

## Electrode controls

Conductive controlling devices,  
for automatic control,  
regulation and signalling of liquid levels



Jola Spezialschalter GmbH & Co. KG  
Klostergartenstr. 11 • 67466 Lambrecht (Germany)  
Tel. +49 6325 188-01 • Fax +49 6325 6396  
contact@jola-info.de • www.jola-info.de

# Jola Electrode controls

## Table of contents

	Pages
- General information on electrode controls	7-1-1 and 7-1-2
- Suspension electrodes	7-1-3
- Rod electrodes	7-1-4 to 7-1-12
- Electrodes for special applications	7-1-13
- Electrode relays	7-1-14 to 7-1-39

## General information on electrode controls

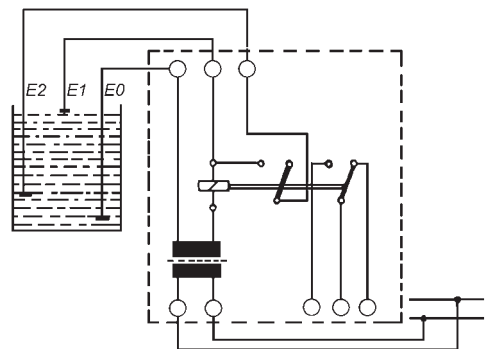
### 1. Operating principle

Electrode controls are used for the automatic control of pumps or electromagnetic valves as well as overflow or run-dry protection in wells or tanks with conductive liquids.

The liquid levels are monitored by electrodes which give switching commands to the electronic relay if they come into contact with the liquid.

For a two-point control system, you require two control electrodes and one earth electrode. If you only wish to signal a liquid level, the control electrode E1 and the earth electrode will suffice. You can also use a metallic, conductive tank wall as an earth connection in place of the earth electrode.

**However, we recommend the use of a separate earth electrode in all cases.**



**Circuit diagram of an electrode control**  
E0 = earth electrode  
E1 and E2 = control electrodes

### 2. Recommendations for the use of control electrodes

The conductive liquid to be controlled should have a specific conductivity of min. 50  $\mu\text{S}/\text{cm}$ . The specific conductivity of tap water is usually set in a range from 100  $\mu\text{S}/\text{cm}$  to 1,000  $\mu\text{S}/\text{cm}$ .

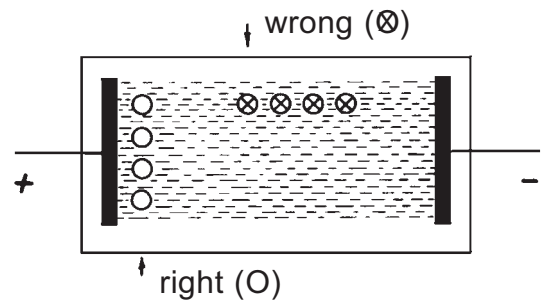
### 3. Recommendations for the design of the electrodes

- Highly conductive liquids:** if there is sufficient space, we advise you to use **several single electrodes** at a spacing of approx. 100 mm instead of a multiple electrode.
- Poorly conductive liquids:** if electrodes are used in poorly conductive liquids, the electrode rods should be mounted as close as possible to one another. For these applications, we recommend the use of a **multiple electrode** in place of several single electrodes.
- All liquids:** wherever possible, we recommend the use of an **electrode with plastic threaded nipple**, as the plastic acts as an insulator and therefore increases the insulation distance between the electrode rod and the conductive tank. If you use an electrode with metallic threaded nipple, this nipple will take same tank potential (= earth electrode E0). The insulation distance between electrode rod(s) and tank will then be limited to the insulators used in the electrode.

#### 4. Recommendations for special cases – the use of electrode controls in electrolysis baths

When installing electrodes in electrolysis baths, it is always necessary to mount the electrodes **across** the voltage path. They must **not** be mounted **along** the voltage path.

It should be noted that in the case of movable poles (the object to be galvanised itself constitutes a pole) the voltage path can change and therefore cause false alarms.



#### 5. Electrode controls can or should not be used:

- in non-conductive liquids (e.g. in mineral oils);
- in mushy or viscous liquids;
- in liquids with a tendency to foam (e.g. possibly beer, washing sodas etc.);
- in liquids with a high level of steam generation and condensate (e.g. at higher temperatures);
- in liquids with a tendency to form deposits (e.g. in limestone milk, oily waste water etc.);
- in liquids with solid particles (e.g. pieces of wood, remnant etc.).

#### 6. Electrical connection

For the connection of electrode to electrode relay, we recommend the use of standard installation cables (e.g. NYM 2 x 1.5 mm<sup>2</sup> or 3 x 1.5 mm<sup>2</sup>). Telephone cables or heavily twisted bell wires should **not** be used.

#### 7. Emptying and filling of a tank via an electrode control

Before you connect up the electrode relay, you must check whether the mains voltage to be connected to the mains terminals is the same as that specified on the rating plate. The built-in transformer steps down the mains voltage to a safe low voltage and forwards it to the electronics of the relay via the connected electrodes.

As soon as the upper electrode E1 comes into contact with the liquid, the energising current flows through the liquid between E1 and E0, and the relay attracts with the electrode relay types NR 5 A, NR 3 A and ES 5/G or drops off with the electrode relay types NR 5, NR 3 or NR 5/G. At the same time, the electrode current between the electrode mounted at the bottom (E2) and the earth electrode (E0) ensures that the switching status is retained until the falling liquid level releases the electrode E2.

The output relay is therefore switched on by E1 at the maximum liquid level and switched off by E2 at the minimum level. The potential-free output contact is suitable for controlling pumps etc. It is designed for max. AC 4 A. The maximum voltage must not exceed AC 250 V and the permanent load of the contacts must not exceed 500 VA (ohmic load).

**For the “pumping empty” function**, in which the pump pumps a full tank empty, the contactor for the pump motor should be connected in accordance with the diagrams on pages 7-1-17, 7-1-23, 7-1-31 and 7-1-35. In these cases, control is effected by the normally open contact of the electrode relay NR 5 A, NR 3 A und ES 5/G or by the normally closed contact of the types NR 5, NR 3 or NR 5/G. The pump is switched on when the tank is full and switched off when the tank is empty.

**For the “pumping full” function**, in which the pump pumps an empty tank full, the contactor for the pump motor should be connected in accordance with the diagrams on pages 7-1-18, 7-1-24, 7-1-32 and 7-1-36. In these cases, control is effected by the normally closed contact of the electrode relays NR 5 A, NR 3 A and ES 5/G or by the normally open contact of the types NR 5, NR 3 and NR 5/G. The pump is switched on when the tank is at the minimum liquid level and the electrodes are not in contact with the liquid and switched off when the top electrode comes into contact with the liquid and causes the output relay to attract in the types NR 5 A, NR 3 A and ES 5/G or to drop off with the types NR 5, NR 3 and NR 5/G.



# Suspension electrodes



Technical data	EH	EHK	LWZ	EHE
<b>Design</b>	1 control electrode or 1 earth electrode		1 control electrode and 1 earth electrode	
Electrode rods		stainless steel 316 Ti		
Housing	PP	PP	PP and Duroplast	stainless steel 316 Ti
	27 mm Ø x ~ 145 mm long	27 mm Ø x ~ 145 mm long	2 x 27 mm Ø x ~ 210 mm long	28 mm Ø x ~ 70 mm long
Insulators		PP and cast resin		PTFE and cast resin
Electrical connection	without, but with connection terminal	1 x 1.5 cable	2 x 0.75 cable	2 x 0.75 cable
Mounting orient.		1 metre, longer on request vertical		
<b>Temperature application range</b>	max. + 60° C			
Pressure resistance	for pressureless applications			



EHK 5



# Suspension electrodes

with adjustable cable lengths

Technical data	EHK 2	EHK 3	EHK 4	EHK 5
<b>Design</b>	2	3	4	5
	EHK electrodes (technical data, see above)			
Screw-in nipple	PP, G2, with cable screw connections			
Pressure resistance	for pressureless applications			

Please note that the distance between a control electrode and the earth electrode should not exceed 3 metres. If the distance is higher than 3 metres, we recommend the use of a supplementary earth electrode, which has to be installed just below the control electrode.



# Rod electrodes

with G $\frac{1}{2}$  screw-in nipple

Technical data	SE 1 A	$\frac{1}{2}$ "-15-30
<b>Design</b>	<b>1 control electrode or earth electrode</b>	
Electrode rod	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)	
Length	—	30 mm
Min. length	approx. 2,500 mm	
Max. length	—	
Insulators	cast resin and polyolefin shrinkdown tubing	aluminium oxide and polyolefin shrinkdown tubing
<b>Screw-in nipple</b>	<b>stainless steel 316 Ti,</b> G $\frac{1}{2}$	<b>galvanized steel,</b> G $\frac{1}{2}$
Electrical connection	special angled plug for H07RN-F 1 x 1 mm <sup>2</sup> , protection class IP 34	
Mounting orient.	vertical	
<b>Temperature application range</b>	<b>max. + 80°C</b>	<b>max. + 80°C</b>
Pressure resistance	max. 10 bar at + 20°C	max. 15 bar at + 20°C



SE 1 A

$\frac{1}{2}$ "-15-30  
with  
electrode  
rod  
> 30 mm



# Rod electrodes

with screw-in nipple made of PP

Technical data	SE 1/M 8	SE 1 $\frac{1}{4}$ "	SE 1 $\frac{1}{2}$ "	SE 2 $\frac{3}{4}$ "	SE 2 $\frac{3}{4}$ " M
<b>Design</b>	<b>1 control electrode or earth electrode</b>			<b>2 control electrodes</b>	<b>1 control electrode and 1 earth electrode</b>
Electrode rods	stainless steel 316 Ti, 3 mm Ø   4 mm Ø   4 mm Ø   4 mm Ø   4 mm Ø — covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)				
Lengths	~ 500 mm		~ 1,500 mm	~ 1,000 mm	
Max. lengths	—		mm	—	
Insulators	PP and cast resin	PP, polyolefin	shrinkdown tubing	and cast resin	—
<b>Screw-in nipple</b>	<b>PP,</b> M 8	<b>PP,</b> G $\frac{1}{4}$	<b>PP,</b> G $\frac{1}{2}$	<b>PP,</b> G $\frac{3}{4}$	<b>PP,</b> G $\frac{3}{4}$
Electrical connection	nut and counternut, protection class IP 00		angled plug for H07RN-F 1 x 1 mm <sup>2</sup> , protection class IP 34	PP connection head with M 16 x 1.5 cable entry, protection class IP 55	
Mounting orient.	vertical				
<b>Temperature application range</b>	<b>max. + 60°C</b>				
Pressure resistance	max. 2 bar at + 20°C				



SE 1/M 8

SE 1 $\frac{1}{4}$ "

SE 1 $\frac{1}{2}$ " SE 2 $\frac{3}{4}$ " M



# Rod electrodes

with G1 screw-in nipple made of PP

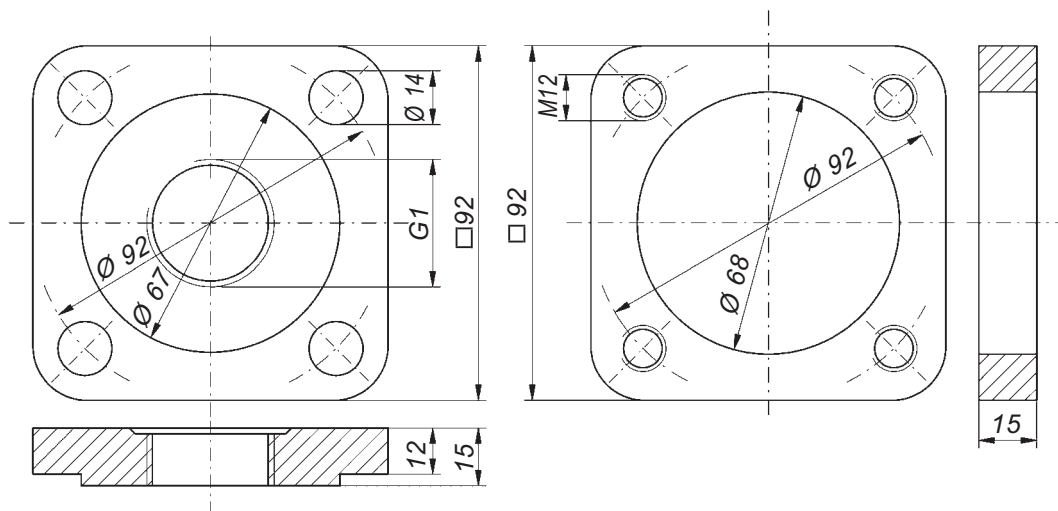
Technical data	S 1/PP	S 2/PP	S 2 M/PP	S 3 M/PP
<b>Design</b>	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)			
Lengths	approx. 2,500 mm			
Max. lengths	approx. 2,500 mm			
Insulators	PP, polyolefin shrinkdown tubing and cast resin			
<b>Screw-in nipple</b>	<b>PP, G1</b>			
Electrical connection	PP connection head with M 20 x 1.5 cable entry, protection class IP 54; on request: aluminium connection head, protection class IP 54			
Mounting orientation	vertical			
<b>Temperature application range</b>	<b>max. + 80°C</b>			
Pressure resistance	max. 2 bar at + 20°C			



**S 1/PP**

## Mounting accessories:

Square flange made of PP for electrodes with G1 screw-in nipple. Counterflange on request.



**Square flange**

**Counterflange**



**S 3 M/PP**

# Jola Rod electrodes

with G1 screw-in nipple made of PVDF

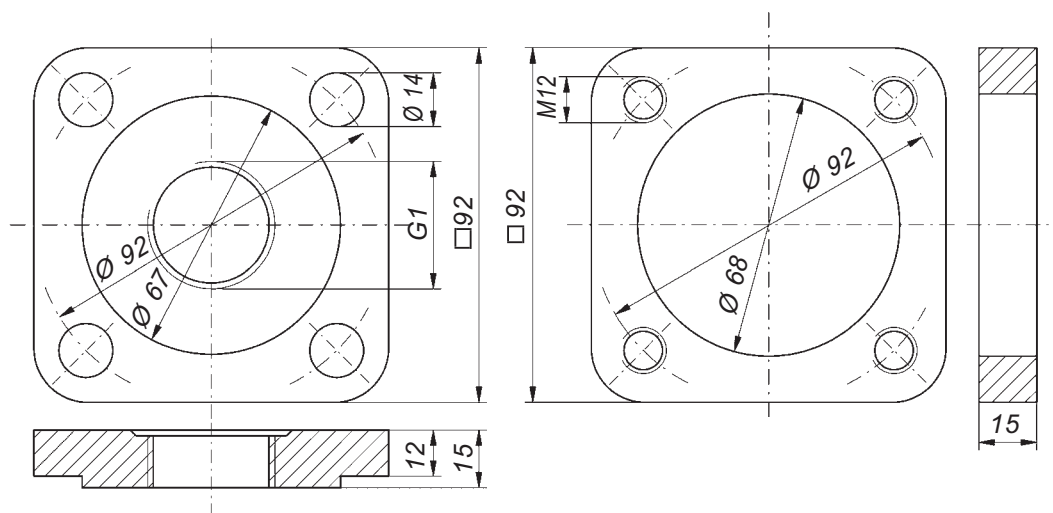
Technical data	S 1/PVDF	S 2/PVDF	S 2 M/PVDF	S 3 M/PVDF
<b>Design</b>	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>PVDF shrinkdown tubing</b>			
Lengths	as desired (measured from nipple sealing surface)			
Max. lengths	approx. 2,500 mm			
Insulators	PVDF, PVDF shrinkdown tubing and cast resin			
<b>Screw-in nipple</b>	<b>PVDF, G1</b>			
Electrical connection	PP connection head with M 20 x 1.5 cable entry, protection class IP 54; on request: aluminium connection head, protection class IP 54			
Mounting orientation	vertical			
<b>Temperature application range</b>	<b>max. + 80°C</b>			
Pressure resistance	max. 2 bar at + 20°C			



S 1/PVDF

## Mounting accessories:

Square flange made of PVDF for electrodes with G1 screw-in nipple. Counterflange on request.



Square flange

Counterflange



S 3 M/PVDF



## Rod electrodes

with G1 screw-in nipple  
made of stainless steel 316 Ti

Technical data	S 2 A	S 2 AM	S 3 AM	S 4 AM	S 5 AM
Design	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode	3 control electrodes and 1 earth electrode	4 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)				
Lengths	approx. 2,500 mm				
Max. lengths	polyolefin shrinkdown tubing and cast resin				
Insulators	<b>stainless steel 316 Ti, G1</b>				
Screw-in nipple	<b>PP connection head</b> with M 20 x 1.5 cable entry, protection class IP 54; on request: aluminium connection head, protection class IP 54 vertical				
Electrical connection					
Mounting orient.	vertical				
Temperature application range	max. + 80°C				
Pressure resistance	max. 10 bar at + 20°C				



S 2 AM



## Rod electrodes

with G1 screw-in nipple  
made of stainless steel 316 Ti

Technical data	S 2 B	S 2 BM	S 3 BM	S 4 BM
Design	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode	3 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>PVDF shrinkdown tubing</b> as desired (measured from nipple sealing surface)			
Lengths	approx. 1,500 mm			
Max. lengths	PVDF shrinkdown tubing and cast resin			
Insulators	<b>stainless steel 316 Ti, G1</b>			
Screw-in nipple	<b>aluminium connection head</b> with M 20 x 1.5 cable entry, protection class IP 54 vertical			
Electrical connection				
Mounting orient.	vertical			
Temperature application range	max. + 100°C			
Pressure resistance	max. 10 bar at + 20°C			



S 3 BM





## Rod electrodes, pressure-resistant

with G1 screw-in nipple made of  
stainless steel 316 Ti and PEEK or PVDF

Technical data	S 2 A/D	S 2 AM/D	S 3 AM/D
Design	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)		
Lengths	approx. 2,500 mm		
Max. lengths	polyolefin shrinkdown tubing, PEEK or PVDF and cast resin		
Insulators	stainless steel 316 Ti and PEEK or PVDF, G1		
Screw-in nipple	PP connection head with M 20 x 1.5 cable entry, protection class IP 54;		
Electrical connection	on request: aluminium connection head, protection class IP 54 vertical		
Mounting orient.	vertical		
Temperature application range	max. + 80°C		
Pressure resistance	max. 15 bar at + 20°C		



S 2 AM/D



## Rod electrodes, pressure-resistant

with G1 screw-in nipple made of  
stainless-steel 316 Ti and PEEK or PVDF

Technical data	S 2 B/D	S 2 BM/D	S 3 BM/D
Design	2 control electrodes	1 control electrode und 1 earth electrode	2 control electrodes und 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>PVDF shrinkdown tubing</b> as desired (measured from nipple sealing surface)		
Lengths	approx. 1,500 mm		
Max. lengths	PVDF shrinkdown tubing, PEEK or PVDF and cast resin		
Insulators	stainless steel 316 Ti and PEEK or PVDF, G1		
Screw-in nipple	aluminium connection head with M 20 x 1.5 cable entry, protection class IP 54 vertical		
Electrical connection	vertical		
Mounting orient.	vertical		
Temperature application range	max. + 100°C		
Pressure resistance	max. 15 bar at + 20°C		



S 3 BM/D



# Rod electrodes

with G1 screw-in nipple made of PP

Technical data	SE 1	SE 2	SE 2 M	SE 3 M	SE 4 M
Design	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode	3 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)				
Lengths	approx. 2,500 mm				
Max. lengths	PP, polyolefin shrinkdown tubing and cast resin				
Insulators	<b>PP, G1</b>				
Screw-in nipple	PP connection head with M 16 x 1.5 cable entry, protection class IP 55, PTFE connection head on request				
Electrical connection	vertical				
Mounting orient.					
Temperature application range	<b>max. + 80°C</b>				
Pressure resistance	max. 2 bar at + 20°C				



SE 2 M SE 3 M



# Rod electrodes

with adjustable electrode rods

Technical data	SEV	SEV/T 1	SEV/T 2	SEV/T 3
Design	1 control electrode or earth electrode	1 control electrode or earth electrode	2 control electrodes or 1 control electrode and 1 earth electrode	3 control electrodes or 2 control electrodes and 1 earth electrode
Electrode rods	stainless steel 316 Ti, 4 mm Ø, adjustable, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface)			
Lengths	approx. 1,000 mm			
Max. lengths	PP and polyolefin shrinkdown tubing			
Insulators	PTFE and polyolefin shrinkdown tubing			
Screw-in nipple	stainless steel 316 Ti, G <sup>1</sup> / <sub>2</sub> , on request G1 or G1 <sup>1</sup> / <sub>4</sub>	PP, G1		
Electrical connection	special angled plug for H07RN-F 1 x 1 mm <sup>2</sup> , protection class IP 34			
Mounting orient.	vertical			
Temperature application range	<b>max. + 80°C</b>	<b>max. + 60°C</b>		
Pressure resistance	for pressureless applications			



SEV/T 3

SEV, G1

Rod electrodes with more than 3 adjustable electrode rods and G2 screw-in nipple on request.



## Rod electrodes

with G2 screw-in nipple made of PP

Technical data	SR 1/ PP	SR 2/ PP	SR 2 M/ PP	SR 3 M/ PP	SR 4 M/ PP	SR 5 M/ PP
Design						
- control electrodes	1	2	1	2	3	4
- earth electrode	—	—	1	1	1	1
Electrode rods	stainless steel 316 Ti, 6 mm Ø, covered with <b>polyolefin shrinkdown tubing</b> as desired (measured from nipple sealing surface) approx. 3,000 mm					
Lengths	PP, polyolefin shrinkdown tubing and cast resin					
Max. lengths	<b>PP, G2</b>					
Insulators	PP connection head with M 20 x 1.5 cable entry, protection class IP 55					
Screw-in nipple	vertical					
Electrical connection	<b>max. + 80°C</b>					
Mounting orient.	max. 2 bar at + 20°C					
Temperature application range						
Pressure resistance						



## Rod electrodes

with G2 screw-in nipple made of PVDF

Technical data	SR 1/ PVDF	SR 2/ PVDF	SR 2 M/ PVDF	SR 3 M/ PVDF	SR 4 M/ PVDF	SR 5 M/ PVDF
Design						
- control electrodes	1	2	1	2	3	4
- earth electrode	—	—	1	1	1	1
Electrode rods	stainless steel 316 Ti, 6 mm Ø, covered with <b>PVDF shrinkdown tubing</b> as desired (measured from nipple sealing surface) approx. 3,000 mm					
Lengths	PVDF, PVDF shrinkdown tubing and cast resin					
Max. lengths	<b>PVDF, G2</b>					
Insulators	PVDF connection head with M 20 x 1.5 cable entry, protection class IP 55					
Screw-in nipple	vertical					
Electrical connection	<b>max. + 80°C</b>					
Mounting orient.	max. 2 bar at + 20°C					
Temperature application range						
Pressure resistance						

Electrode rods made of titanium, Hastelloy C, Hastelloy B or monel and screw-in nipple made of PVC or PTFE on request.

SR 5 M/PP  
or  
SR 5 M/PVDF



## Rod electrodes made of special materials



## Rod electrodes made of titanium

with G1 screw-in nipple made of PVDF



STI or SHC 1

Technical data	STI 1	STI 2	STI 2 M	STI 3 M
Design	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	titanium, $\leq 4$ mm $\varnothing$ , covered with <b>PVDF shrinkdown tubing</b> as desired (measured from nipple sealing surface)			
Lengths	approx. 2,500 mm			
Max. lengths	PVDF, PVDF shrinkdown tubing and cast resin			
Insulators	<b>PVDF, G1</b>			
Screw-in nipple	PP connection head with M 20 x 1.5 cable entry, protection class IP 54;			
Electrical connection	on request: aluminium connection head, protection class IP 54 vertical			
Mounting orient.	vertical			
Temperature application range	max. + 80°C			
Pressure resistance	max. 2 bar at + 20°C			

Version with screw-in nipple made of PTFE and/or shrinkdown tubing made of PTFE available on request.



STI 3 M or SHC 3 M



## Rod electrodes made of Hastelloy C

with G1 screw-in nipple made of PVDF

Technical data	SHC 1	SHC 2	SHC 2 M	SHC 3 M
Design	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	Hastelloy C, $\leq 4$ mm $\varnothing$ , covered with <b>PVDF shrinkdown tubing</b>			

All other technical data as for rod electrodes described above.

Version with screw-in nipple made of PTFE and/or shrinkdown tubing made of PTFE available on request.



## Rod electrodes made of Hastelloy B

with G1 screw-in nipple made of PVDF

Technical data	SHB 1	SHB 2	SHB 2 M	SHB 3 M
Design	1 control electrode or earth electrode	2 control electrodes	1 control electrode and 1 earth electrode	2 control electrodes and 1 earth electrode
Electrode rods	Hastelloy B, $\leq 4$ mm $\varnothing$ , covered with <b>PVDF shrinkdown tubing</b> as desired (measured from nipple sealing surface) approx. 2,500 mm			
Lengths	PVDF, PVDF shrinkdown tubing and cast resin			
Max. lengths	<b>PVDF, G1</b>			
Insulators	PP connection head with M 20 x 1.5 cable entry, protection class IP 54; on request: aluminium connection head, protection class IP 54			
<b>Screw-in nipple</b>	vertical			
Electrical connection	max. + 80°C			
Mounting orient.	max. 2 bar at + 20°C			
<b>Temperature application range</b>				
Pressure resistance				

Version with screw-in nipple made of PTFE and/or shrinkdown tubing made of PTFE available on request.



SHB 1,  
SMO 1  
or  
STA 1



## Rod electrodes made of monel

with G1 screw-in nipple made of PVDF

Technical data	SMO 1	SMO 2	SMO 2 M	SMO 3 M
Design	see above			
Electrode rods	monel, $\leq 4$ mm $\varnothing$ , covered with <b>PVDF shrinkdown tubing</b>			

All other technical data as for rod electrodes described above.

Version with screw-in nipple made of PTFE and/or shrinkdown tubing made of PTFE available on request.



SHB 3 M,  
SMO 3 M  
or  
STA 3 M



## Rod electrodes made of tantalum

with G1 screw-in nipple made of PVDF

Technical data	STA 1	STA 2	STA 2 M	STA 3 M
Design	see above			
Electrode rods	tantalum, $\leq 4$ mm $\varnothing$ , covered with <b>PVDF shrinkdown tubing</b>			

All other technical data as for rod electrodes described above.



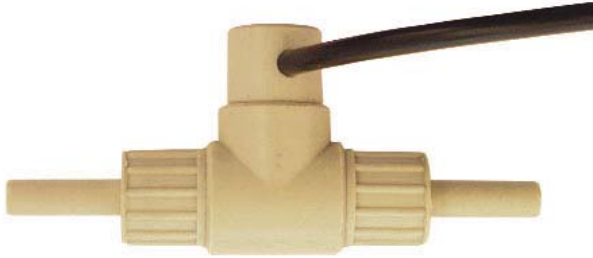
# Electrodes for special applications

**WME electrode for indication of the lack of water in a hose**

- for installation in a hose

**Rod electrode without screw-in nipple, with mounting stand**

- for installation in shallow collection tubs



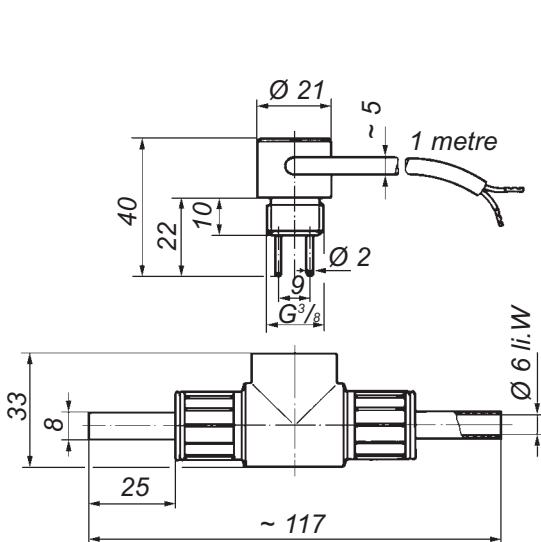
**WME**

*Picture with smaller scale compared to adjacent picture*

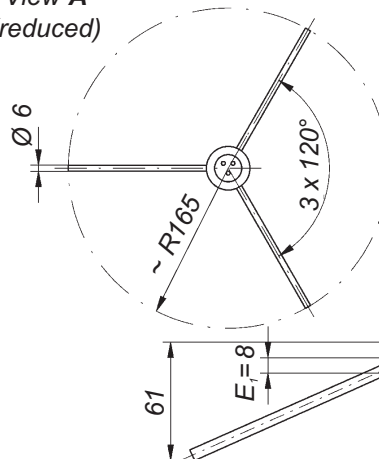


**SON 3 M/ST**

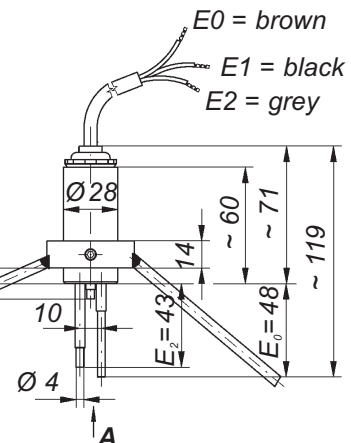
Technical data	WME	SON 3 M/ST
<b>Design</b>	<b>1 control electrode and 1 earth electrode</b>	<b>2 control electrodes and 1 earth electrode</b>
Electrode rods	stainless steel 316 Ti, 2 mm Ø	stainless steel 316 Ti, 4 mm Ø, covered with <b>polyolefin shrinkdown tubing</b>
Lengths	approx. 22 mm (measured from nipple sealing surface)	acc. to drawing below, other lengths on request
Insulators	PP and cast resin	PP, polyolefin shrinkdown tubing and cast resin
<b>Screw-in nipple</b>	<b>PP, G<sup>3/8</sup></b>	—
Electrical connection	PVC cable 2 x 0.75;	PVC cable 3 x 0.75;
Mounting	1 metre, longer on request; using the T-piece made of PP,	other cable on request using the mounting stand made of stainless steel 316 Ti,
Mounting orientation	dimensions see drawing below depending on the application	dimensions see drawing below vertical
<b>Temperature appl. range</b>	<b>max. + 60°C</b>	<b>max. + 80°C</b>
Pressure resistance	for pressureless applications	



*View A (reduced)*



*Diagram with smaller scale compared to adjacent drawing*





# Electrode relays

for automatic level control  
or signalling with conductive liquids

Jola electrode relays are used for the automatic control of pumps or electromagnetic valves as well as overflow or run-dry protection in wells or tanks with conductive liquids.

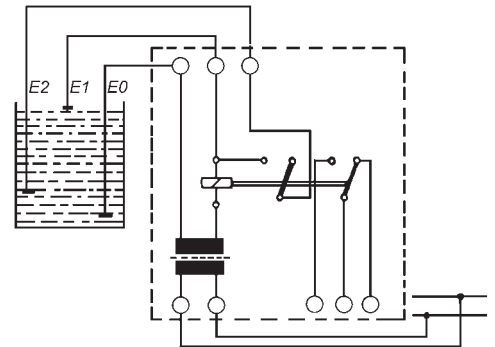
The liquid levels are monitored by electrodes which give switching commands to the electronic relay if they come into contact with the liquid.

For a two-point control system, you require two control electrodes and one earth electrode.

If you only wish to signal a liquid level, the control electrode E1 and the earth electrode will suffice.

You can also use a metallic, conductive tank wall as an earth connection in place of the earth electrode.

**However, we recommend the use of a separate earth electrode in all cases.**



**Circuit diagram of an electrode control**  
E0 = earth electrode,  
E1 and E2 = control electrodes

Function	Type designation	Page	Output	Self-hold
Relay for signalling 1 limit level or for 1 two-point control	NR 5 NR 5 A	7-1-15	1 potential-free changeover contact based on <b>quiescent current principle</b> based on <b>working current principle</b>	with
	NR 3 NR 3 A	7-1-21	1 potential-free changeover contact based on <b>quiescent current principle</b> based on <b>working current principle</b>	with
	NR 5/G	7-1-29	1 potential-free changeover contact based on <b>quiescent current principle</b>	with
	ES 5/G	7-1-33	1 potential-free changeover contact based on <b>working current principle</b>	with
Relay for signalling 3 limit levels	ER 53	7-1-37	2 make contacts and 1 break contact based on working current principle with common Wurzelkontakt	without

A switch-on and switch-off delay of between 0.5 and 3 seconds depending on the conductivity of the medium renders the units insensitive to short-term contacting (e.g. due to splashes) and short contact interruptions.



# NR 5 and NR 5 A electrode relays

for signalling a limit level  
or for level control

Electrode relay for U-bar mounting or surface mounting, with connection terminals on top of housing and with 2 built-in LEDs for signalling the respective switching status.

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

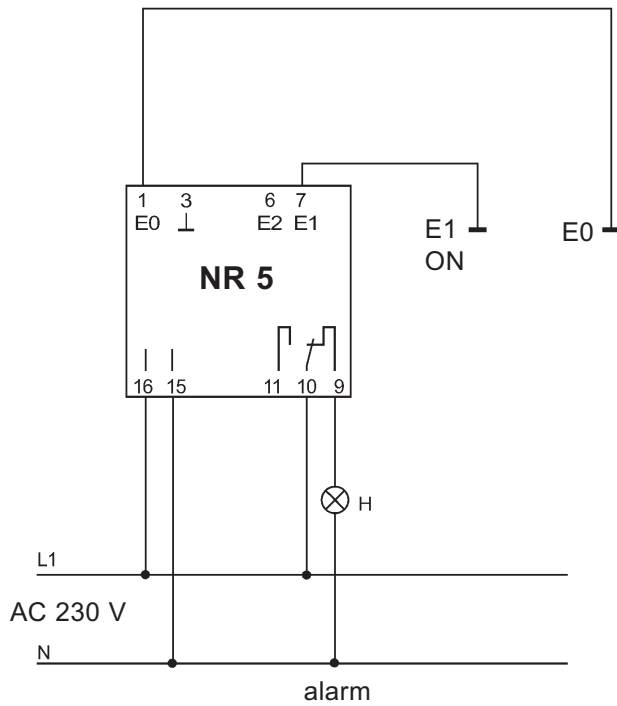


Technical data	NR 5	NR 5 A
Alternative supply voltages (AC versions: terminals 15 and 16; DC versions: - terminal 15: -, - terminal 16: +)	<ul style="list-style-type: none"> <li>- AC 230 V (supplied if no other supply voltage is specified in the order) or</li> <li>- AC 240 V or</li> <li>- AC 115 V or</li> <li>- AC 24 V or</li> <li>- DC 24 V or</li> <li>- DC 12 V or</li> </ul> <p>in these two cases, the unit must only be connected to a low safety voltage which corresponds to the safety regulations relating to the application</p>	
Power input Electrode circuit (terminals 1, 6, 7)  - no-load voltage - short-circuit current - response sensitivity	<p>- further supply voltages on request approx. 3 VA</p> <p>3 terminals (under safety extra low voltage SELV), acting on 1 output relay with self-hold 9 V<sub>eff</sub> <math>\square</math> 10 Hz (safety extra low voltage SELV) max. 0.5 mA<sub>eff</sub> approx. 30 kOhm or approx. 33 μS (electric conductance)</p>	
<b>Controlled circuit (terminals 9, 10, 11)</b>	<p><b>1 single-pole potential-free changeover contact with self-hold</b></p>	
<b>Functioning</b>	<p><b>based on the quiescent current principle</b>   <b>based on the working current principle</b></p>	
Switching status indicators	<p>1 green LED, lights when output relay is energised 1 red LED, lights when output relay is not energised</p>	
Switching voltage Switching current Switching capacity Housing Connection Protection class Mounting	<p>max. AC 250 V max. AC 4 A max. 500 VA insulating material, 75 x 55 x 110 mm terminals on top of housing IP 20 clip attachment for U-bar to DIN 46277 and EN 50022 or fastening via 2 boreholes any</p>	
Mounting orientation Temperature application range	<p>from - 20°C to + 60°C</p>	
<b>Max. cable length between electrode relay and electrode(s)</b> EMC	<p><b>1,000 metres</b></p>	
	<p>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.</p>	

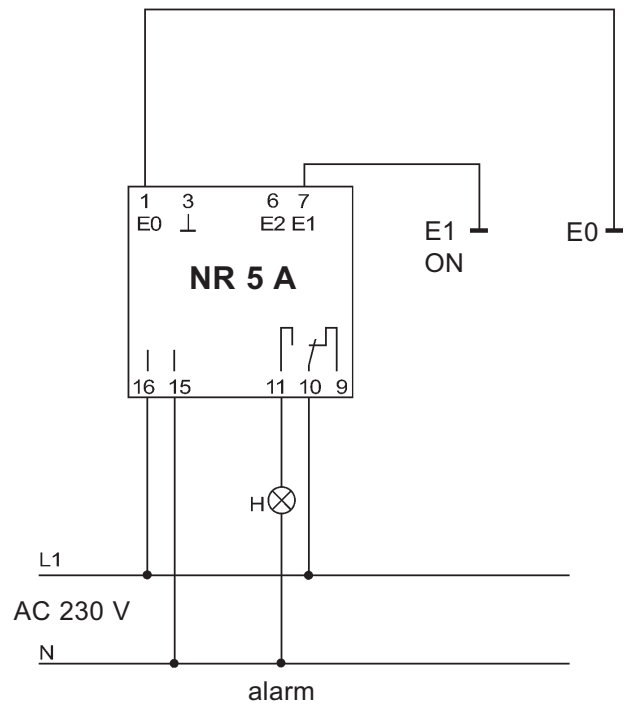


## Connection diagrams

### NR 5

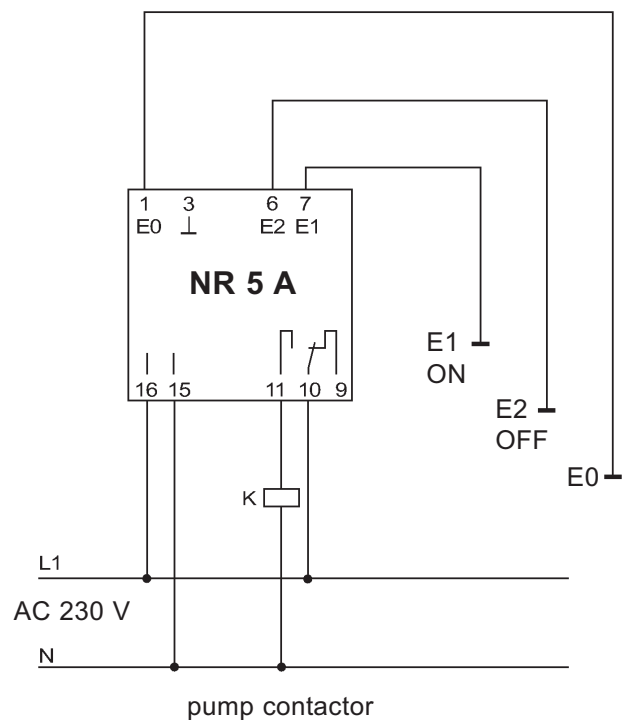
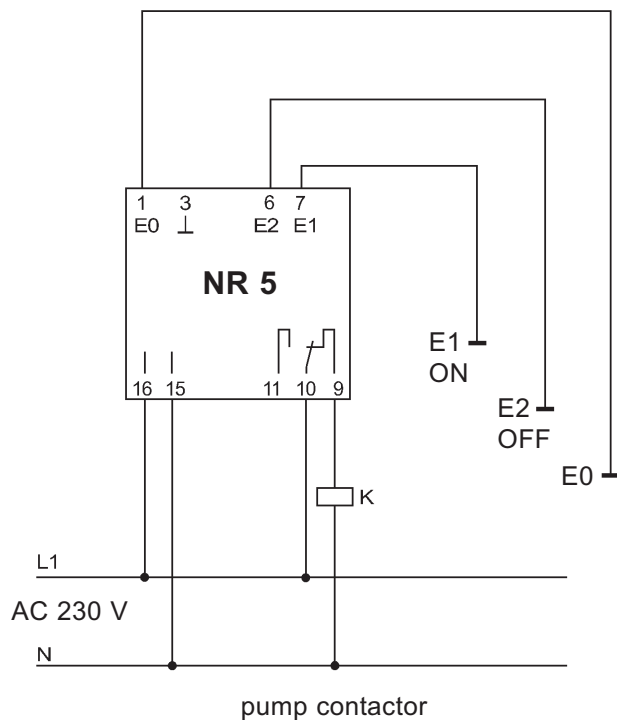


### NR 5 A

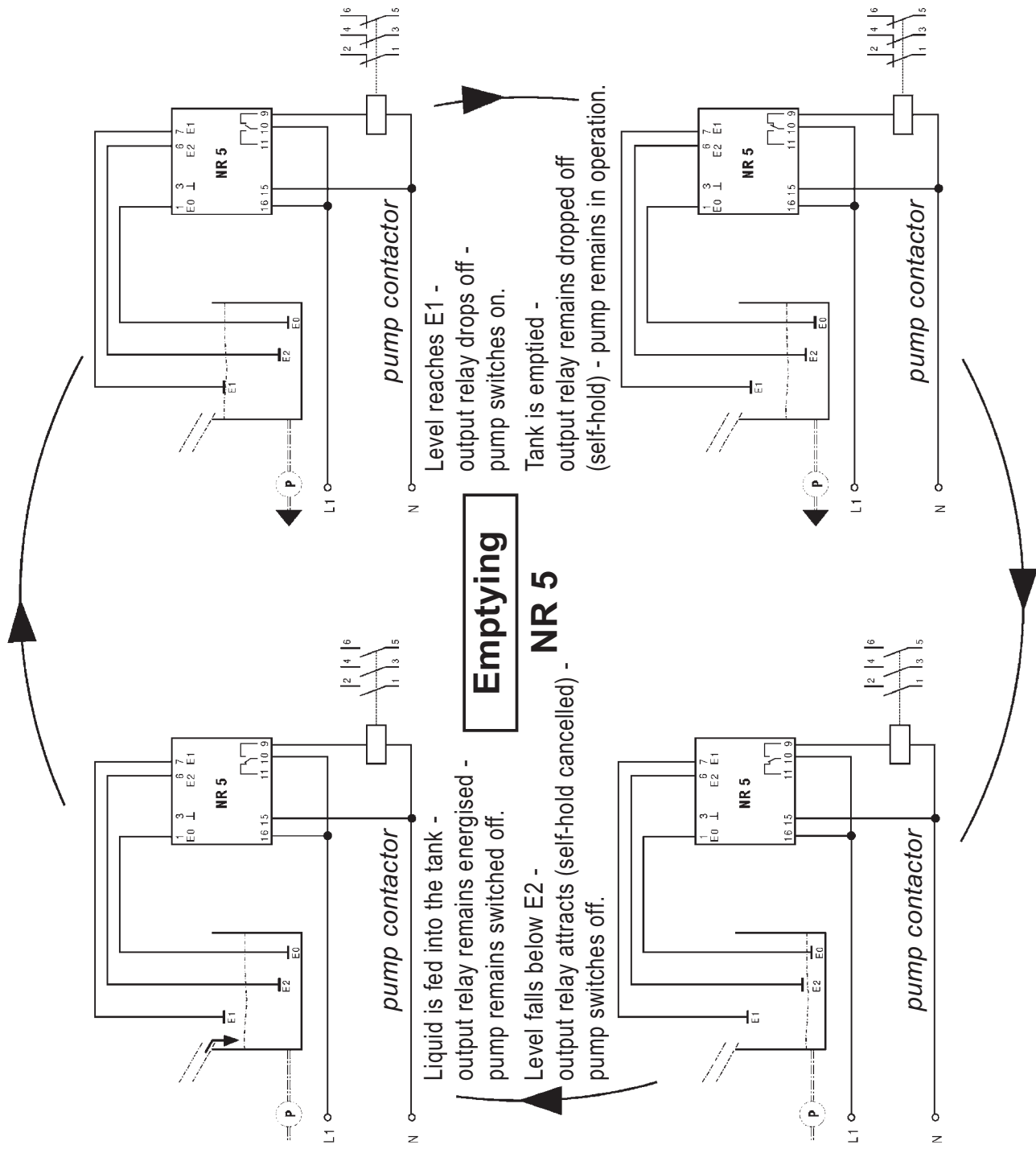


Attention! When several NR 5 or NR 5 A electrode relays are used for automatic level control or signalling in the same tank, the **terminal 3 serves** to connect the earth of each NR 5 or NR 5 A electrode relay.

**The protective ground must never be connected to terminal 3!**

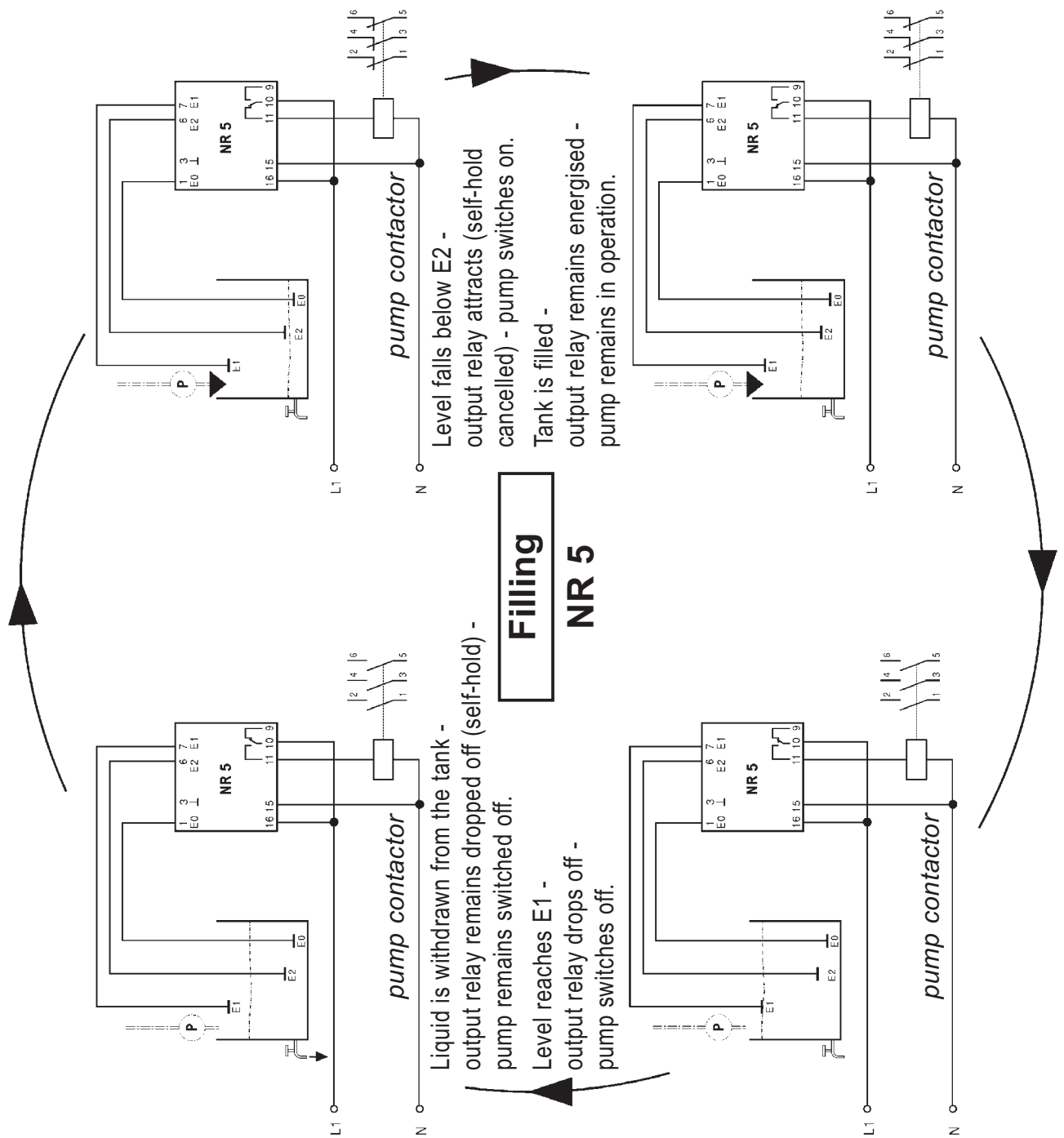


Output contact shown in no-current condition of the relay



**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 5 electrode relay is always the same. The function selection “Emptying” or “Filling” is made on the basis of the terminal assignment chosen at the relay output.



**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 5 electrode relay is always the same. The function selection “Emptying” or “Filling” is made on the basis of the terminal assignment chosen at the relay output.

## Instructions and notice for the use of one or several NR 5 or NR 5 A electrode relays

- When using several electrode relays for automatic level control or signalling in the same tank, the earth electrode E0 may only be connected to one electrode relay. The other electrode relays must be connected to each other via their earth terminal (terminal 3). It is important to note that only a maximum of 8 inputs can be used. The protective ground must never be connected to terminal 3!

- **Max. connecting cable length between electrode relay(s) and electrodes:**

**connection of one electrode relay:**

- electrode conductors are laid together in a common cable: 1,000 metres
- each conductor is laid separately: 1,000 metres

**connection of several electrode relays (max. 4):**

- electrode conductors are laid together in a common cable: 1,000 metres
- each conductor is laid separately: 1,000 metres

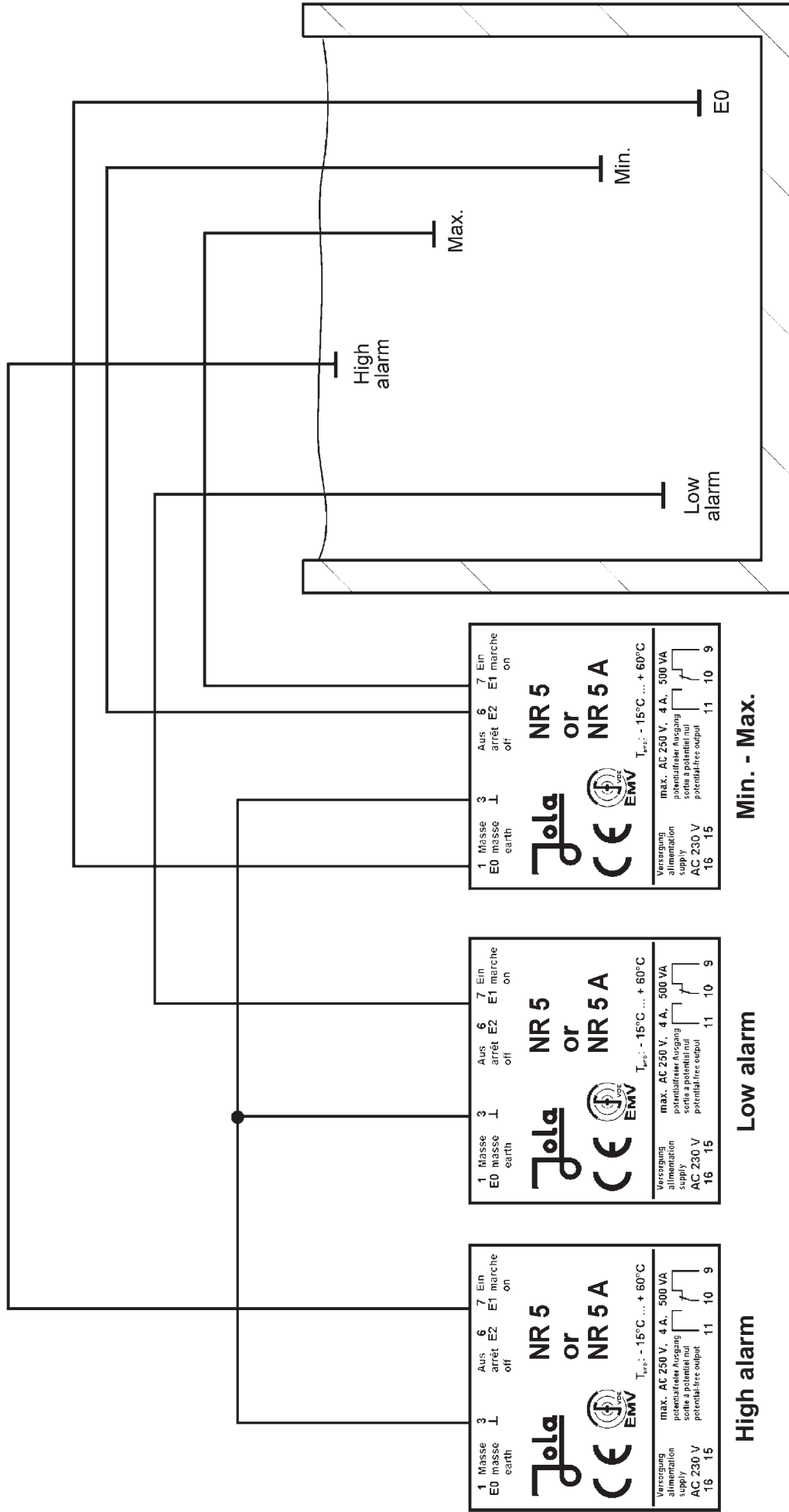
**- Relevant information for a safe functioning:**

If the conductor for the earth electrode E0 is laid separately and the conductors for the other electrodes are laid together in a common cable, the response sensitivity of the electrode control might be reduced compared to the normal, and that especially with very long cables.

- **Connection of one control electrode to several electrode relays (see pages 7-1-27 and 7-1-28):**

If a control electrode is connected to the inputs (E1 or E2) of several electrode relays, the response sensitivity of these inputs is reduced depending on their number.

- when connecting to 1 input: response sensitivity 30 kOhm
- when connecting to 2 inputs: response sensitivity 15 kOhm
- when connecting to 3 inputs: response sensitivity 10 kOhm
- when connecting to 4 inputs: response sensitivity 7.5 kOhm



Output contact shown in no-current condition of the relays

Example for the input assignment for high alarm + low alarm + level control (min. - max.)

NR 5 (quiescent current principle): the output relay is not activated (e.g. no water in the tank).

NR 5 A (working current principle): the output relay is energised, when the input is activated (e.g. water in the tank).



# NR 3 and NR 3 A electrode relays

for signalling a limit level  
or for level control

Electrode relay for U-bar mounting, with connection terminals on top of housing and with 2 built-in LEDs for signalling the respective switching status.

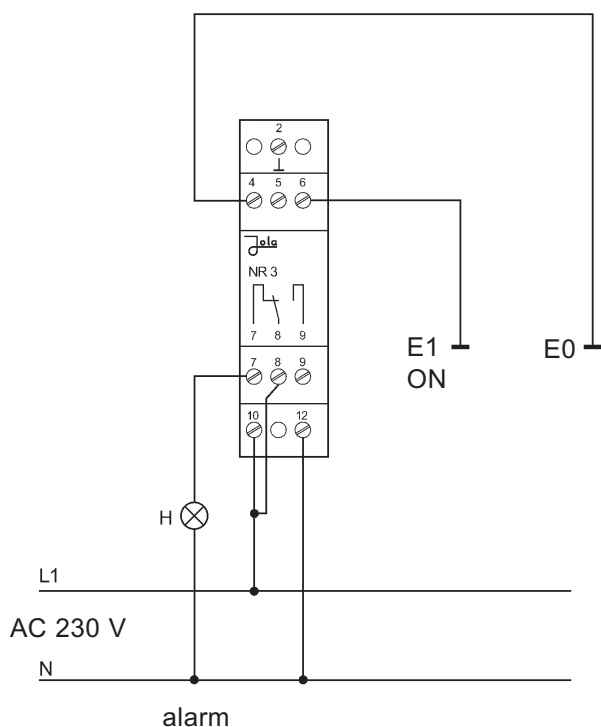
The units are designed for switch cabinet mounting or installation in a suitable protective housing and may therefore only be mounted/installed in these locations. They are suitable for use in clean environments only.



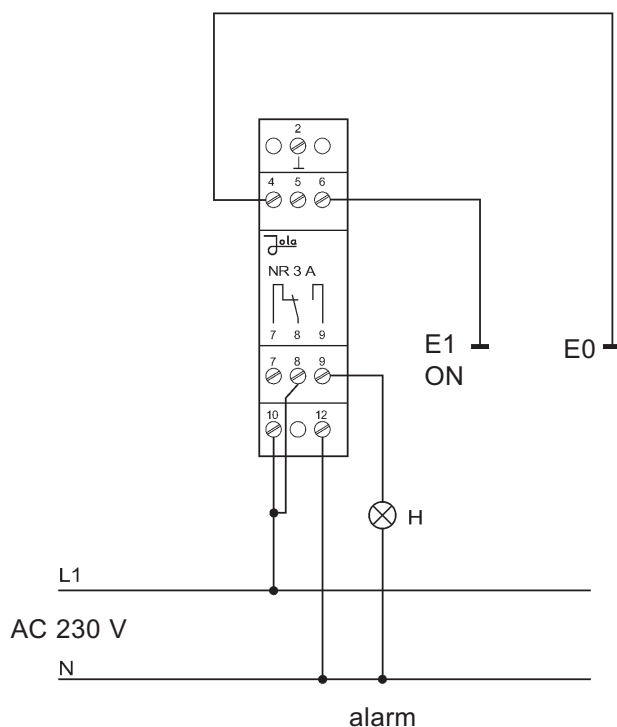
Technical data	NR 3	NR 3 A
Alternative supply voltages (AC versions: terminals 10 and 12; DC versions: - terminal 10: -, - terminal 12: +)	<ul style="list-style-type: none"> <li>- AC 230 V (supplied if no other supply voltage is specified in the order) or</li> <li>- AC 240 V or</li> <li>- AC 115 V or</li> <li>- AC 24 V or</li> <li>- DC 24 V or</li> <li>- DC 12 V or</li> </ul> <p>in these two cases, the unit must only be connected to a low safety voltage which corresponds to the safety regulations relating to the application</p> <ul style="list-style-type: none"> <li>- further supply voltages on request</li> </ul>	
Power input	approx. 3 VA	
Electrode circuit (terminals 4, 5, 6)	3 terminals (under safety extra low voltage SELV), acting on 1 output relay with self-hold	
- no-load voltage	9 V <sub>eff</sub> $\square$ 10 Hz (safety extra low voltage SELV)	
- short-circuit current	max. 0.5 mA <sub>eff</sub>	
- response sensitivity	approx. 30 kOhm or approx. 33 $\mu$ S (electric conductance)	
<b>Controlled circuit (terminals 7, 8, 9)</b>	<b>1 single-pole potential-free changeover contact with self-hold</b>	
<b>Functioning</b>	<b>based on the quiescent current principle</b>	<b>based on the working current principle</b>
Switching status indicators	1 green LED, lights when output relay is energised 1 red LED, lights when output relay is not energised	
Switching voltage	max. AC 250 V	
Switching current	max. AC 4 A	
Switching capacity	max. 500 VA	
Housing	insulating material, 75 x 22.5 x 100 mm	
Connection	terminals on top of housing	
Protection class	IP 20	
Mounting	clip attachment for U-bar to DIN 46277 and EN 50022	
Mounting orientation	any	
Temperature application range	from - 20°C to + 60°C	
<b>Max. cable length between electrode relay and electrode(s)</b>	<b>1,000 metres</b>	
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.	

## Connection diagrams

### NR 3

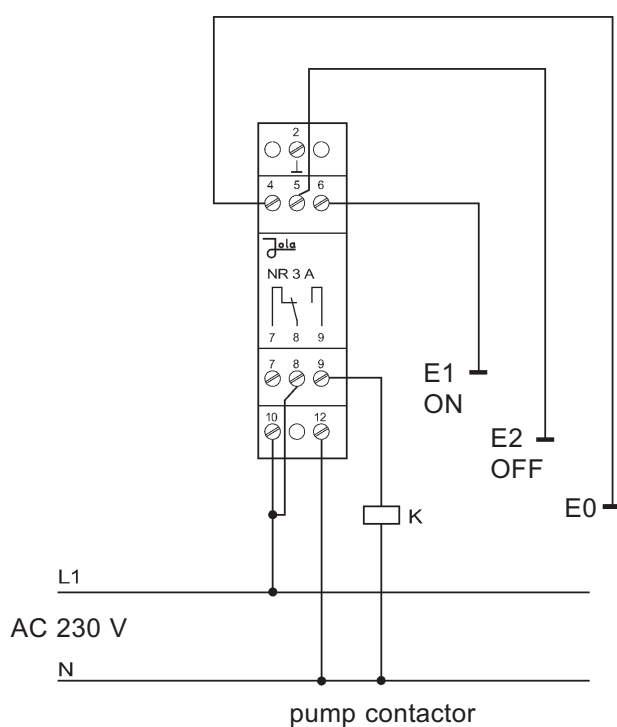
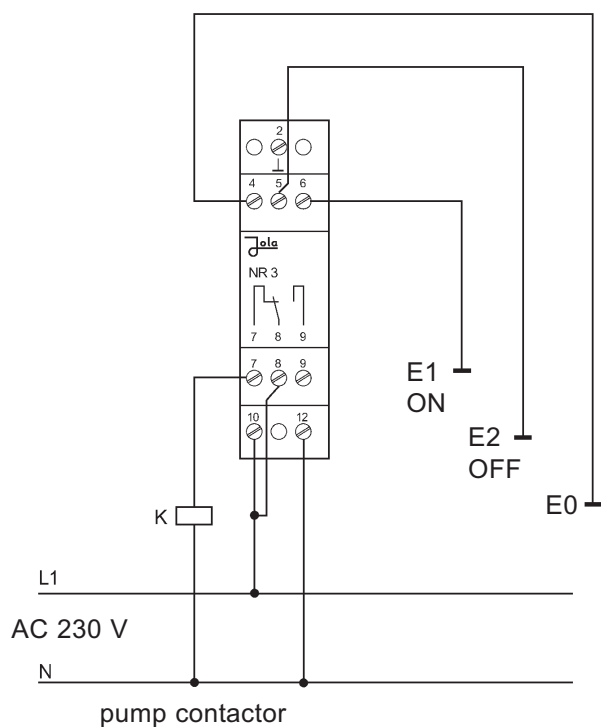


### NR 3 A

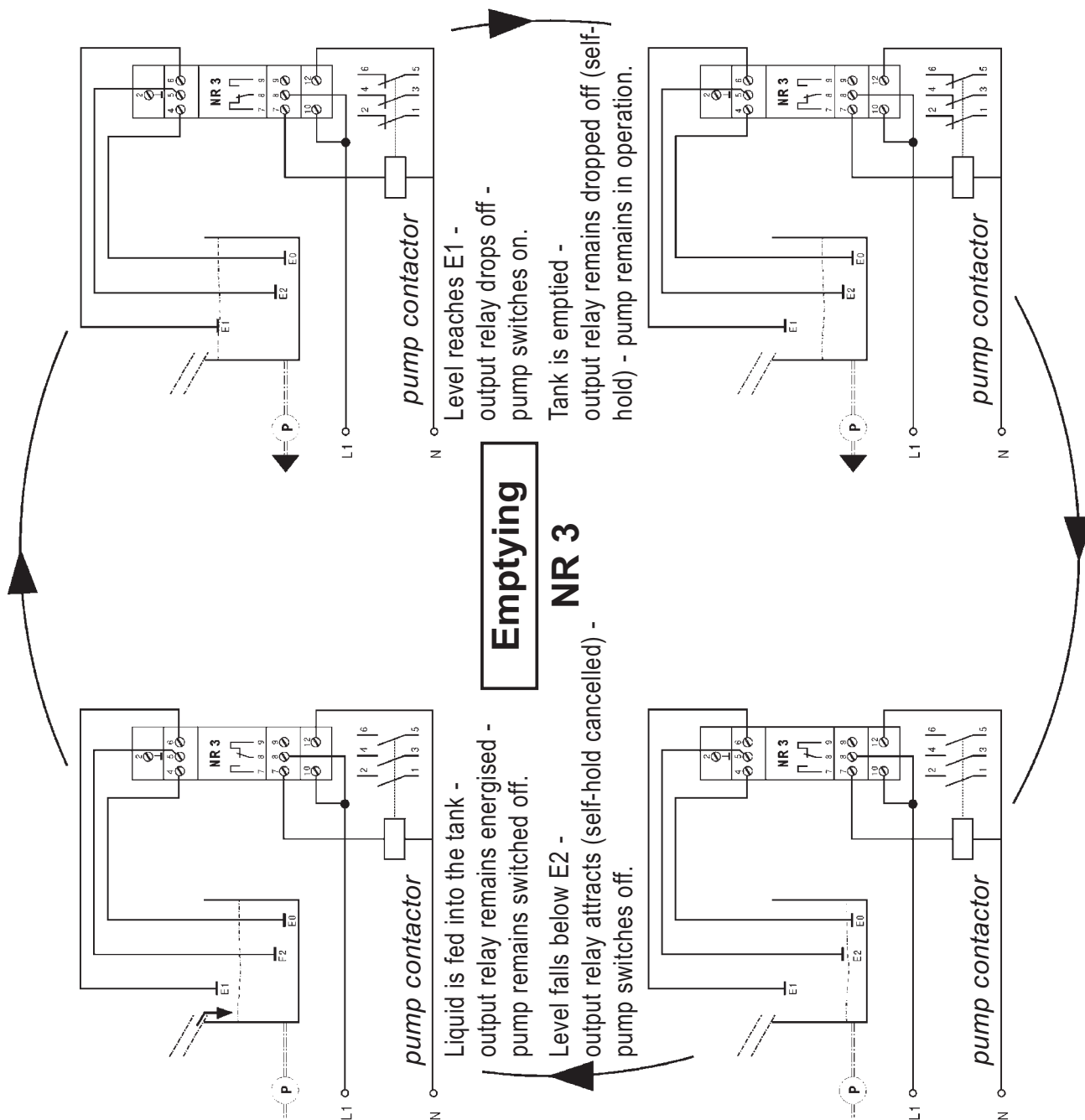


Attention! When several NR 3 or NR 3 A electrode relays are used for automatic level control or signalling in the same tank, the **terminal 2 serves** to connect the earth of each NR 3 or NR 3 A electrode relay.

**The protective ground must never be connected to terminal 2!**



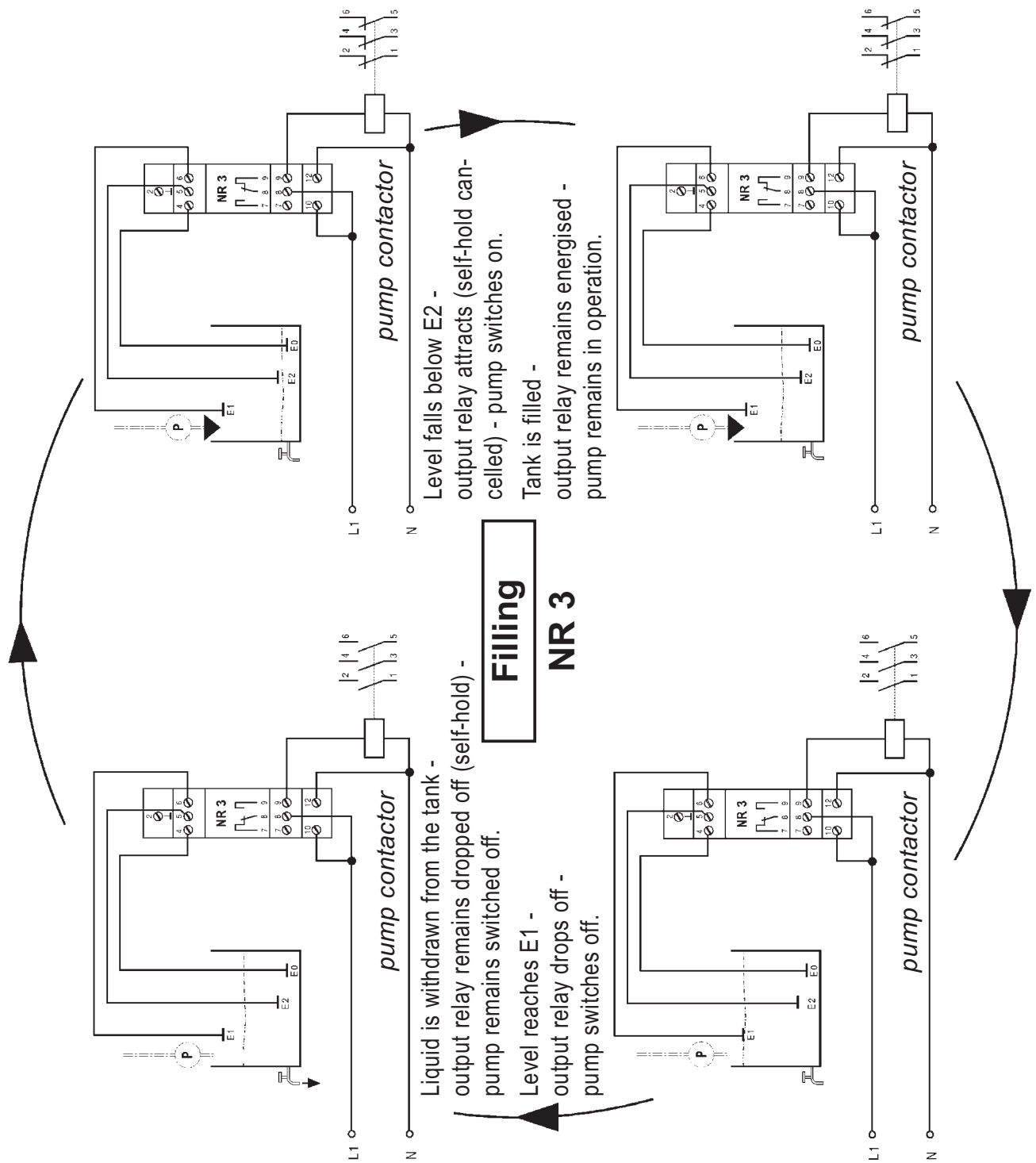
**Output contact shown in no-current condition of the relay**



**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 3 electrode relay is always the same. The function selection “Emptying” or “Filling” is made on the basis of the terminal assignment chosen at the relay output.





**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 3 electrode relay is always the same. The function selection "Emptying" or "Filling" is made on the basis of the terminal assignment chosen at the relay output.

## Instructions and notice for the use of one or several NR 3 or NR 3 A electrode relays

- When using several electrode relays for automatic level control or signalling in the same tank, the earth electrode E0 may only be connected to one electrode relay. The other electrode relays must be connected to each other via their earth terminal (terminal 2). It is important to note that only a maximum of 8 inputs can be used. The protective ground must never be connected to terminal 2!

- **Max. connecting cable length between electrode relay(s) and electrodes:**

**connection of one electrode relay:**

- electrode conductors are laid together in a common cable: 1,000 metres
- each conductor is laid separately: 1,000 metres

**connection of several electrode relays (max. 4):**

- electrode conductors are laid together in a common cable: 1,000 metres
- each conductor is laid separately: 1,000 metres

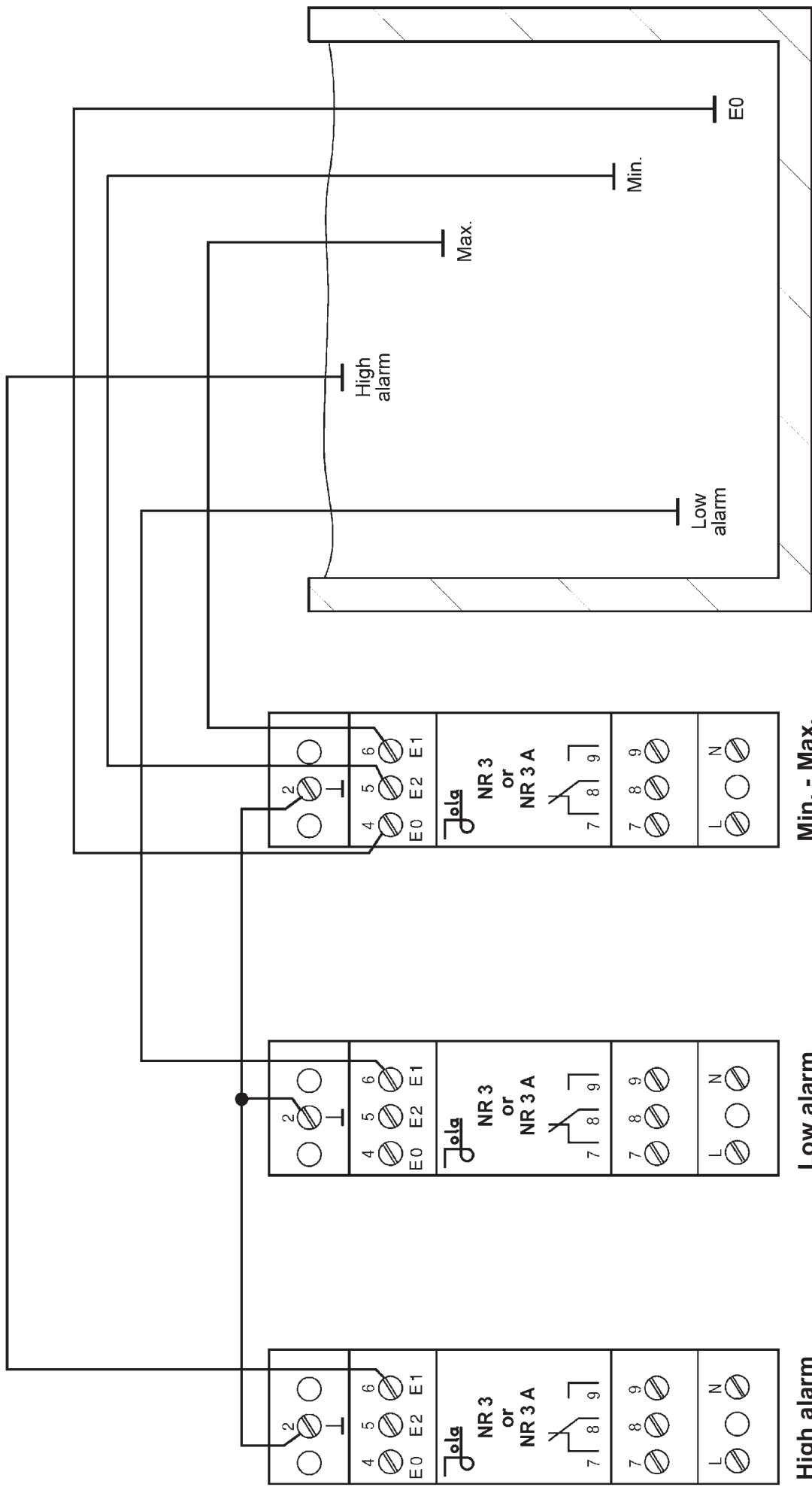
**- Relevant information for a safe functioning:**

If the conductor for the earth electrode E0 is laid separately and the conductors for the other electrodes are laid together in a common cable, the response sensitivity of the electrode control might be reduced compared to the normal, and that especially with very long cables.

- **Connection of one control electrode to several electrode relays (see pages 7-1-27 and 7-1-28):**

If a control electrode is connected to the inputs (E1 or E2) of several electrode relays, the response sensitivity of these inputs is reduced depending on their number.

- when connecting to 1 input: response sensitivity 30 kOhm
- when connecting to 2 inputs: response sensitivity 15 kOhm
- when connecting to 3 inputs: response sensitivity 10 kOhm
- when connecting to 4 inputs: response sensitivity 7.5 kOhm



Output contact shown in no-current condition of the relays

Example for the input assignment for high alarm + low alarm + level control (min. - max.)

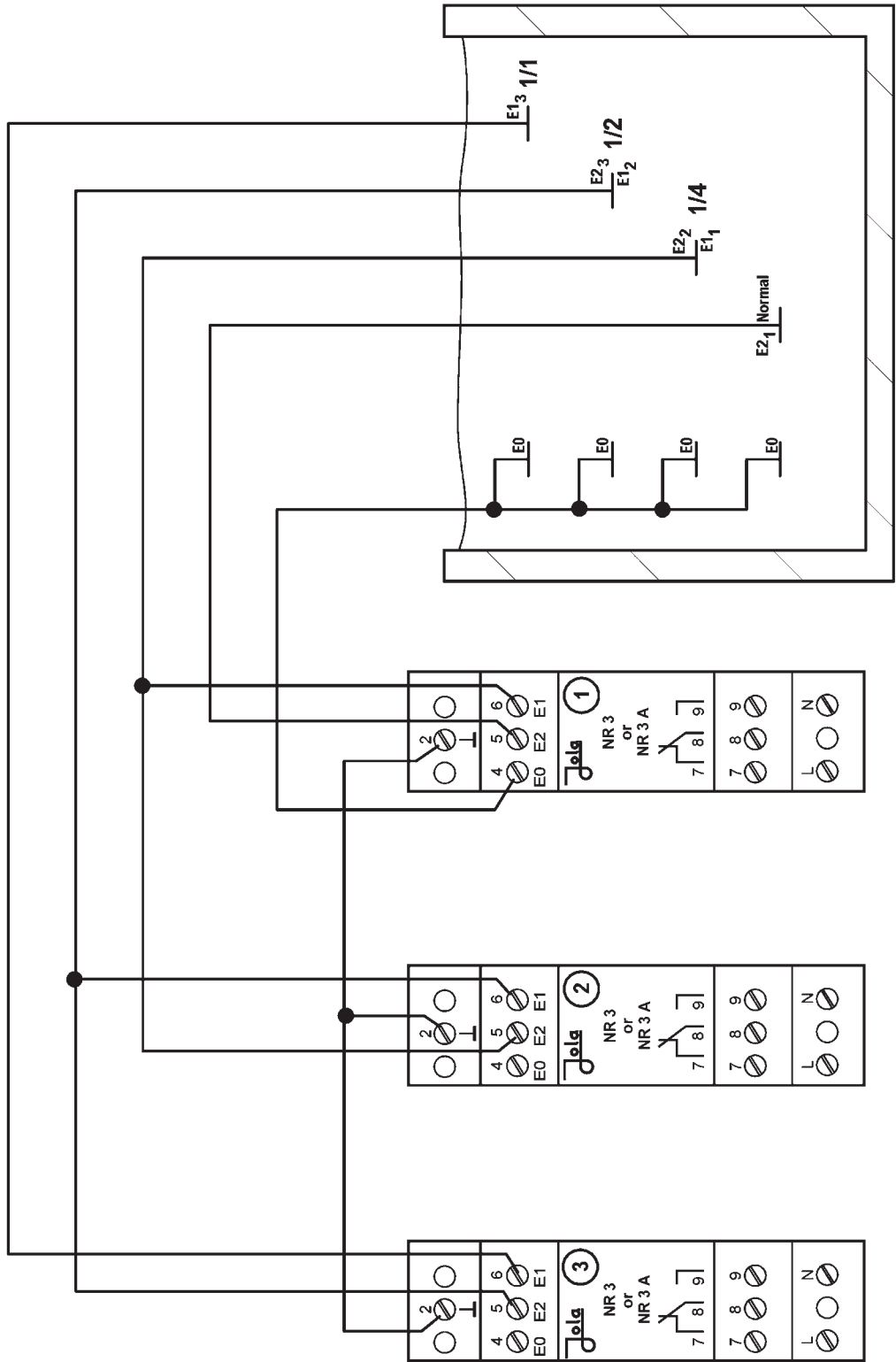
NR 3 (quiescent current principle): the output relay is not activated (e.g. no water in the tank).

NR 3 A (working current principle): the output relay is energised, when the input is activated (e.g. water in the tank).

• **Connection of one control electrode to several electrode relays:**

If a control electrode is connected to the inputs (E1 or E2) of several electrode relays, the response sensitivity of these inputs is reduced depending on their number.

- when connecting to 1 input: response sensitivity 30 kOhm
- when connecting to 2 inputs: response sensitivity 15 kOhm
- when connecting to 3 inputs: response sensitivity 10 kOhm
- when connecting to 4 inputs: response sensitivity 7.5 kOhm



**Output contact shown in no-current condition of the relays**

**Multiple using of control electrodes inputs:**

If a control electrode is connected to the inputs (E1 or E2) of several electrode relays, the response sensitivity of these inputs is reduced. The control electrodes for 1/4 and 1/2 act simultaneously on inputs (E1 or E2) of 2 electrode relays. So the response sensitivity of these inputs is reduced to 15 kOhm.

**NR 3 (quiescent current principle): the output relay is energised, when the input is not activated (e.g. no water in the tank).**

**NR 3 A (working current principle): the output relay is energised, when the input is activated (e.g. water in the tank).**



# NR 5/G electrode relay

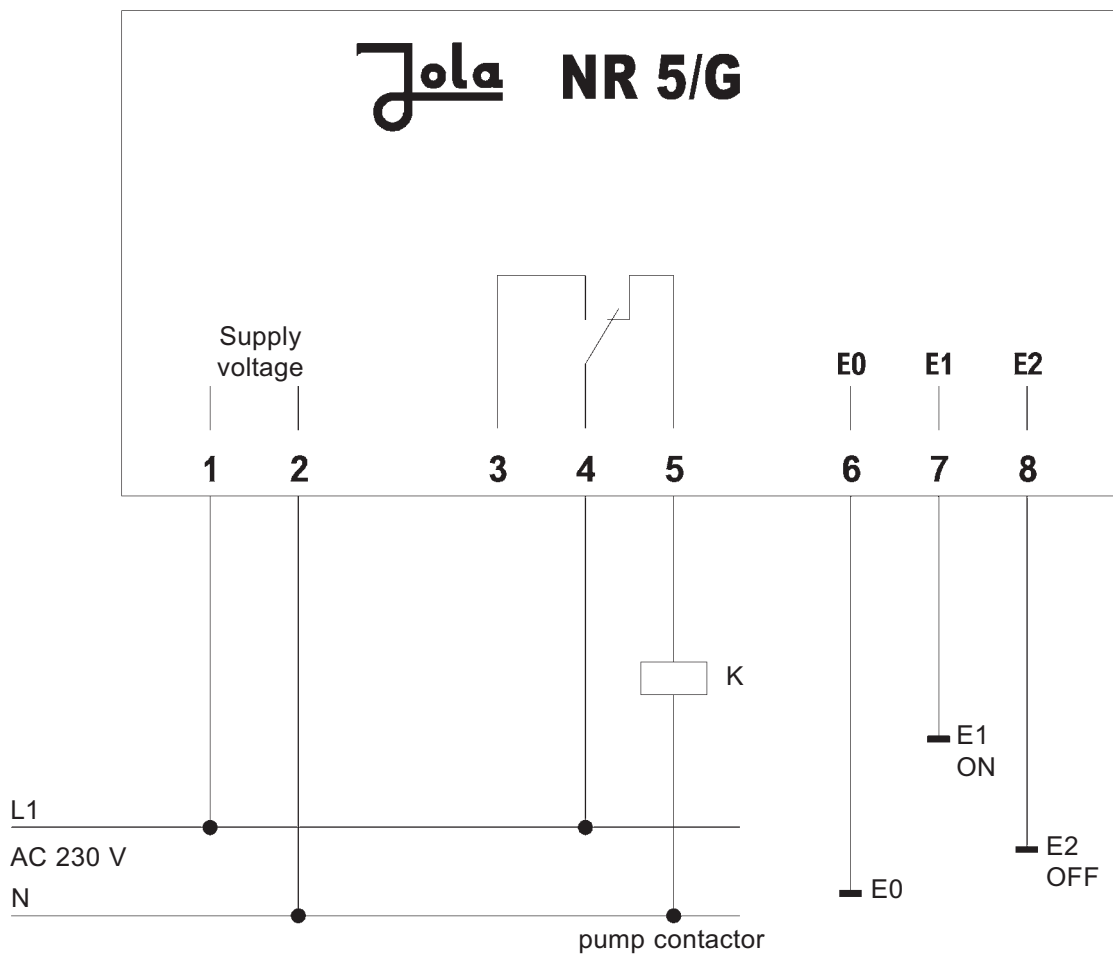
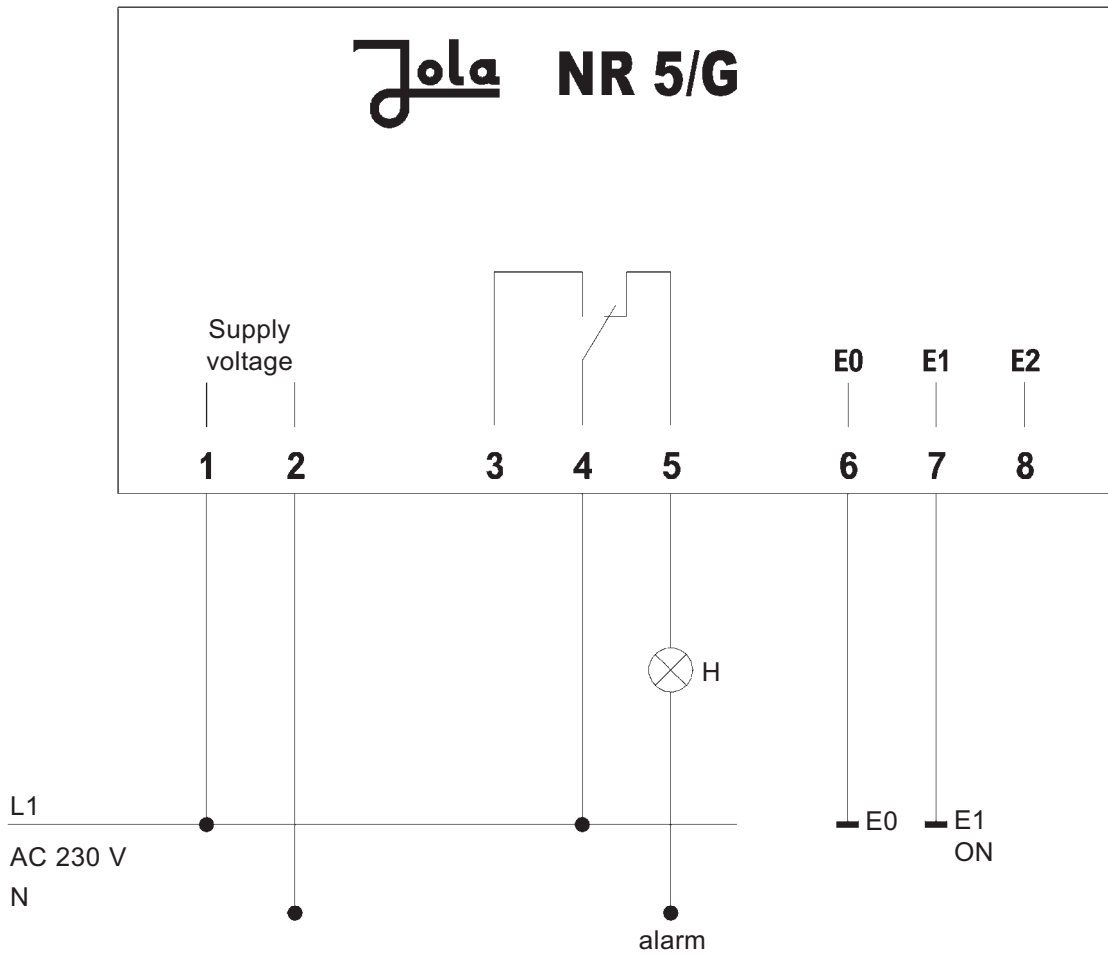
for signalling a limit level or  
for level control

Electrode relay in surface-mount housing,  
with transparent cover and with 2 built-in  
LEDs (inside the housing) for signalling the  
respective switching status

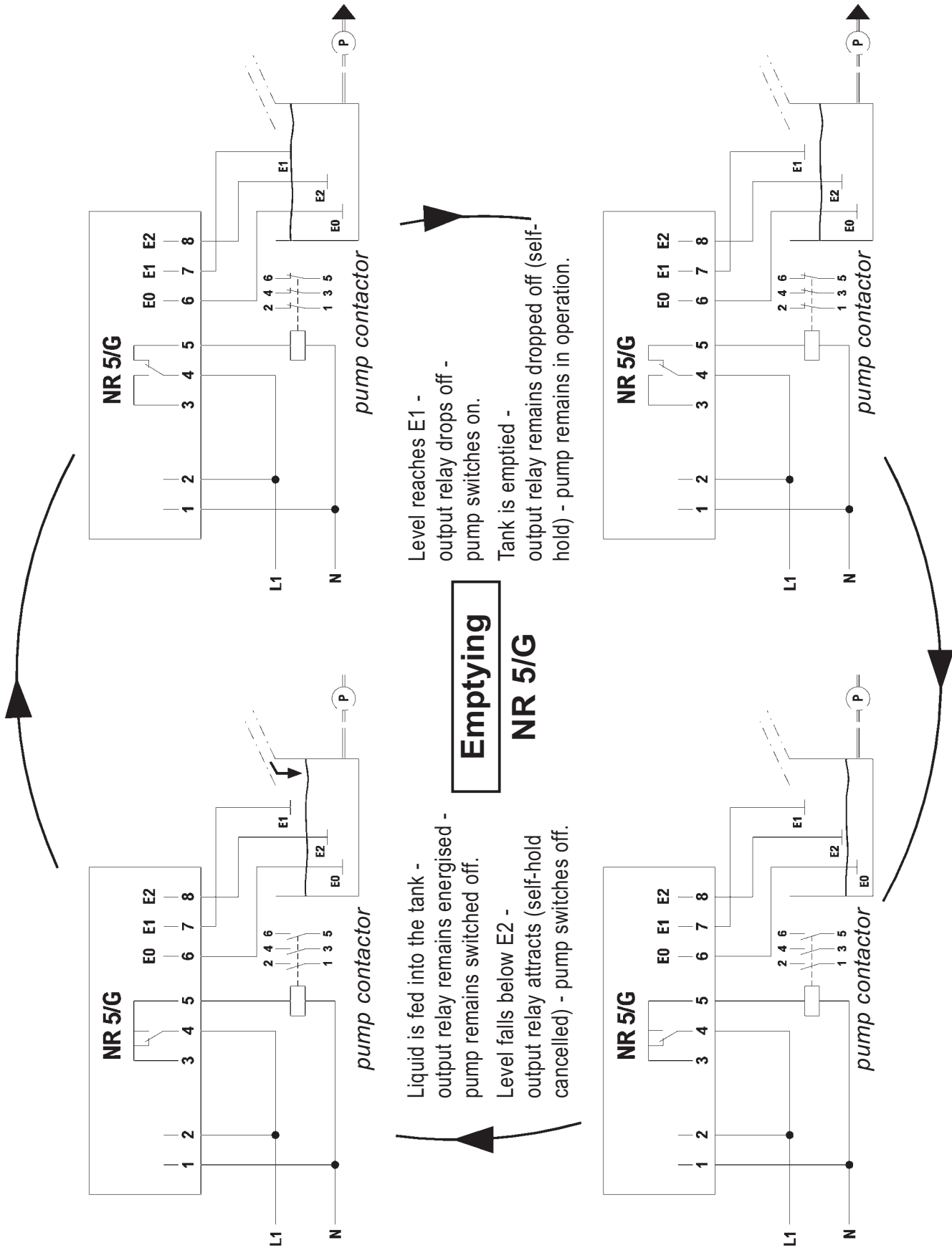


Technical data	NR 5/G
Alternative supply voltages: (AC versions: terminals 1 and 2; DC versions: - terminal 1: -, - terminal 2: +)	<ul style="list-style-type: none"> <li>- AC 230 V (supplied if no other supply voltage is specified in the order) or</li> <li>- AC 240 V or</li> <li>- AC 115 V or</li> <li>- AC 24 V or</li> <li>- DC 24 V or</li> <li>- DC 12 V or</li> </ul> <p>in these two cases, the unit must only be connected to a low safety voltage which corresponds to the safety regulations relating to the application</p> <p>- further supply voltages on request</p>
Power input Electrode circuit (terminals 6, 7, 8)  - no-load voltage - short-circuit current - response sensitivity	<p>approx. 3 VA</p> <p>3 terminals (with safety extra low voltage SELV), acting on 1 output relay with self-hold</p> <p>9 V<sub>eff</sub> <math>\square</math> 10 Hz (safety extra low voltage SELV) max. 0.5 mA<sub>eff</sub> approx. 30 kOhm or approx. 33 <math>\mu</math>S (electric conductance)</p>
<b>Controlled circuit (terminals 3, 4, 5)</b>	<p><b>1 single-pole potential-free changeover contact with self-hold</b></p>
<b>Functioning</b>	<p><b>based on the quiescent current principle</b></p>
Switching status indicators	<p>1 green LED, lights when output relay is energised 1 red LED, lights when output relay is not energised</p>
Switching voltage	max. AC 250 V
Switching current	max. AC 4 A
Switching capacity	max. 500 VA
Housing	insulating material, with 3 screw connections
Connection	internal terminals
Protection class	IP 54
Mounting	using 4 screws
Mounting orientation	any
Temperature application range	from - 20°C to + 60°C
<b>Max. cable length between electrode relay and electrode(s)</b>	<p><b>1,000 metres</b></p>
EMC	<p>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.</p>

Connection diagrams



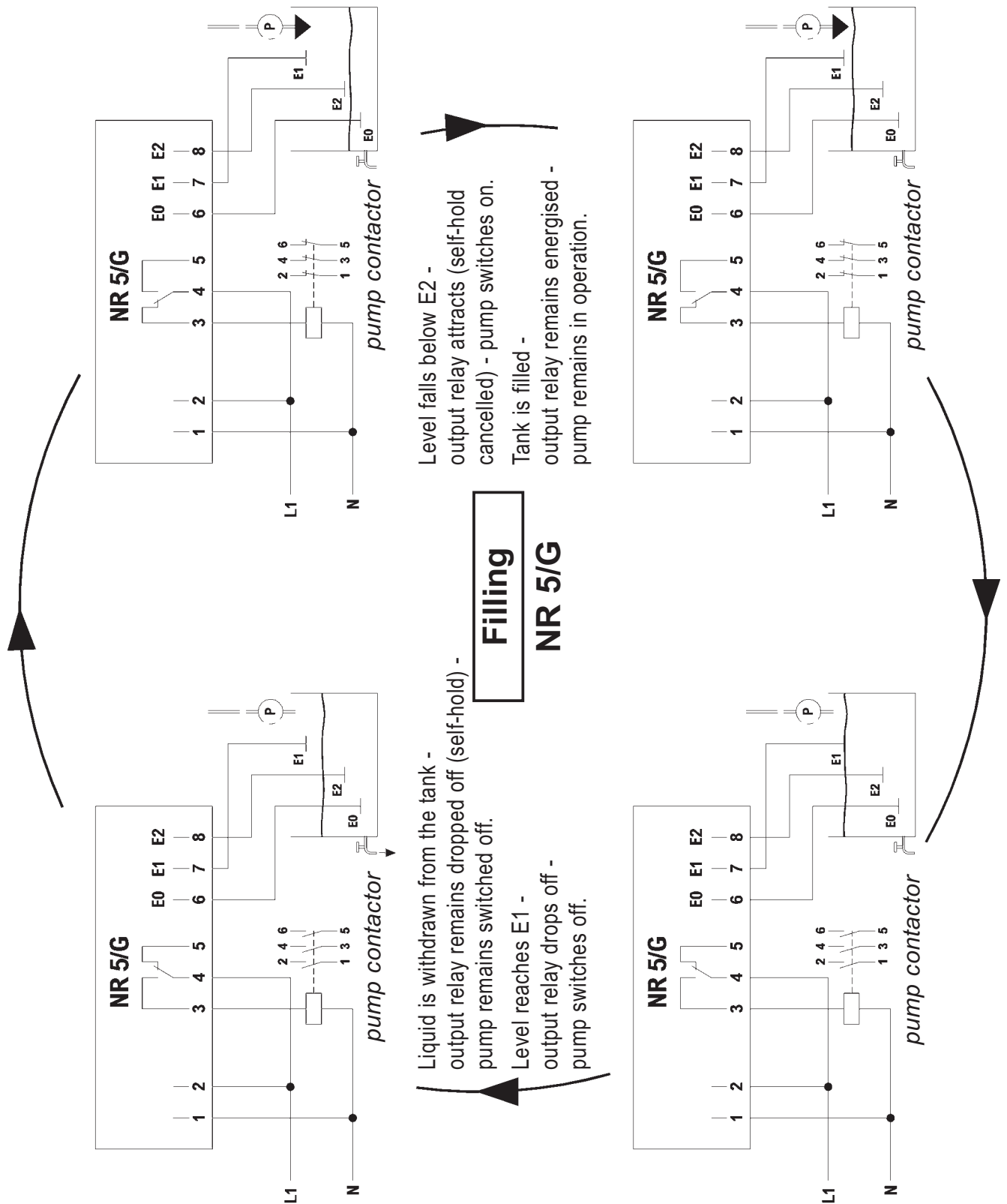
Output contact shown in no-current condition of the relay



**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 5/G electrode relay is always the same. The function selection “Emptying” or “Filling” is made on the basis of the terminal assignment chosen at the relay output.





**N.B.**

The connection of electrodes E0, E1 and E2 to the NR 5/G electrode relay is always the same. The function selection "Emptying" or "Filling" is made on the basis of the terminal assignment chosen at the relay output.



# ES 5/G electrode relay

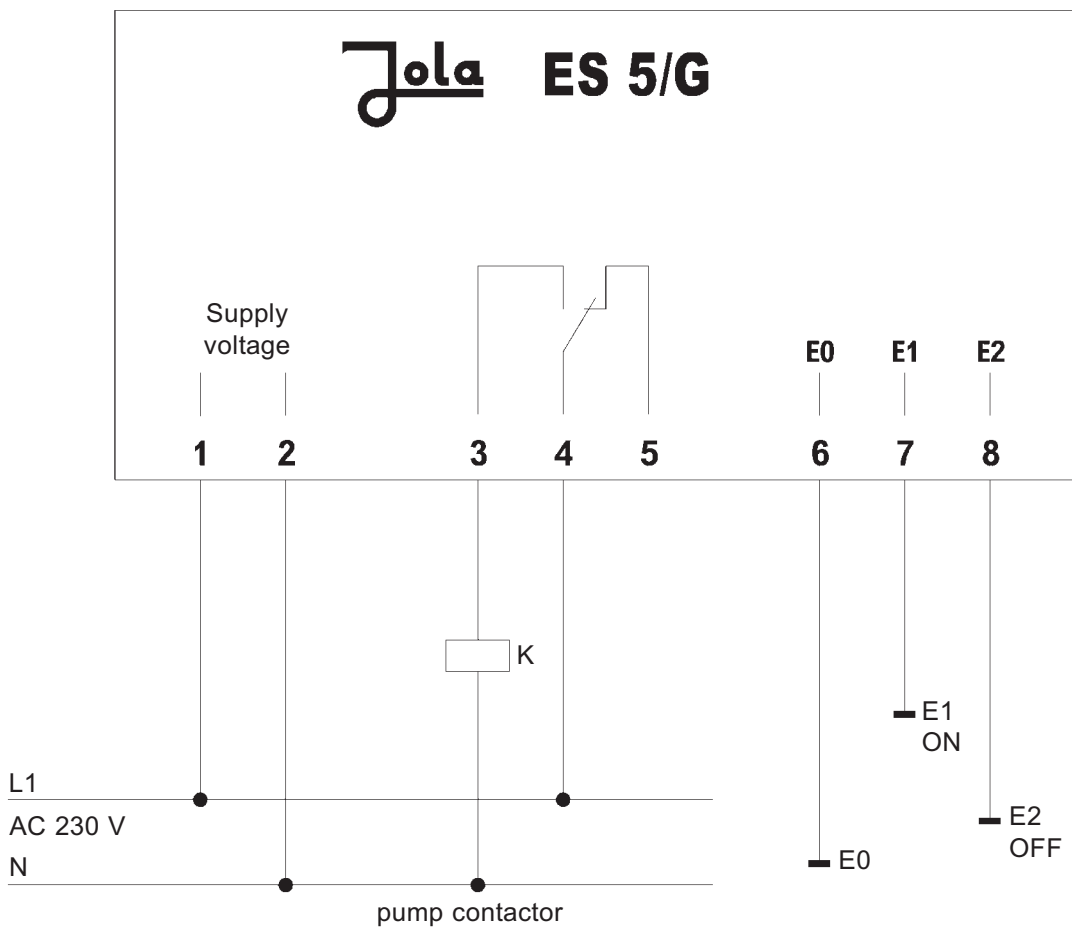
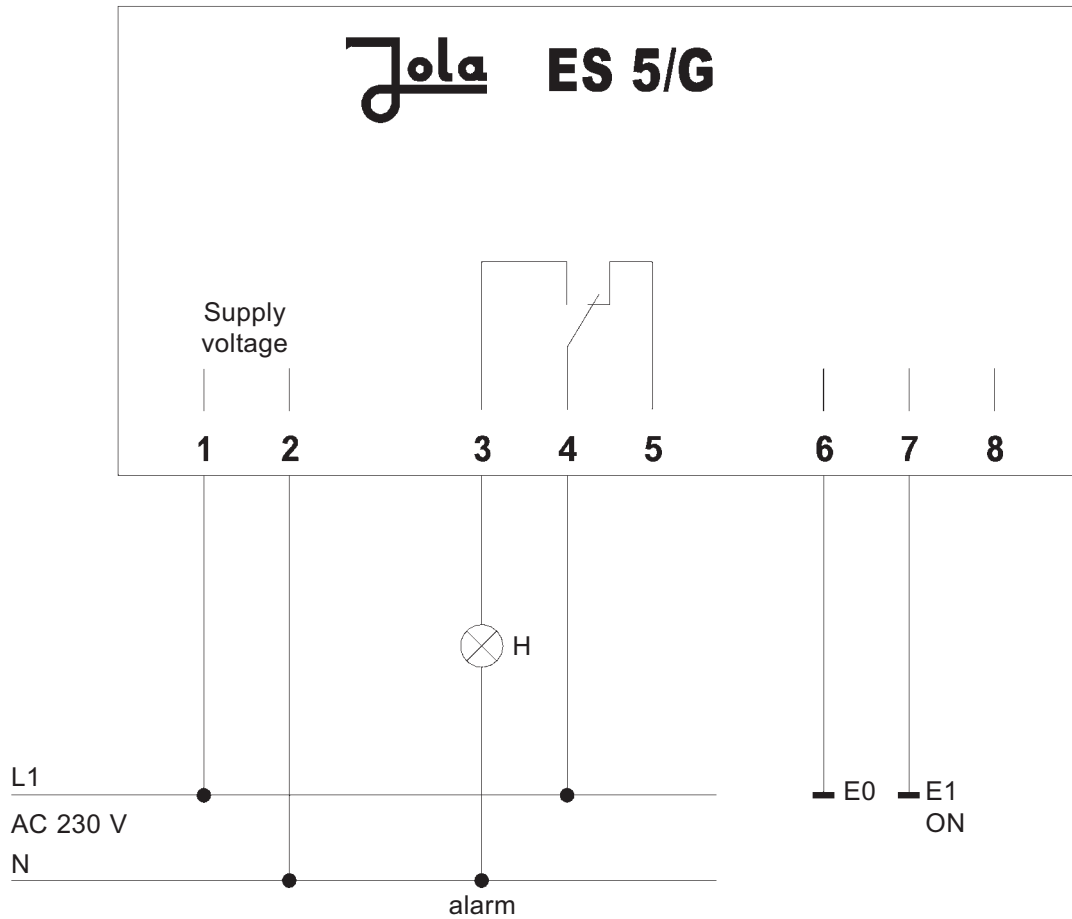
for signalling a limit level or  
for level control

Electrode relay in surface-mount housing, with transparent cover, mains monitoring indicator and switching status indicator inside the housing

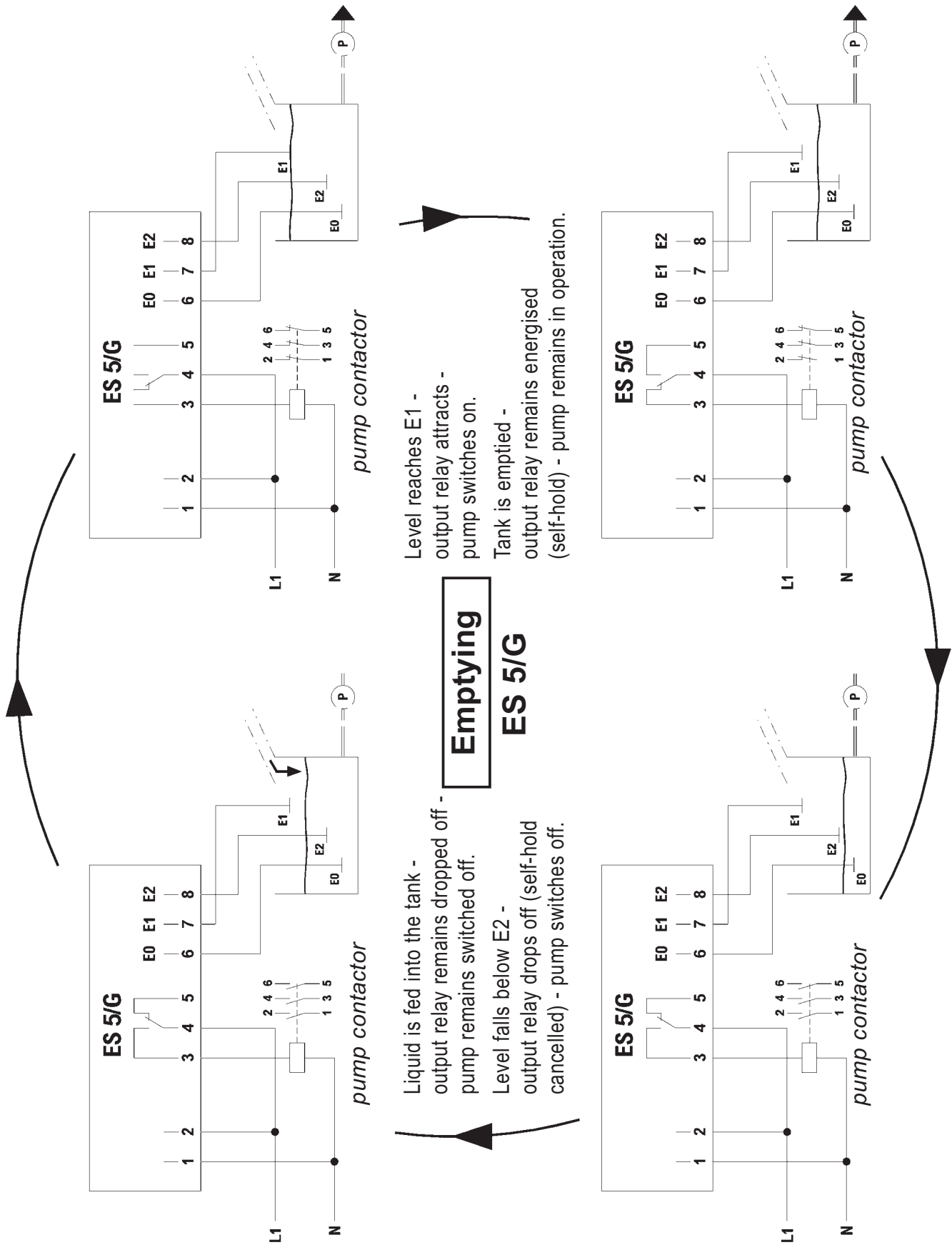


Technical data	ES 5/G
Alternative supply voltages (terminals 1 and 2)	<ul style="list-style-type: none"> <li>- AC 230 V (supplied if no other supply voltage is specified in the order)</li> <li>- AC 240 V or</li> <li>- AC 115 V or</li> <li>- AC 24 V or</li> <li>- further AC supply voltages on request</li> </ul>
Mains monitoring indicator	1 green LED
Power input	approx. 3 VA
Electrode circuit (terminals 6, 7, 8)	3 terminals (with safety extra low voltage SELV), acting on 1 output relay with self-hold
<ul style="list-style-type: none"> <li>- no-load voltage</li> <li>- short-circuit current</li> <li>- response sensitivity</li> </ul>	approx. AC 22 V (safety extra low voltage SELV) approx. 2 mA approx. 30 kOhm or approx. 33 μS (electric conductance)
<b>Controlled circuit (terminals 3, 4, 5)</b>	<b>1 single-pole potential-free changeover contact with self-hold</b>
<b>Functioning</b>	<b>based on the working current principle</b>
Switching status indicator	1 red LED, lights when output relay is energised
Switching voltage	max. AC 250 V
Switching current	max. AC 4 A
Switching capacity	max. 500 VA
Housing	insulating material, with 3 screw connections
Connection	internal terminals
Protection class	IP 54
Mounting	using 4 screws
Mounting orientation	any
Temperature application range	from - 20°C to + 60°C
<b>Max. cable length between electrode relay and electrode(s)</b>	<b>100 metres</b>
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.

## Connection diagrams

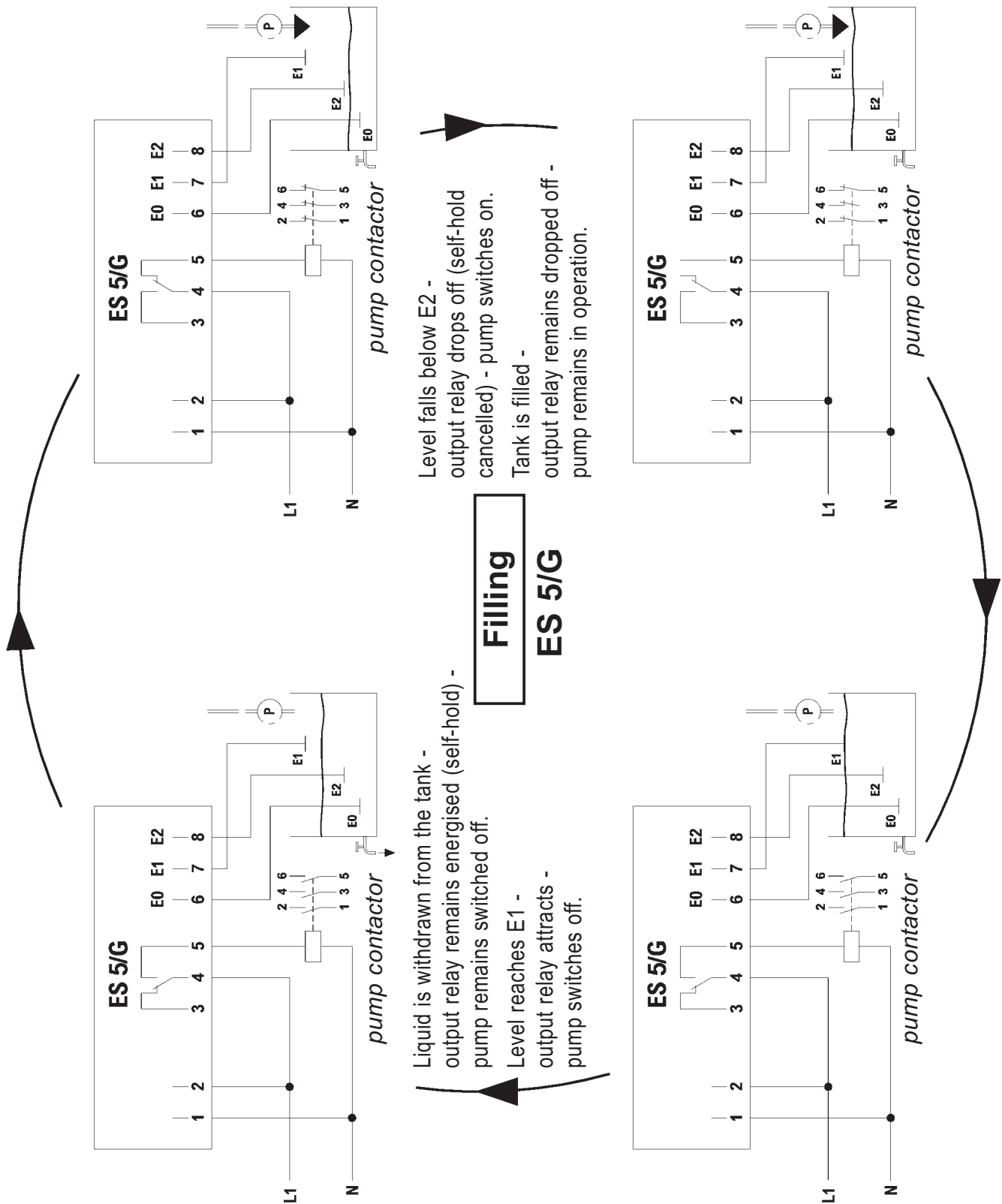


Output contact shown in no-current condition of the relay



**N.B.**

The connection of electrodes E0, E1 and E2 to the ES 5/G electrode relay is always the same. The function selection "Emptying" or "Filling" is made on the basis of the terminal assignment chosen at the relay output.



**N.B.**

The connection of electrodes E0, E1 and E2 to the ES 5/G electrode relay is always the same. The function selection “Emptying” or “Filling” is made on the basis of the terminal assignment chosen at the relay output.

# Jola ER 53 electrode relay

## for signalling 3 limit levels

Electrode relay for U-bar mounting or surface mounting, with connection terminals on top of housing, with mains monitoring indicator and with 3 built-in LEDs for signalling the activation of the 3 inputs.

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.



### Technical data

### ER 53

Alternative supply voltages:

(AC versions:

terminals 15 and 16;

DC versions:

- terminal 15: -,

- terminal 16: +)

- AC 230 V (supplied 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

- DC 12 V or

} in these two cases, the unit must only be connected to a low safety voltage which corresponds to the safety regulations relating to the application

- further supply voltages on request

Mains monitoring indicator

Power input

Electrode circuit

(terminals 1, 5, 6, 7)

1 yellow LED

approx. 3 VA

- no-load voltage

- short-circuit current

- response sensitivity

**Controlled circuit**

(terminals 9, 10, 11, 12)

4 terminals (with safety extra low voltage SELV),

acting on 3 output relays without self-hold

9 V<sub>eff</sub>  $\square$  10 Hz (safety extra low voltage SELV)

max. 0.5 mA<sub>eff</sub>

approx. 30 kOhm or approx. 33  $\mu$ S (electric conductance)

**2 make (NO) contacts (terminals 10 and 11) and**

**1 break (NC) contact (terminal 9) with common root contact (terminal 12)**

**based on the working current principle**

**Functioning**

Switching status indicators

3 green LEDs light correspondingly to the activation of the electrode inputs E1, E2 and E3 (each time when a conductive path is created between the rod of the earth electrode E0 and the non-insulated electrode rod sensor surface of a control electrode)

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

IP 20

Mounting

clip attachment for U-bar to DIN 46277 and EN 50022

Mounting orientation

any

Temperature application range

from - 20°C to + 60°C

**Max. cable length between**

**electrode relay and**

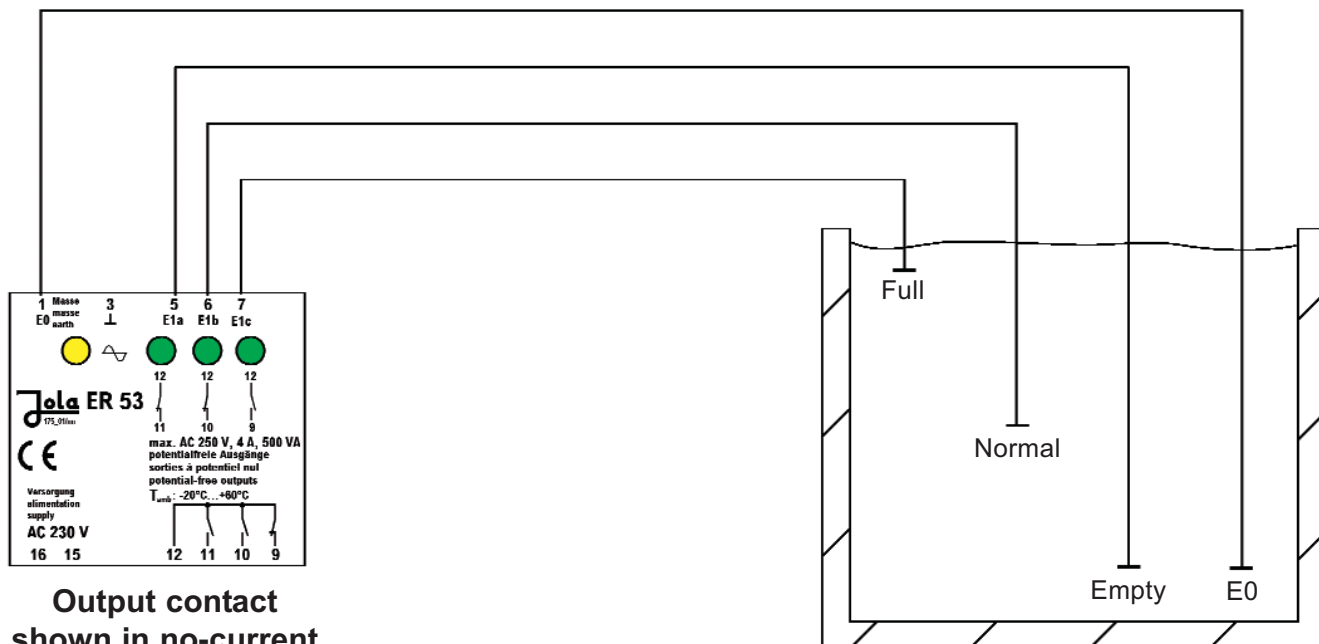
**electrode(s)**

**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.

## Application example: ER 53 with a 4-rod electrode for signalling 3 limit levels



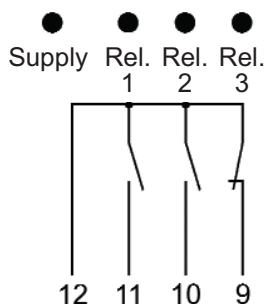
**Output contact shown in no-current condition of the relay**

### Relevant information:

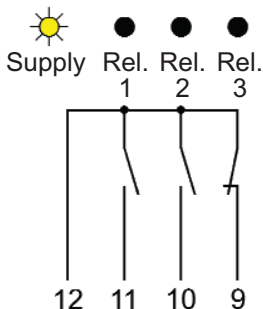
When several electrode relays are used for automatic level control or signalling in the same tank, the earth electrode E0 may only be connected to one electrode relay. The other electrode relays are to be connected to each other via their earth terminal (terminal 3 for NR 5 and ER 53 or terminal 2 for NR 3) as shown on pages 7-1-19/20 and 7-1-25/26. It is important to note that only a maximum of 8 inputs can be used.

**The protective ground must never be connected to terminal 2 or 3!**

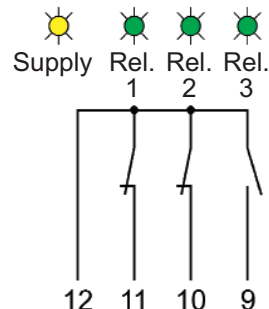
### Position of output contacts of the ER 53 electrode relay



**LEDs dark:**  
electrode relay without voltage



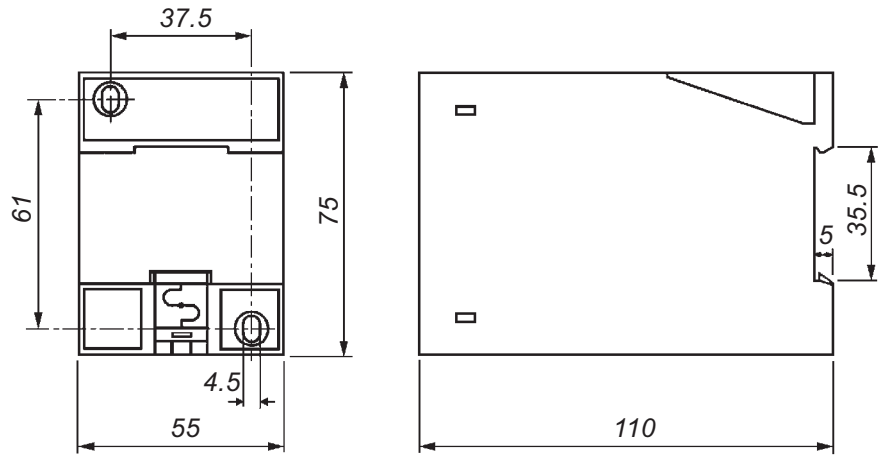
**yellow LED lights, green LEDs dark:**  
electrode relay under voltage, electrodes dry (tank empty)



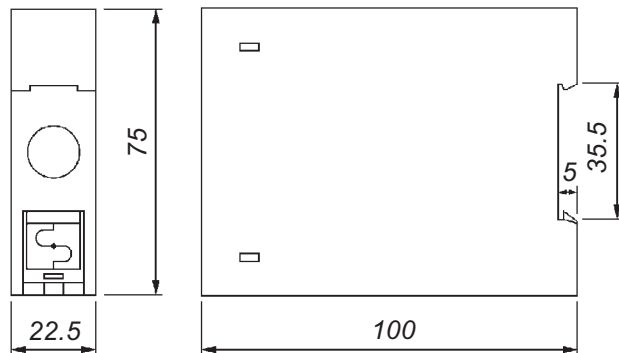
**yellow LED lights, green LEDs light:**  
electrode relay under voltage, electrodes wet (tank full)

## Dimensional drawings

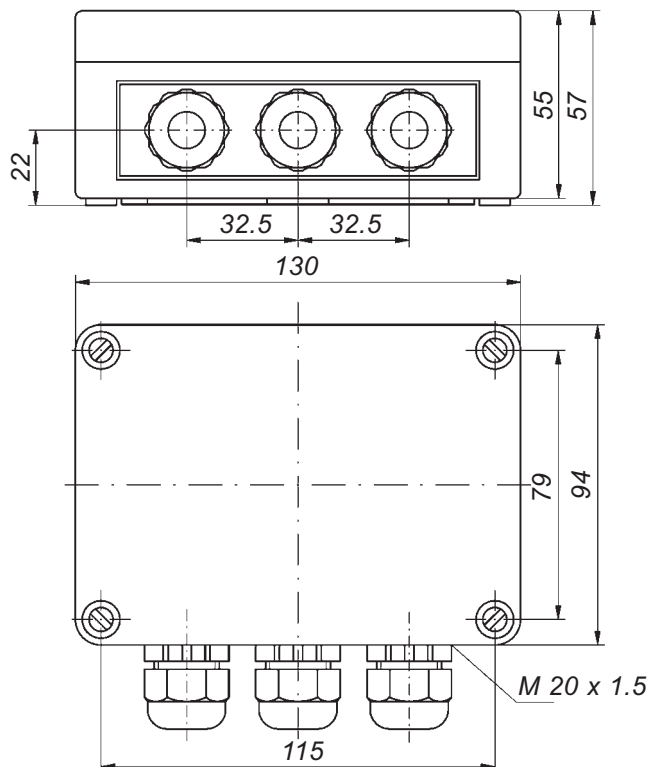
NR 5, NR 5 A, ER 53



NR 3, NR 3 A



NR 5/G, ES 5/G







## “Pumpswitch” floor electrode with integrated evaluation electronics and relay output



The Jola “Pumpswitch” device is a conductive floor electrode with integrated evaluation electronics and a delayed switch-off power relay for the direct switching of a flat suction pump.

- Pump switches on from a water level of 3 mm
- If the water level falls below 3 mm, the pump switches off again after a preset shutoff delay
- Connection via three-wire cable:
  - brown: power supply L1
  - black: switching wire for the pump
  - blue: joint reference conductor N
- Reliable galvanic separation of the contactable electrodes:
  - due to creepage and air distances  $\geq 8$  mm
  - due to safety transformer and safety relay with a voltage resistance  $\geq 4$  kV



# “Pumpswitch” floor electrode with integrated evaluation electronics and relay output



“Pumpswitch” with mounting stand



View from below  
(looking at the electrode plates)

## Mode of operation

The “Pumpswitch” floor electrode is equipped with two integral single electrodes in the form of two electrode plates: 1 control electrode and 1 earth electrode.

In the electrode housing, there is an evaluation electronics device with output relay with a switching contact which is looped into the pump circuit. As soon as an electrically conductive liquid creates a conductive connection between the two electrode plates, the built-in output relay in the electrode housing is switched on. The output relay operates on the working current principle: in other words, the relay is energised when the electrodes are wet. Once the electrodes are free again after the liquid has been pumped off, the output relay switches off again after a preset time delay.

The electrode circuit is reliably galvanically separated from the supply voltage and the pump circuit.

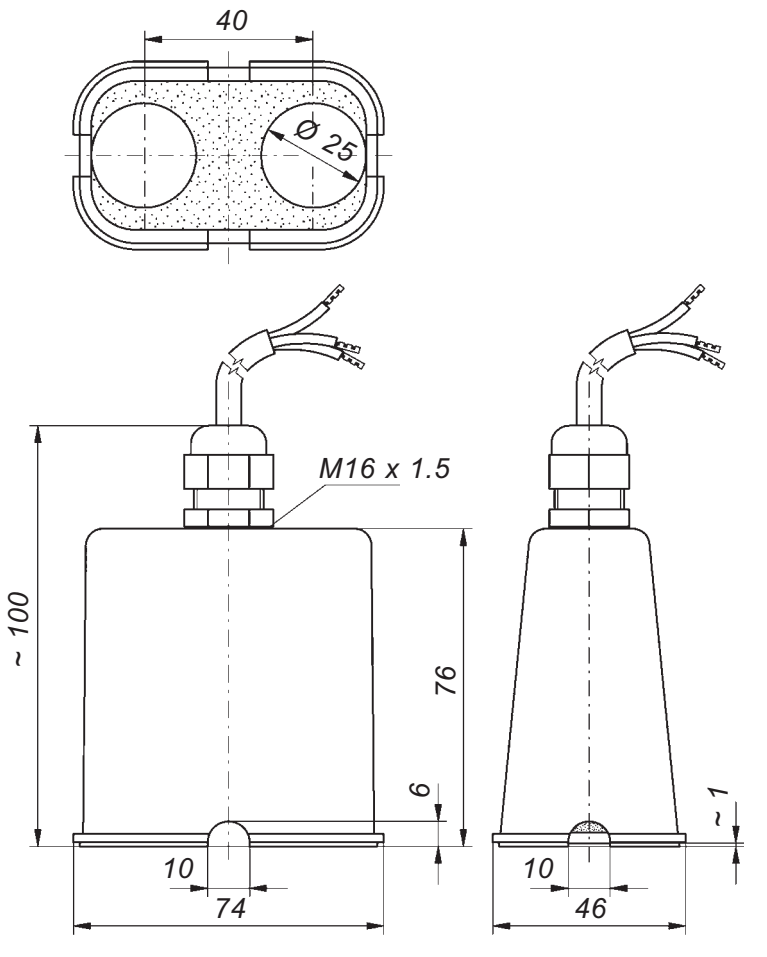
## Important notes to ensure safe use

You have to ensure that the rated output of the pump to be switched does not exceed the switching capacity of the integrated output relay.

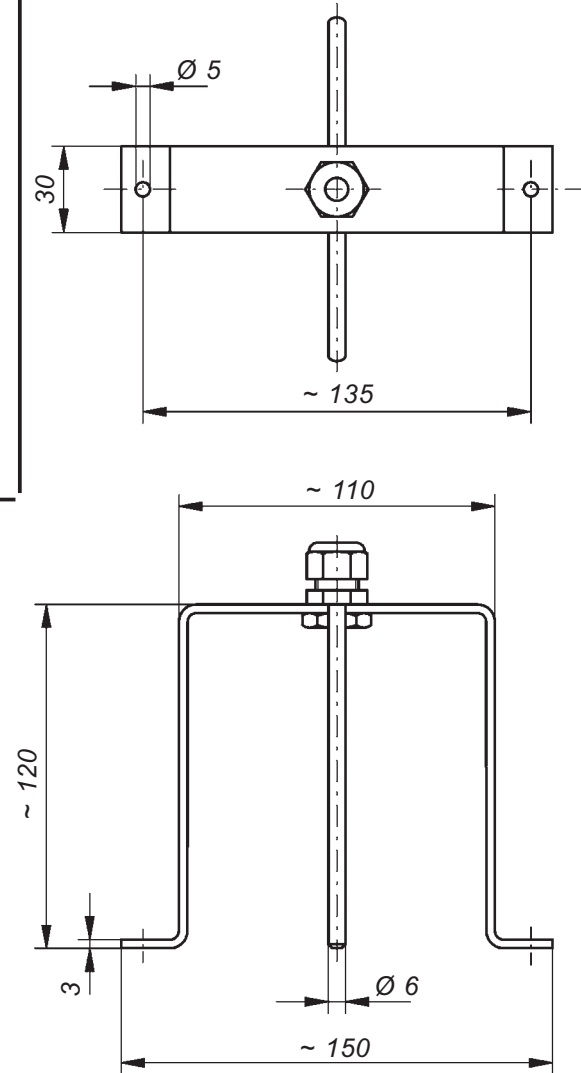
In order to ensure that the unit works as desired, the floor electrode may only be used in cases in which the electrode plates are free again once the liquid has been pumped off. Electrically conductive residues caused by such things as sludge can result in permanent activation of the floor electrode.

The floor electrode may not be used in aggressive liquids that attack the electrode plates, the electrode housing or the connecting cable.

Technical data	“Pumpswitch”
<b>Area of application</b>	for the direct switching of a flat suction pump if a water level rises above a preset low level
Electrode plates	2 electrode plates made of stainless steel 316 Ti
Response height	3 mm
Housing	PP and cast resin
Weight of electrode	approx. 300 g
Electrical connection	H05RN-F cable, 3 x 0.75; length 2 m, other length on request
Supply voltage (to brown and blue)	AC 230 V; other supply voltage on request
Power requirements of integrated electronics	approx. 3 VA
Electrode circuit:	
Electrode voltage	approx. 10 V <sub>eff</sub> 50 Hz
Electrode current	max. 0.5 mA <sub>eff</sub>
Response sensitivity	approx. 30 kΩ or approx. 33 μS (conductance)
Galvanic separation	air and creepage distances ≥ 8 mm; voltage resistance ≥ 4 kV
Pump circuit (to black and blue):	
Performance data of the looped relay contact	max. 4 (2) A, max. 500 VA; other values on request
Shutoff delay	to be defined when ordering: between 5 seconds and 90 seconds
Temperature application range	from - 20°C to + 60°C, higher temperature on request
Mounting accessory	mounting stand made of stainless steel 316 Ti (optional)
Protection class	IP 68
Operating position	upright on the floor or suspended in a mounting stand
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.



**Option:  
mounting stand made of  
stainless steel 316 Ti  
(diagrams with smaller  
scale compared to  
adjacent drawings)**



**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.**