Floating electrodes

for detection of a thin layer of non-conductive liquids with a lower specific gravity on top of conductive liquids with a higher specific gravity

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SCHE … floating electrodes

Areas of application

Floating electrodes are designed for use only **in pits, reservoirs, pump shafts, separator plants for light liquids or similar areas**.

It should be noted that floating electrodes can only be used **to detect the presence of a layer of a light liquid which is not soluble in water and which is not conductive on a surface of water (or another conductive liquid which has a higher specific density than the respective light liquid) which is sufficiently calm to allow phase formation.**

The precondition for proper functioning of the floating electrodes is, namely, **that clear separation between the heavy conductive liquid and the lighter non-conductive liquid to be detected** is possible in the various locations, such as pits, reservoirs, pump shafts, separator plants or similar.

In analogy to DIN 1999-100, DIN EN 858-1 and DIN EN 858-2 (separators for light liquids), the separation of light liquids which are insoluble in water and which are non-saponifiable, such as benzines, diesel and fuel oils as well as other oils of mineral origin with densities up to max. 0.95 g/cm³, is proven. Functioning of the floating electrodes is therefore ensured **when used in closed surveillance areas without discharges (pits, reservoirs, pump shafts) and in separator plants in compliance with DIN 1999-100, DIN EN 858-1 and DIN EN 858-2** for the listed media. Application tests have shown that an alarm is activated if non-conductive liquids have formed layers between approx. 3 mm and 10 mm on the heavy liquid (e.g. water) to be monitored.

For all other application areas, a test must be performed prior to the desired use to ascertain whether the phase formation and minimum layer thickness of the non-conductive liquid required for exact functioning can be achieved in the operating conditions in question (such as flow parameters, possible dwell times of the light liquid to be detected in the application site etc.).

In case of doubt, the installation conditions should be assessed by an expert from JOLA or from a supervisory organisation to determine whether the use of the floating electrodes is feasible.

It should also be noted that, although the floating electrodes can generally be used in the respective temperature ranges specified in the brochure, **it is absolutely essential that both media are present in light liquid form** to ensure proper functioning (which, for example, is only assured with water with a temperature above 0° C).

Design

The SCHE … floating electrodes are made up of an upper section and a lower section. The upper section consists of an electrode holder and a rod electrode (whose position can be adjusted in the electrode holder) with one control electrode and one earth electrode for alarm signalling. Alternatively, the rod electrode is also available with two control electrodes and one earth electrode for pre-alarm and main alarm. The lower section of the floating electrode is made up of four floats and a stabilising plate.

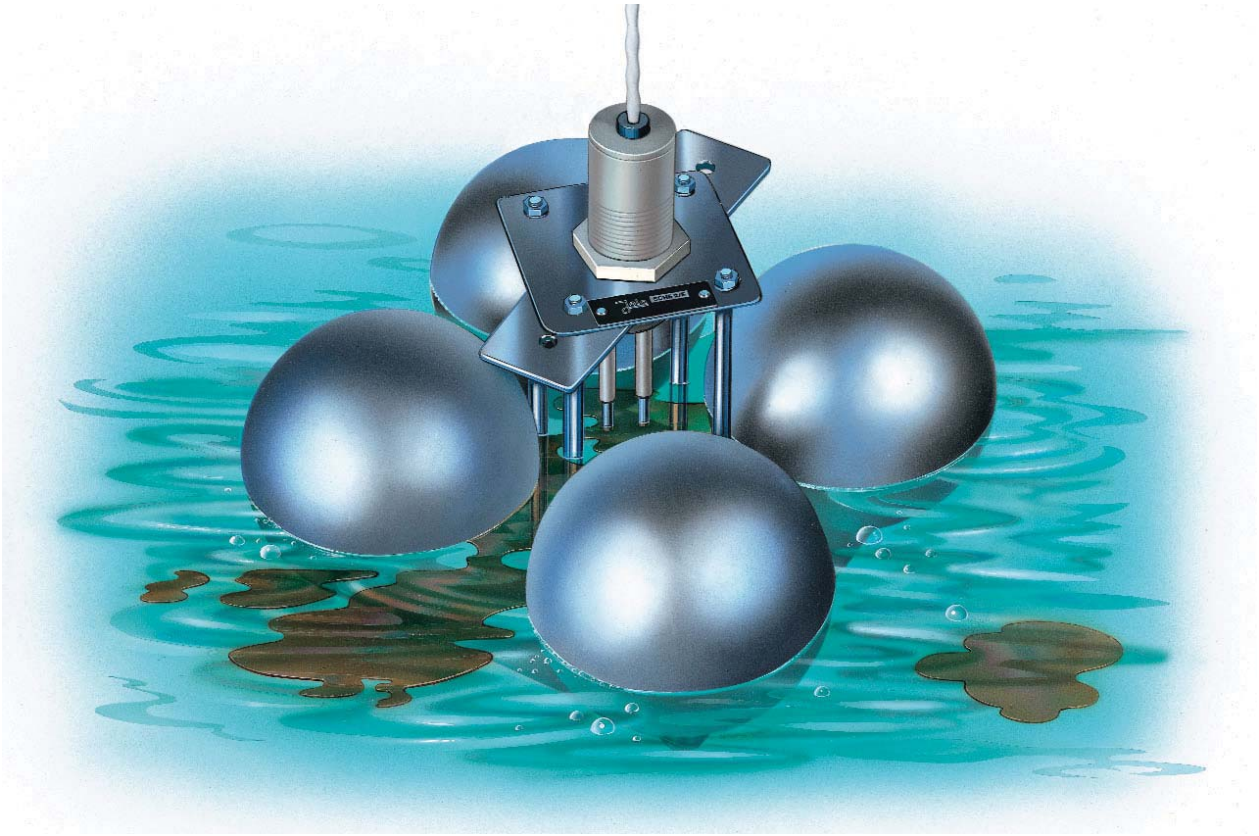
Mode of operation and adjustment

The SCHE … floating electrode normally floats on a conductive liquid, such as water. It is connected to an electrode relay which supplies it with a low safety voltage. The height of the rod electrode is set in such a way that the two electrode rod tips are permanently underwater. Depending on the movement of the surface of the liquid, the rod electrode should be set further up or down. Although the two electrode rod tips should be permanently underwater, they should only just be underwater, so that when a conductive liquid (water in our example) is overlaid by a non-conductive liquid (such as oil), a thin layer of the non-conductive liquid (oil) is sufficient to lift the electrode rod tips of the rod electrode from the conductive water layer into the non-conductive oil layer, to thus interrupt the current flowing from the electrode relay via the rod electrode, and therefore to activate an alarm.

If, for example, oil flows onto a still water surface following a leak, exact setting of the rod electrode will ensure that an oil layer of only approx. 3 to 10 mm thickness is sufficient to interrupt the control current flowing via the rod electrode and activate an alarm.

To ensure functionning of the SCHE … floating electrode, there must be a minimum liquid level above the floor (see technical data of the individual floating electrodes). If this condition is not fulfilled, the two electrode rod tips will no longer be underwater – in other words, they will not be electrically bridged by a conductive liquid. This will lead to normally undesired alarm activation via the connected electrode relay. The only model with an alarm bridging contact for this eventuality is the SCHE 2/E (ILS variant).

A SCHE … floating electrode is designed for connection to an **electrode relay ESA 2, ESA 2/G** or **NR 3 A.**



Floating electrode types and main differentiating features

Types	Main differentiating features	Pages
– **SCHE 2/T/GR**	Floats made of **PP**, plates and brackets made of **PVC**, conductive electrode with **2 electrode rods**, **for signalling 1 alarm**.	39-1-5 to 39-1-7
– **SCHE 2/T/KL**	Floats made of **PP**, plates and brackets made of **PVC**, conductive electrode with **2 electrode rods**, **for signalling 1 alarm**.	39-1-5 to 39-1-7
– **SCHE 2/E**	Floats, plates and brackets made of **stainless steel**, conductive electrode with **2 electrode rods**, **for signalling 1 alarm**.	39-1-5 to 39-1-8
– **SCHE 3/E**	Floats, plates and brackets made of **stainless steel**, conductive electrode with **3 electrode rods**, **for signalling 2 alarms**.	39-1-9 to 39-1-11
– **SCHE 2/E (ILS variant)**	Floats, plates and brackets made of **stainless steel**, conductive electrode with **2 electrode rods**, **for signalling 1 alarm,** **special version with alarm bridging contact for the event that no or insufficient conductive liquid is present to ensure functioning of the floating electrode.**	39-1-12 to 39-1-14

pages 39-1-4 to 39-1-11 deleted as irrelant

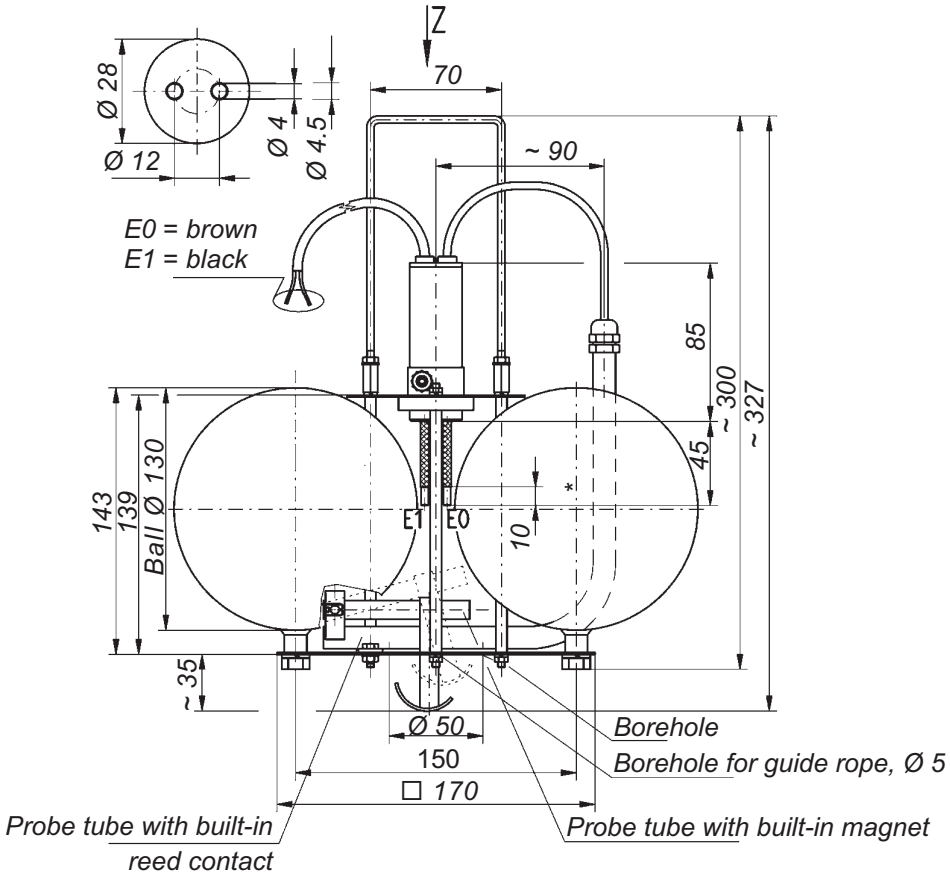
SCHE 2/E (ILS variant) floating electrode

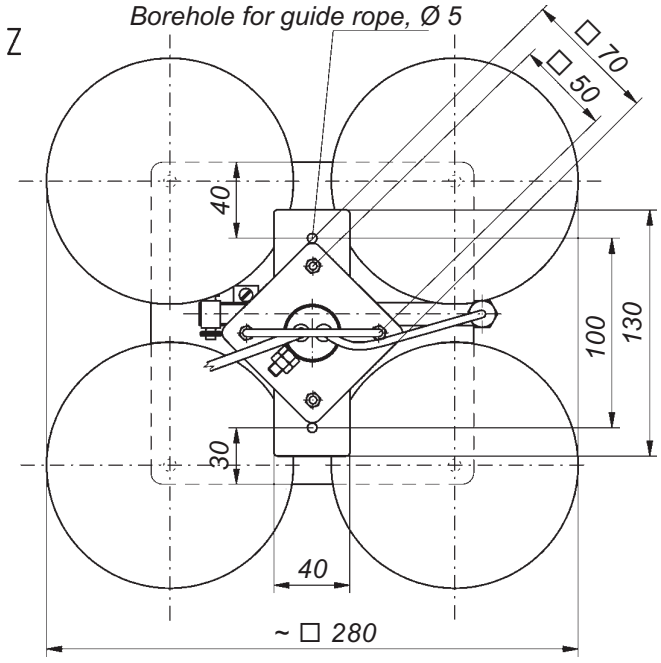
with conductive electrode with 2 electrode rods for signalling 1 alarm, special version with alarm bridging contact for the event that no or insufficient conductive liquid is present to ensure functioning of the floating electrode

Technical data	SCHE 2/E (ILS variant)
Design	1 control electrode and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with shrinkdown tubing made of PVDF or PTFE
Length of electrode rods	approx. 45 mm, other electrode rod lengths on request
Material of electrode head	stainless steel 316 Ti
Electrical connection	PTFE cable, potted in electrode head; other cable on request
Length of connecting cable	2 metres; longer connecting cable on request
Protection class of the electrode head	IP 67
Material of electrode holder, stabiliser plate and brackets	stainless steel 316 Ti or other stainless steel
No. of floats and float dimensions	4 units, approx. 130 mm Ø
Minimum liquid level above the floor to ensure functioning of the floating electrode (with d = 1 g/cm³)	**130 mm**
Alarm bridging contact	reed contact activated via a magnet located in the moving part of the mechanism in the event that no or insufficient conductive liquid is present to ensure functioning of the floating electrode
Temperature range	from – 20°C to + 90°C
Pressure resistance	for pressureless applications only
Max. length of connecting cable between floating electrode and electrode relay	**1,000 metres**

SCHE 2/E (ILS variant)

SCHE 2/E (ILS variant) floating electrode





SCHE 2/E (ILS variant)

ESA 2 electrode relay

Electrode relay for U-bar mounting or surface mounting, with connection terminals on top of housing and built-in two-colour LED for signalling the respective switching status.

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

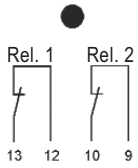
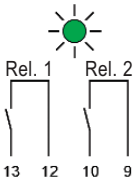
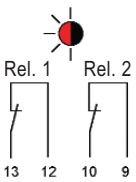
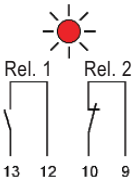
The design of the electrode relay is based on the **quiescent current principle**; in other words, an alarm signal is given if there is no conductive connection between the two connected electrode rods of the JOLA SCHE ... floating electrode; the output contacts of the unit also revert to alarm status if there is a supply voltage failure.

In standby status (unit is supplied with voltage and electrode rods are in a conductive liquid), the two potential-free output contacts are in activated condition (= open) and the two-colour LED lights green.

In the event of an alarm, the two potential-free output contacts are in non activated condition (= closed) and the two-colour LED flashes red.

In order to cancel the alarm given via one of the two output relays, one of the two output relays can be reset using the built-in acknowledgement button or a connected external acknowledgement button. The LED then stops flashing and reverts to permanent red.

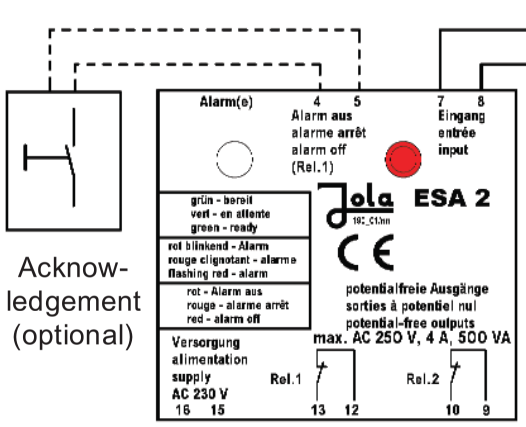
Position of output contacts of the ESA 2 electrode relay

Without supply voltage	OK status	Alarm status	Alarm status acknowledged
			
LED dark – both output relays not energised – output contacts closed	**LED lights green –** both output relays energised – output contacts open	**LED flashes red –** both output relays not energised – output contacts closed	**LED lights red –** output relay 1 energised – contact 12, 13 open – output relay 2 not energised – contact 9, 10 closed

Technical data	ESA 2
Alternative supply voltages (AC versions: terminals 15 and 16; DC versions: - terminal 15: – - terminal 16: +)	- AC 230 V (delivered if no other supply voltage is specified in the order) or - AC 240 V or - AC 115 V or - AC 24 V or - DC 24 V or } in these two cases, the unit must only be - DC 12 V or } connected to a low safety voltage which corresponds to the safety regulations relating to the application - further supply voltages on request
Power input	approx. 3 VA
Electrode circuit (terminals 7 and 8)	2 terminals (under safety extra low voltage SELV), acting on 2 output relays without self-hold, where one can be reset if an alarm is activated
– no-load voltage – short-circuit current – response sensitivity	9 V_{eff} ⊓⊔ 10 Hz (safety extra low voltage SELV) max. 0.5 mA_{eff} approx. 30 kOhm or approx. 33 µS (electric conductance)
Controlled circuits (terminals 12, 13 – rel. 1, terminals 9, 10 – rel. 2)	**2 potential-free normally closed contacts based on the quiescent current principle, both activated in standby status.** **One of the two normally closed contacts (terminals 12, 13 – rel. 1) can be reset in the event of alarm.** **The other normally closed contact (terminals 9, 10 – rel. 2) retains its switching status as long as the alarm is given.**
Acknowledgement	output relay 1 (terminals 12, 13) can be reset via a built-in button or external acknowledgement button (connection option at terminals 4 and 5)
Switching status indicator	via two-colour LED: green = standby, both output relays energised flashing red = alarm, both output relays not energised lights red = alarm acknowledged, output relay 1 reset
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 (dimensions see page 39-1-27)
Connection	terminals on top of housing
Protection class	IP 20
Mounting	clip attachment to U-bar to DIN 46 277 and EN 50 022 or fastening via two boreholes
Mounting orientation	any
Temperature range	from – 20°C to + 60°C
Max. cable length between ESA and floating electrode	**1,000 metres**
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

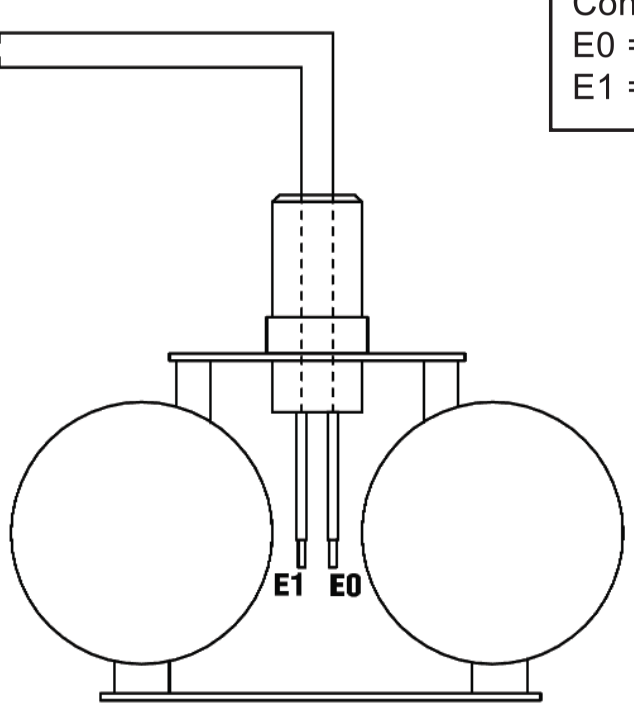
Circuit diagram for connection of floating electrode SCHE 2/T/GR, SCHE 2/T/KL, SCHE 2/E or SCHE 2/E (ILS variant) to electrode relay ESA 2

Connection:
E0 = brown
E1 = black



Acknow-
ledgement
(optional)

Output contacts shown in
no-current condition of the relay



SCHE 2/T/GR,
SCHE 2/T/KL,
SCHE 2/E
or
SCHE 2/E (ILS variant)