



# 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 6-8kK. For rain or condensed water, distilled water is excluded, sensitivity is instead adjusted at 15-25kK.

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 or LVM25 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 emptying and filling 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 is generally considered a safety feature.

### 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

#### Inadmissible liquids

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

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

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



**Level relay for conductive liquids**

**LVM20**

**Single voltage**

- Electrode inputs: COM, MIN and MAX, protected by varistors
- Adjustable sensitivity: 2.5-50kK
- 1 relay output with 1 changeover contact
- Double insulation between each supply, electrode and output relay circuit.



**Level relay for conductive liquids**

**LVM25**

**LVM30**

**Emptying or filling functions**

- Multivoltage: AC and DC for LVM25; AC only for LVM30
- Electrode inputs: COM, MIN and MAX, protected by varistors
- Adjustable sensitivity: 2.5-100kK for LVM25; 2.5-50kK for LVM30
- Adjustment potentiometer for probe signal and pump start time delays for LVM30 only
- Programmable emptying or filling functions
- 1 relay output with 2 changeover contacts; 1 only contact for LVM25
- Double insulation between each supply, electrode and output relay circuit.



**Level relay for conductive liquids**

**LVM40**

**Multifunction**

- Electrode inputs: COM, MIN1, MIN2, MAX1 and MAX2, protected by varistors
- Adjustable sensitivity: 2.5-200kK; selectable full scale value: 25kK, 50kK, 100kK or 200kK
- 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 N/O contact
- 1 relay output with 1 changeover contact for Extra MIN and Extra MAX level alarms or for pump priority starting change
- Double insulation between each supply, electrode and output relay circuit.



**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

For LVMP05 only:

- Multivoltage
- Simple operation and installation.

For LVMP10 only:

- 4 inputs for motor control; 2 for starting and 2 for stopping, protected against over voltages

- Fixed delay for motor starting at power up in case of simultaneity to exclude current peaks on the supply system
- 3-wire start-stop motor control to exclude control contact chattering available
- Function usage as motor priority or stand-by change available.

Both with 2 output relays each with 1 normally open contact.

## Technical characteristics



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- LVM20** Level relay for conductive liquids. Single voltage.
- LVM25** Level relay for conductive liquids. Emptying and filling functions.
- LVM30** Level relay for conductive liquids. Emptying and filling functions.
- LVM40** Level relay for conductive liquids. Multifunction.

	LVM20	LVM25	LVM30	LVM40
3 detecting electrodes (MIN, MAX and COM)	■	■	■	
5 detecting electrodes (MIN1, MAX1, MIN2, MAX2 and COM)				■
Sensitivity adjustment: 2.5...50kK	■		■	
Sensitivity adjustment: 2.5...100kK		■		
Sensitivity adjustment: 2.5...200kK				■
Adjustable sensitivity full-scale value: 25-50-100-200kK				■
Separate sensitivity adjustment of MAX probe (foam detection)				■
Emptying function	■	■	■	■
Filling function		■	■	■
Emptying function with Extra MIN and/or Extra MAX alarm relays				■
Filling function with Extra MIN and/or Extra MAX alarm relays				■
Emptying function with pump start-up priority change control				■
Filling function with pump start-up priority change control				■
Tank filling, well drawing functions and alarm				■
Filling-emptying adjustment selector		■	■	
5 function adjustment selector				■
1 relay OUT with 1 changeover contact (NO/NC): rated 8A at 250VAC in AC1 or 1.5A at 240VAC in AC15	■	■		
1 relay OUT with 2 changeover contacts (each NO/NC): rated 8A at 250VAC in AC1 or 1.5A at 240VAC in AC15			■	
2 relay outputs of which one with 1 changeover contact and the other with 1 normally-open (N/O) contact: rated 8A at 250VAC in AC1 or 1.5A at 240VAC in AC15				■
Double insulation between each supply, electrode and output relay circuit	■	■	■	■
Fixed probe signal time delay: <1s	■			
Probe signal delay adjustment: 1...10s				■
Pump starting delay adjustment: 0...30min				■
Time delay adjustment for probe signal: 1...10s or for pump starting: 0...300s			■	
Stray electrode-cable capacitance insensitivity		■		■
Green indication LED for power on	■	■	■	■
Red indication LEDs for output relay status	■	■	■	■
Red indication LEDs for electrode status				■
Terminals 4.0mm <sup>2</sup> , 12AWG	■	■	■	■
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.

	LVMP05	LVMP10
Motor start-up priority change	■	
Motor start-up priority change and stand-by motor controls		■
2 relay OUT, each with 1 normally open (N/O) contact: rated 8A at 250VAC in AC1 or 1.5A at 240VAC in AC15	■	■
Green indication LED for power on	■	■
Red indication LEDs for relay status	■ (n°1)	■ (n°2)
Terminals 4.0mm <sup>2</sup> , 12AWG	■	■
Operating ambient temperature: -20...+60°C	■	■
Degree of protection on front: IP40	■	■

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# How to order



## Certifications and compliance

Certifications obtained:  
cULus, GOST.

Compliant with standards:

IEC/EN 60255-6;  
IEC/EN 61000-6-2;  
IEC/EN 61000-6-3.

### Level relays



**LVM20**



**LVM25**  
**LVM30**



**LVM40**

### Priority change relay for 2 motors



**LVMP05**  
**LVMP10**

### Kit complete with relay and electrodes



**LVMKIT25**

Order code	Supply voltage 50/60Hz	Output relay contacts	Qty per pkg	Weight
	[V]	4'	n°	[kg]

LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
<b>LVM20 A024</b>	24VAC	1 changeover	1	0.220
<b>LVM20 A127</b>	110-1127VAC	1 changeover	1	0.220
<b>LVM20 A240</b>	220-240VAC	1 changeover	1	0.220
<b>LVM20 A415</b>	380-415VAC	1 changeover	1	0.220

LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
<b>LVM25 240</b>	24-240VAC/DC	1 changeover	1	0.090
<b>LVM30 A240</b>	24/220-240VAC	2 changeover	1	0.300
<b>LVM30 A415</b>	110-127/380-415VAC	2 changeover	1	0.300

LEVEL RELAY FOR CONDUCTIVE LIQUIDS				
<b>LVM40 A024</b>	24VAC	1 changeover+1 NO	1	0.260
<b>LVM40 A127</b>	110-127VAC	1 changeover+1 NO	1	0.260
<b>LVM40 A240</b>	220-240VAC	1 changeover+1 NO	1	0.260
<b>LVM40 A415</b>	380-415VAC	1 changeover+1 NO	1	0.260

PRIORITY CHANGE RELAY FOR 2 MOTORS				
<b>LVMP05</b>	24-48VDC/24-240VAC	2 NO	1	0.090
<b>LVMP10 A024</b>	24VAC	2 NO	1	0.250
<b>LVMP10 A127</b>	110-127VAC	2 NO	1	0.250
<b>LVMP10 A240</b>	220-240VAC	2 NO	1	0.250
<b>LVMP10 A415</b>	380-415VAC	2 NO	1	0.250

Order code	Description	Qty per pkg	Weight
		n°	[kg]
<b>LVMKIT25</b>	Level relay LVM25 240 + n. 2 SN1 electrodes with 1 probe each	1	0.190

## ACCESSORIES

### Rod probes

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

### Level detection electrodes and electrode holders for conductive liquids

Order code	Rod Probe included	Probe length	Qty per pkg	Weight
		[mm]	n°	[kg]
ELECTRODE WITH 1 PROBE				
<b>11 SN1</b>	yes	10	10	0.050
<b>31 SCM 04</b>	yes	43	1	0.065
<b>31 SCM 50</b>	yes	500	1	0.116
<b>31 SCM 100</b>	yes	1000	1	0.151
<b>31 CGL125 3</b>	yes	327	1	0.128
<b>31 CGL125 5</b>	yes	500	1	0.174
<b>31 CGL125 7</b>	yes	700	1	0.330
<b>31 CGL125 10</b>	yes	1000	1	0.452
ELECTRODE WITH 3 PROBES				
<b>31 PS31</b>	yes	300	1	0.117
ELECTRODE HOLDER FOR 3 ROD PROBES				
<b>31 PS3S</b>	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<sup>2</sup>, 12AWG.

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 10 bars 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 2 bars maximum.

Maximum operating ambient 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.

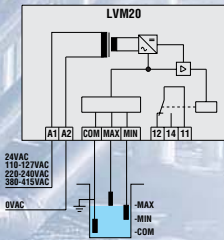
Maximum ambient operating temperature: +100°C.

Fixing: 2" GAS threaded plastic holder.

Application: Tanks.



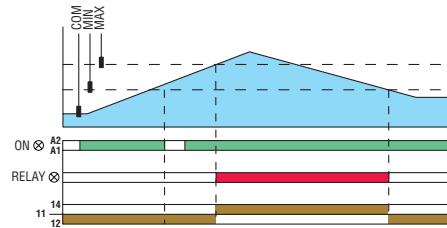
## LVM20



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

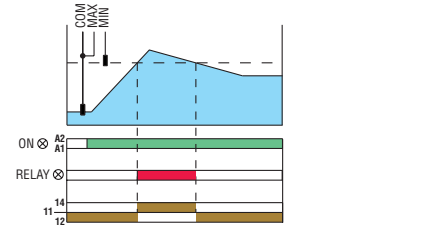
### Operation with 3 level electrodes

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.

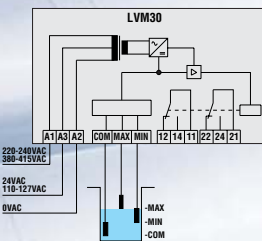
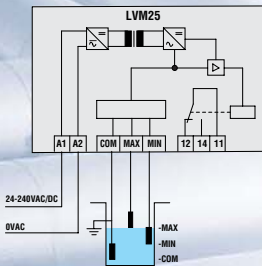


### Operation with 2 level electrodes

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.



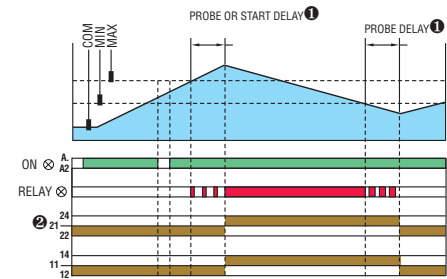
## LVM25-LVM30



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

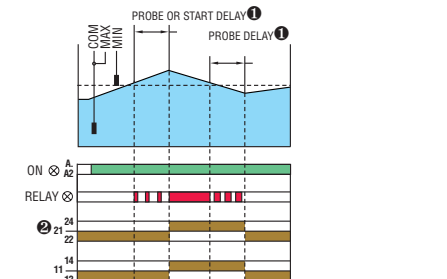
### Emptying "DOWN" operation with 3 level electrodes

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.



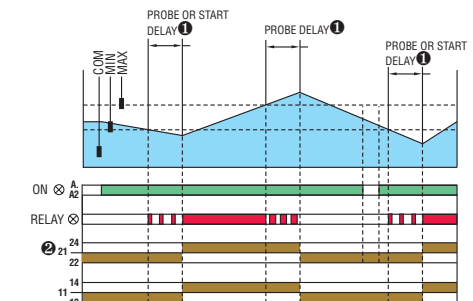
### Emptying "DOWN" operation with 2 level electrodes

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.



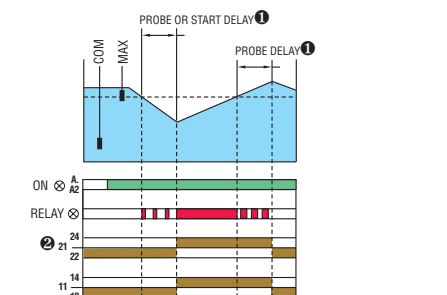
### Filling "UP" operation with 3 level electrodes

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.



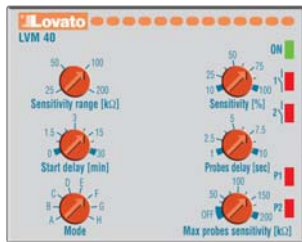
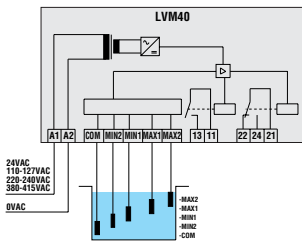
### Filling "UP" operation with 2 level electrodes

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.



① Delay for LVM30 only.  
② Changeover contact for LVM30 only.

### LVM40



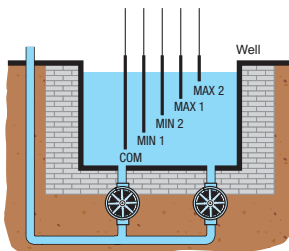
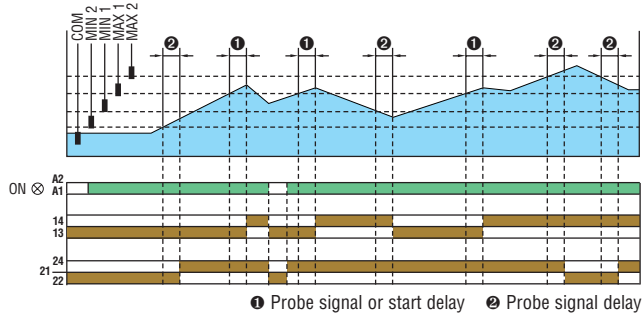
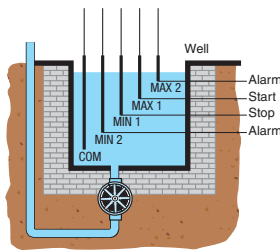
### SELECTABLE FUNCTIONS

**A- Emptying with MIN and/or MAX alarms.**

**B- Filling with MIN and/or MAX alarms.**

**EXAMPLE OF EMPTYING 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.



### SELECTABLE FUNCTIONS

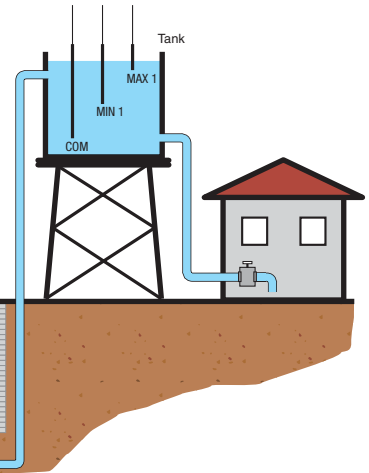
**C- Emptying with pump priority change.**

**D- Filling with pump priority change.**

### SELECTABLE FUNCTIONS

**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.



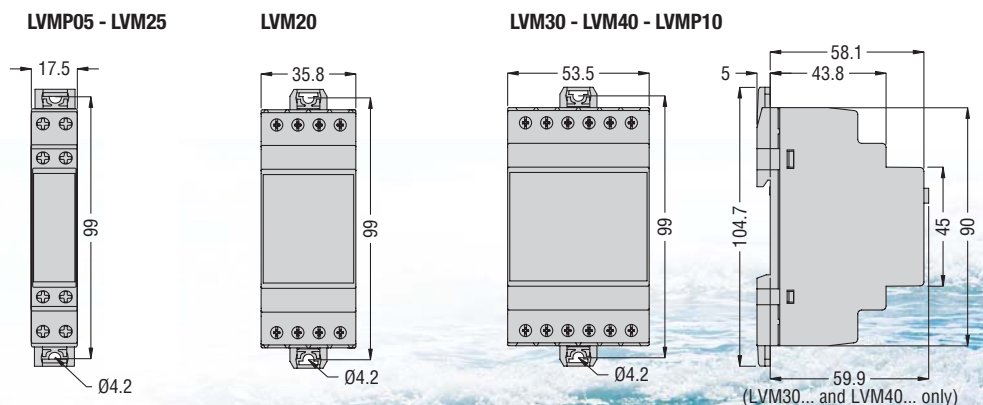
During the tank filling, the pump could stop before the MAX1 level is wet because the well MIN2 level is no longer wet. Should the tank MIN1 level no longer be wet at which the pump should restart but the well MIN2 level is also no longer wet, then the alarm relay is de-energised.

### EXAMPLE OF EMPTYING 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 activated 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.

**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]



**new**  
**2009**



Switch disconnectors  
16 to 1250A



Contactors



Signal towers and beacons



Digital multimeters and  
power analyzers DMG series



Automatic transfer switch controllers  
ATL 10 type

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**electric**  
100% electricity

**PLANET Switch**

- Motor protection circuit breakers
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- Motor protection relays
- Electromechanical starters
- Control and signalling units
- Limit, micro and foot switches
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**PLANET Din**

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

**PLANET Logic**

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