

## VARIMETER

### Level Sensing Relay

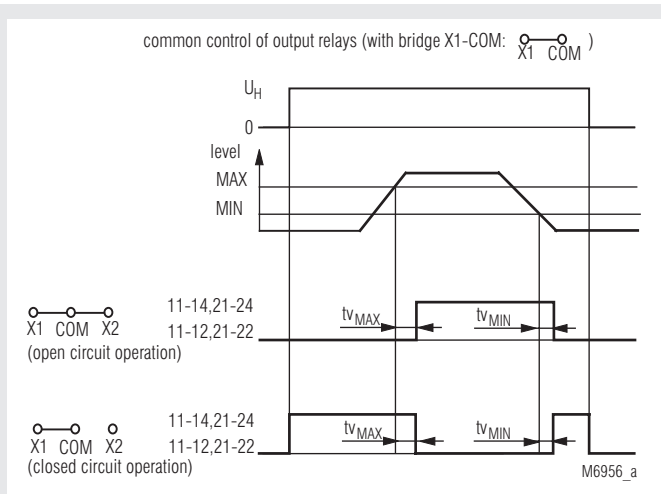
IL 9151, SL 9151, MK 9151N



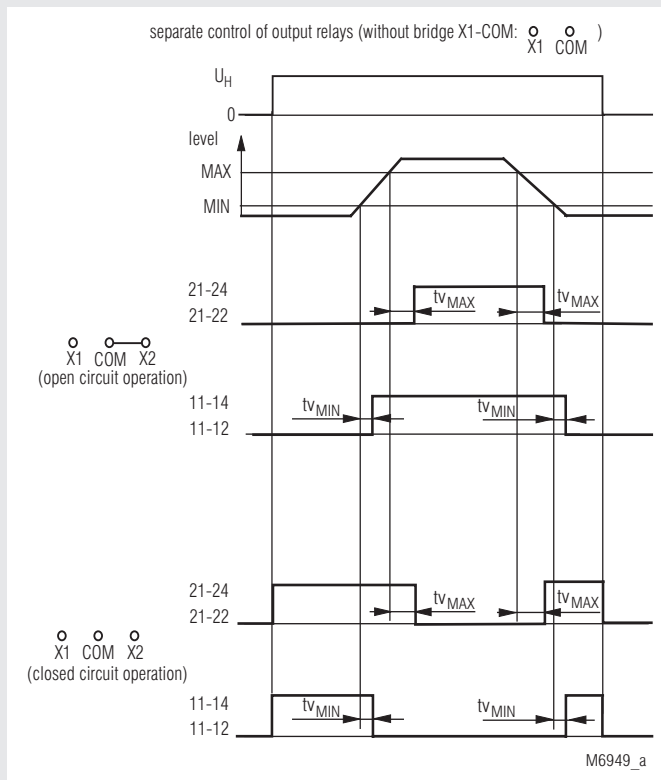
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- According to IEC/EN 60 255, DIN VDE 0435-303
- 3 probe connections for 2-point and 1-point level control
- Also for use as moisture detector
- High interference resistance of the Measuring Circuit, which is isolated from the mains
- Max. wire length to the probes: 1500 m
- Large setting range: 2 ... 450 kΩ  
this permits differentiation between fluid and foam
- Separately adjustable response and release time delay 0.2 ... 20 s for MIN- and MAX-level
- Programmable for:
  - 2 separate controllable output relays for MIN and MAX level
  - common controlled output relays for 2-point hysteresis level control
  - open circuit operation
  - closed circuit operation
- Measuring Circuit for probes works with internally generated AC voltage (approx. 30 Hz), electrolytic behaviour does not occur in the liquid
- For auxiliary voltages of 24 ... 415 V AC or 24 V DC
- LEDs for operation and state of contact
- 2 changeover relays with 1 changeover contact each
- IL 9151 and SL 9151 with safe separation according to IEC/EN 61 140, IEC/EN 60 947-1
- Devices available in 3 enclosure versions:
  - IL 9151: depth 59 mm, with terminals at the bottom for installation systems and industrial distribution systems according to DIN 43 880
  - SL 9151, MK 9151N: depth 98 mm, with terminals at the top for cabinets with mounting plate and cable duct
- IL/SL 9151: 35 mm width
- MK 9151N: 22.5 mm width

### Function Diagrams



common control of output relays



separate control of output relay

### Approvals and Markings

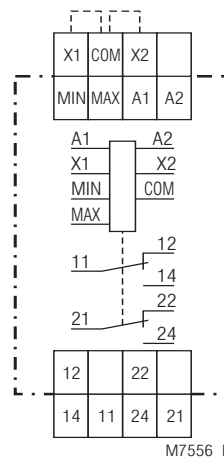


<sup>1)</sup> only MK 9151N

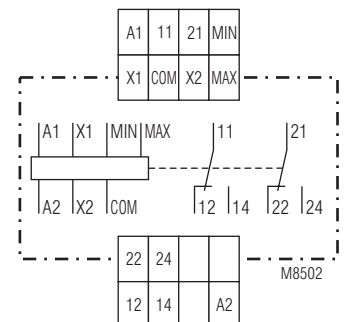
### Application

- Level monitoring and control for conductive liquids and powders, e.g. maximum and minimum filling levels, overfilling and protection against dry running
- Monitoring and control of the mixing ratio of conductive liquids
- General resistance monitoring tasks, e.g. limit temperature detection with PTC
- Contact protection relay with time delay

### Circuit Diagram



IL 9151.12, SL 9151.12



MK 9151N.12

Indicators	
<b>IL/SL 9151</b>	
green LED:	on, when auxiliary supply connected
yellow LED:	on, when relay MIN active
red LED:	on, when relay MAX active
<b>MK 9151N</b>	
green LED:	on, when auxiliary supply connected
yellow LED "MIN":	on, when relay MIN active
red LED "MAX":	on, when relay MAX active

### Notes

All commercially available probes are suitable.

The reference probe for level measurement is generally located at the lowest point of the container and must always be connected to the "COM" terminal. The container itself can be used as a reference probe if it consists of conductive material.

On the level "MIN" and "MAX" the other probes are installed and connected to the corresponding inputs of IL 9151. It is also possible to connect only one probe.

#### 2-point level control

The 2-point control is selected when a liquid should be kept between "MIN" and "MAX" level. 2 operation modes can be selected:

- without bridge X1 - COM: separate control of output relays for "MIN" and "MAX" level
- with bridge X1 - COM: common control of both output relays

When the relays are separately controlled each output relay is operated by the corresponding probe circuit. For each level the time delay can be set separately ( $t_{v_{MIN}}$  and  $t_{v_{MAX}}$ ).

When the relays are controlled together, these work like a relay with 2 changeover contacts as follows:

If the liquid rises above the "MAX" level the output relays switch over after the delay time of  $t_{v_{MAX}}$  and start e.g. a pump to sink the liquid. If the level goes under the "MAX" level the output relays remain activated until the "MIN" level is reached. Now the output relays switch back after the time delay of  $t_{v_{MIN}}$  and stop the pump. The whole process starts again when the level reaches the "MAX" probe.

#### 1-point level control

1-point level control (see Figure) is especially suitable for protection against overflowing and dry running on containers with a free inlet/outlet. In this configuration, all that is required besides the reference probe "COM" is the "MAX", which must be located at the desired limit level. The output relay switches over after the set delay time if the fluid level exceeds or falls below the limit level, which permits fluid to be pumped out or added.

Without bridge X1 - COM only relay "MAX" (contacts 21-22-24) switch, with bridge X1 - COM both relays switch together. If for each output relay a separate time delay is necessary, the unit has to be set to separate control of the outputs and the "MIN" and "MAX" inputs are connected to the same probe. Please note that the resistance of the liquid is divided up on both input circuits. Therefore the response value must be set to the double value.

If separate output control is selected with 1-point control for each output relay the time delay can be set separately.

Because of the settable time delay of 0.2 to 20 sec for each probe circuit, it is possible to suppress early switching caused by waves on the liquid. Also time depending level control can be realised. The delay works integrating and is active when the liquid goes over as well as under the probe level.

The wide setting range allows easily an optimum setting so that the unit can differentiate between foam and liquid. The response value must be set to a value high enough, that the unit reacts when the liquid, but not when the foam reaches the probe (for setting procedure the time delay is set to min. value).

### Technical Data

#### Input

##### Setting range of the

**fluid resistance:** 2 ... 450 k $\Omega$  (response value)  
**Setting:** on logarithmically divided absolute scale  
**Switching point hysteresis:** approx. 4 % (at 450 k $\Omega$ )  
 ... 15 % (at 2 k $\Omega$ ) of the set value

##### Voltage and temperature

**influence:** < 2 % of the set value

##### Max. cable length to the probes:

Set value	Cable length (at 100 nF/km)
450 k $\Omega$	50 m
100 k $\Omega$	200 m
35 k $\Omega$	500 m
10 k $\Omega$	1500 m
5 k $\Omega$	3000 m

##### Max. sensing voltage:

approx. AC 10 V  
(internally generated)

##### Max. sensing current:

approx. AC 1.5 mA  
(internally generated)

##### Response and release times

$t_{v_{MIN}}$ ,  $t_{v_{MAX}}$ : 0.2 ... 20 s for both output relays  
 separate settable  
 Setting on logarithmically-divided absolute scale

#### Auxiliary Circuit

##### Auxiliary voltage $U_H$ :

AC 24, 42, 110, 230 V  
 DC 24 V

##### Voltage range of $U_H$

AC: 0.8 ... 1.1  $U_N$   
 DC: 0.85 ... 1.25  $U_N$

##### Nominal power consumption

AC: approx. 2 VA  
 DC: approx. 1 W

##### Frequency range:

45 ... 400 Hz

#### Output

##### Contacts

IL/SL 9151.12, MK 9151N.12: 2 x 1 changeover contact

**Thermal current  $I_{th}$ :** 4 A

##### Switching capacity

IL/SL 9151:

to AC 15

NO contact: 5 A / AC 230 V IEC/EN 60 947-5-1  
 NC contact: 2 A / AC 230 V IEC/EN 60 947-5-1

MK 9151N:

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1  
 NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1  
 to DC 13: 1 A / DC 24 V IEC/EN 60 947-5-1

##### Electrical life

IL/SL 9151: IEC/EN 60 947-5-1

to AC 15 at 1 A, AC 230 V: 2 x 10<sup>5</sup> switching cycles

MK 9151N: IEC/EN 60 947-5-1

to AC 15 at 1 A, AC 230 V: 1.5 x 10<sup>5</sup> switching cycles

##### Short circuit strength

**max. fuse rating:** 4 A gL IEC/EN 60 947-5-1

**Mechanical life:**  $\geq 30 \times 10^6$  switching cycles

#### General Data

**Operating mode:** Continuous operation

**Temperature range:** - 20 ... + 60°C

##### Clearance and creepage distances

rated rated impulse voltage voltage /

pollution degree IEC 60 664-1

IL/SL 9151:

input / Auxiliary Circuit: 6 kV / 2 (at  $U_H$  = DC 24 V: 1kV)

input / output circuit: 6 kV / 2

MK 9151N:

input / Auxiliary Circuit: 4 kV / 2 (at  $U_H$  = DC 24 V: 1 kV)

input / output circuit: 4 kV / 2

auxiliary / output circuit

A1-A2 (AC): 4 kV / 2

## Technical Data

### EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
Interference suppression:	Limit value class B	EN 55 011

### Degree of protection

Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529

### Housing:

Thermoplastic with V0 behaviour according to UL subject 94

### Vibration resistance:

Amplitude 0.35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6 20 / 060 / 04 IEC/EN 60 068-1

### Climate resistance:

### Terminal designation:

EN 50 005

### Wire connection:

IL/SL 9151:	2 x 2.5 mm <sup>2</sup> solid or 2 x 1.5 mm <sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3/-4
MK 9151N:	1 x 4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled or 2 x 1.5 mm <sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3/-4

### Wire fixing:

IL/SL 9151:	Flat terminals with self-lifting clamping piece IEC/EN 60 999-1
MK 9151:	Box terminal with wire protection
<b>Mounting:</b>	DIN rail IEC/EN 60 715

### Weight

IL 9151:	approx. 165 g
SL 9151:	approx. 192 g
MK 9151N:	approx. 180 g

## Dimensions

### Width x height x depth

IL 9151:	35 x 90 x 59 mm
SL 9151:	35 x 90 x 98 mm
MK 9151N:	22.5 x 90 x 98 mm

## CCC-Data

### Nominal voltage U<sub>N</sub>:

MK 9151N:	AC 24, 42, 110, 230 V DC 24 V
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### Switching capacity

to AC 15	
NO contact:	1.5 A / AC 230 V IEC/EN 60 947-5-1



Technical data that is not stated in the CCC-Data, can be found in the technical data section.

## Standard Type

IL 9151.12	2 ... 450 kΩ	AC 230 V	0.2 ... 20 s
Article number:	0049135		
• Settable response value:	2 ... 450 kΩ		
• Auxiliary voltage U <sub>H</sub> :	AC 230 V		
• Response and release delay:	0.2 ... 20 s		
• 2 output relays with 1 changeover contact each			
• With safe separation			
• Width:	35 mm		

SL 9151.12	2 ... 450 kΩ	AC 230 V	0.2 ... 20 s
Article number:	0051552		
• Settable response value:	2 ... 450 kΩ		
• Auxiliary voltage U <sub>H</sub> :	AC 230 V		
• Response and release delay:	0.2 ... 20 s		
• 2 output relays with 1 changeover contact each			
• With safe separation			
• Width:	35 mm		

MK 9151N.12	2 ... 450 kΩ	AC 230 V	0.2 ... 20 s
Article number:	0054100		
• Settable response value:	2 ... 450 kΩ		
• Auxiliary voltage U <sub>H</sub> :	AC 230 V		
• Response and release delay:	0.2 ... 20 s		
• 2 output relays with 1 changeover contact each			
• Width:	22.5 mm		

## Variants

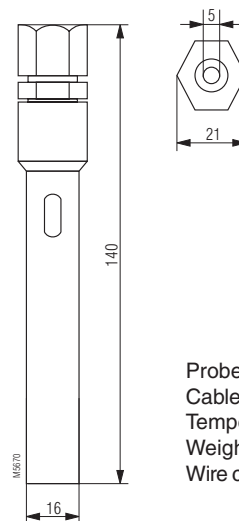
MK 9151N.12/001:	time delay, when level drops under setting value
MK 9151N.12/002:	time delay, when level rises over setting value

## Ordering example for variants

MK 9151 N	.12	/00	2 ... 450 kΩ	AC 230 V	0.2 ... 20 s
					Response and release delay
					Auxiliary voltage
					Response value
					Variant, if required
					Contacts
					Type

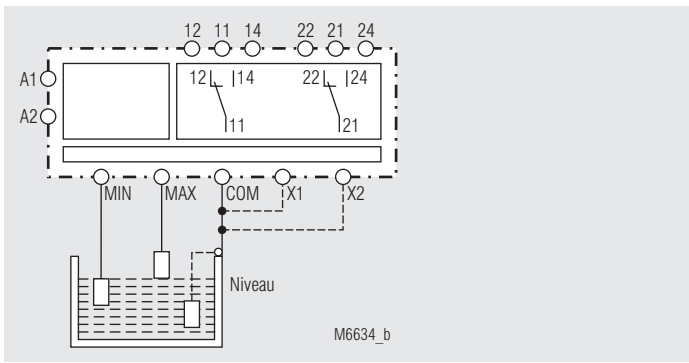
## Accessories

OA 5640:	Standard probe Article number: 0016045
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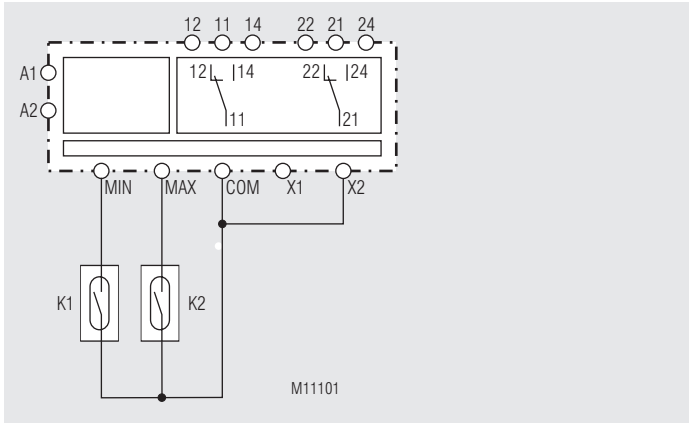


Probe made of stainless steel,  
Cable entry PG 9,  
Temperature range 0 ... +60°C,  
Weight approx. 0.1 kg  
Wire connection 2.5 mm<sup>2</sup> stranded wire with sleeve

## Application Example



IL 9151, SL 9151 with safe separation according to IEC/EN 61 140, IEC/EN 60 947-1



Application as contact protection relay, e.g. for two reed contact switches (K1, K2).