

CONFIGURATION HANDBOOK

CPL35L/R1-NAV1



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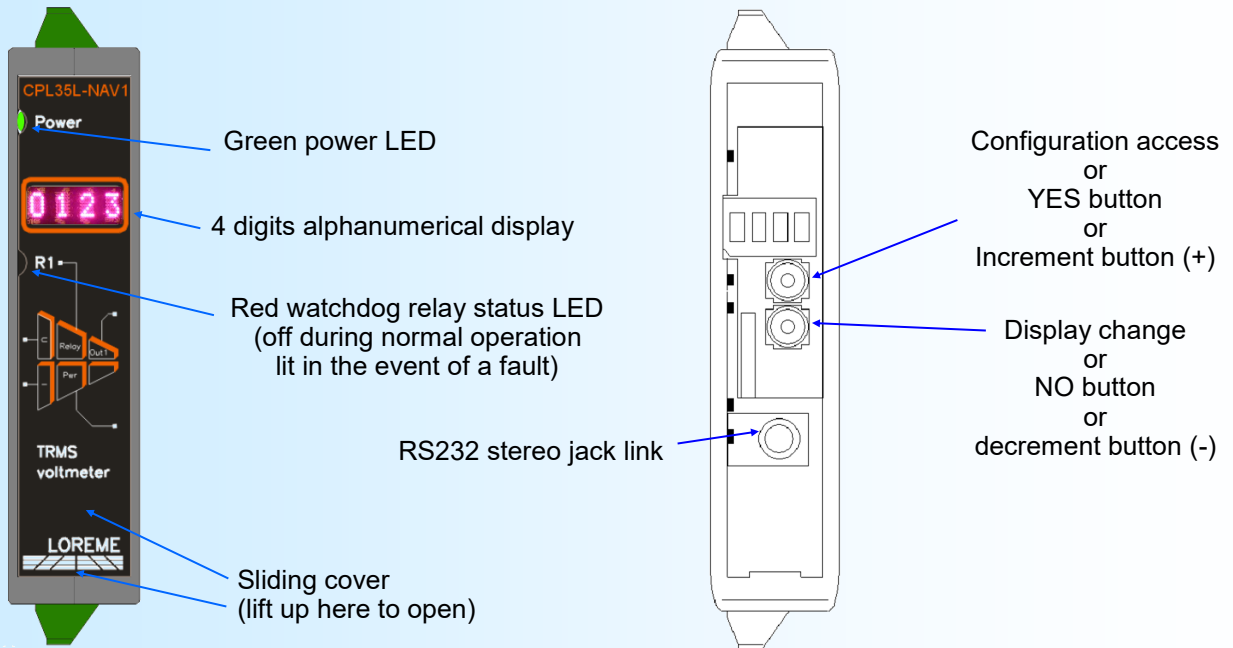
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## Device Presentation

The CPL35L/R1-NAV1 is a TRMS (AC+DC) converter for measuring, monitoring and retransmission of the voltage of a 450 V / 60 Hz network, in IT mode without distributed neutral (see wiring p17).

### USER INTERFACE



#### 1) Visualization

At power on, the device displays a Hard-Soft revision number (rh-s) during 1 s and then the last selected measurement.

#### 2) Display change

Normally, the device displays the value of the currently selected measurement. Pressing the bottom button toggles the display to the unit for 2 seconds. The units shown are:

- **V** for voltage measurement.
- **A** for current measurement.
- **Hz** for frequency measurement on voltage inputs 600V and 150V only.
- **Vpic** for peak voltage measurement.

During the display of the unit, the operator can change measurement by re pressing the bottom button as many times as necessary. The unit changes after each press. The device automatically returns to the measurement display mode after 2 seconds.

#### Note:

*The type of measurement displayed remains active even if the device is powered off.*

### 3) CONFIGURATION

To access the configuration, push the top button. It is possible to lock the access in the "SPECIAL FUNCTIONS" rubric in terminal mode. If the access is locked then the message "NOT ALLOWED!" is displayed.

**Note about value setting:**

Use the (+) / (-) buttons to increase or decrease the value. The value is automatically validated after 4 seconds if no button is pressed.

#### 3.1) Language configuration

LANGUAGE CONFIGURATION?      This message scrolls on the display. Push the **YES** button to access to the rubric.  
 FRENCH? or ENGLISH?      **YES** button to choose French language, **NO** button to select the next choice.

#### 3.2) Inputs configuration

The device comes with two voltage inputs (high and low) and three current inputs (2 internals and 1 for external shunt). Default calibers of the inputs are:

- 600 V for high voltage input,
- 150 V for low voltage input,
- 1 A for the internal shunt current input 1,
- 5 A for the internal shunt current input 2,
- 200 mV (200 A) for the external shunt current input (default configured shunt sensibility is 1 A/mV),

The inputs configuration rubric permits to select the measured voltage input, the measured current input and the measurement response time (integration time for TRMS measurement value calculation). This parameter is configurable from 0.01 s to 60 s (1 s by default). It should be noted that the amplitude of the ripple on the calculated TRMS measurement is inversely proportional to this value. A fast response time implies a strong ripple on the TRMS measurement value. For example, with a filter of 1 s, the ripple is 0.6% of the measured value.

INPUTS CONFIG?      This message scrolls on the display. Push the **YES** button to access to the rubric.  
 Push the **NO** button to go to the next rubric.

VOLTAGE INPUT?      Push the **YES** button to access to the voltage input selection.

600V?      Push the **YES** button to choose the 600V voltage input or the **NO** button to select the next choice.

150V?      Push the **YES** button to choose the 150V voltage input or the **NO** button to select the previous choice.

CURRENT INPUT?      Push the **YES** button to access to the current input selection (only standard & Hall).  
 1A?      Push the **YES** button to choose the 1 A internal shunt current input.  
 5A?      Push the **YES** button to choose the 5 A internal shunt current input.  
 200mV?      Push the **YES** button to choose the external shunt current input.

MEASURE RESPONSE TIME?      Push the **YES** button to access to the response time setting (0.01 s to 60 s).

#### 3.3) Network configuration

The network configuration possibilities are:

- Alternative (Single-phase or Two-phases without neutral).
- Continuous.

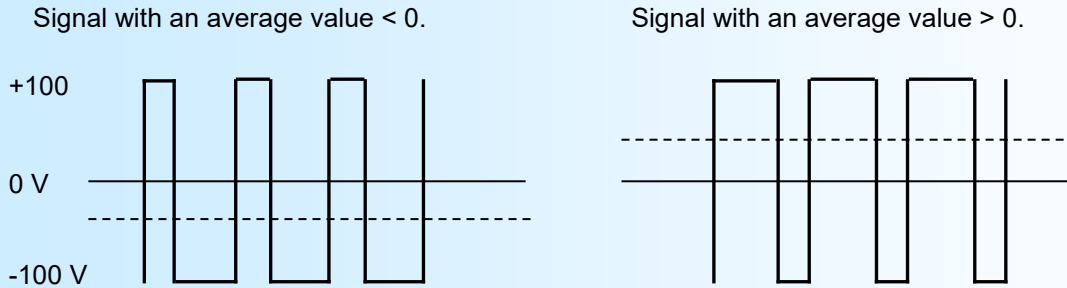
It is also necessary to configure:

- The Potential Transformer ratio.
- The Current Transformer ratio or the external current shunt sensibility.

NETWORK CONFIG?      Push the **YES** button to access to the rubric.  
 Push the **NO** button to go to the next rubric.

- ALTERNATIVE? Push the **YES** button to choose TRMS (AC+DC) measure mode or the **NO** button to select the next choice.
- CONTINUOUS? Push the **YES** button to choose the DC measure mode or the **NO** button to select the previous choice.

**Note**  
 In CONTINUOUS mode, the device calculate the average value of the signal with the response time set previously. For an AC signal the average value is 0.



- PT RATIO? Push the **YES** button to access the Potential Transformer ratio setting (0.001 to 1 M) or the **NO** button to go to the next rubric.
- CT RATIO? Push the **YES** button to access the Current Transformer ratio setting (0.001 to 1 M) in internal shunt current input configuration.
- or
- SHUNT SENSIBILITY? Access to the shunt sensibility setting (0.001 A/ mV to 1 MA/mV) if the external shunt current input (200 mV) is selected.

The factory configuration is:  
 150V voltage input, 5A current input, measurement response time = 0.5 s, AC network, PT ratio = 4.5, CT ratio = 1.

**3.4) Relay 1 configuration**

Relay R1 is used as a watchdog relay. It is active during normal operation and inactive in the event of input voltage failure or loss of the module power supply.

For the watchdog function, the alarm must be configured as follows:

- Threshold alarm.
- Monitoring of the voltage measurement.
- LOW threshold detection.
- Threshold set to 4 V.
- Hysteresis set to 0 V.
- Security to "RELAY CLOSED OUT OF ALARM".
- No alarm hold function.
- Activation and deactivation delays set to 0 s.

- RELAYS CONFIG? Push the **YES** button to access to the rubric.
- RELAY 1? Push the **YES** button to access to the relay 1 configuration.
- THRESHOLD ALARM?Y The threshold alarm is enabled. "?Y" is displayed. **YES** confirms the threshold alarm activation. **NO** deactivates the threshold alarm ("?N" will be displayed next time).
- WINDOW ALARM?N **YES** to activate the window alarm, **NO** to deactivate it.



If the threshold alarm is activated:

- MEASURE: Choice of monitored measure type.
- VOLTAGE? Push the **YES** button to choose the displayed type. Push the **NO** button to display the next type (possible types are: voltage, current, frequency).
- HIGH THRESHOLD?  
LOW THRESHOLD? Choose the type of detection (High or Low).
- THRESHOLD? Push the **YES** button to access the threshold value setting.
- RELAY CLOSED IN ALARM?  
RELAY CLOSED OUT OF ALARM? Choose the type of security.
- ALARM HOLD?N **YES** to activate the hold function, **NO** to deactivate it.
- ACTIVATION DELAY? Push the **YES** button to access the activation delay setting.
- DEACTIVATION DELAY? Push the **YES** button to access the deactivation delay setting. Absent if the alarm hold function is enabled.

If the window alarm is activated:

- MEASURE: Choice of monitored measure type.
- VOLTAGE? Push the **YES** button to choose the displayed type. Push the **NO** button to display the next type.
- LOW THRESHOLD? Push the **YES** button to access the low threshold value setting.
- HIGH THRESHOLD? Push the **YES** button to access the high threshold value setting.
- RELAY CLOSED IN THE WINDOW?  
RELAY CLOSED OUT OF WINDOW? Choose the functioning mode.
- ACTIVATION DELAY? Push the **YES** button to access the activation delay setting.
- DEACTIVATION DELAY? Push the **YES** button to access the deactivation delay setting.

**3.5) Output configuration**

- OUTPUTS CONFIG? Push the **YES** button to access to the rubric.
- OUTPUT 1? Push the **YES** button to access to the output 1 configuration.
- CURRENT?  
VOLTAGE? Choose the output type, current or voltage.
- OUTPUT 0%? Push the **YES** button to access the output low scale setting.
- OUTPUT 100%? Push the **YES** button to access the output high scale setting.
- RESPONSE TIME? Push the **YES** button to access the output response time setting (0 to 60 s).
- LIMITATION? Push the **YES** button to activate the output limitation, Push the **NO** button to deactivate the output limitation.
- MEASURE:  
VOLTAGE? Choice of monitored measure.  
Push the **YES** button to choose the displayed type. Push the **NO** button to display the next measurement type.

- MEASURE 0%? Push the **YES** button to access the measure low scale setting.
- MEASURE 100%? Push the **YES** button to access the measure high scale setting.
- HOLD TIME? Peak voltage hold time setting access (0.01 s to 60 s). This menu is only visible if the user has chosen the monitoring of the PEAK VOLTAGE measure.

The default factory parameters are:

output scale = 4/20 mA, input scale = 0/450 V, response time = 0 s, no limitation.

**3.6) Display configuration**

This section allows you to customize the display of measurements on front.

- DISPLAY CONFIG? Push the **YES** button to access to the rubric.
- DISPLAY FILTER? Push the **YES** button to access the display filter setting (0 to 60 s). Allows filtering of the displayed value to smooth fluctuations of the measurement.
- DECIMAL POINT? Push the **YES** button to access the decimal point mode setting.
- AUTO?Y Pressing **YES** selects the automatic decimal point display mode. Pressing **NO** selects the fixed mode.
- NUMBER OF DECIMAL FOR: Choosing the number of decimals (0, 1 or 2) for each measure in fixed mode.
- VOLTAGE? Push the **YES** button to access the number of decimals displayed for the voltage measure.
- CURRENT? Push the **YES** button to access the number of decimals displayed for the current measure.
- FREQUENCY? Push the **YES** button to access the number of decimals displayed for the frequency measure.
- ACTIVE P.? Not useful.
- REACTIVE P.? Not useful.
- APPARENT P.? Not useful.
- POWER FACTOR? Not useful.

**3.7) End of configuration**

OK! This message indicates that all the parameters have been successfully saved.

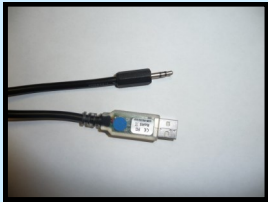
**Note:**

*If, during the configuration process, no buttons are pressed for more than 90 s, the device returns to measure mode without saving the new configured parameters.*

## RS232 link setting

The device can be configured or updated in terminal mode via an RS232 link.

### Step 1: Driver installation for USB / RS232 adapter



- download driver at [www.loreme.fr](http://www.loreme.fr):  
[http://www.loreme.fr/aff\\_produits.asp?rubid=53&langue=fr](http://www.loreme.fr/aff_produits.asp?rubid=53&langue=fr)
- Click on executable file to install the driver,
- Plug the cable on a USB port, Windows install a new serial communication port **COMx**

**Notes:**

- The use of the cable on another USB port don't generates a new communication port.
- Use of another adapter generates another communication port number (COMx) and requires the reconfiguration of the HyperTerminal.

### Step 2: Setting of terminal emulation software (PC with windows).

**1** The terminal emulation software for PC « HyperTerminal » is resident in windows up to XP version. For later versions, it is downloadable on : [www.loreme.fr](http://www.loreme.fr) in **download part** ( <http://www.loreme.fr/HyperTerm/htpe63.exe> )  
=> Run the downloaded software to install it.

**2** Start a "hyper Terminal" connection :  
- Click on **"START"** button  
Up to XP version  
- Go to **"Programs \ Accessories \ Communication \ Hyper Terminal"**  
- Click on **"Hypertrm.exe"**  
Or if the software was downloaded  
- Go to **"All programs \ HyperTerminal Private Edition"**  
- Click on **"HyperTerminal Private Edition"**

**3** Enter name for the new connection

**4** Choose the communication port related to the adapter.

**5**

Choose:  
- 9600 bauds  
- 8 DATA bits  
- no parity  
- 1 stop bit  
- **XON/XOFF**

**6** The PC is now in terminal mode, connect it to the device by plugging the RS232 cable. The measures are displayed on the terminal. To access configuration, press 'C' key.

**7** When leaving Hyper terminal, the following window will appear. By saving, the terminal session will start with the same configuration.

Thus, the shortcut **LOREME.ht** will permit to communicate with all LOREME devices.

**Note:** To modify the parameters of terminal session whereas this one is connected, it is necessary to disconnect it, modify the parameters and then to reconnect it.



## Terminal mode

### 1) Visualization

The CPL35L/R1-NAV1 can be connected to a terminal via the RS232 link on the front of the device. This requires a USB/Jack adapter cable, and to have a ASCII emulation program like 'HyperTerminal' or else installed on the PC.

Once the device is connected to the PC, it displays the following measurements page on the terminal every 5 seconds.

VOLTAGE:             310.5 V  
 CURRENT:            0 A  
 FREQUENCY:         60.01 Hz

OUTPUT 1:            15.04 mA

**Note:**  
*In terminal mode the metrological performance of the device are degraded. It is therefore preferable to limit the time of use in this mode.*

### 2) Configuration

The device can also be configured by the terminal link. To enter configuration mode, just press the "**C**" key. The message '**CONF**' is displayed in front.

#### 2.1) Method

At the configuration time, different types of questions are displayed. For each one, several answers are possible. You will find below the detailed description of each case.

##### 2.1.1) Menu selection

example:    INPUTS CONFIGURATION     The user makes a choice by pressing the keys "**Y**" or "**N**".  
             (Y-N)

##### 2.1.2) Parameter selection

example:    VOLTAGE            or     VOLTAGE  
             (Y-N)YES                 (Y-N)NO

Previous choice = YES:   - pressing "**Y**" or "**Enter**" => choice validation = YES.  
                               - pressing "**N**" => choice changing = NO.

Previous choice = NO:   - pressing "**N**" or "**Enter**" => choice validation = NO.  
                               - pressing "**Y**" => choice changing = YES.

##### 2.1.3) Value acquisition

Example:    LOW SCALE  
             4 mA

There are two possibilities:  
 - The validation without modification by typing "**Enter**",  
 - The modification with simultaneous display followed by validation with "**Enter**".

#### Notes:

- *It is possible, when a mistake is made during a value acquisition, before validating it, to go back by pressing on backspace key. This re-displays the message without taking notice of the mistake.*
- *In configuration mode, if there is no action on a key during 2 minutes, device goes back in measure mode without taking notice of the modifications made before.*
- *In configuration mode, if you want go back to measure mode without taking notice of modifications made before, just press the escape key.*

## Configuration

### 2.2) Language

The language possibilities are:

- French
- English

### 2.3) Input

The input configuration is made of:

- Voltage input choice.
- Current input choice.
- Measure response time.

### 2.4) Network

The configurable parameters are:

- Alternative TRMS (AC+DC, single-phase or two-phases).
- Continuous (DC).

It is also necessary to configure:

- The Potential Transformer ratio,
- The Current Transformer ratio (1A or 5A input) or external current shunt sensibility (200mV input).

### 2.5) Relay R1

Relay R1 is used as a watchdog relay. It is active during normal operation and inactive in the event of input voltage failure or loss of the module power supply.

For the watchdog function, the alarm must be configured as follows:

- Threshold alarm.
- Monitoring of the voltage measurement.
- LOW threshold detection.
- Threshold set to 4 V.
- Hysteresis set to 0 V.
- Security to "RELAY CLOSED OUT OF ALARM".
- No alarm hold function.
- Activation and deactivation delays set to 0 s.

Relay parameters are:

- Choice of function: No function, threshold alarm, window alarm.

#### For the threshold alarm:

- Monitored value: voltage, current, frequency.
- Type of detection: high or low threshold.
- Threshold and hysteresis value.
- Security.
- Hold function.
- Activation and deactivation delays

#### For the window alarm:

- Monitored value: voltage, current, frequency.
- Low threshold value.
- High threshold value.
- Functioning mode.
- Relay activation and deactivation delays.

The threshold alarm works in this manner:

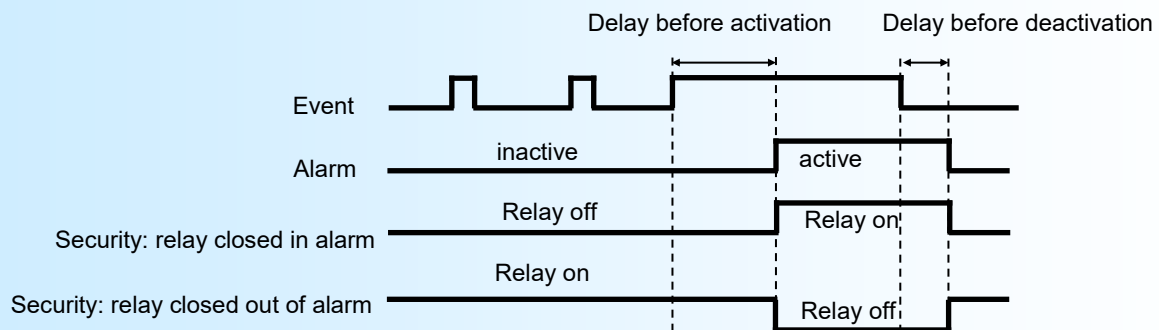
- **high threshold** detection: .alarm is activated when measure goes above threshold,  
.alarm is removed when measure goes below threshold minus hysteresis.
- **low threshold** detection: .alarm is activated when measure goes below threshold,

.alarm is removed when measure goes above threshold plus hysteresis.

The **security** function allows to choose between the activation or the de-activation of the relay when alarm is activated (see chronograms on next page).

The **Hold** function keeps the alarm activated, even if the measure comes off alarm, and this until it has been disabled by a reset on the front.

The **activation and deactivation** delays, configurable from 0 to 600 s set the time above which alarm changes its state after event appearance and disappearance.



The window alarm works in this manner:

In the "RELAY CLOSED IN THE WINDOW" mode

- The relay is activated when the measure  $\geq$  to the low threshold and  $\leq$  to the high threshold.
- The relay is deactivated when the measure is  $<$  than the low threshold or  $>$  than the high threshold.

In the "RELAY CLOSED OUT OF WINDOW" mode

- The relay is deactivated when the measure  $\geq$  to the low threshold and  $\leq$  to the high threshold.
- The relay is activated when the measure is  $<$  than the low threshold or  $>$  than the high threshold.

## 2.6) Analogical output

The device provides one insulated analogical output to monitor the input voltage measurement.

Configurable output parameters:

- Type of output: Current output (mA) or Voltage output (V) with strap connected.
- Low and high output scales.
- Response time.
- Limitation.
- Monitored value: voltage or peak voltage or current or frequency.
- Low and high input measure scales.

The **limitation** allows to bound the output signal swing to the configured output scales for all input signal values.

The **response time** allows a smoothing of the output. It is configurable from 0 to 60 s (set to 0 s at the factory).

The **hold time** is the time for the detected peak voltage measurement to be maintained on the output. It is configurable from 0,01 to 60 s (set to 1 s at the factory). This configuration rubric is only visible if the user has chosen the PEAK VOLTAGE measure to be monitored.

## 2.7) Display

This rubric permits to personalize the measurements display on the front.

The display parameters are:

- Display filter.
- Decimal point display mode.

DISPLAY CONFIGURATION? (Y-N)	Press the 'Y' key to access display configuration.
DISPLAY FILTER? 1 s	Enter the filter value (0 to 60 s).
DECIMAL POINT? (Y-N)	Press the 'Y' key to access decimal point mode configuration.
AUTO? (Y-N)YES	Press 'Y' key to choose the automatic decimal point display mode or 'N' to choose the fixed mode.
NUMBER OF DECIMAL FOR: VOLTAGE 1 etc.....	configure the number of decimal for the fixed mode for each measure. Enter the number of decimals to display for the voltage measurements.

**2.8) Special functions**

The device disposes of some special functions to adapt its operation.

The **front face configuration lock** allows the user to lock the configuration procedure accessible via the front face.

SPECIAL FUNCTIONS? (Y-N)	Press 'Y' to access the special function configuration.
FRONT FACE CONFIG. LOCK? (Y-N)NO	Press 'Y' to lock the front face configuration access.

**2.9) End of the configuration**

OK! This message indicates that all the parameters have been successfully saved.

**Note**  
*If no action is performed during the configuration process, the device returns automatically to measurement mode after a delay of two minutes, without taking into account of the modifications made before.*

## FIRMWARE update

To access to the firmware update function, you must first open an HyperTerminal session on a PC, connect the device to the PC with the RS232 link cable and then power on the device.

The following character is send to the terminal:

> <————— The device sends this character then it waits the « F » key during 0.5 s.

If the user has pressed the « F » key in the allowed time, the following message is displayed in the HyperTerminal windows:

**FIRMWARE LOADER Rev3  
READY TO TRANSFER...**

The device is now in the firmware load mode and is waiting for the firmware file. This file is provide by LOREME and contain the firmware code in Intel HEX format.

Select the « Transfer », « Send a text file ... » in the HyperTerminal menu.  
Select the directory and open the file. The HyperTerminal program begins to send the file to the device.

**FIRMWARE LOADER Rev3  
READY TO TRANSFER**

\*\*\*\*\* <————— The star characters appears to show the progress of the uploading.

At the end, the message « **PROGRAMMING OK !** » is display if no errors occurs. Otherwise, these following message could be displayed:

- **SERIAL COM ERROR !**      Error during receipt.
- **SERIAL TIMEOUT !**      Waiting time of receipt elapsed (60 s).
- **PROGRAMMING FAILED !**    Programming error in the internal flash memory.

### Attention

*If an error occurs during the programming process, it is necessary to start again the whole procedure.  
A bad programming leads to an inoperative device.*



## 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

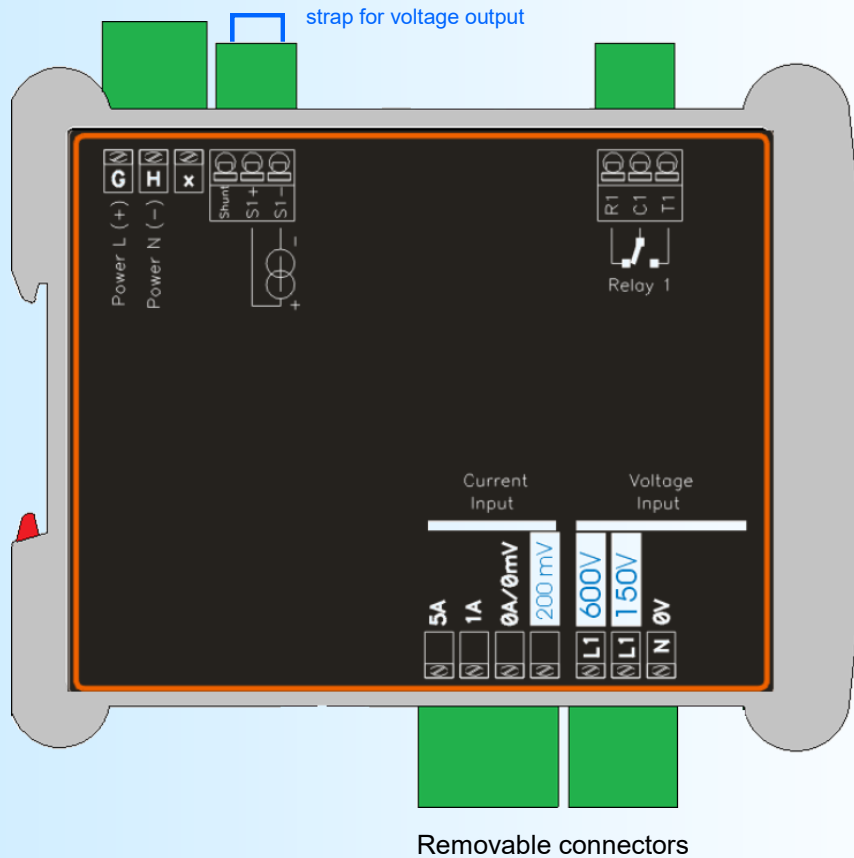
- Comply with the features indicated in the technical sheet (power supply voltage, frequency, allowance of the values, stability, variations ...).
- It is better that the power supply should come from a system with section switches equipped with fuses for the instrumentation element and that the power 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.

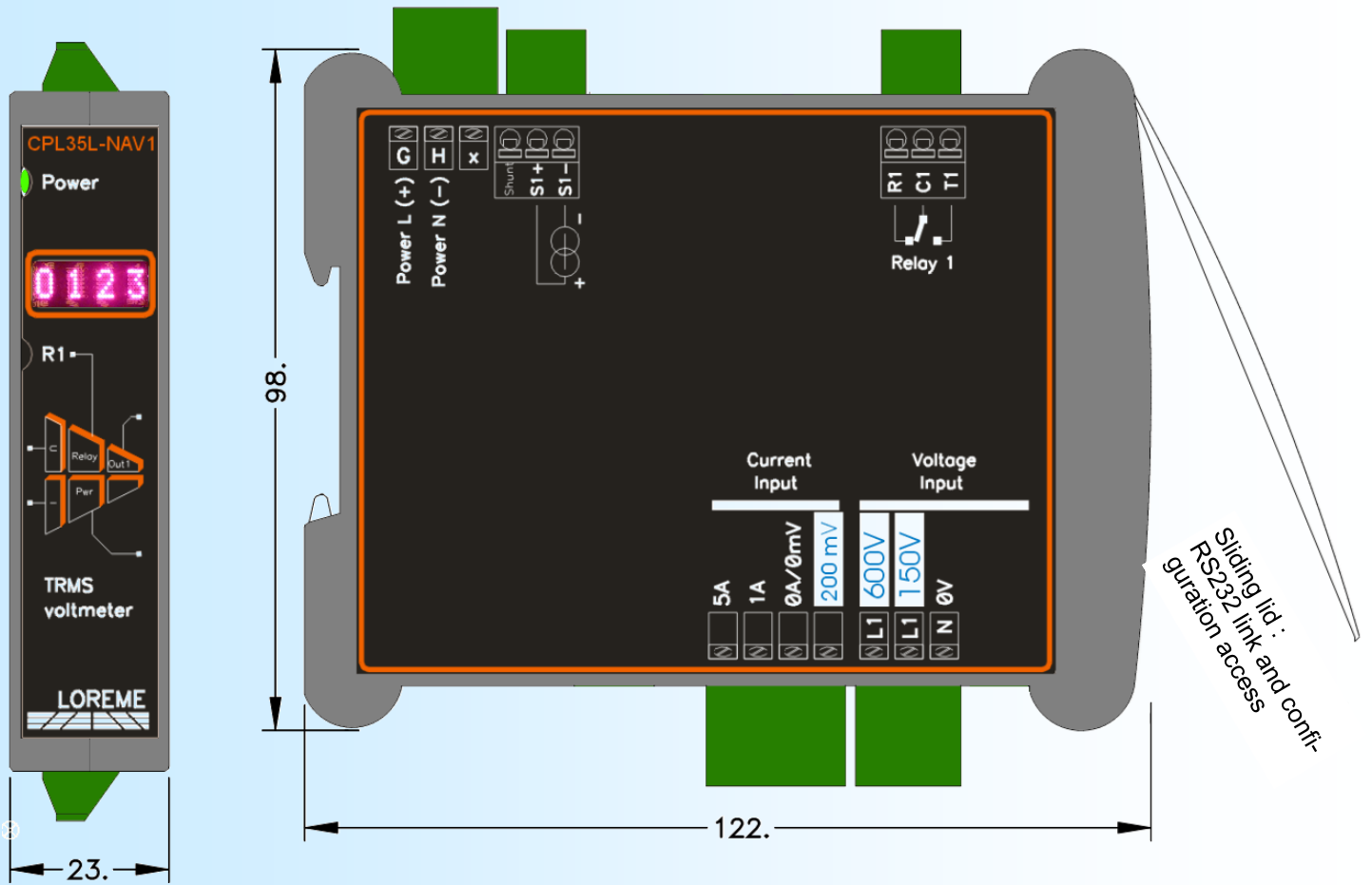
# Wirings

## Removable connectors



- Power supply (10 to 30 Vdc): Terminals G, H.
- Relay 1 (watchdog): Terminals common (C1), rest (R1), work (T1).
- Analogical output 1: Terminals S1+, S1-, Shunt (Internal 500 Ohms shunt for voltage output).
- Voltage inputs:
  - High voltage input: Terminals 600V, 0V.
  - Low voltage input: Terminals 150V, 0V.
- Current inputs:
  - Internal 1 A shunt: Terminals 1A, 0mV/0A.
  - Internal 5 A shunt: Terminals 5A, 0mV/0A.
  - External shunt: Terminals 200mV, 0mV/0A.

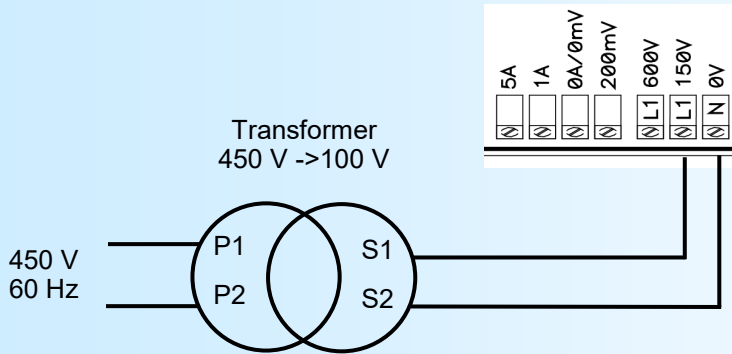
# Outline dimensions



# Wiring examples

## Measurements on a two-phases 450 V / 60 Hz network, without distributed neutral

### Voltage measurement with 450 V / 100 V Potential Transformer



Remark:

With the default factory configuration, the 4/20 mA output is the image of the 100 V measured input voltage.

## ENVIRONMENT

Operating temperature	-20 / 60 °C (75 °C peak)
Storage temperature	-40 / 85 °C
Drift (% of full scale)	< 0.03 % / °C
Humidity	85 % not condensed
Weight	~ 250 g
Protection rating	IP20
Shock IEC 60068-2-27 (operating)	15 G / 11 ms
Vibration IEC 60068-2-6 (operating)	Frequency range: 0.1 Hz to 50 Hz a=25 mm from 0,1 Hz to 1 Hz, 0,1 G from 1 Hz to 5 Hz, a=1 mm from 5 to 22 Hz, 2 G from 22 to 50 Hz
Dielectric strength (Inputs/Power-Outputs-Relays)	2500 Vrms
MTBF (MIL HDBK 217F)	> 3 000 000 Hrs @ 25°C
Life time	> 200 000 Hrs @ 30°C

## ELECTRICAL SPECIFICATION

### INPUT

TYPE	RANGE	ACCURACY
2 ranges for ac voltage	150Vac / 600 Vac	+/- 0.3% of full range
Input impedance	1 Mohms / 4 Mohms	
Overload	2 x full range during 3 s	
Measure Threshold	0.5% of full range	
Power consumption	0.12 W	
2 ranges for ac current	200mV ; 1A ; 5 A	+/- 0.3% of full range
Input impedance	0.05 ohms: 5A 0.25 ohms: 1A	
Overload	6 x full range during 3 s	
Measure Threshold	0.5% of full range	
Power consumption	max 1.25 W	
Frequency	1 Hz...440 Hz	+/- 0.2 %

### ANALOG OUTPUT

TYPE	RANGE	ACCURACY
<b>Current</b> S1 and S2	0 ... 4 ... 20 mA	+/- 20 µA
max Load:	0.....850 Ohms	
<b>Voltage</b> S1 and S2	0 ... 10 V	+/- 10 mV
Output impedance:	500 ohms (internal 0.1% shunt)	

### RELAY

Change over contact, switching power:  
 dc: 220VDC, 0.24A, 60W ; 125VDC, 0.24A, 30W ; 30VDC, 2A, 60W  
 ac: 250VAC, 0.25A, 62.5VA ; 125VAC, 0.5A, 62.5VA  
 Dielectric strength 3 kV coil/contacts, 2.5 kV contacts/contacts.  
 Mechanical life: 10<sup>8</sup> operations  
 Shock resistance: 300G functional

### POWER SUPPLY

18 Vdc....to.....30 Vdc, 3 W