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Level control relays LVM series

Lovato electric

100% electricity

General application provisions

Sensitivity adjustment

In applications for water level control, as in the case of drinking, well, waste or river water, the sensitivity value is usually set at 6-8kΩ. For rain or condensed water, distilled water excluded, sensitivity is instead adjusted at 15-25kΩ.

For the correct operation of the level relay, it is good practice to regulate the sensitivity at a value slightly higher than the actual liquid resistivity to control.

Stray electrode-cable capacitance

When there is a need for high sensitivity adjustment, it is recommended to use cables with low stray (parasite) capacitance and reduce the cable length as much as possible.

Harmful effects of stray capacitance reduce variability of the probe signal, in that the higher the capacitance the higher the liquid resistivity becomes.

If the difference between a wet and a no longer wet probe is quite minimal, the level relay may not be capable of discriminating the two conditions.

In applications where the electrode cables are significantly long and the liquid to control is highly resistive, i.e. low conductivity, it is advisable to use the LVM40 level relay. It comprises a special probe signal detection circuit, which offsets the harmful effects of cable capacitance.

Fail-safe operation

For pump control, the LVM series provides for the use of a normally open (N/O) contact for both the empytying and filing functions.

This denotes the relay will not make any unrequired operation should the level relay be inadvertently de-energised and at the power up, this will also avoid false activations. This feature is generally considered a safety factor.

Probe signal and start time delay

The time delay for the probe signal is used when there is liquid motion and the level control must be monitored when the electrode is constantly wet, as for the MAX probe, or not wet, as for the MIN probe.

The time delay for starting is mainly used to avoid frequent pump startings. This can occur in applications with two-electrode level control or when drawing from wells with unusual structure or shape.

List of various admissible liquids

Type of liquid	Resistivity [Ωcm]	Type of liquid	Resistivity [Ωcm]
Drinking water	5-10kΩ	Milk	~1kΩ
Well water	2-5kΩ	Milk serum	~1kΩ
River water	2-15kΩ	Fruit juices	~1kΩ
Rain water	15-25kΩ	Vegetable juices	~1kΩ
Waste water	0.5-2kΩ	Broths	~1kΩ
Seawater	~0.03kΩ	Wine	~2.2kΩ
Salt water	~2.2kΩ	Beer	~2.2kΩ
Natural/hard water	~5kΩ	Coffee	~2.2kΩ
Chlorinated water	~5kΩ	Soap foam	~18kΩ
Condensed water	~18kΩ		

N.B. Table resistivity is based on Ωcm values and for reference only.

Inadmissible liquids

- Demineralised water
- Deionised water
- Gasoline
- Oil
- Liquid gases
- Paraffin
- Ethylene glycol
- Paints
- High alcohol-content liquids

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Level relay for conductive liquids — LVM20

Single voltage

- Electrode inputs: COM, MIN and MAX, protected by varistors
- Adjustable sensitivity: 2.5-50kΩ
- 1 relay output with 1 8A AC1 changeover contact
- Double insulation between supply, electrodes and output relay.

Level relay for conductive liquids — LVM30

Emptying or filling functions

- Electrode inputs: COM, MIN and MAX, protected by varistors
- Adjustable sensitivity: 2.5-50kΩ
- Adjustment potentiometer for probe signal and pump start time delays
- Programmable emptying or filling functions
- 1 relay output with 2 8A AC1 changeover contacts
- Double insulation between supply, electrodes and output relay.

Level relay for conductive liquids — LVM40

Multifunction

- Electrode inputs: COM, MIN1, MIN2, MAX1 and MAX2, protected by varistors
- Adjustable sensitivity: 2.5-200kΩ; selectable full scale value: 25kΩ, 50kΩ, 100kΩ or 200kΩ
- Adjustment time delay potentiometer for probe signals.
- Adjustment time delay potentiometer for pump starting
- Probe input circuit insensitive to cable capacitance
- Indication LED for probe status
- Standard emptying and alarms
- Standard filling and alarms
- Emptying and filling with priority start-up change control
- Filling with priority start-up change control
- Well drawing and tank filling and alarms
- 1 relay output with 1 8A AC1 changeover contact for Extra MIN and Extra MAX level alarms or for pump priority starting change
- Double insulation between supply, electrodes and output relay.

Priority change relay for 2 motors — LVMP05 LVMP10

Devices to balance the number of motors startings and to optimise wear of two units – primary and stand-by

- Multivoltage (LVMP05 only)
- Simple operation and installation (LVMP05 only)
- 4 inputs for motor control; 2 for starting and 2 for stopping, protected against over voltages (LVMP10 only)
- Available 3-wire start-stop motor control to exclude control contact chattering (LVMP10 only)
- Available function usage as motor priority or stand-by change (LVMP10 only)
- Fixed delay for motor starting at power up in case of simultaneity to exclude current peaks on the supply system (LVMP10 only)
- 2 output relays each with 1 normally open 8A AC1 250VAC contact.

Lovato electric

Technical characteristics

LVM20 Level relay for conductive liquids. Single voltage.
LVM30 Level relay for conductive liquids. Emptying and filling functions.
LVM40 Level relay for conductive liquids. Multifunction.

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	LVM20	LVM30	LVM40
3 detecting electrodes (MIN, MAX and COM)	■	■	
5 detecting electrodes (MIN1, MAX1, MIN2, MAX2 and COM)			■
Sensitivity adjustment: 2.5...50kΩ	■	■	
Sensitivity adjustment: 2.5...200kΩ			■
Adjustable sensitivity full-scale value: 25-50-100-200kΩ			■
Separate sensitivity adjustment of MAX probe (foam detection)			■
Emptying function and alarm		■	■
Filling function and alarm		■	■
Emptying function with Extra MIN and/or Extra MAX alarm relay			■
Filling function with Extra MIN and/or Extra MAX alarm relay			■
Emptying function with pump start change control			■
Filling function with pump start change control			■
Tank filling and well drawing and alarm			■
Filling-emptying adjustment selector		■	
5 function adjustment selector			■
1 relay output with 1 changeover contact (NO/NC): 8A AC1 250VAC or 1.5A AC15 240VAC	■		
1 relay output with 2 changeover contacts (each NO/NC): 8A AC1 250VAC or 1.5A AC15 240VAC		■	
2 relay outputs of which one with 1 changeover contact and the other with 1 normally-open (N/O) contact: 8A AC1 250VAC or 1.5A AC15 240VAC			■
Double insulation between supply, electrodes and output relay	■	■	■
Fixed probe signal time delay: <1sec	■		
Probe signal delay adjustment: 1...10sec			■
Pump starting delay adjustment: 0...30min			■
Time delay adjustment for probe signal: 1...10s or for pump starting: 0...300sec		■	
Probe cable capacitance insensitivity			■
Red indication LEDs for output relay status	■	■	■
Green indication LED for power on	■	■	■
Red indication LEDs for electrode status			■
Terminals 4.0 mm^2 12 AWG	■	■	■
Operating ambient temperature: -20...+60°C	■	■	■
Degree of protection on front: IP40	■	■	■

LVMP05 Priority change relay for 2 motors.
LVMP10 Priority change relay for 2 motors and stand-by motors controls.

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	LVMP05	LVMP10
2 relay outputs, each with 1 normally open (N/O) contact: 8A AC12 250VAC or 1.5 AC15 240VAC	■	■
Green indication LED for power on	■	■
Red indication LEDs for relay status	■ (n°1)	■ (n°2)
Terminals 4.0 mm^2 12 AWG	■	■
Operating ambient temperature: -20...+60°C	■	■
Degree of protection on front: IP40	■	■
Motor start change	■	
Motor start change and stand-by motor controls		■

How to order

Lovato electric

Level relays

Priority change relay for 2 motors

Order code	Supply voltage 50/60Hz	Output relay	Qty per pkg.	Weight
	[V]	⅂'	n°	[kg]
LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
LVM20 A024	24VAC	1 changeover	1	0.220
LVM20 A127	110-1127VAC	1 changeover	1	0.220
LVM20 A240	220-240VAC	1 changeover	1	0.220
LVM20 A415	380-415VAC	1 changeover	1	0.220
LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
LVM30 A240	24/220-240VAC	2 changeover	1	0.300
LVM30 A415	110-127/380-415VAC	2 changeover	1	0.300
LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
LVM40 A024	24VAC	1 changeover+1NO	1	0.260
LVM40 A127	110-127VAC	1 changeover+1NO	1	0.260
LVM40 A240	220-240VAC	1 changeover+1NO	1	0.260
LVM40 A415	380-415VAC	1 changeover+1NO	1	0.260
PRIORITY CHANGE RELAY FOR 2 MOTORS				
LVMP05	24-48VDC/24-240VAC	2NO	1	0.060
LVMP10 A024	24VAC	2NO	1	0.250
LVMP10 A127	110-127VAC	2NO	1	0.250
LVMP10 A240	220-240VAC	2NO	1	0.250
LVMP10 A415	380-415VAC	2NO	1	0.250

Certifications and compliance

Certifications obtained: cULus; EZU (LVM20 only).
Compliant with standards: IEC/EN 60255-6; IEC/EN 61000-6-2; IEC/EN 61000-6-3.

ACCESSORIES

Rod probes

Order code	Probe length	Qty per pkg.	Weight
	[mm]	n°	[kg]
FOR SCM ELECTRODE			
31 ASTA 460 MM4	460	1	0.045
31 ASTA 960 MM4	960	1	0.093
FOR PS3S ELECTRODE HOLDER			
31 ASTA 460 MM6	460	1	0.100
31 ASTA 960 MM6	960	1	0.210

Level detection electrodes and electrode holders for conductive liquids

SN1
SCM
CGL
PS

Order code	Rod Probe included	Probe length	Qty per pkg.	Weight
		[mm]	n°	[kg]
ELECTRODE WITH 1 PROBE				
11 SN1	yes	10	10	0.050
31 SCM 04	yes	40	1	0.065
31 SCM 50	yes	500	1	0.116
31 SCM 100	yes	1000	1	0.151
31 CGL125 3	yes	300	1	0.128
31 CGL125 5	yes	500	1	0.174
31 CGL125 7	yes	700	1	0.330
31 CGL125 10	yes	1000	1	0.452
ELECTRODE WITH 3 PROBES				
31 PS31	yes	300	1	0.117
ELECTRODE HOLDER FOR 3 ROD PROBES				
31 PS3S	no	—	1	0.210

SINGLE PROBE ELECTRODE, SN1 TYPE
It is a single-pole electrode used for level control in wells or storage tanks,
It comprises an AISI 303 stainless steel probe, a plastic PPOX holder and a cable gland.
A seal ring and the tightening of the cable gland prevent water from entering the cable terminal connector and from causing its oxidation.
The external cable diameter must be 2.5 to 6mm to warrant perfect sealing of the PG7 gland.
Maximum operating ambient temperature: +60°C.
Maximum conductor section: 2.5mm^2, AWG12.
Application: Tanks and deep wells.

SINGLE-PROBE ELECTRODE, SCM TYPES
It is a single-pole electrode used for level control on boilers, autoclaves and in general where pressure, 10bar maximum, and high temperature, +100°C maximum, are present.
It comprises an AISI 303 stainless steel probe embedded in an alumina-oxide body and a 3/8" GAS threaded metal support holder.
Application: Tanks, pressurised tanks and boilers.

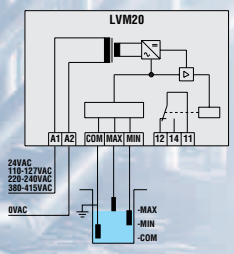
SINGLE-PROBE ELECTRODE, CGL125 TYPES
It is a single-pole electrode with AISI 302 probe, used for level control on boilers and autoclaves and in general wherever pressure is up to 10bar maximum.
Maximum ambient operating temperature: +180°C.
Fixing: 3/8" GAS threaded metal holder.
Application: Tanks, pressurised tanks and boilers.

THREE-PROBE ELECTRODE, PS31 TYPE
It is a small electrode holder, complete with three AISI 304 stainless steel probes.
Particularly suited to small containers whenever pressure is up to maximum 2bar and temperature +70°C.
Fixing: 1/2" GAS threaded plastic holder.
Cable connection termination: Faston tabs included.
Application: Tanks and automatic dispensers.

ELECTRODE HOLDER, PS3S TYPE
It is a thermoset resin electrode holder to be used with three probes, rod probes to be purchased separately, and complete with terminal cover.
Maximum ambient operating temperature: +100°C.
Fixing: 2" GAS threaded plastic holder.
Application: Tanks.

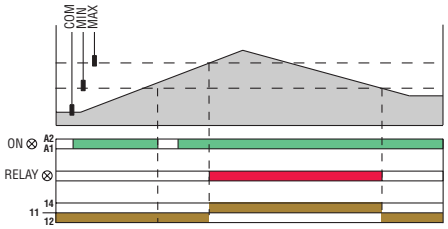
Operating diagrams

LVM20

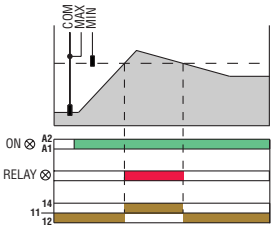


Note:
When a tank of conductive material is used, "COM" terminal can be directly connected to the tank.

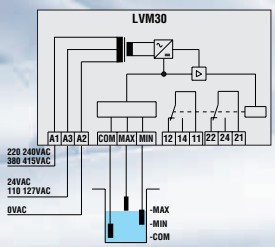
Operation with 3 level electrodes
When the liquid level wets the MAX electrode, the output relay energises and activates the emptying tank or well pump.
When the liquid no longer wets the MIN electrode, the pump is stopped.



Operation with 2 level electrodes
When the liquid wets the MIN electrode, the output relay energises and activates the emptying tank or well pump.
When the liquid no longer wets the MIN electrode, the pump is stopped.

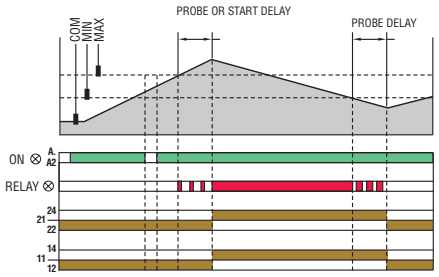


LVM30

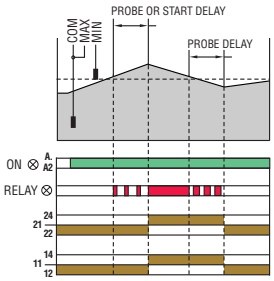


Note:
When a tank of conductive material is used, "COM" terminal can be directly connected to the tank.

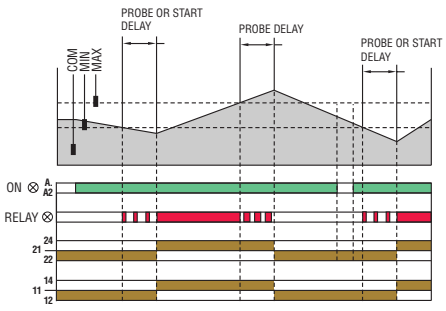
Emptying "DOWN" operation with 3 level electrodes
When the liquid level wets the MAX electrode, the output relay energises after the probe or start delay lapses and activates the emptying tank pump.
When the liquid no longer wets the MIN electrode, the pump is stopped after the probe delay, if any, has lapsed.



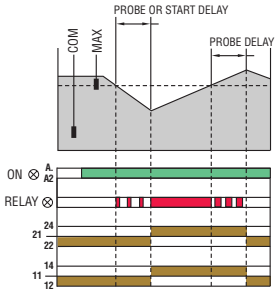
Emptying "DOWN" operation with 2 level electrodes
When the liquid level wets the MIN electrode, the output relay energises after the probe or start delay lapses and activates the emptying tank pump.
When the liquid no longer wets the MIN electrode, the pump is stopped after the probe delay, if any, has lapsed.



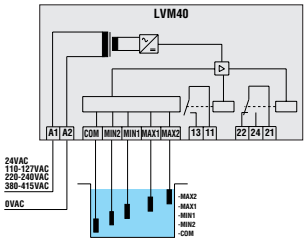
Filling "UP" operation with 3 level electrodes
When the liquid level no longer wets the MIN electrode, the output relay energises after the probe or start delay lapses and activates the filling tank pump.
When the liquid wets the MAX electrode, the pump is stopped after the probe delay, if any, has lapsed.



Filling "UP" operation with 2level electrodes
When the liquid level no longer wets the MAX electrode, the output relay energises after the probe or start delay lapses and activates the filling tank pump.
When the liquid wets the MAX electrode, the pump is stopped after the probe delay, if any, has lapsed.



LVM40

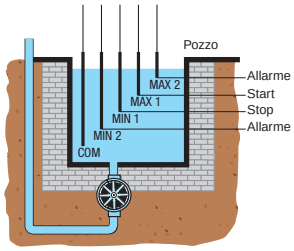


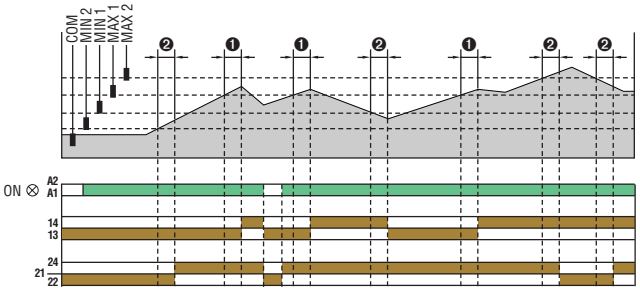
SELECTABLE FUNCTIONS

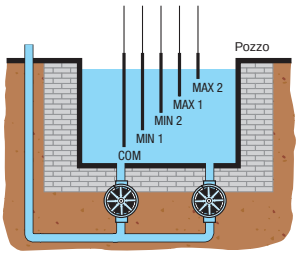
A- Emptying with MIN and/or MAX alarms.

B- Filling with MIN and/or MAX alarms.

EXAMPLE OF EMPTYNG OPERATION
To achieve this type of operation, two electrodes are used to control the liquid between the fixed limits using MIN1 and MAX1 and two alarm levels using MIN2 and MAX2.
When one of the alarm electrodes is wet, the alarm relay is de-energised.
The alarm can be caused by pump malfunction, insufficient pump delivery capacity, MAX control level failure or MIN level electrode shorted.
With a proper connection, only the MIN alarm or MAX alarm can be activated or neither of the two can be activated so the relative output contacts can be used for pump control.





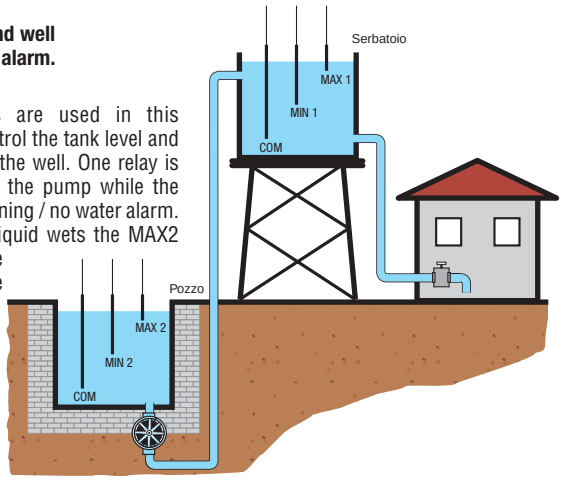


C- Emptying with pump priority change.

D- Filling with pump priority change.

EXAMPLE OF EMTYPING OPERATION
This operation is obtained by using four electrodes positioned at four different levels and two relay outputs to control two pumps.
For example, one can place the four electrodes, MIN1, MIN2, MAX1 and MAX2, in increasing order from the lowest to the highest levels and must control the tank emptying. Usually, the level is controlled between the MIN1 and MAX1 levels by starting one of the two pumps but this case is different so the pumps can be maintained at the best efficiency and optimise their wear.
When the liquid wets the MAX2 level and because the first pump is faulty or else a higher delivery capacity is needed, the second stand-by pump is activiated to back up the first pump. When the liquid lowers and no longer wets the MIN2 level, the second pump is stopped and then when the MIN1 level is no longer wet, the first pump is stopped too.

E- Tank filling and well drawing with alarm.



Two electrodes are used in this operation to control the tank level and another two for the well. One relay is used to activate the pump while the other for dry running / no water alarm.
When the well liquid wets the MAX2 level and the liquid wets the MIN1 tank level, the tank-filling pump is activated.
When the tank MAX1 level is wet, the pump is stopped.
During the tank filling, the pump could stop before the MAX1 level is wet because the well MIN2 level is no longer wet.
Should the tank MIN1 level no longer be wet at which the pump should restart but the well MIN2 level is also no longer wet, then the alarm relay is de-energised.

DIFFERENTIATED SENSIVITY OF MAX ELECTRODES (LVM40 ONLY). The sensitivity of the MAX electrodes can be regulated at a higher value than the MIN one to provide optimised level detection of foaming liquids and avoid in this way problems with overflowing.

Dimensions [mm]

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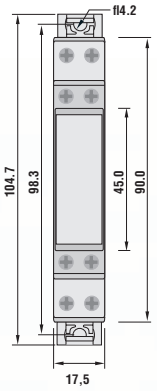
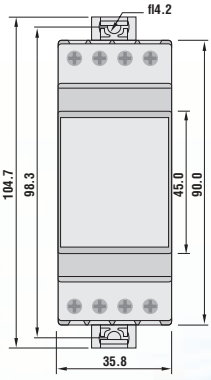
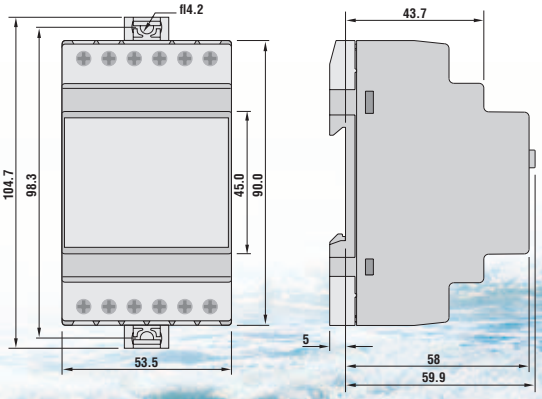
LVMP05



LVM20



LVM30 - LVM40 - LVMP10



new

2006

Prewired limit switches type KP...

Micro switches type KS...

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TM series modular time relays

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PM series protection relays

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Digital ammeter and voltmeter type DMK7... and DMK8...

Soft starters type ADX...BP

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LRD series programmable logic relays

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Planet-SWITCH

- Motor protection circuit breakers
- Switch disconnectors
- Contactors
- Motor protection relays
- Electromechanical starters
- Push buttons and selectors
- Limit, micro and foot switches
- Rotary cam switches

Planet-DIN

- Modular contactors
- Time relays
- Protection relays
- Level control relays
- Earth leakage relays

Planet-LOGIC

- Digital metering instruments and current transformers
- Soft starters
- AC motor drives
- Automatic power factor controllers
- Automatic battery chargers
- Automatic transfer switches
- Programmable logic relays

LOVATO ELECTRIC S.P.A.
CONTROL SOLUTIONS
FOR INDUSTRY

VIA DON E. MAZZA, 12
24020 GORLE (BERGAMO)
ITALY

Tel. +39 035 4282111
Fax +39 035 4282200
E-mail info@LovatoElectric.com

Sales Department:
Tel. +39 035 4282354
Fax +39 035 4282400

www.LovatoElectric.com

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