acknowledged or not <ul style="list-style-type: none"> • red LED flashes <ul style="list-style-type: none"> output relay 1 • red LED lights up <ul style="list-style-type: none"> output relay 1 	<p style="text-align: center;">1 red LED</p> alarm for leakage or cable break energised (open-circuit principle), e.g. activation of a horn alarm acknowledged but cause of the leakage or cable break alarm still present not energised (open-circuit principle) e.g. desactivation of a horn
Housing	insulating material, 180 x 94 x 57 mm, with 5 cable glands
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
Length of the signalling line	sensor cable/tape: max. 100 m connecting line: max. 500 m other lengths on request

Technical data	Localizer 255/2	
Influence of the resistance of the connecting line on the signal indicating the length of the sensor cable/tape or the leakage location <ul style="list-style-type: none"> • 100 m • 200 m • 300 m • 400 m • 500 m 	1 mm² 1.75 Ω 3.50 Ω 5.25 Ω 7.00 Ω 8.75 Ω	2.5 mm² 0.70 Ω 1.40 Ω 2.10 Ω 2.80 Ω 3.50 Ω
EMC	<p style="text-align: center;">The factory setting of the Localizer 255/2 electrode relay is designed for a sensor cable/tape length of 0...100 m with a BTE-Z5V6/3 or ZE-Z5V6/3 electrode.</p> <p style="text-align: center;">The resistance of the ground conductor of the connecting line causes the addition of a length signal of 1 m per 2.5 Ω.</p> <ul style="list-style-type: none"> • 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 	

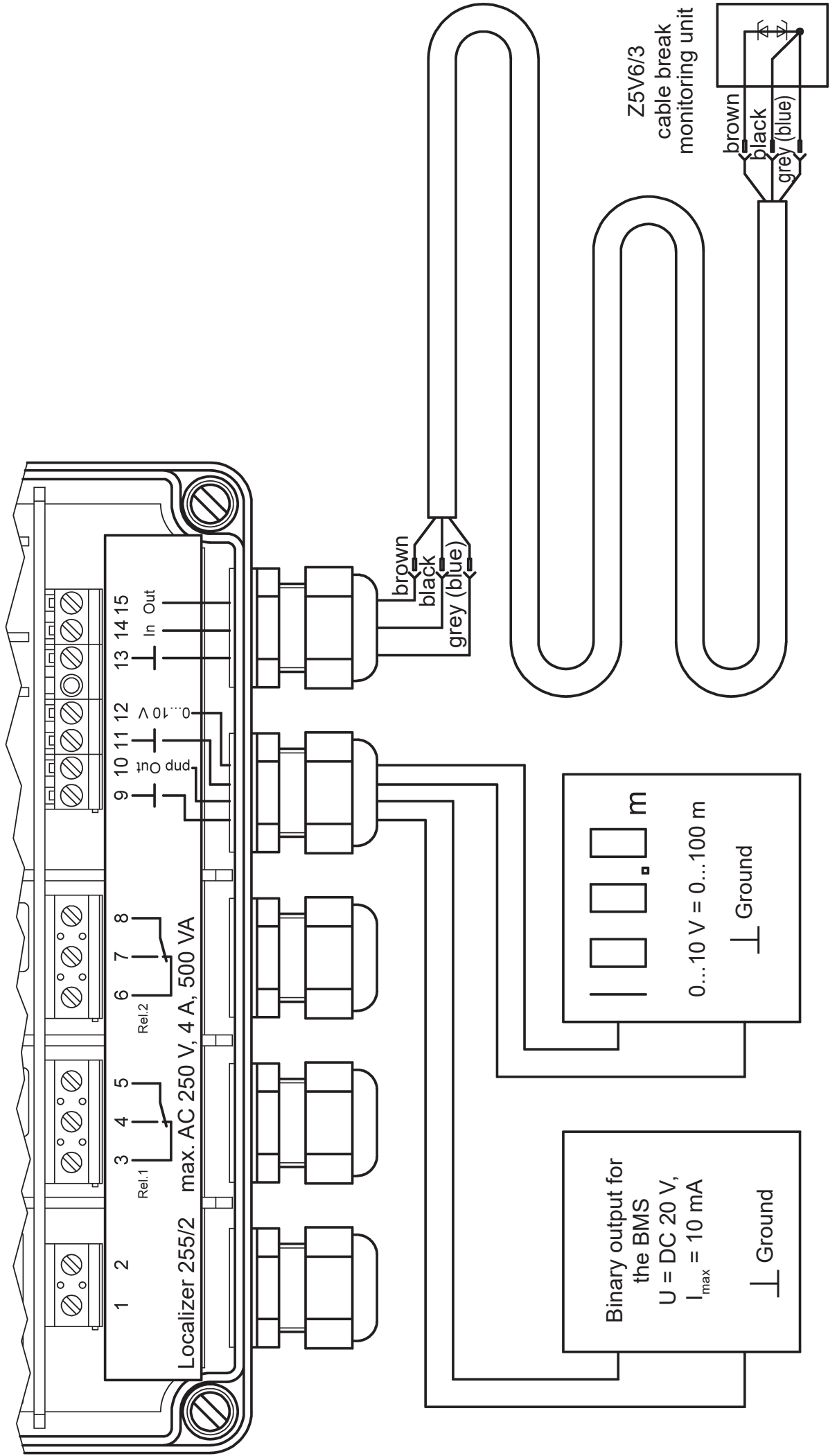
◆ Acknowledgement via touch sensor button

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

Acknowledgement has no effect whatsoever on output relay 2.

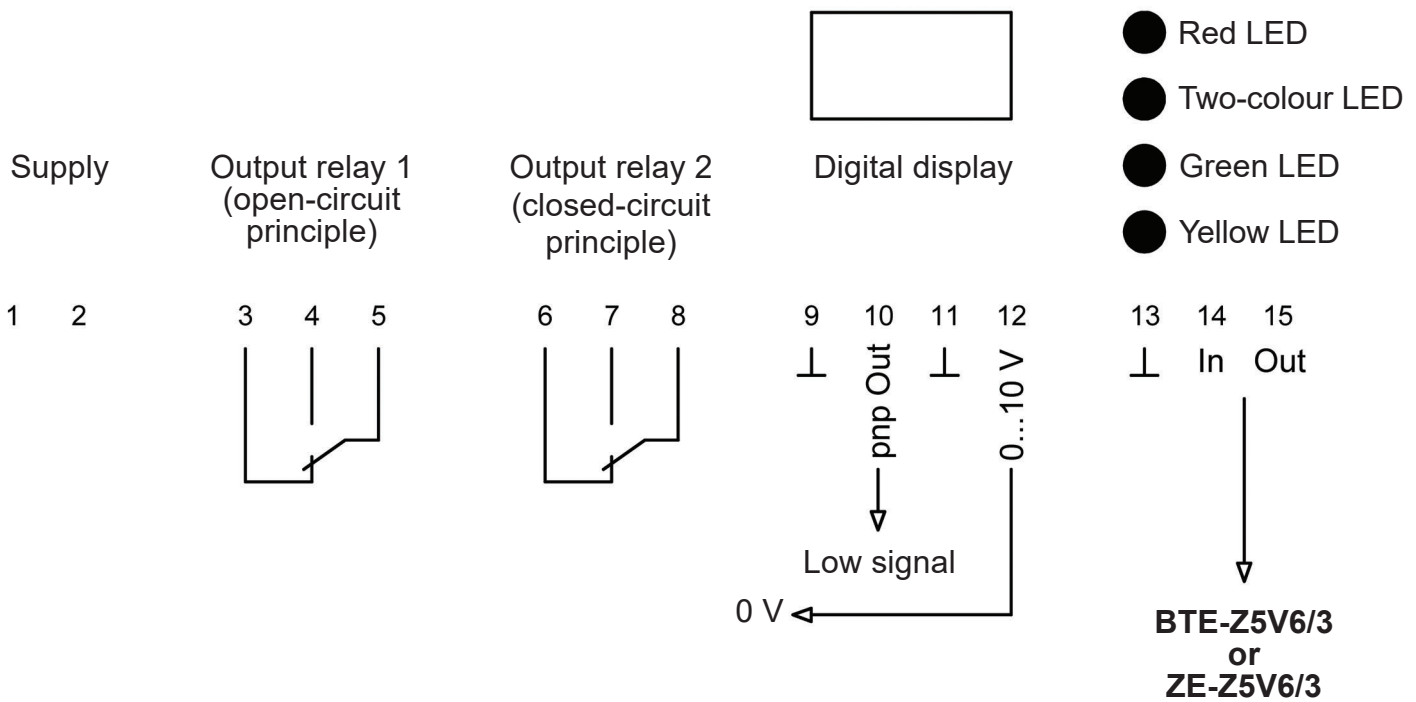
Connection diagram of a BTE-Z5V6/3 or ZE-Z5V6/3 electrode to a Localizer 255/2 electrode relay

Supply Output relay 1 (open-circuit principle) Output relay 2 (closed circuit principle)

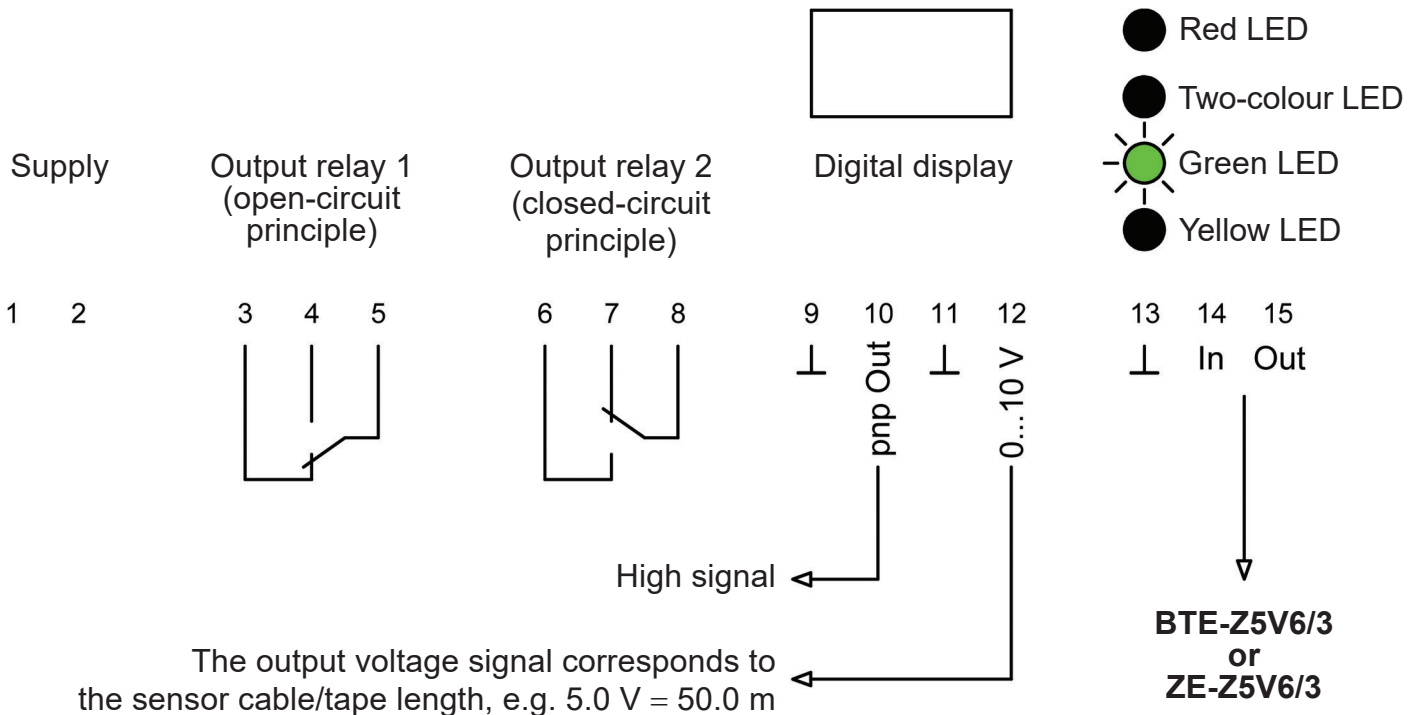


Depiction of the output statuses

Localizer 255/2 without voltage



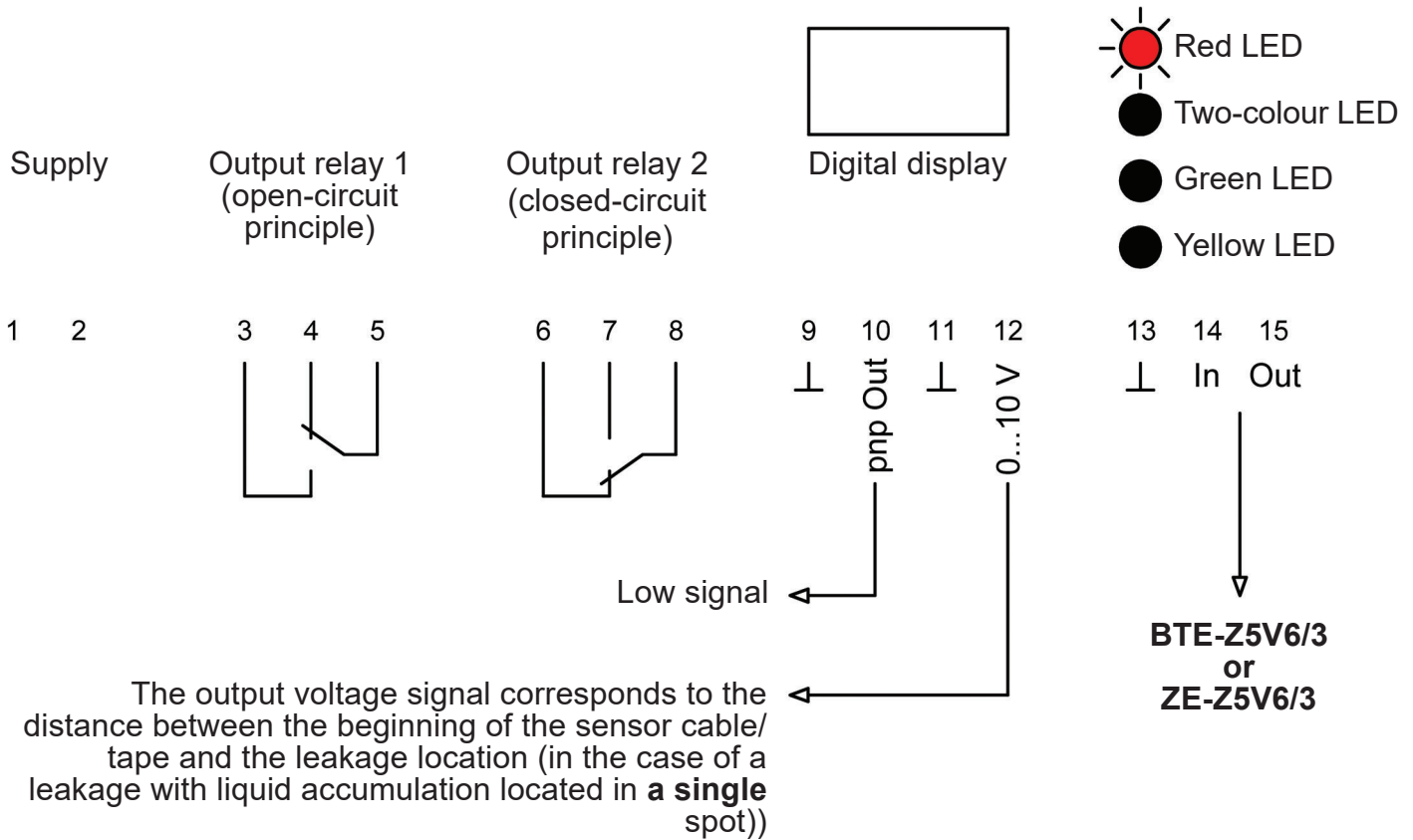
Localizer 255/2 under voltage – OK status with display of the sensor cable/tape length



The 0...10 V output voltage signal corresponds to the value 0...100.0 m on the built-in digital display.

Depiction of the output statuses

Localizer 255/2 under voltage – Alarm with display of the leakage location

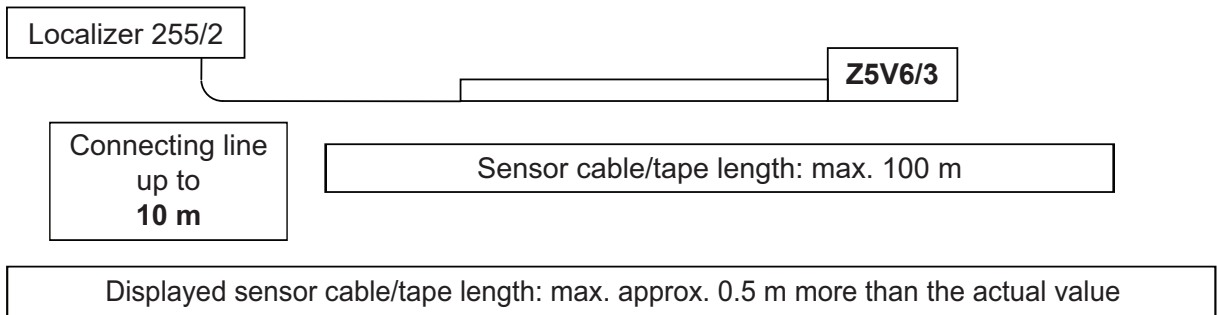
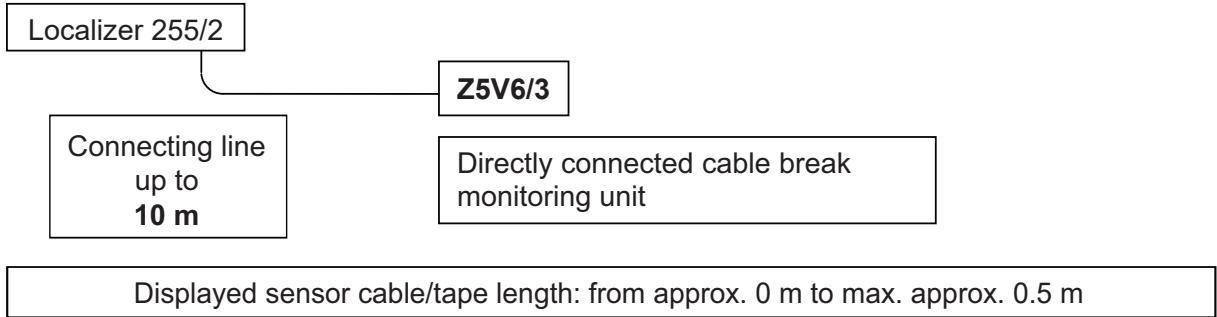


The 0...10 V output voltage signal corresponds to the value 0...100.0 m on the built-in digital display.

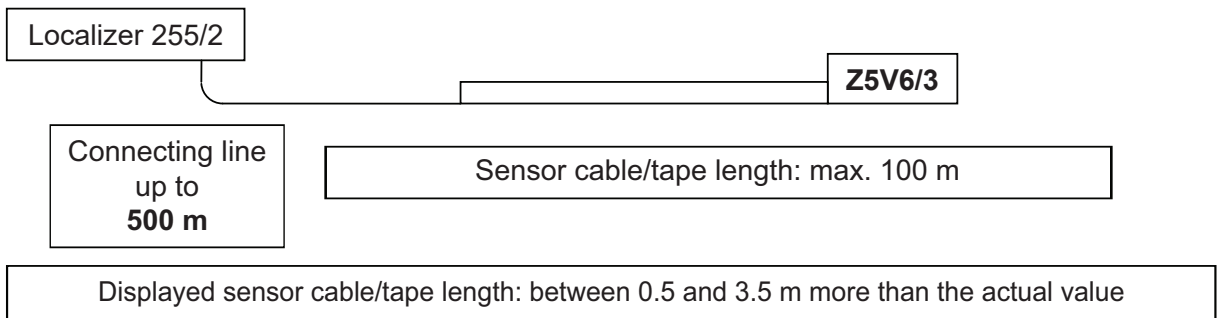
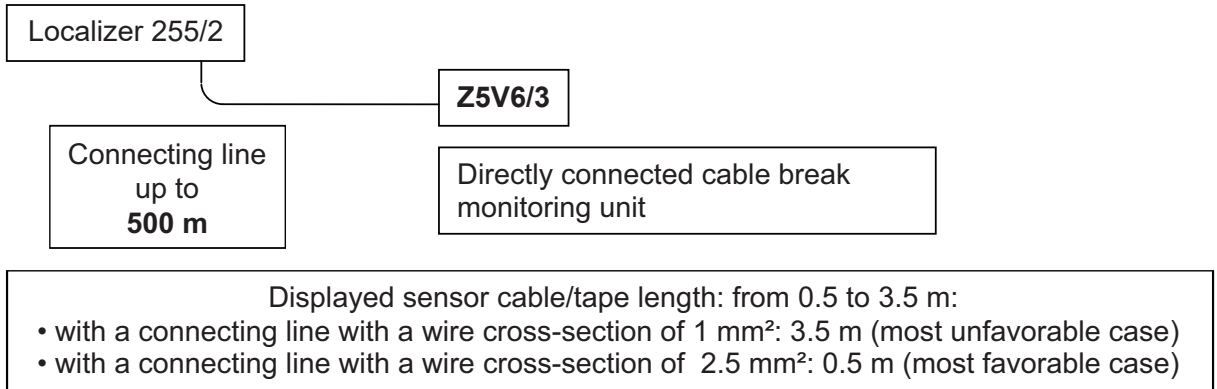


Influence of the connecting line length on the sensor cable/tape length display with the BTE-Z5V6/3 and ZE-Z5V6/3 electrodes

Example: short connecting line up to approx. 10 m



Example: long connecting line up to max. 500 m



If possible, avoid long connecting lines. If this is not possible, use a cable with a cross-section $\geq 2.5 \text{ mm}^2$ to reduce the resistance of the ground conductor (e.g. by connecting several conductors of a multi-conductor cable in parallel to obtain a thicker ground conductor).



Recalibration of the Localizer 255/2 electrode relay

◆ Technical information

The Localizer 255/2 electrode relay has a 30-turn trimmer potentiometer that enables the adjustment of the constant alternating current..

For use with the BTE-Z5V6/3 or ZE-Z5V6/3 electrode, the constant alternating current is factory set to 0.635 mA.

250Ω per 100 m stainless steel ropes x 0.635 mA constant alternating current = 159 mV per 100 m

This signal is amplified 63 times, providing a measurement voltage of 0...10.0 V (corresponding to 0...100.0 m) for the sensor cable/tape length display.

◆ Recalibration (only with connected sensor cable/tape absolutely dry = without any trace of humidity)

No recalibration is normally necessary.

However, if necessary, recalibration must be carried out at the 30-turn trimmer potentiometer by a qualified technician, the device being without voltage, after having removed the seal and using a screwdriver.