

**CONFIGURATION HANDBOOK**

**RPL23**  
**RPL23uC**  
**RPL23peak**  
**RPL23Ho**



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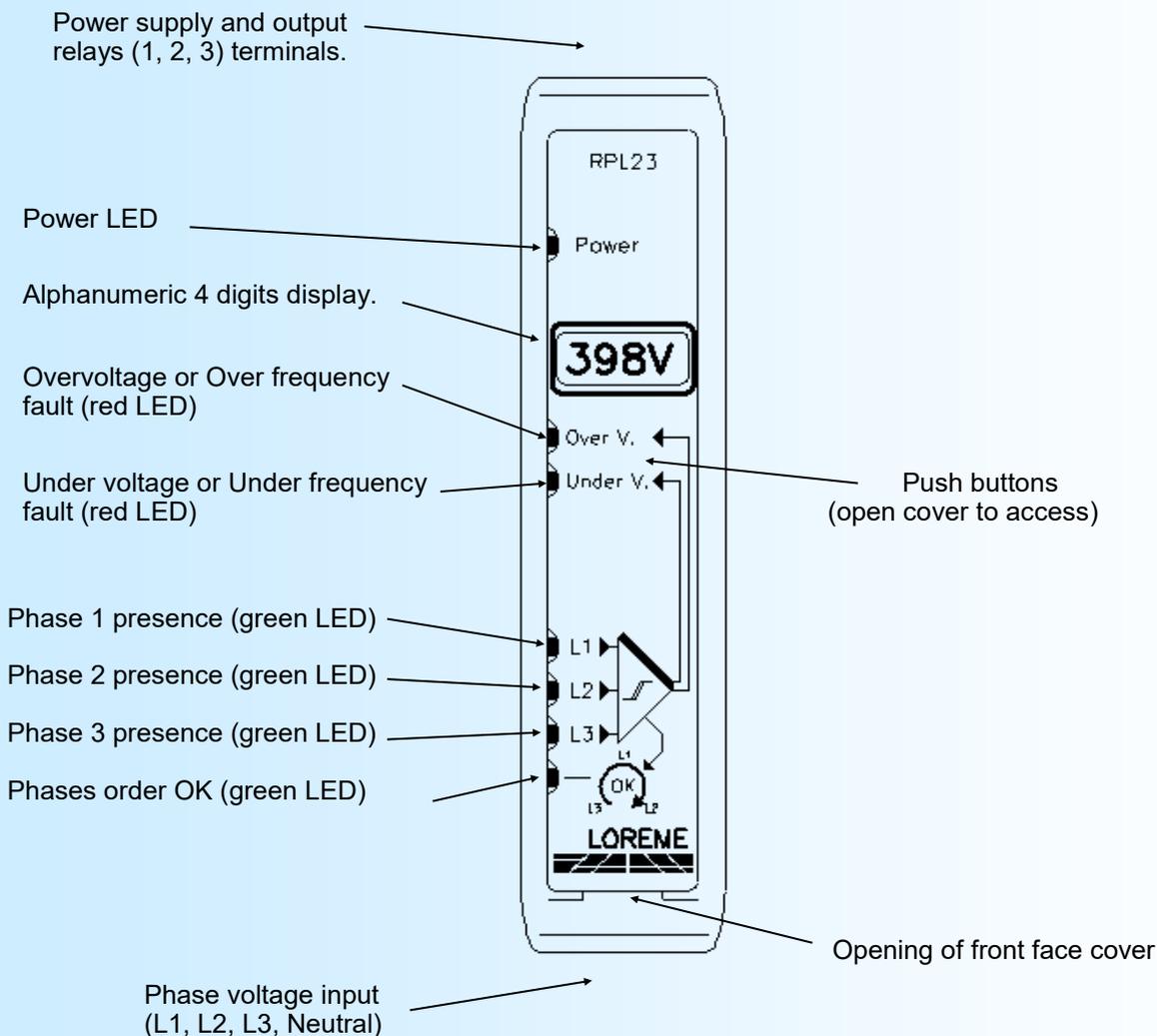
## Device Presentation

RPL23 monitoring relay allow to detect overvoltage, under voltage, over frequency, under frequency, asymmetry, phase failure of a three-phase or a single phase low voltage or high voltage network, plus phase order on a three-phase network.

### Characteristics:

- Line voltage monitoring with or without neutral of three phase network, single phase network or continuous (DC) voltage.
- Versatile auxiliary power supply.
- 2 alarm relays in case of overvoltage, under voltage, phase asymmetry and over/under frequency.
- 1 phase order monitoring relay (only present if option /Po).
- Response time of alarm relay adjustable up to 600 seconds.
- Alarm memorization (HOLD function).
- Fault indication by falling output relay.
- Power supply voltage LED.
- Faults LEDs : phases sequence error, under/over voltage, under/over frequency, phase failure.
- Alphanumeric 4 digits display for measures visualization and device configuration.
- 2 push buttons for device configuration and for acknowledge a memorized failure.

The technical data sheet is downloadable here: [http://www.loreme.fr/fichtech/RPL23\\_eng.pdf](http://www.loreme.fr/fichtech/RPL23_eng.pdf)



## Operating

The RPL23 continuously measures L1, L2 and L3 voltages on three-phase networks or L1/N voltage on single phase networks or the continuous DC voltage between L1 & L2. Then it enable or disable its internal components, depending of configured alarms and detected faults.

### In normal three-phase operation:

- LEDs L1, L2, L3 are lit, indicating the presence of the 3 phases (Lx LED is off in case of phase failure).
- "Over V." and "Under V." LEDs are off.
- Phases sequence LED is on (correct phase order).
- C1/T1 and/or C2/T2 (C3/T3 in option) contacts are closed.
- **The mean value of the 3 RMS star input voltages is displayed.**

### In normal single phase AC or DC voltage operation:

- L1 LED is lit, L2, L3 LEDs are off.
- "Over V." and "Under V." LEDs are off.
- Phases order LED is off.
- C1/T1 and/or C2/T2 contacts are closed.
- **The L1/N RMS input voltage or the DC voltage is displayed.**

### In case of overvoltage, over frequency (AC voltage) and/or under voltage, under frequency (AC voltage):

- "Over V. " and/or "Under V." LEDs are lit.
- For a over/under voltage alarm, Lx LED of phase failure is blinking.
- For a over/under frequency alarm, Lx LED of phase failure is lit fixed.
- C1/T1 and/or C2/T2 contacts are open.
- The overvoltage / under voltage level which trig the alarms is viewed on display : +10% or -6% (max +/- 99%).  
In the event of an over / under frequency alarm, the device continue to display the voltage measurement.

### In case of asymmetry alarm (three-phase only):

- "Over V. ", "Under V." , L1, L2 and L3 LEDs are blinking synchronously.
- C1/T1 and/or C2/T2 relays contacts are open.
- The asymmetry level which trig the alarms is viewed on display : #10% (max = #99%).

### In case of reverse phases order detection (three-phase only):

- Phases order LED is off (with or without /Po option).
- C3/T3 relay contact is open (only if /Po option).

## Configuration

The RPL23 is entirely configurable in front face. Configuration access is done by pressing the top button. For each configuration rubric, a message scrolls on display. The top button (<YES>) allow to access to parameters setting of a relay or validate the corresponding function. The bottom button (<NO>) allow to switch to the next rubric or disable the corresponding function.

When setting a parameter value, the top button allow to increment and the bottom button to decrement the value. While setting, the display is blinking. Leaving the setting is automatic if no button is pressed for more than 4 seconds.

At the end of configuration, the message "OK !" is displayed and all parameters are memorized.

Configurable parameters are:

- Choice of AC or DC voltage measurement.
- Network type, single phase or three phases.
- Nominal line voltage (star voltage in three phases, L1/N voltage in single phase AC or L1/L2 voltage in DC).
- Associate alarms to relay 1 and 2.
- Activation and deactivation delays for relay 3 (phase order).

For each relay, it is possible to configure:

- Under voltage, overvoltage, asymmetry (three phases) and under/over frequency (AC) thresholds and activation/ deactivation delays.
- Enabling / disabling the 'HOLD' function (alarm memorised).

**Notes:** When "HOLD" function is activated, the alarm is memorized, 2 conditions are necessary to disable it:

- Make disappear the default that caused the alarm.
- Push the alarm acknowledge button (bottom button). A bip confirms the acknowledge.

*The configured relay delays are added to the measure response time witch is approximately 400 ms.*

### 1) Network parameters

Display message: **NETWORK (Y/N)?**

The top button allow access to configuration of the network parameters, the bottom button allow to move to the nominal voltage rubric.

#### 1.1) Alternative voltage measurement (AC)

Display message: **AC VOLTAGE (Y/N)?**

The top button validates the choice, the bottom button toggles to the DC voltage choice.

#### 1.2) Continuous voltage measurement (DC)

Display message: **DC VOLTAGE (Y/N)?**

The top button validates the choice, the bottom button toggles to the AC voltage choice.

#### **Note:**

*If the user has selected the continuous mode (DC), the three phases / single phase rubrics are no longer accessible. In this mode the device measures the continuous voltage present between L1 and L2 or L1 and N (see wiring p11).*

#### 1.3) Three phase network

Display message: **THREE PHASES (Y/N)?**

The top button validates the choice, the bottom button toggles to the single phase choice.

#### 1.4) Single phase network

Display message: **SINGLE PHASE (Y/N)?**

The top button validates the choice, the bottom button toggles to the three phases choice.

### 2) Nominal voltage

Display message: **NOMINAL VOLTAGE**

The value can be set between 50V (high voltage version) or 12 V (low voltage version) and 1600 V.

### 3) Relay #1

Display message: **RELAY #1 (Y/N)?**

The top button allows access to configuration of relay 1, the bottom button allows to move to the relay 2 rubric.

#### 4) **Relay #2**

Display message: **RELAY #2 (Y/N)?**

The top button allows access to configuration of relay 2, the bottom button allows to move to the relay 3 rubric.

#### 5) **Configurable alarms parameters for the relays**

##### 5.1) **Under voltage alarm**

Display message: **UNDERVOLTAGE CONFIG. (Y/N)?**

The top button allows access to configuration, the bottom button allows to move to the next rubric.

Displayed message: **THRESHOLD**

Threshold setting from 0 to -99%, 'No' to disable the under voltage detection.

The minimum measured voltage is 10 V (high voltage version) or 2.5V (low voltage version). Beneath this value, the measured voltage is zero. The voltages are given between phase and neutral.

**Note:** *If the threshold is set to -99 %, they will be no undervoltage detection.*

Displayed message: **ACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

Displayed message: **DEACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

##### 5.2) **Overvoltage alarm**

Display message: **OVERVOLTAGE CONFIG. (Y/N)?**

The top button allows access to configuration, the bottom button allows to move to the next rubric.

Displayed message: **THRESHOLD**

Threshold setting from 0 to 99%, 'No' to disable the overvoltage detection.

**Note:** *If the threshold is set to 99 %, they will be no overvoltage detection.*

Displayed message: **ACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

Displayed message: **DEACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

##### 5.3) **Phase asymmetry alarm**

Display message: **ASYMMETRY CONFIG. (Y/N)?**

The top button allows access to configuration, the bottom button allows to move to the next rubric.

Displayed message: **THRESHOLD**

Threshold setting from 0 to 99%, 'No' to disable the asymmetry detection.

**Note:** *If the threshold is set to 99 %, they will be no asymmetry detection.*

Displayed message: **ACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

Displayed message: **DEACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

##### 5.4) **Under frequency alarm**

Display message: **UNDERFREQUENCY CONFIG. (Y/N)?**

The top button allows access to configuration, the bottom button allows to move to the next rubric.

Displayed message: **THRESHOLD**

Threshold setting from 70 Hz to 5 Hz, 'No' to disable the under frequency detection.

Displayed message: **ACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

Displayed message: **DEACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600 s.

**5.5) Over frequency alarm**

Displayed message: **OVERFREQUENCY CONFIG. (Y/N)?**

The top button allows access to configuration, the bottom button allows to move to the next rubric.

Displayed message: **THRESHOLD**

Threshold setting from 5 Hz to 70 Hz, 'No' to disable the over frequency detection.

Displayed message: **ACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600s.

Displayed message: **DEACTIVATION DELAY**

Delay setting from 0 to 600 s by 0,2 s steps between 0 and 100 s and 1 s up to 600s.

**5.6) HOLD function**

Displayed message: **HOLD (Y/N)?**

Press the <YES> button to enable the alarm memory function.

Press the <NO> button to disable the alarm memory function.

**6) Relay #3 (phase order alarm for three phases network)**

Displayed message: **RELAY #3 (Y/N)?**

The top button allow access to configuration of relay 3, the bottom button leaves the configuration.

The configurable parameters are the alarm activation and deactivation delays. The relay is in alarm if the phase order is not correct and is out of alarm if the phase order is ok.

**7) Special functions**

Displayed message: **SPECIAL FUNCTIONS (Y/N)?**

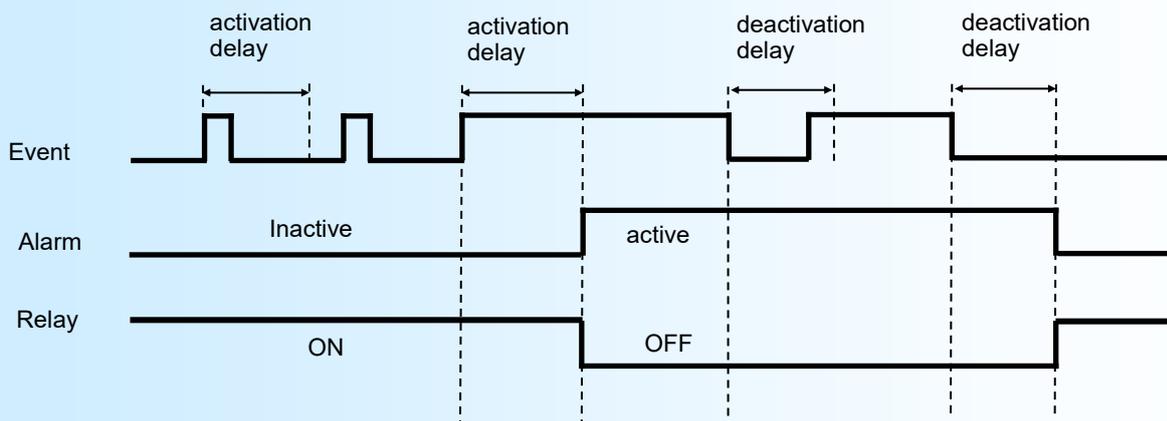
In this section the user can activate or deactivate the over/undervoltage alarm detection on the average of the 3 phases. If the function is active, the average value of the 3 single voltages of the three-phase network is used to determine over-voltage and undervoltage alarms.

Displayed message: **ALARMS ON AVERAGE VOLTAGE (Y/N)?** .The top button activate the function, the bottom button deactivate it.

At end of the configuration, the device saves the configured parameters and displays the message "OK!".

**8) Activation and deactivation delay chronograms**

- Default factory settings :*
- Three phase network.
  - Nominal voltage: 398 V (High Voltage) or 99 V (Low Voltage).
  - For all threshold : 20%, No over/under frequency detection.
  - All delays are set to 1 s.
  - « HOLD » function enabled.
  - Alarms on average voltage deactivated.



### 9) RPL23uC features

The RPL23uC can detect micro breaks on a single or three phase network. It has two output relays which operates in opposition.

Relay 1 is inactive and relay 2 active during normal operation.

Relay 1 is active and relay 2 is inactive in micro breaks detection.

A RPL23uC configurable parameters are:

- The nominal L/N voltage from 30 V to 600 V.
- The type of network, single or three phase.
- The micro breaks detection threshold from 0 to -70% of the nominal voltage.
- The activation delay from 0 to 5 s in 0.02 s steps.
- The deactivation delay from 0 to 600 s in 0.1 s steps from 0 to 99.9 s and 1 s steps from 100 s to 600 s.

### 10) RPL23peak features

The RPL23peak detects peak voltage overshoots on its three input voltage. It is fitted with two individual alarms independently configurable relays. The relays operates in negative security, i.e. that they are excited when alarm is off. On the front panel, the unit displays the max peak line voltage with a refresh delay of 2 seconds.

In alarm state:

- The value of the peak voltage which trigger the alarm status is stored and remains until its deactivation.
- The red LED R1 and/or R2 is lit to indicate the status of the alarm relay.
- The green LED L1, L2, L3 lights to indicate the phase on witch has occur the peak.

The configurable relay settings are:

- The peak detection threshold.
- The activation delay, configurable from 1 to 5 ms in 1 ms steps.
- The deactivation delay, configurable from 0.1 to 600 s in 0.1 s steps from 0 to 99.9 s and 1 s steps from 100 to 600 s.

To access the configuration just press the top button.

The message **RELAY #1?** is displayed.

The top button (<YES>) provides access to its configuration, the bottom button (<NO>) jump to the relay 2 rubric.

For the threshold access setting, the message displayed is:

**PEAK VOLTAGE THRESHOLD?**

For the activation/deactivation delays access setting the messages are:

**ACTIVATION DELAY?**

**DEACTIVATION DELAY?**

The top button (<YES>) provides access to the configuration of the parameter, the bottom button (<NO>) jump to the next rubric. In the case of <YES> choice , the actual parameter value is displayed and blinks. The buttons (up/down) permits to increment/decrement the value. The value is validated after a delay of 4 seconds when no buttons is pressed.

The default detection factory settings for the 2 relays are:

- Threshold = 0.7 \* Input caliber, activation delay = 2 ms deactivation delay = 10 s.

### 11) RPL23Ho features

The RPL23Ho can be used to detect earth fault voltage on a three-phase network with neutral. It is fitted with two individual alarms independently configurable relays and 1 phase order relay (**/Po** option). The relays operates in negative security, i.e. that they are excited when alarm is off. The earth fault voltage (UHo) of the network or the single voltage of phase 1 (UL1) or 2 (UL2) or 3 (UL3) can be displayed on the front panel. The displayed measurement is changed by pressing the bottom button.

In addition, various LEDs indicate the status of the device:

The LEDs "L1", "L2", "L3" are lit indicating the presence of the 3 phases (LED Lx is off in case of phase failure).

The LEDs "R1" and "R2" indicate the alarm status of relays 1 and 2 (lit in alarm, off out of alarm).

The phase order LED indicates the wiring order of the 3 phases, lit in direct order, off in reverse order (the LED is present and functional with or without the **/Po** option).

Relay 3 (phase order, only present with the **/Po** option) is activated if the phase order is direct (contacts C3/T3 closed) and deactivated if the phase order is reverse (contacts C3/T3 open).

The configurable relay 1 & 2 settings are:

- The earth fault voltage detection threshold.
- The activation delay, configurable from 0.1 to 600 s in 0.1 s steps from 0 to 99.9 s and 1 s steps from 100 to 600 s.
- The deactivation delay, configurable from 0.1 to 600 s.

The configurable relay 3 (phase order) settings are:

- The activation delay, configurable from 0.1 to 600 s in 0.1 s steps from 0 to 99.9 s and 1 s steps from 100 to 600 s.
- The deactivation delay, configurable from 0.1 to 600 s.

To access the configuration just press the top button.

The message **RELAY #1?** is displayed.

The top button (<YES>) provides access to its configuration, the bottom button (<NO>) jump to the relay 2 rubric.

For the threshold access setting, the message displayed is:

**THRESHOLD?**

For the activation/deactivation delays access setting the messages are:

**ACTIVATION DELAY?**

**DEACTIVATION DELAY?**

The top button (<YES>) provides access to the configuration of the parameter, the bottom button (<NO>) jump to the next rubric. In the case of <YES> choice , the actual parameter value is displayed and blinks. The buttons (up/down) permits to increment/decrement the value. The value is validated after a delay of 4 seconds when no buttons is pressed.

For relay 2, the configuration procedure is the same as for relay 1.

For relay 3, the delays configuration procedure is the same as for relays 1 & 2.

The default detection factory settings for the relays 1 & 2 are:

- Threshold = 50 V, activation delay = 1 s, deactivation delay = 1 s.

And for the relay 3 are:

- Activation delay = 1 s, deactivation delay = 1 s.

## EMC Consideration

### 1) Introduction

To meet its policy concerning EMC, based on the Community directives **2014/30/EU** & **2014/35/EU**, the LOREME company takes into account the standards relative to this directives from the very start of the conception of each product.

The set of tests performed on the devices, designed to work in an industrial environment, are made in accordance with **IEC 61000-6-4** and **IEC 61000-6-2** standards in order to establish the EU declaration of conformity. The devices being in certain typical configurations during the tests, it is impossible to guarantee the results in every possible configurations. To ensure optimum operation of each device, it would be judicious to comply with several recommendations of use.

### 2) Recommendations of use

#### 2.1 ) General remarks

- Comply with the recommendations of assembly indicated in the technical sheet (direction of assembly, spacing between the devices, ...).
- Comply with the recommendations of use indicated in the technical sheet (temperature range, protection index).
- Avoid dust and excessive humidity, corrosive gas, considerable sources of heat.
- Avoid disturbed environments and disruptive phenomena or elements.
- If possible, group together the instrumentation devices in a zone separated from the power and relay circuits.
- Avoid the direct proximity with considerable power distance switches, contactors, relays, thyristor power groups, ...
- Do not get closer within fifty centimeters of a device with a transmitter (walkie-talkie) of a power of 5 W, because the latter can create a field with an intensity higher than 10 V/M for a distance fewer than 50 cm.

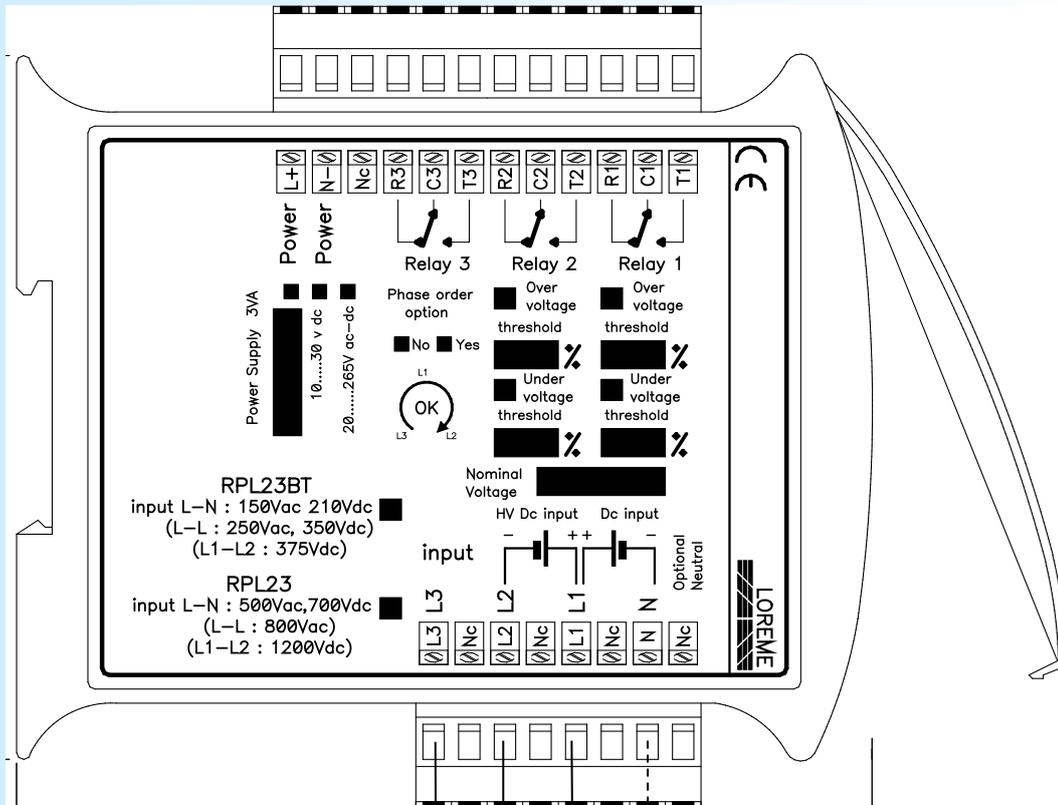
#### 2.2 ) Power supply

- Comply with the features indicated in the technical sheet (power supply voltage, frequency, allowance of the values, stability, variations ...).
- It is better that the power supply should come from a system with section switches equipped with fuses for the instrumentation element and that the power supply line be the most direct possible from the section switch.
- Avoid using this power supply for the control of relays, of contactors, of electrogates, ...
- If the switching of thyristor statical groups, of engines, of speed variator, ... causes strong interferences on the power supply circuit, it would be necessary to put an insulation transformer especially intended for instrumentation linking the screen to earth.
- It is also important that the installation should have a good earth system and it is better that the voltage in relation to the neutral should not exceed 1V, and the resistance be inferior to 6 ohms.
- If the installation is near high frequency generators or installations of arc welding, it is better to put suitable section filters.

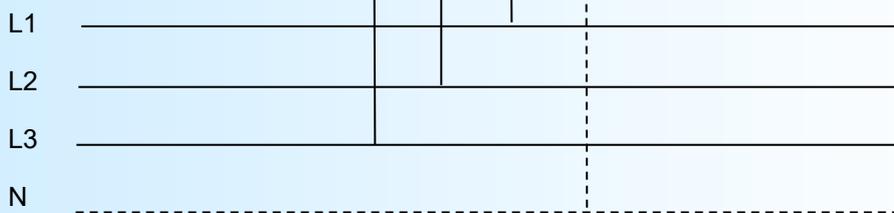
#### 2.3 ) Inputs / Outputs

- In harsh conditions, it is advisable to use sheathed and twisted cables whose ground braid will be linked to the earth at a single point.
- It is advisable to separate the input / output lines from the power supply lines in order to avoid the coupling phenomena.
- It is also advisable to limit the lengths of data cables as much as possible.

# Wiring



### Three phases network



- |                       |  |
|-----------------------|--|
| L+, N- terminals:     | Power supply 20 to 265 Vac/dc or 10 to 30 Vdc. |
| R3, R2, R1 terminal:  | Rest relay contact.                            |
| C3, C2, C1 terminals: | Common relay contact.                          |
| T3, T2, T1 terminals: | Work relay contact.                            |
| L1 terminal:          | Phase 1 voltage input.                         |
| L2 terminal:          | Phase 2 voltage input.                         |
| L3 terminal:          | Phase 3 voltage input.                         |
| N terminal:           | Neutral input (optional).                      |

For a single phase alternative (AC) voltage, use inputs L1 and N.  
 For a continuous voltage (DC), use inputs L1 / L2 or L1 / N (Dc input).