

Technical Description

Leak detector Type T-200.L.

Measuring transducer

Type KR-163... ; KR-168...; KR-268...; KR-163/A/Ex...; ET-52.; ET-580; ET-R...;
OAA-100-A1...; OAA-100-A3...; OAA-300...; OAA-500...

1. Design of the leak protector

The leak protector consists of the level switch (1), which works according to the float principle, and a separate measuring transducer (2) (KR-163..., KR-163Aex, KR-268..., XR- ...; OAA-100...) or a level switch (1) with integrated measuring transducer (2) (ET-520...; ET-521; ET-522; or ET-580) or a level switch LR (1,2) (float – magnetic switch) which provide a binary switch signal at the output.

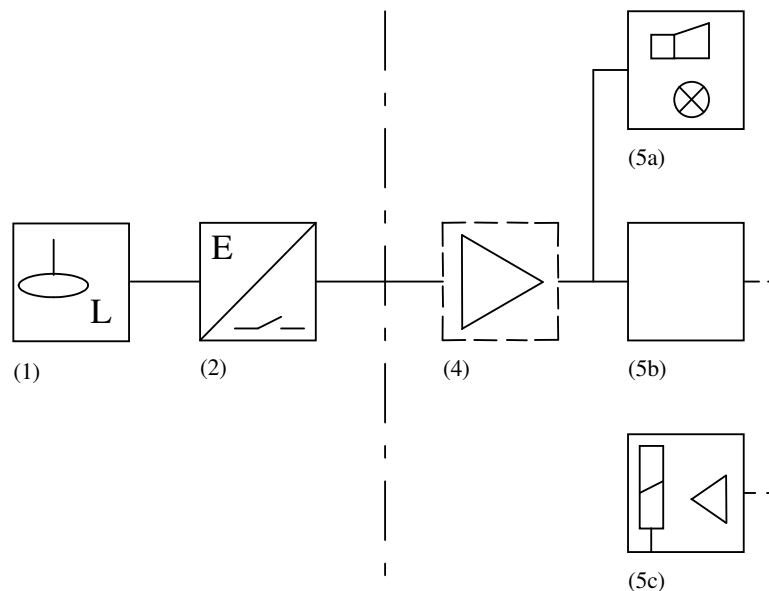
This binary signal can be delivered directly or indirectly via a signal amplifier (4), to the alarm device (5a) or the control device (5b) with its control element (5c).

In the case of overfull cut-out devices which consist of the level switch (1) with downstream alarm signal (OAA-200...; OAA-300... resp. OAA-500...) the measuring transducer (2) and alarm device (5a) are also integrated.

The untested system parts of the overfull cut-out device, such as signal amplifier (4), the alarm device (5a) or the control device (5b) with the control element (5c) must conform with the requirements of Sections 3 and 4 of the approval principles (German ZG-ÜS) for overfull cut-out devices.

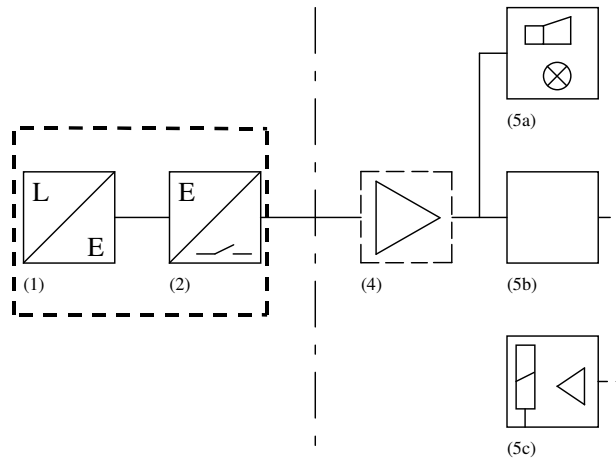
1.1 Schematic design of the leak protector

1.1.1 Leak protector (1), separate measuring transducer (2)



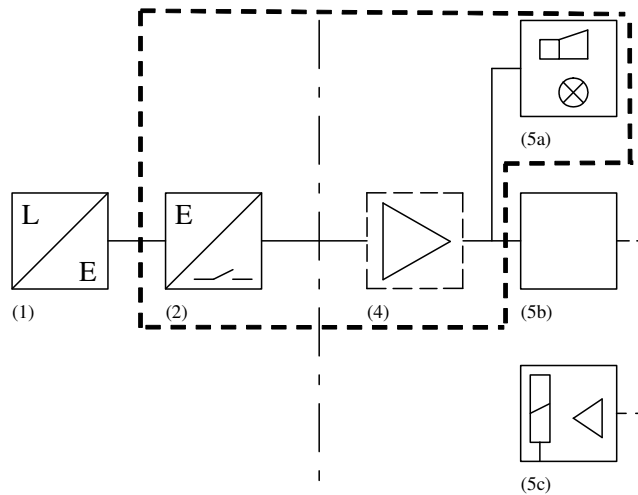
- (1) Leak protector
- ((2) Measuring transducer
- (4) Signal amplifier
- (5a) Alarm device
- (5b) Control device
- (5c) Control element

1.1.2 Leak protector (1) with integrated measuring transducer (2)



- (1) Leak protector
- (2) Measuring transducer integrated
- (4) Signal amplifier
- (5a) Alarm device
- (5b) Control device
- (5c) Control element

1.1.3 Leak protector (1) with separate measuring transducer (2) and integrated alarm device (5a)

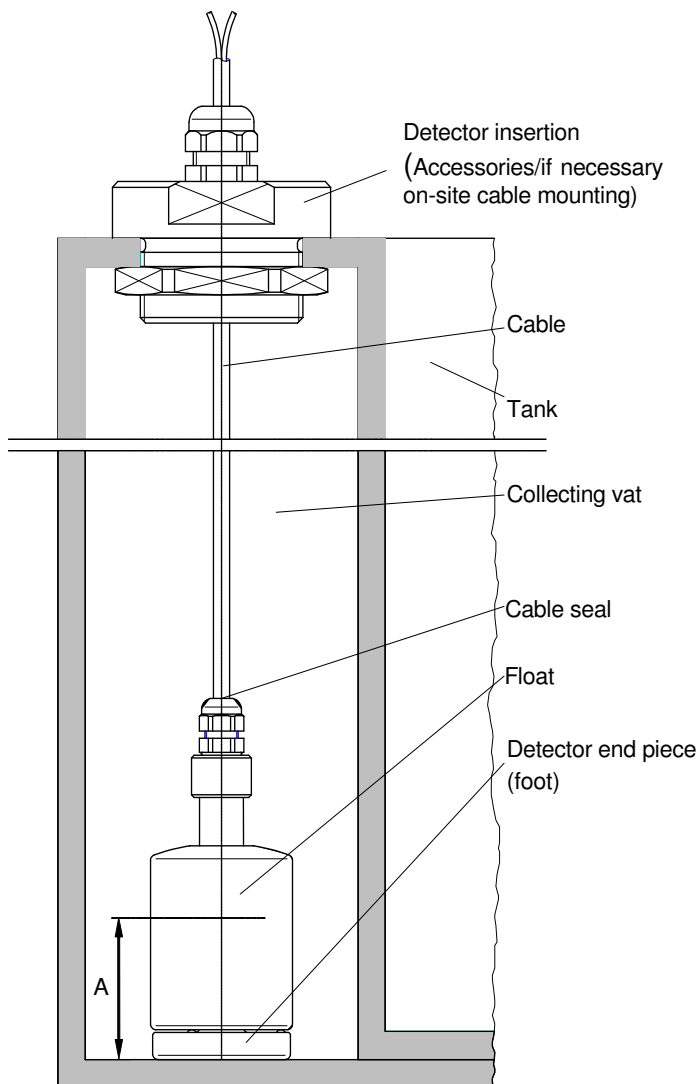


- (1) Leak protector
- (2) Measuring transducer integrated
- (4) Signal amplifier integrated
- (5a) Alarm device integrated
- (5b) Control device
- (5c) Control element

1.2 Function description

The float of the leak detector rests below the set switch point on a stop ring and actuates the reed contact (s) located in the guide tube with the permanent magnets installed in the float. When the float is raised by the rising liquid level, the reed contact (s) opens (t) and triggers the alarm.

Two signal lamps indicate whether the alarm was triggered by a line error or a leak message.



The measuring transducer works according to the quiescent current principle, i.e. if there is no alarm message, the output relay is energized. It drops into the alarm position in the case of a leak alarm or line error or when the supply voltage has failed.

The measuring transducer allows the connection of downstream alarm/ indicating and control devices.

For safety reasons, the **L-contact** consists of two reed contacts arranged in parallel, which are series connected. Line monitoring of the signal line between the **L-contact** and the measuring transducer is conducted by the valuation of the electric circuit resistance. In the operational state of the leak detector the circuit resistance is approx. 1kOhm, in the case of leakage alarm

The **LR-contact** consists of a reed contact with a series-connected contact protection resistor.

Signalling Table							
	KR-163 / ET-580		KR-168 / -268 / XR-...			ET- 520../-521	
<i>LED</i>	green	red	green	yellow	red	green	red
Mains OFF	●	●	●	●	●	●	●
Operation	☼	●	☼	●	●	☼	●
Line error	●	☼	☼	☼	☼	●	☼
Filling alarm	☼	☼	☼	☼	●	☼	☼

LED off: ●, LED on: ☼

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Signalling Table OAA-100 ...

<i>LED</i>	OAA 100-A1			OAA 100-A3	
	green	red I	red II	green	red
Mains OFF	●	●	●	●	●
Operation	☀	●	●	☀	●
Line error Channel 1	☀ ●	☀	●	☀ ●	☀
Line error acknowledged Horn Off	☀ ●	☀ ●	●	☀ ●	☀ ●
Filling alarm Channel 1	☀	☀	●	☀	☀
Filling alarm acknowledged Horn Off	☀	☀ ●	●	☀	☀ ●
Line error Channel 2	☀ ●	●	☀		
Line error acknowledged Horn Off	☀ ●	●	☀ ●		
Filling alarm Channel 2	☀	●	☀		
Filling alarm acknowledged Horn Off	☀	●	☀ ●		

LED off: ●, LED on: ☀, LED flashes: ☀ ●.

Signalling Table OAA-200 ...

<i>LED</i>	<u>Channel LED, 3 coloured</u>	Summary alarm	<u>Horn</u>
Mains OFF, resp. no sensor connected	●	●	Off
Operation, sensor connected	green ☀	●	Off
Line error	red ☀	☀ ●	On
Line error acknowledged	red ☀ ●	☀ ●	Off
Filling alarm, Leak alarm	yellow ☀	☀ ●	On
Filling alarm, Leak alarm acknowledged	yellow ☀ ●	☀ ●	Off
Error rectified	green ☀ ●	☀ ●	Off
Rectified error acknowledged	green ☀	●	Off

LED off: ●, LED on: ☀, LED flashes: ☀ ●.

Signalling Table OAA-300 ...

<i>LED</i>	<u>Channel LED, 3 coloured</u>	Summary alarm	<u>Horn</u>
Mains OFF, resp. no sensor connected	●	●	Off
Operation, sensor connected	green ☀	●	Off
Line error	red ☀	☀ ●	On
Line error acknowledged	red ☀ ●	☀ ●	Off
Error rectified	green ☀ ●	☀ ●	Off
Rectified error acknowledged	green ☀	●	Off
Filling alarm, Leak alarm	yellow ☀	☀ ●	On
Filling alarm, Leak alarm acknowledged	yellow ☀ ●	☀ ●	Off
Error rectified	green ☀ ●	☀ ●	Off
Rectified error acknowledged	green ☀	●	Off

LED off: ●, LED on: ☀, LED flashes: ☀ ●.

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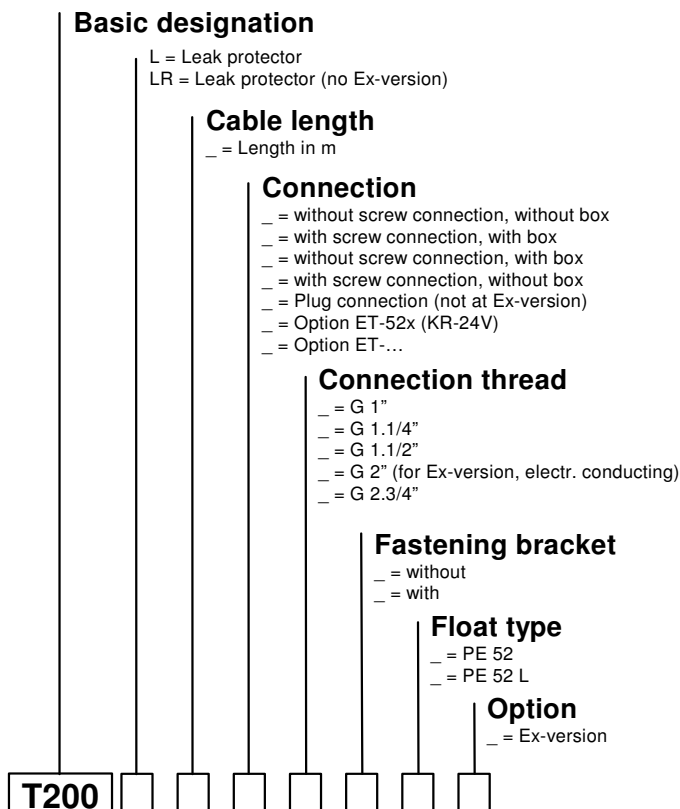
Signalling Table OAA-500 ...

LED	Channel LED, 3 coloured	Summary alarm	Horn
Mains OFF, resp. no sensor connected	●	●	Off
Operation, sensor connected	green ☀	●	Off
Line error	red ☀	☀ ●	On
Line error acknowledged	red ☀ ●	☀ ●	Off
Filling alarm, Leak alarm	yellow ☀	☀ ●	On
Filling alarm, Leak alarm acknowledged	yellow ☀ ●	☀ ●	Off
Error rectified	green ☀ ●	☀ ●	Off
Rectified error acknowledged	green ☀	●	Off

LED off: ●, LED on: ☀, LED flashes: ☀ ●.

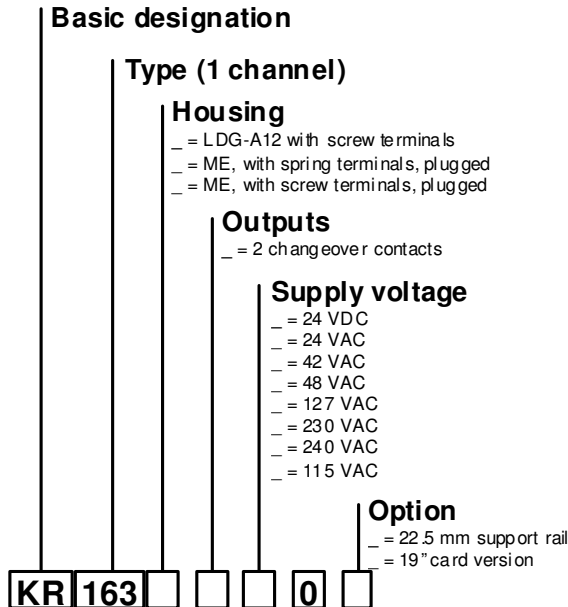
1.3 Type key

1.3.1 Leak detector (1)

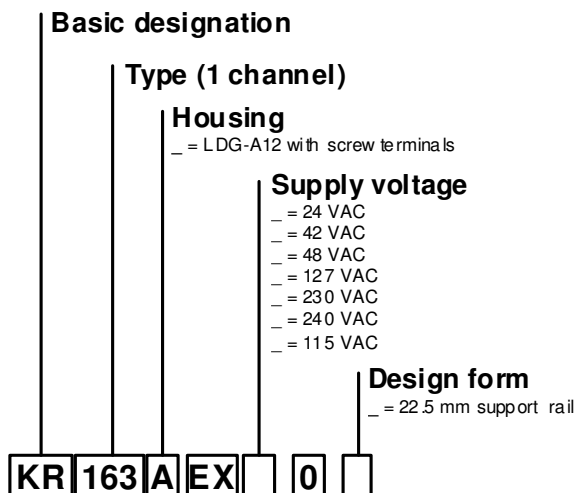


1.3.2. Measuring transducer (2)

1.3.2.1 Measuring transducer KR-163...



1.3.2.2 Measuring transducer KR-163/A/Ex...



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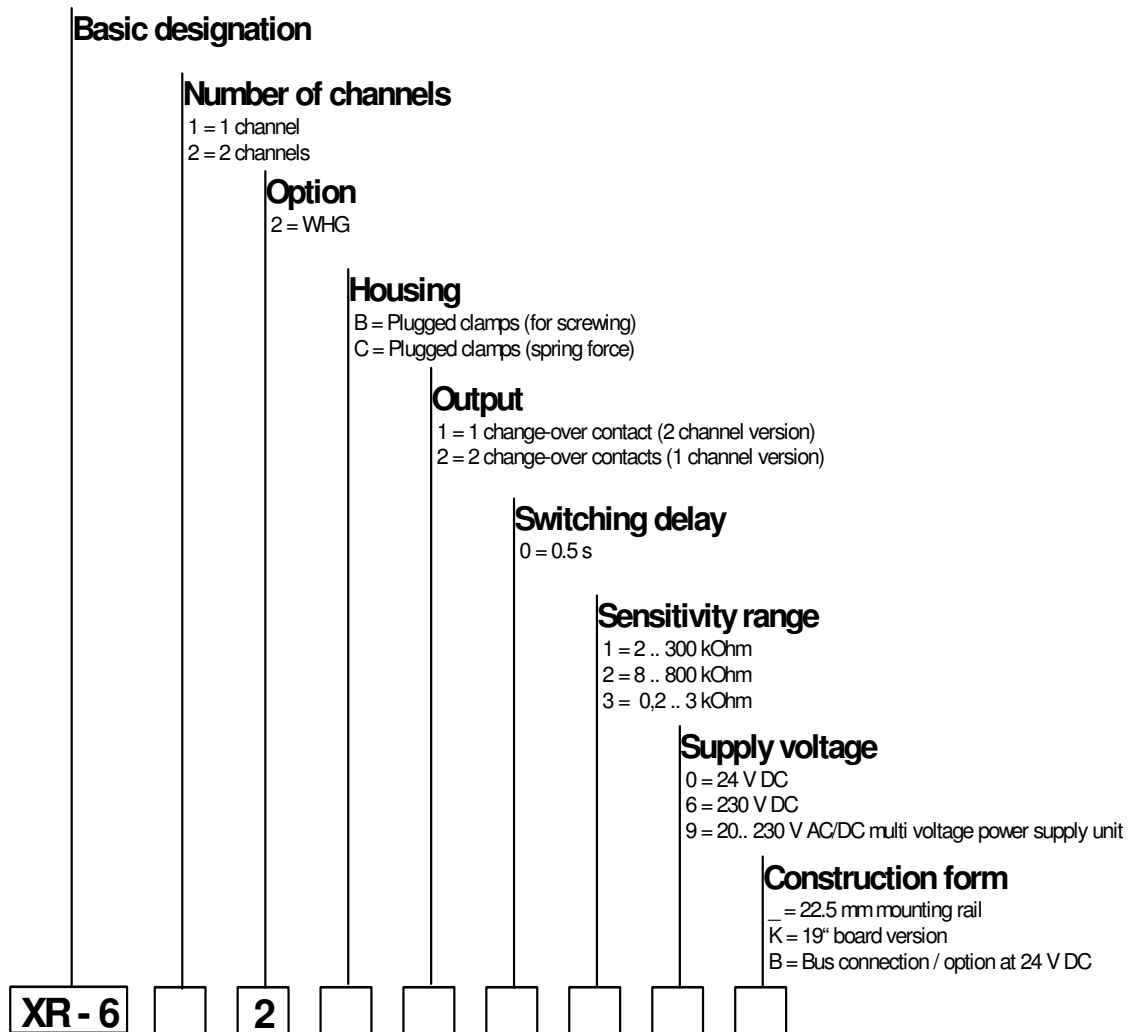
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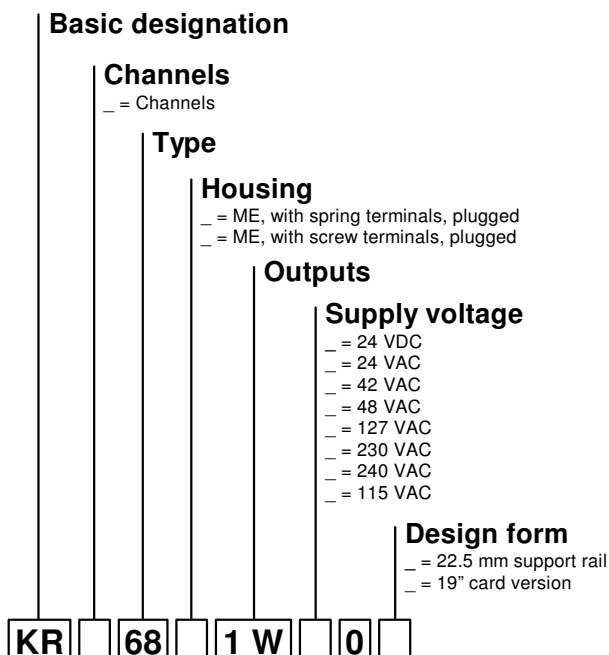
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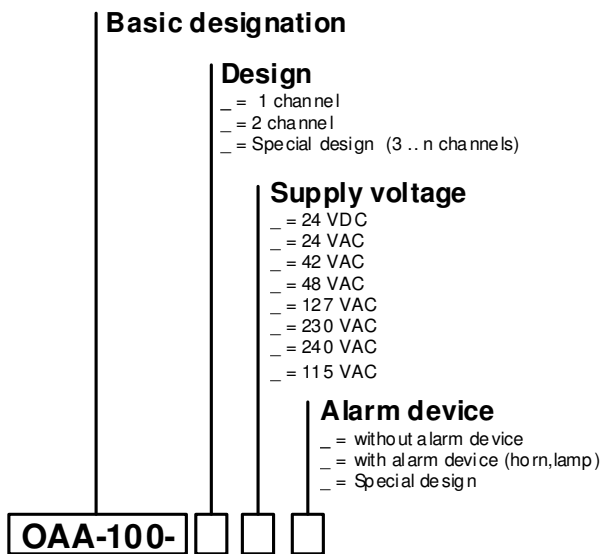
1.3.2.3 Measuring transducer series XR-



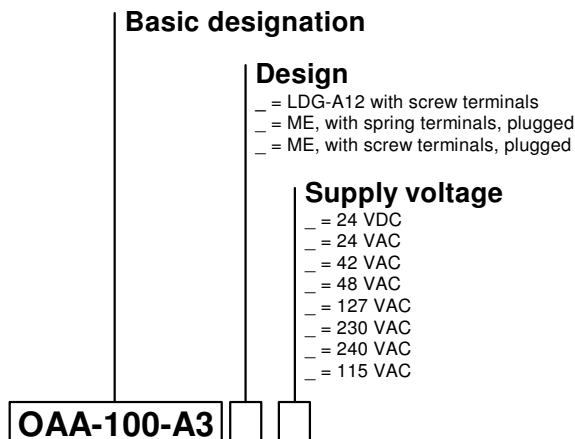
1.3.2.4 Measuring transducer KR-x68...



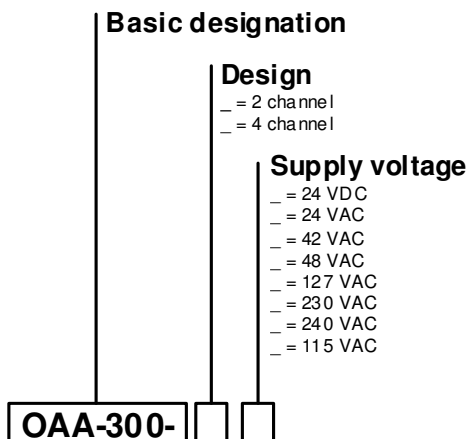
1.3.2.5 Measuring transducer OAA-100-A1...



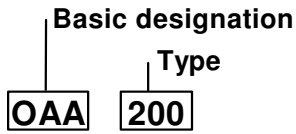
1.3.2.6 Measuring transducer OAA-100-A3...



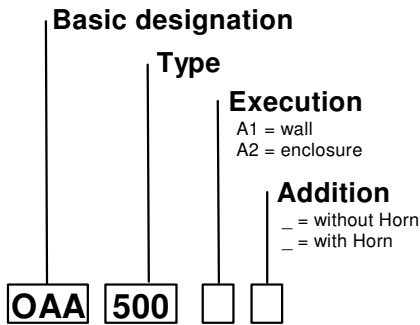
1.3.2.7 Measuring transducer OAA-300...



1.3.2.8 Measuring transducer OAA-200...

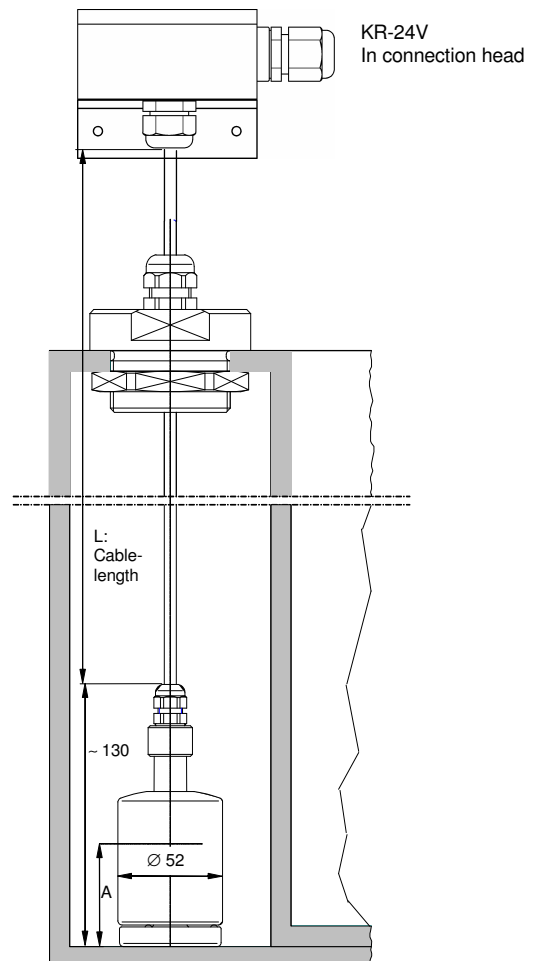
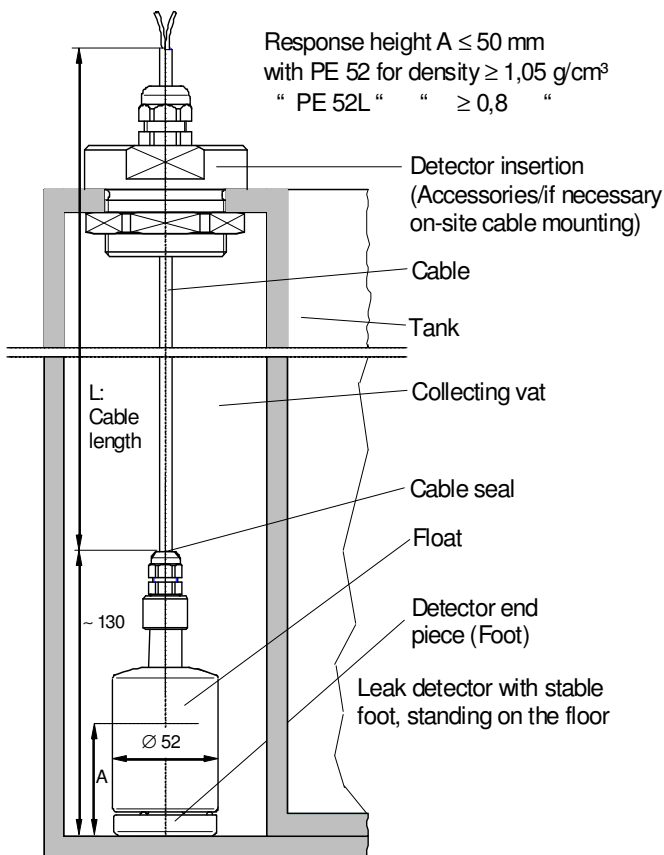


1.3.2.9 Measuring transducer OAA-500...



1.4 Dimensional drawings, Technical data

1.4.1 Dimensional drawings leak detector (1)

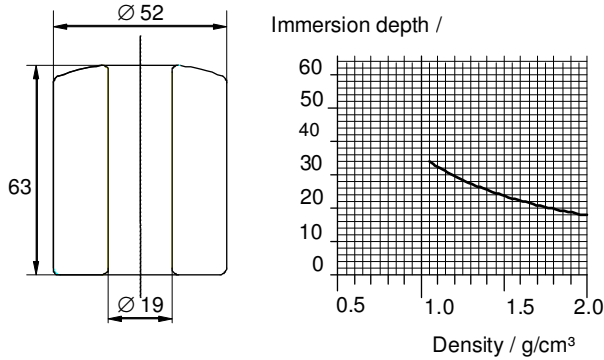


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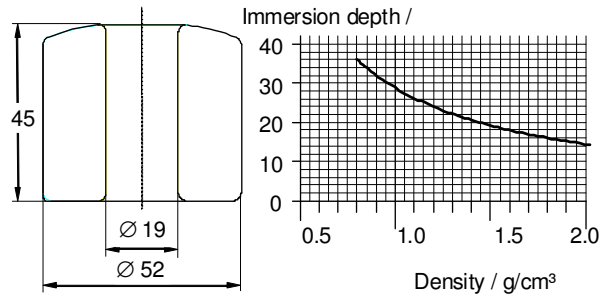
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1.4.2 Dimensional drawings floats

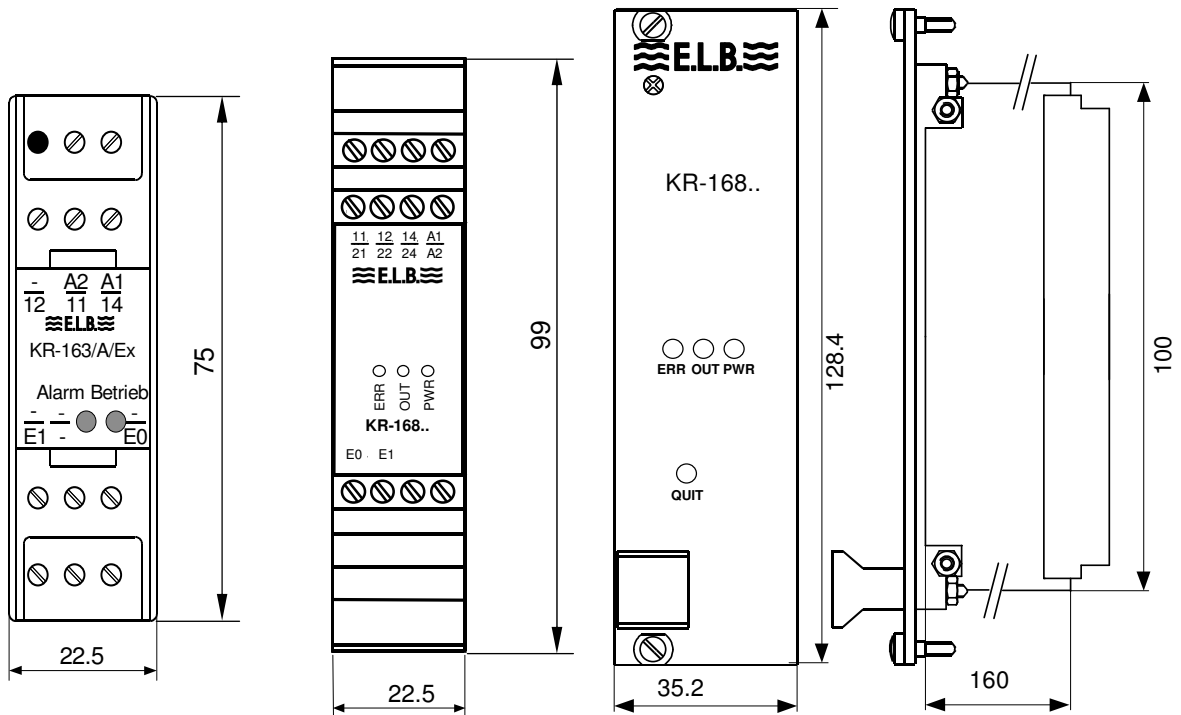
Float - Type: PE 52,
for density $\geq 1.05 \text{ g/cm}^3$



Float - Type: PE 52 L,
for density $\geq 0.8 \text{ g/cm}^3$



1.4.3 Dimensional drawings for measuring transducer (2)



Housing for types:
 KR-163/A/Ex..
 KR-163/A/..
 OAA-100-A3-A..
 XR-

Housing for types:
 KR-168/B/..
 KR-268/B/..
 KR-163/B/..
 OAA-100-A3-B...

Housing for types:
 KR-168/B/.../K
 KR-268/B/.../K
 OAA-100-K...

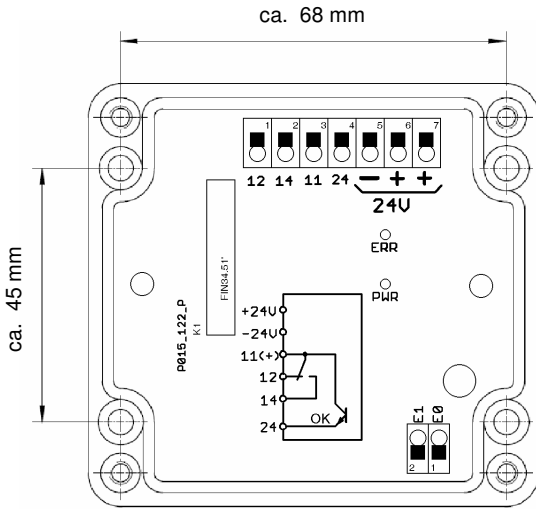
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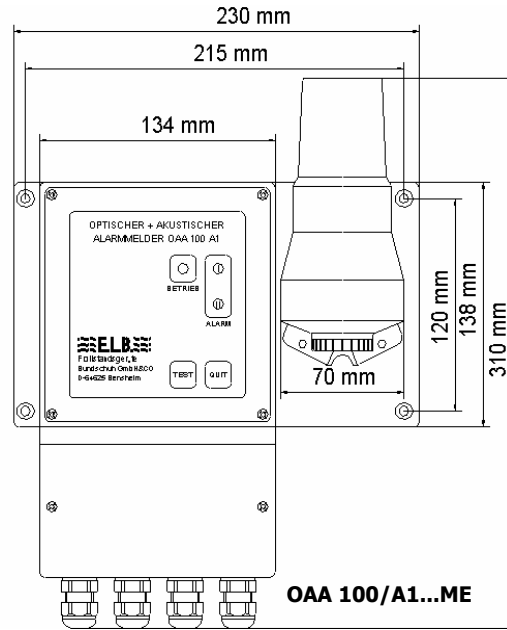


ca. 45 mm

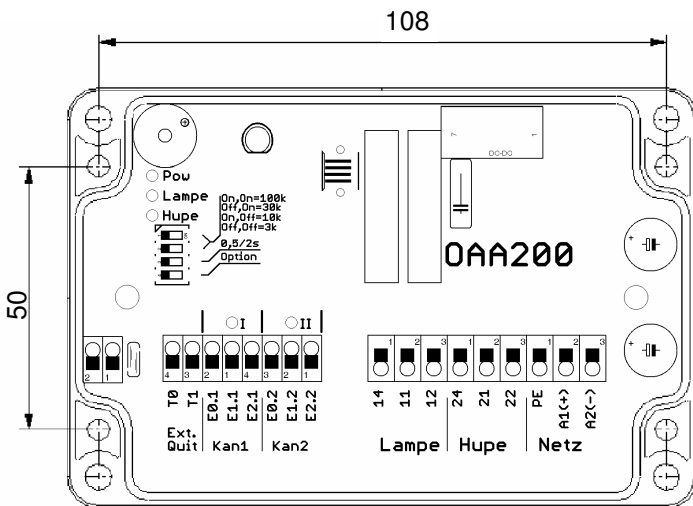
ca. 68 mm

Housing dimensions ET-520a:

75 mm x 80 mm



OAA 100/A1...ME

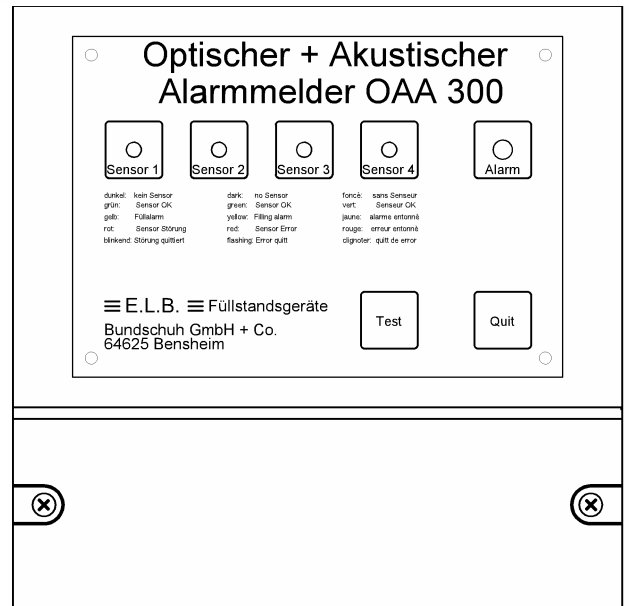


50

108

housing dimensions:

120 mm x 80 mm x 57 mm



housing dimensions: 170 x 165 x 85 mm

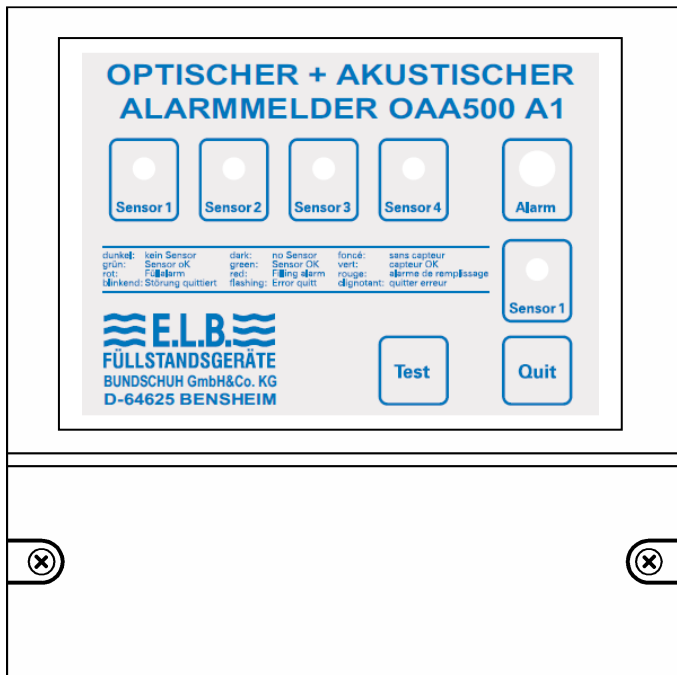
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housing dimensions:

137 mm x 186 mm (without cable glands) x 103 mm



housing dimensions:

86 mm x 70 mm x 60 mm

1.4.4 Technical data for leak detector (1)

Connection	Line connector, socket or jack
Protective type accord. to EN 60529	IP 65
Operational conditions	atmospheric conditions
Density ρ per liquid	with floater PE 52 min. 1.05 g/cm ³ PE 52 L min. 0.8 g/cm ³
Switching hysteresis	typ. 2 mm
Switch point tolerance	max. 2 mm
Resistance value of leak detector (L-contact) :	
Operational conditions	approx. 1 k Ω (actuated)
Leak message	approx. 12 k Ω (non-actuated)
Resistance value of leak detector (LR-contact):	
Operational conditions	ca. 47 Ω (contact protective resistor)
Leak message	ca. ∞ (contact opened)

1.4.5 Technical data for measuring transducer (2):

Type	KR-163/A.. resp. KR-163/B..	KR-163/A/Ex ..	KR-268.. resp. KR-168x..	XR-...	LR (ET-R...)
Mains supply:					
Rated operating voltage	230 VAC (+10% / -15%)	230 VAC (+10% / -15%)	230 VAC (+10% / -15%)	20 .. 230VAC/DC	24 V (± 10%)
On request: (± 10 %)	24; 42; 48; 110; 115; 127; 240; VAC	24; 42; 48; 110; 115; 127; 240; VAC		24 V DC 230 V AC	
Rated frequency	48 ... 62 Hz	48 ... 62 Hz	48 ... 62 Hz	max. 62 Hz	
Power consumption	≤ 3 VA		≤ 3 VA	≤ 2 VA / W	≤ 0.4 W
On request:	24 (20...35) VDC	24 (20...35) VDC	24 (20...35) VDC		
Power consumption	≤ 2 W		≤ 2 W		
Output:					
Output relay	2 potential-free changeover-contacts	1 potential-free changeover-contact	per Output: 1 potential-free changeover-contact	2 potential-free changeover-contacts	
Switching voltage	max. 250 VAC max. 150 VDC	max. 250 VAC max. 150 VDC	max. 250 VAC max. 150 VDC	max. 250 V	max. 24 V
Switching current	max. cos φ = 1 ⇒ 3 A max. cos φ = 0.7 ⇒ 1 A	max. cos φ = 1 ⇒ 3 A max. cos φ = 0.7 ⇒ 1 A	max. cos φ = 1 ⇒ 3 A max. cos φ = 0.7 ⇒ 1 A	max. 5 A	max. 80 mA
Switching power	max. 1250 VA / W (30VDC/5A) 150 W	max. 100 / 50 VA / W (30 VDC) 10 W	max. 500 VA / W (30VDC) 10 W	max. 100 VA; max. 50 W	max. 2 W
Input:		DIN EN 60947-5-6			
Open circuit voltage	8.6 ... 9.6 V	8.6 ... 9.6 V	8.6 ... 9.6 V	max. 14.8 VDC	
Short-circuit current	8.2 ... 10.2 mA	8.2 ... 10.2 mA	8.2 ... 10.2 mA	max. 5.6 mA	
Switching delay	< 0.5 s	< 0.5 s	< 0.5 s	adjustable 0.5 / 2 / 2.5 / 10	
Operating temperature	-20 ... + 60 °C	-20 ... + 60 °C	-20 ... + 60 °C	-20 ... + 60 °C	
Protective type according to EN 60529	IP 20	IP 20	IP 20	Housing: IP 40	

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Type	ET-580	OAA-100-A1...	OAA-100-A3..	OAA-200..	OAA-300..	OAA-500..
Mains supply:						
Rated operat. voltage	20 .. 230 V AC/DC	230 VAC (+10% / -15%) 24; 115; 240 VAC	230 VAC (+10% / -15%) 24; 115; 240 VAC	24 .. 230 V AC/DC	230 VAC (+10% / -15%) 24; 115; 240; VAC	42...253 VAC 20 ...60 VDC
On request: (\pm 10 %)		48 ... 62 Hz	48 ... 62 Hz		48 ... 62 Hz	48 ... 62 Hz
Rated frequency		\leq 3 VA	\leq 1 VA / W	max. 2 VA / W	\leq 3 VA	\leq 3 VA / W
Power consumption		24 (20...35) VDC	24 (20...35) VDC		24 (20...35) VDC	
On request:		\leq 2 W	\leq 2 W		\leq 3 W	
Power consumption	\leq 1 W					
Output:						
Output relay	2 potential-free changeover-contacts	2 potential-free changeover-contacts; 2 makers	2 potential-free changeover-contacts	2 potential-free changeover-contacts	6 potential-free changeover-contacts	2 potential-free changeover- contacts
Switching voltage	max. 250 V AC/DC	max. 250 VAC max. 150 VDC	max. 250 VAC max. 150 VDC	max. 250 V AC/DC	max. 250 VAC max. 150 VDC	max. 250 VAC max. 115 VDC
Switching current	max. 5 A	max. 3 A	max. 3 A	max. 5 A	max. 3 A	max. 3 A
Switching power	max. 500 VA / W (30VDC) 10 W	max. 500 VA / W (30VDC/5A) 150 W	max. 500 VA / W (30VDC/5A) 150 W	max. 1250 VA max. 50 W	max. 500 VA / W (30VDC/5A) 150 W	max. 500 VA / W (30VDC) 10 W
Optocoupler						
Input:						
Open circuit voltage	< 10 V	< 10 VDC	< 10 V	max. 3.3 VAC	< 10 VDC	< 24 VDC
Short-circuit current	< 5 mA	< 10 mA	< 10 mA	max. 1 mA	< 10 mA	< 20 mA
Switching delay		< 0.5 s	< 0.5 s		< 0.5 s	< 0.5 s
Operating temperat.	-20 ... + 60°C	-20 ... + 60°C	-20 ... + 60°C	-20 ... + 60°C	-20 ... + 60°C	-20 ... + 60°C
Protecting type acc. to EN 60529	IP 00	Housing: IP 65	IP 20	Housing: IP 65	Housing: IP 65	Version A1: IP 65 Version A2: IP 20

Type	ET-520.. / ET-521	ET-522
<u>Mains supply:</u>		
Rated operat. voltage	24 (20 ... 35) VDC	24 (20 ... 35) VDC
On request: ($\pm 10\%$)		
Rated frequency		
Power consumption		
On request:		
Power consumption	$\leq 1\text{ W}$	$\leq 1\text{ W}$
<u>Output:</u>		
Output relay	1 potential-free changeover-contact	Breaker or maker
Switching voltage	max. 250 VAC max. 150 VDC	max. 24 VDC
Switching current	max. $\cos \varphi = 1 \Rightarrow 3\text{ A}$ max. $\cos \varphi = 0.7 \Rightarrow 1\text{ A}$	max. 200 mA DC
Switching power	max. 500 VA / W (30VDC) 10 W	$\leq 5\text{ W}$
Optocoupler	1 pot. fr. semi-cond. sw max. 30 VDC / 100 mA	
<u>Input:</u>		
Open circuit voltage	$< 10\text{ V}$	$< 10\text{ V}$
Short-circuit current	$< 10\text{ mA}$	$< 5\text{ mA}$
Switching delay	$< 0.5\text{ s}$	
Operating temperat.	$-20 \dots + 60^\circ\text{C}$	$-20 \dots + 60^\circ\text{C}$
Protecting type acc. to EN 60529	IP 65	IP 65

2. Materials of the leak detector

The parts of the leak detector which come into contact with the liquid, its vapours or condensate, are manufactured of suitable plastic materials.

The line is manufactured with a sheathing material suitable for the application.

3. Application areas of the leak detector

The leak detectors may be operated under atmospheric temperatures and pressures. The liquids must be free of solid materials or low in solid material content, and not tend to form resins, gum up or crystallise. The solid material parts may not be magnetisable.

Solid material diameter $\leq 200\ \mu\text{m}$

Viscosity $\leq 150\ \text{mm}^2/\text{s}$ (e.g. olive oil approx. 120 mm^2/s)

4. Malfunction messages, Error messages

Disconnection or short-circuit of the signal line between the leak detector (1) and the measuring transducer (2) or power failure effect – due to the quiescent current principle employed - a drop of the output relay of the measuring transducer into the alarm position.

At T200.LR, an interruption of the signal line causes an interruption of the connection line or the reaching of the response level. The evaluation is carried out in the downstream signaling device (eg. PLC).

5. Installation and connection information

5.1 Installation of the leak detector

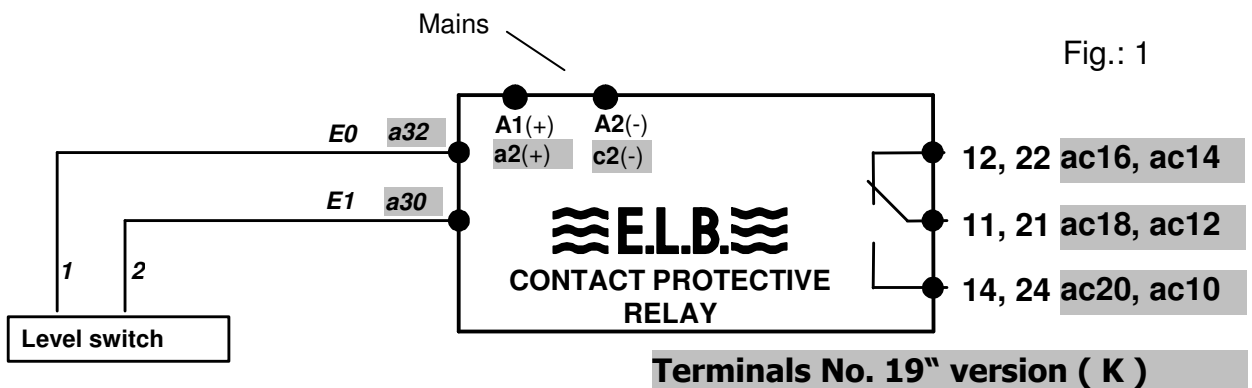
The leak detector must be lowered carefully by the cable from the top into e.g. the collecting vat of the container to be monitored. Attention must be paid that the leak detector, when it reaches the bottom of the vat, has optimum stability in the upright position. The cable should hang loose but without sagging. The float must not be hindered from rising through an overlying cable.

The detector cable must be attached/run either with our accessories or by client's.

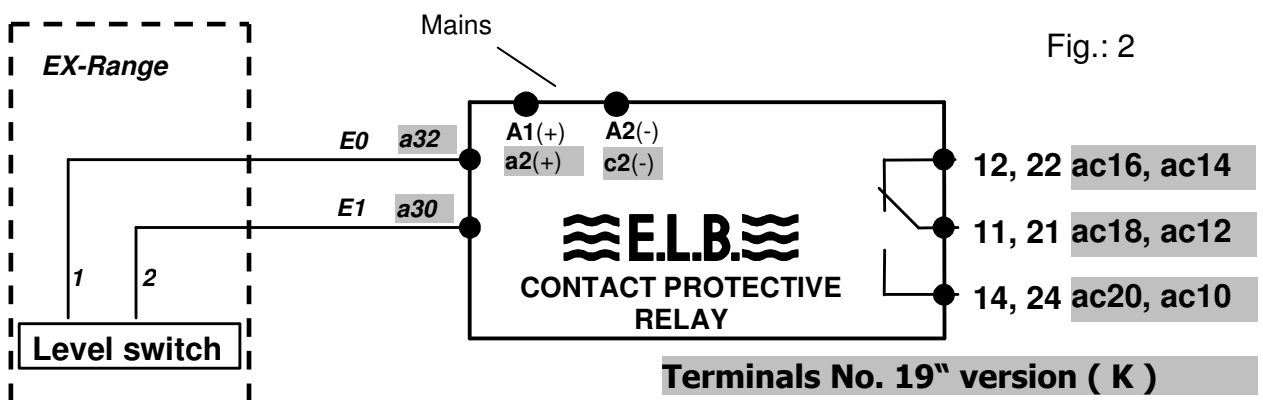
5.2 Connection of the level switch with switching amplifier

When connecting the switching amplifier **KR-...** resp. **XR-...** please proceed according to the connection diagram. The signal line must be connected to terminals 1 and 2 (terminal 1 to E0 resp. terminal 2 to E1), which are marked additionally with an "F", in general on the level switch. The measuring transducers must be installed with observance of the max. permissible line resistance ($\leq 50 \Omega$) of the signal line. Provide over-current protection, such as a fuse (250 mA) or circuit breaker, to limit fault currents on supply wiring. The alarm devices and / or control devices must be connected to the potential-free output contacts as required.

KR-163... (Fig. 1):



KR-163/A/Ex.. (Fig. 2):



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KR-168 / B 1-Channel Version (Fig. 3):

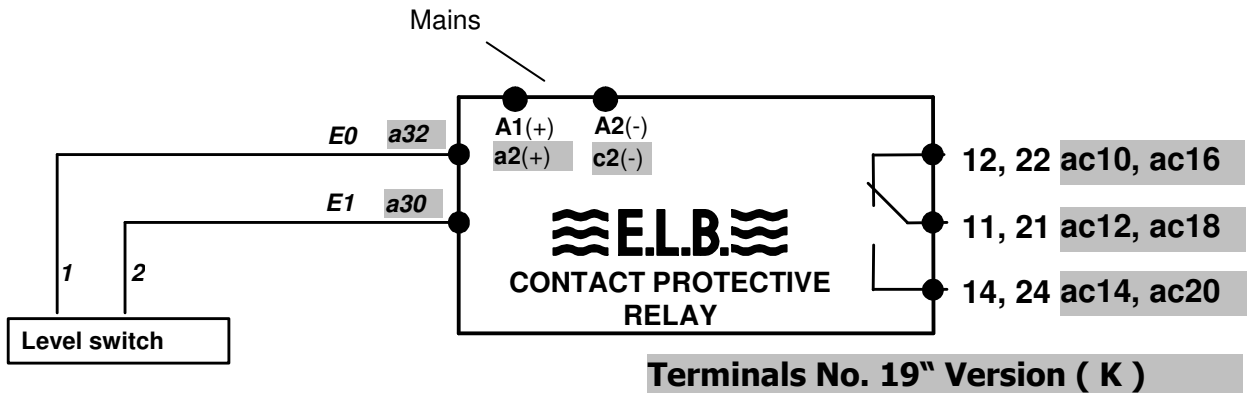


Fig.: 3

KR-268 / B 2-Channel Version (Fig. 4):

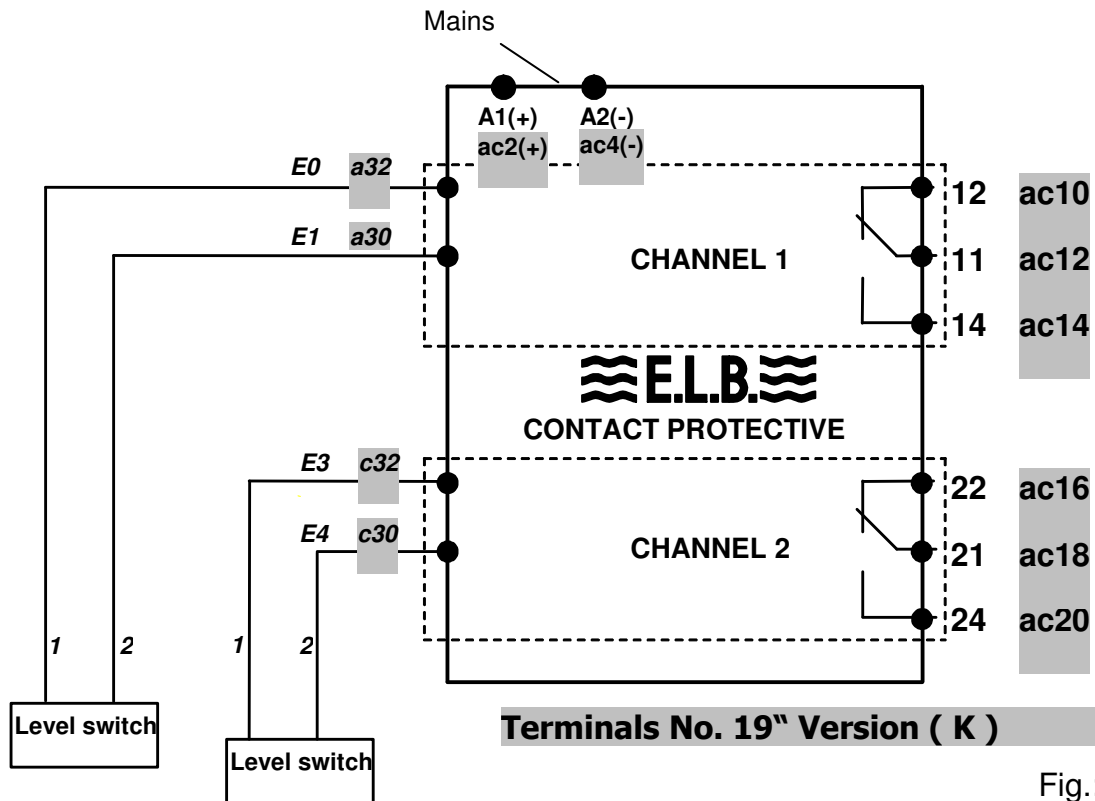


Fig.: 4

ELB Füllstandsgeräte

Overfull cut-out device with level switch for stationary containers to store liquids hazardous to water

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XR... (Fig. 5):

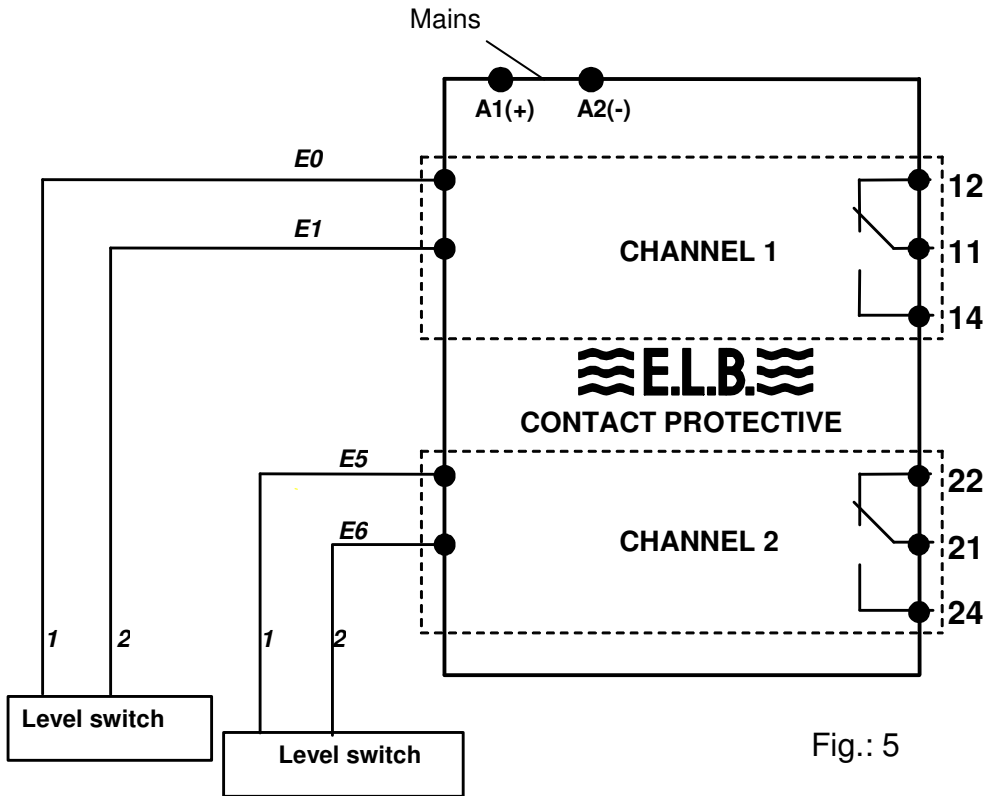
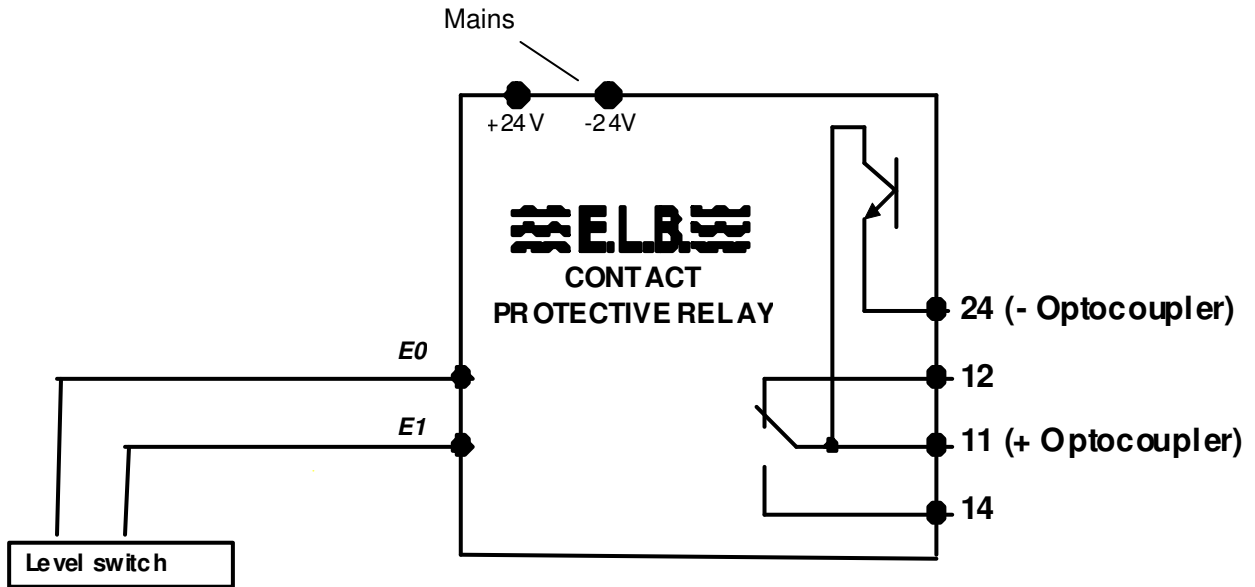


Fig.: 5

ET- 520.. (Fig. 6a), ET-521 (Fig. 6b), ET-522 (Fig. 6c):



Version ET-520a
Connection housing

Fig.: 6a

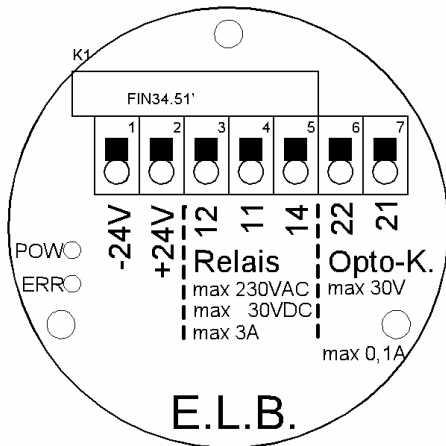
E.L.B. Füllstandsgeräte

Overfull cut-out device with level switch for stationary containers to store liquids hazardous to water

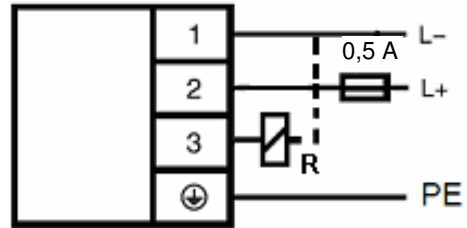
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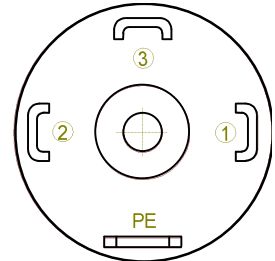


Version ET-521
Connection housing Fig.: 6b



Version ET-522
1-Channel Version

Fig.: 6c



LR [ET-R...] (Fig. 7):

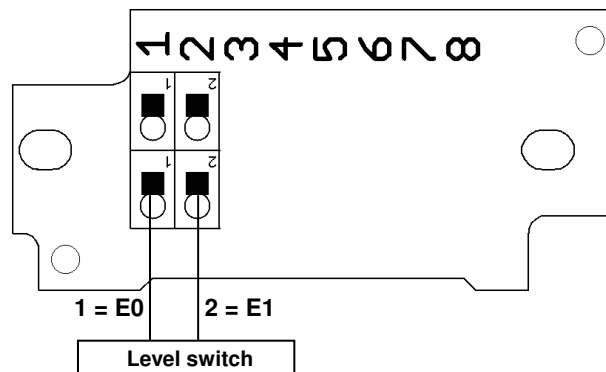


Fig.: 7

ET - 580 (Fig. 8):

The mains connection (20 ... 230 V) of the transducer ET-580 is to be put on clamp 1 („+“) and clamp 2 („-“).

change over switch 1: clamp 3 = NC
clamp 4 = COM
clamp 5 = NO

change over switch 2: clamp 6 = NC
clamp 7 = COM
clamp 8 = NO

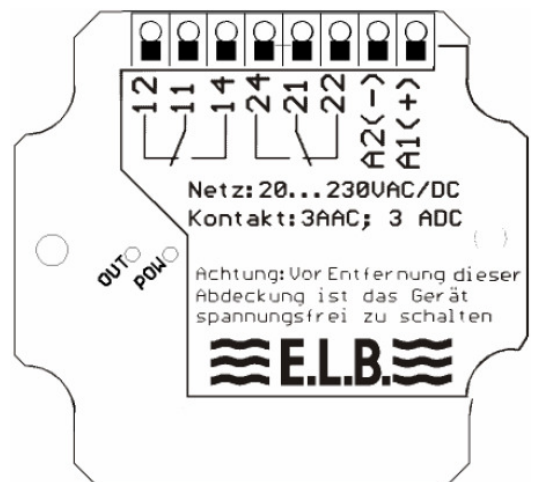


Fig.: 8

EL.B. Füllstandsgeräte

Overfull cut-out device with level switch for stationary containers to store liquids hazardous to water

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OAA 100-A1 (Fig.9)

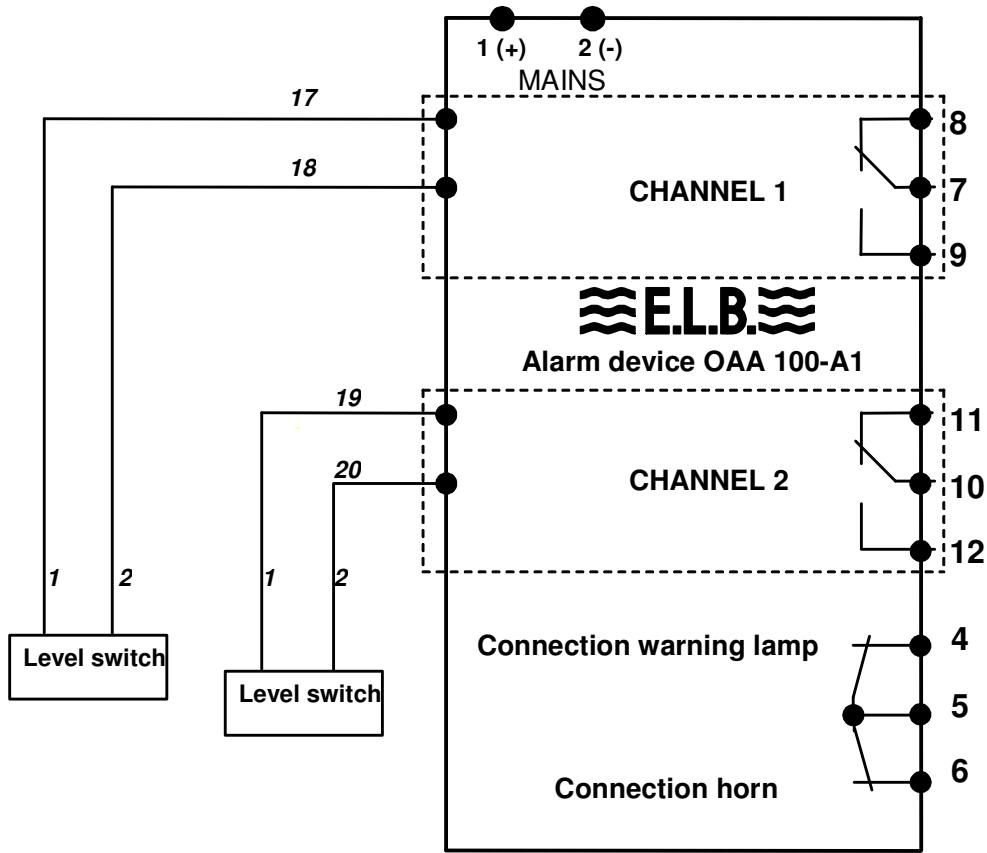


Fig.: 9

OAA 100-A3 (Fig.10)

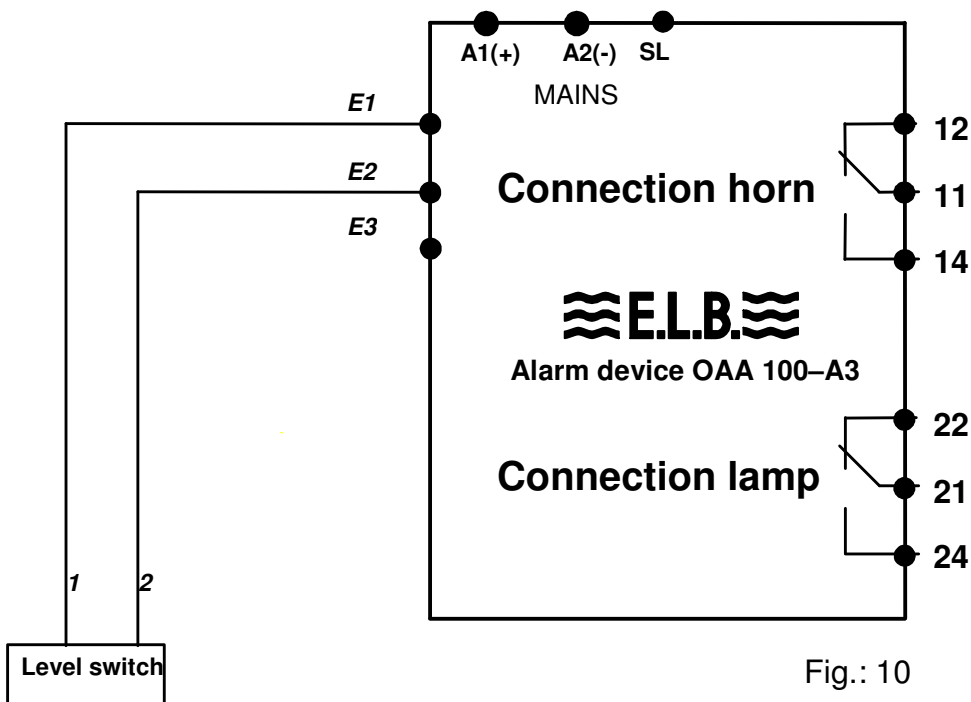


Fig.: 10

OAA-200 Optical and Acoustic Warning Device (Fig.11)

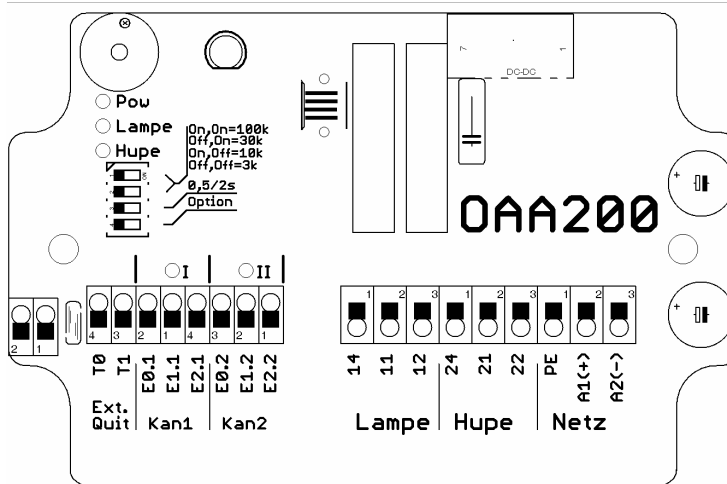


Fig.: 11

Terminal assignment OAA-200			
The mains connection	PE	A2 = L (+)	A1 = N (-)
Output relay lamp	11 = COM	12 = NC	14 = NO
Output relay horn	21 = COM	22 = NC	24 = NO
Channel 1		E 0.1	E 1.1
Channel 2		E 0.2	E 1.2
Input ext. acknowledgem.	TO, T1 pot.-free contact		

If the alarm is on, the horn can be turned off by pressing the side button. Further alarm messages turn the horn again. The collective interference lamp cannot be turned off with the side button until there are no more alarm messages left. The alarm can be acknowledged externally also by means of a potential-free contact.

OAA-300 Optical and Acoustic Warning Device (Fig.12)

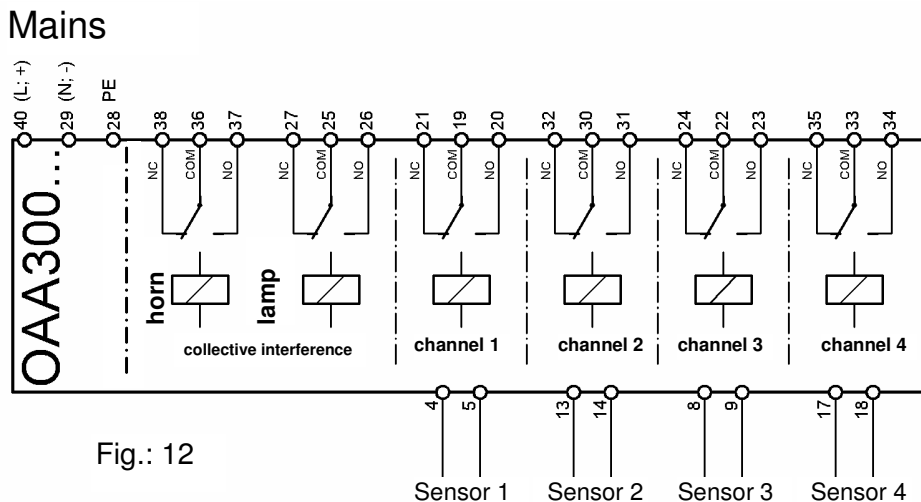


Fig.: 12

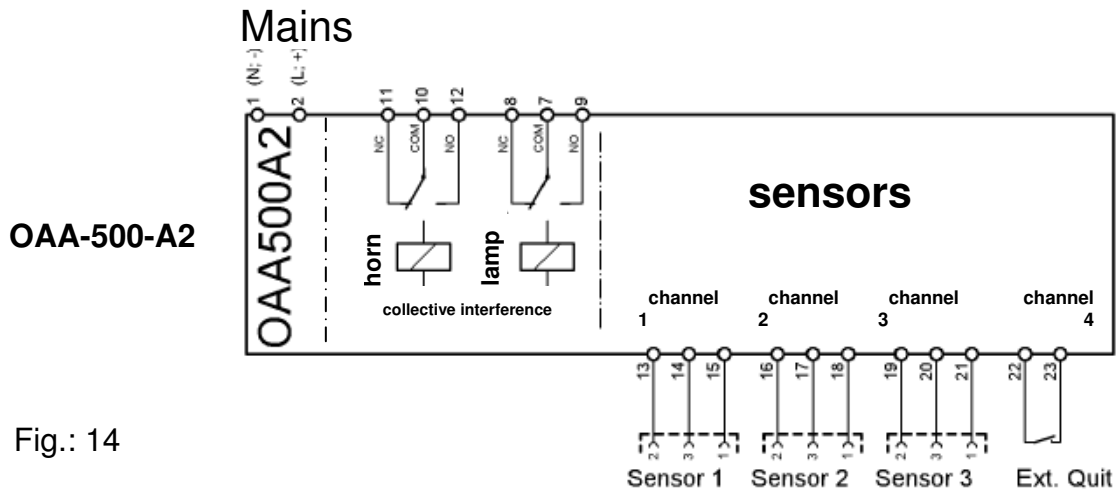
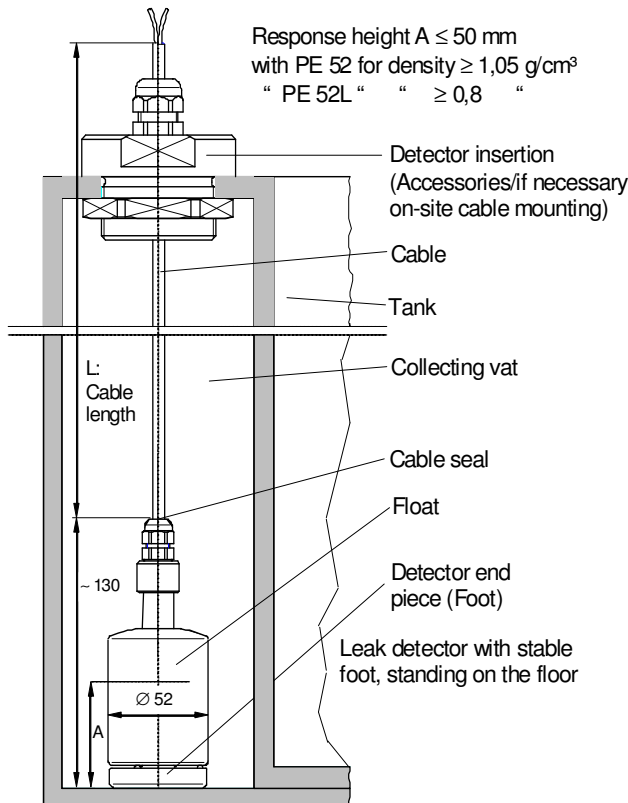


Fig.: 14

Terminal assignment OAA-500-A2			
The mains connection		2 = L (+)	1 = N (-)
Output relay lamp	7 = COM	9 = NO	8 = NC
Output relay horn	10 = COM	12 = NO	11 = NC
Sensor 1	13 = + 12 VDC	14 = Input (12 VDC)	15 = GND (-)
Sensor 2	16 = + 12 VDC	17 = Input (12 VDC)	18 = GND (-)
Sensor 3	19 = + 12 VDC	20 = Input (12 VDC)	21 = GND (-)
Input ext. acknowledgem.	22, 23 pot.-free NO-contact		

6. Setting information



The leak detector must be employed with due regard to the provisions set out in the VAWs (German regulation for systems handling water-hazardous materials) of the states and the VdTÜV fact sheet "Tank systems 967".

On the basis of its design the E.L.B. leak detector T-200.L.... guarantees the report of a leaking liquid with a density greater than 1.05 g/cm³ (0.8 g/cm³) when reaching a response height of max. 50mm. It is therefore not necessary to set the response height.

7. Operating instructions

When used as intended, the leak protector - consisting of the leak detector and the measuring transducer works maintenance-free. The system parts of the leak protector must have indicating, resp. control devices connected downstream. The output contacts are used for this purpose. The general Operating Instructions of the used equipment must be observed.

8. Recurrent inspection

The good working order of the leak detector must be checked in appropriate periods but at least once a year. It is the responsibility of the operator to select the type of inspection and the intervals in the stated time frame.

The inspection test must be conducted so that the faultless functioning of the leak detector in cooperation with all components is proven.

The leak detector must be lowered by the cable into the corresponding storage container. Alternatively, the test can also be carried out in a suitable test vessel with storage liquid. When the float immerses into the storage liquid, the leak message must ensue. Attention must be paid that only the leak detector immerses into the liquid and not the cable.

Testing the fault: The signal line is disconnected and then short-circuited. The malfunction message and leak message must ensue in any case.

If the good working order of the leak detector and the measuring transducers can be identified in another manner (exclusion of function-inhibiting errors), the inspection test can also be conducted by simulating the corresponding output signal. Further information about the inspection test methods can be found, e.g. the guideline VDI/VDE 2180, sheet 4.