

ZELIO-CONTROL™
Measurement Relays
RM4

File 8430



Merlin Gerin

Modicon

Square D

Telemecanique




Schneider Electric Brands

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ZELIO-CONTROL™ Measurement Relays - RM4

Application Data

Application Data

Conforming to Standards		IEC 60255-6, EN 60255-6
Product Approvals		 File E164353 CNN NKCR  File LR 89150 Guide 3211 07 GL
CE Marking		Zelio Control measurement relays conform to European regulations relating to CE Marking.
Ambient Air Temperature Around the Device	Storage	-40 to 185 °F (-40 to + 85 °C)
	Operation	-4 to 149 °F (-20 to + 65 °C)
Permissible Relative Humidity Range	Conforming to IEC 60721-3-3	15 to 85% Environmental class 3K3
Vibration Resistance	Conforming to IEC 60068-2-6, 10 to 55 Hz	a = 0.35 ms
Shock Resistance	Conforming to IEC 60068-2-27	15 gn - 11 ms
Degree of Protection	Housing	IP 50
	Terminals	IP 20
Degree of Pollution	Conforming to IEC 60664-1	3
Overvoltage Category	Conforming to IEC 60664-1	III
Rated Insulation Voltage Between contact circuit and power supply or between contact circuit and control inputs	Conforming to IEC	500 V
	Conforming to CSA, UL	500 V
Test Voltage for Insulation Tests	Dielectric test	UL Hipot at 2,200 V (IEC 2,500 V)
	Shock wave	4.8 kV
Voltage Limits	Power supply circuit	0.85-1.1 Uc ▲
Disconnection Value	Power supply circuit	> 0.1 Uc
Mounting Position without Derating	In relation to the normal vertical mounting position	Any position
Connection Maximum Cross-Section	Stranded wire without cable end	2 # 14 AWG (2 x 2.5 mm ²)
	Stranded wire with cable end	2 # 16 AWG (2 x 1.5 mm ²)
Tightening Torque		4.5-9.9 lb-in (0.5-1.1 N•m)
Mounting		Can be mounted on 1.38" (35mm) wide by 0.29" (7.5mm) or 0.59" (15mm) depth mounting track or can be mounted directly to a panel.

Immunity from Electromagnetic Interference (EMC) (Application Class 2 Conforming to EN 61812-1)

Electrostatic Discharge	Conforming to IEC 61000-4-2	Level 3 (6 kV contact, 8 kV air)
Electromagnetic Fields	Conforming to IEC 61000-4-3	Level 3 (10 V/m)
Rapid Transients	Conforming to IEC 61000-4-4	Level 3 (2 kV output power, 1 kV control)
Shock Waves	Conforming to IEC 61000-4-5	Level 3 (2 kV common mode, 1 kV differential mode)
Radiated and Conducted Emissions	CISPR11	Group 1 Class A
	CISPR22	Class A

▲ Except RM4T, see page 17.



ZELIO-CONTROL™ Measurement Relays - RM4

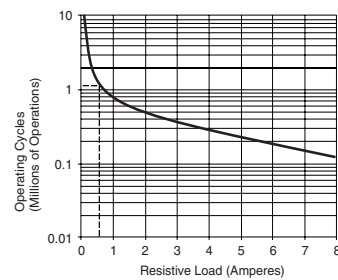
Application Data

Output Relay Specifications

Mechanical Durability ■	In millions of operating cycles	30 ■		
Current Limit Ith		8 A		
Rated Operational Limits at 70 °C Conforming to IEC 60947-5-1/1991 and VDE 0660		24 V	115 V	250 V
	AC-15	3 A	3 A	3 A
	DC-13	2 A	0.3 A	0.1 A
UL and CSA Current Ratings (NEMA/UL B300)	Resistive Rating	5 A		
	Inductive Rating	3600 VA Make Rating 360 VA Break Rating 5 A Carry		
Minimum Switching Capacity		12 V/10 mA		
Switching Voltage	Rated	250 Vac		
	Max	440 Vac		
Contact Material		Silver Nickel 90/10		

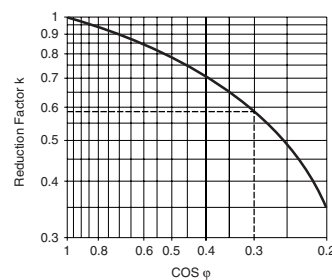
**Curve 1
AC Load**

Electrical durability of contacts on resistive load in millions of operating cycles ■

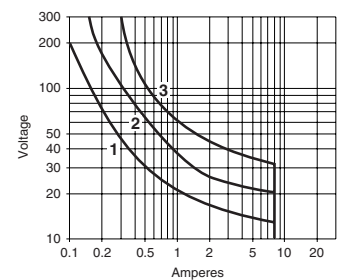


**Curve 2
▲**

Reduction factor k for inductive loads (applies to values taken from the durability curve opposite) ■



**DC Load
Load Limit Curve ■**



Example:

An LC1-F185 contactor supplied with 115 V/50 Hz for a consumption of 55 VA or a current consumption equal to 0.1 A and $\cos \phi = 0.3$.

For 0.1 A, Curve 1 indicates a durability of approximately 1.5 million operating cycles.

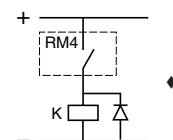
As the load is inductive, it is necessary to apply a reduction coefficient k to this number of cycles, as indicated by curve 2.

For $\cos \phi = 0.3$: $k = 0.6$

The electrical durability therefore becomes:

1.5×10^6 operating cycles $\times 0.6 = 900,000$ operating cycles.

- 1 L/R = 20 ms
- 2 L/R with load protection diode
- 3 Resistive load



■ The product life expressed above is based on average usage and normal operating conditions. Actual operating life will vary with conditions. The above statements are not intended to, nor shall they create any expressed or implied warranties as to product operation or life. For information on the listed warranty offered on this product, refer to the Square D terms and conditions of sale found in the Square D Digest.

◆ When used with a dc contactor, it is recommended that a free-wheel diode be connected in parallel on the coil.

▲ Curve 2 based on 35% power factor.



ZELIO-CONTROL™ Measurement Relays - RM4 Liquid Level Relays



RM4LG01



RM4LA32

FUNCTIONS

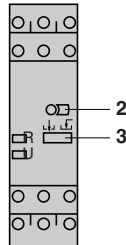
These devices monitor the levels of conductive liquids. They control the actuation of pumps or valves to regulate levels, and are also suitable for protecting submersible pumps against running empty, or protecting tanks from “overflow”. They can also be used to control dosing of liquids in mixing processes and to protect heating elements in the event of non-immersion. They have a transparent, hinged cover on the front face to prevent any accidental alternation of the settings. This cover can be sealed.

- Some compatible liquids are, but not limited to:
 - Spring, town, industrial and sea water
 - Metallic, acid or basic salt solutions
 - Liquid fertilizers
 - Non-concentrated alcohol (< 40 %)
 - Liquids in the food processing industry: milk, beer, coffee, etc.
- Some non-compatible liquids are, but not limited to:
 - Chemically pure water
 - Fuels, liquid gasses (inflammable)
 - Oil, concentrated alcohol (> 40 %)
 - Ethylene, glycol, paraffin, varnish and paints

Features

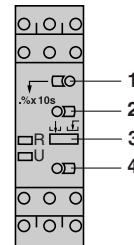
RM4LG01

Width 0.89 in (22.5 mm)



RM4LA32

Width 0.89 in (22.5 mm)



- 1 Fine adjustment of time delay (as % of maximum value of setting range).
 - 2 Fine adjustment of response sensitivity (as % of maximum value of setting range).
 - 3 Function selector switch:
empty or fill .
 - 4 Switch combining:
 - selection of the response sensitivity range
 - selection of time delay on energization or on de-energization of the relay.
- R** Yellow LED: Indicates relay state (Off for de-energized relay, On for energized relay).
- U** Green LED: Indicates that supply to the RM4 is present.

Details for Switch 3

Switch Position	Time Delay	Sensitivity
500	On-Delay	High = 500 kΩ range
500	Off-Delay	High = 500 kΩ range
50	On-Delay	Medium = 50 kΩ range
50	Off-Delay	Medium = 50 kΩ range
5	On-Delay	Low = 5 kΩ range
5	Off-Delay	Low = 5 kΩ range



ZELIO-CONTROL™ Measurement Relays - RM4
Liquid Level Relays



OPERATING PRINCIPLE



The operating principle is based on a change in the resistance measured between immersed or non immersed electrodes. Low resistance between electrodes: liquid present. High resistance between electrodes: no liquid present. The electrodes may be replaced by other sensors or probes which transmit values representing variations in resistance. The ac measuring voltage, which is < 30 V and galvanically insulated from the supply and contact circuits, ensures safe use and the absence of any electrolysis phenomena.

RM4L relays may be used:

- For detection of a liquid level, operating with 2 electrodes, one reference electrode and one high level electrode, or an LA9RM201 probe. Example: Prevention of tank overflow.
- For regulating a liquid level between a minimum and a maximum level, operating with 3 electrodes, or an LA9RM201 probe. Example: Water tower.

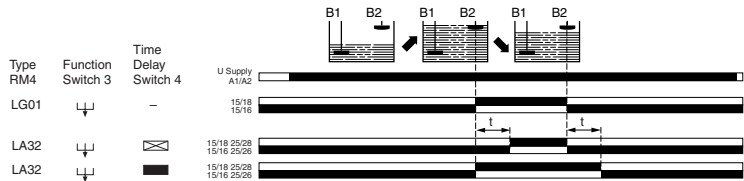
The state of the output relay can be configured:

- Empty function  : The output relay is energized when high level electrode B2 is immersed and is de-energized when low level electrode B3 is “dry” ■.
- Fill function  : The output relay is energized when the low level electrode is “dry” and is de-energized when the high level electrode is immersed ■.

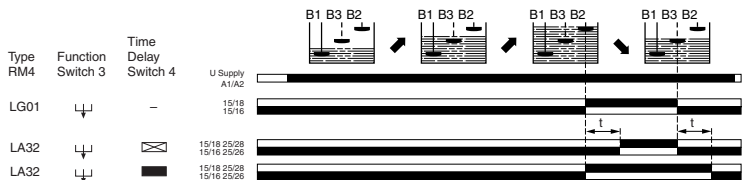
On model RM4LA32, a time delay can be set on energization or de-energization of the output relay in order to raise the maximum level (function ) or to lower the minimum level (function ) .

This function also makes it possible to avoid pulsing of the output relay (wave effect) when operating with 2 electrodes.

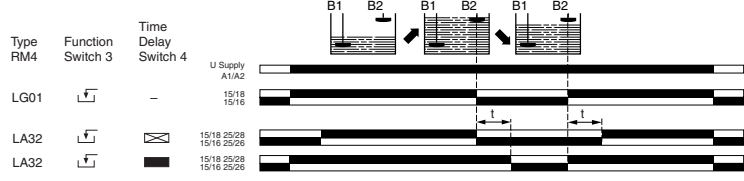
Empty Function, Maximum Level Detection (2 Electrodes or 1 Probe LA9RM201)



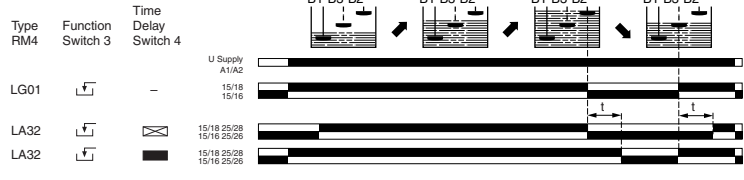
Empty Function, Regulation between a Maximum and a Minimum Level (3 Electrodes or 2 Probes LA9RM201)



Fill Function, Maximum Level Detection (2 Electrodes or 1 Probe LA9RM201)



Empty Function, Regulation between a Maximum and a Minimum Level (3 Electrodes or 2 Probes LA9RM201)







B1: Reference electrode **B2: High level electrode** **B3: Low level electrode**
■ When operating with 2 electrodes, the high level electrode performs both high and low level functions.

ZELIO-CONTROL™ Measurement Relays - RM4 Liquid Level Relays

Power Supply Circuit Specifications

Type of Relay 50/60 Hz	RM4LG01					RM4LA32				
Rated Supply Voltage (Un)	50/60 Hz Vac	24 Vac	110-130 Vac	220-240 Vac	380-415 Vac	24-240 Vac	24 Vac	110-130 Vac	220-240 Vac	380-415 Vac
	Vdc	—	—	—	—	24-240 Vdc	—	—	—	—
Average Consumption at Un	Vac	1.9 VA	2.6 VA	2.4 VA	2.9 VA	2.7 VA	3.1 VA	2.7 VA	2.6 VA	3.4 VA
	Vdc	—	—	—	—	2.4 W	—	—	—	—

Output Relay and Operating Specifications



Number of SPDT (C/O) Contacts	1 C/O	2 C/O DPDT
	 SPDT	 DPDT
Output Relay State	Can be configured by switch: empty  fill 	

Electrode Circuit Specifications ■

Sensitivity Scale	5-100 (adjustable) kΩ	0.25-5 kΩ	2.5-50 kΩ	25-500 kΩ
Maximum ac Electrode Voltage (peak to peak)	24 V	24 V		
Maximum Current in the Electrodes	1 mA	1 mA	1 mA	1 mA
Maximum Cable Capacity	10 nF	200 nF	25 nF	4 nF
Maximum Cable Length	330 ft (100 m)	3300 ft (1000 m)	330 ft (100 m)	66 ft (20 m)

Ordering Information

Liquid Level Control Relays

Time Delay	Sensitivity Scale	Width in (mm)	Output Relay	Voltage 50/60 Hz	Catalog Number	Weight lb (kg)
None	5-100 kΩ	0.87 in (22.5 mm)	1 C/O	24 Vac	RM4LG01B	0.36 lb (0.165 kg)
			 SPDT	110-130 Vac	RM4LG01F	0.36 lb (0.165 kg)
				220-240 Vac	RM4LG01M	0.36 lb (0.165 kg)
				380-415 Vac	RM4LG01Q	0.36 lb (0.165 kg)
Adjustable 0.1-10 s	0.25 -5 kΩ 2.5 -50 kΩ 25 -500 kΩ	0.87 in (22.5 mm)	2 C/O	24-240 Vac or Vdc	RM4LA32MW	0.36 lb (0.165 kg)
			 DPDT	24 Vac	RM4LA32B	0.36 lb (0.165 kg)
				110-130 Vac	RM4LA32F	0.36 lb (0.165 kg)
				220-240 Vac	RM4LA32M	0.36 lb (0.165 kg)
				380-415 Vac	RM4LA32Q	0.36 lb (0.165 kg)

Liquid Level Control Probe

Type of Installation	Maximum Operating Temperature	Catalog Number	Weight
Suspended by cable	212 °F (100 °C)	LA9RM201	0.22 lb (0.100 kg)

- The electrodes may also be incorporated in the probes. The probes are normally designed for fixing to a tank by means of a bracket with a seal (closed tanks) or suspended by their own electrical connecting cable (boreholes, etc.). See page 27 "Setting-up" Probe LA9RM201.



RM4LG01



RM4LA32



LA9RM201



ZELIO-CONTROL™ Measurement Relays - RM4

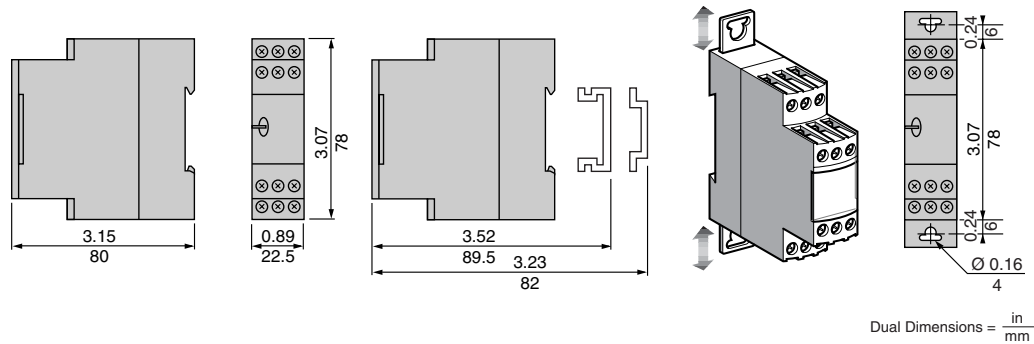
Liquid Level Relays

DIMENSIONS

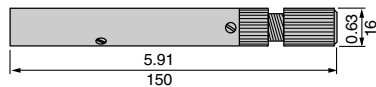
RM4LG01

Rail Mounting

Direct Mounting



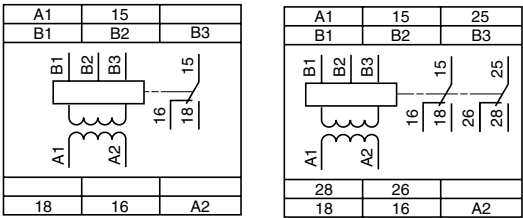
Probe LA9RM201



Wiring Connections

RM4LG01

RM4LA32



- A1-A2** Supply Voltage
- B1, B2, B3** Electrodes
(see table below)
- 15-18** 1st C/O contact
of the output relay
- 25-28** 2nd C/O contact
of the output relay

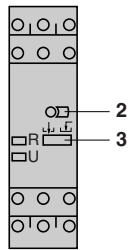
Electrode and Level Controlled

B1	Reference or tank ground electrode
B2	High Level
B3	Low Level

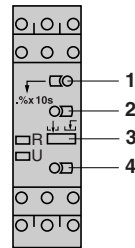


ZELIO-CONTROL™ Measurement Relays - RM4 Liquid Level Relays

Setting-Up



RM4LG01



RM4LA32

- Select the empty \downarrow /fill \downarrow function according to the sequence to be performed.
- If necessary, set potentiometer 1 to minimum (time delay).
- Set potentiometer 2 to minimum; on RM4LA select the lowest sensitivity range using potentiometer 4 (5 \boxtimes or 5 \blacksquare).
- With all the electrodes immersed, turn the sensitivity potentiometer towards maximum until the relay is energized (\downarrow function) or de-energized (\downarrow function), then exceed the threshold by about 10 % to compensate for variation in the supply voltage.
- If the relay is not able to energize, a higher sensitivity scale must be used (selector 4 on RM4LA32) or relay RM4LG must be replaced by an RM4LA32 relay and the adjustment procedure must be started again.
- Then check that the relay de-energizes (\downarrow function) or energizes (\downarrow function) as soon as electrodes B3 and B2 are out of the liquid. If the relay does not de-energize, select a lower sensitivity scale.
- The electrode connection point must be protected against corrosion. In areas where thunderstorms are likely to occur, measures must also be taken to protect the electrode lines.

NOTE: The high level can be raised by means of the adjustable time delay from 0.1 to 10 seconds with function \boxtimes . The low level can be lowered by means of this same time delay with function \blacksquare .

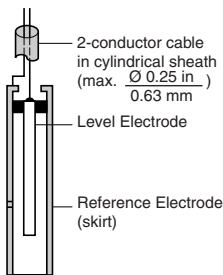
Probe LA9RM201

This probe is of the “suspended” type. It is coaxial, i.e. in addition to the normal (central) electrode, the stainless steel skirt can also act as ground (reference) electrode, which means that there is no need to install a separate reference probe. In this way, for controlling one level, only one probe is required instead of 2; for controlling 2 levels, only 2 probes are required instead of 3.

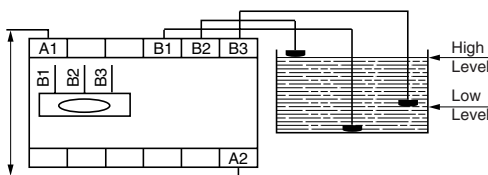
The connecting cable must be of the “2-conductor” type, with common cylindrical PVC sheath, having a maximum diameter of 0.25 in (6.3 mm). The skirt also acts as a “calming chamber”, so avoiding inaccuracy due to an agitated surface of the liquid (waves).

Maximum operating temperature: 212 °F (100 °C).

Probe LA9RM201 can also be fixed on various containers (cisterns, tanks,...) by means of a bracket or other suitable fixing device.



Connection Examples Control by Electrodes



Control by Probes

