CONFIGURATION HANDBOOK

CPL105

LOREME 12, rue des Potiers d'Etain Actipole BORNY - B.P. 35014 - 57071 METZ CEDEX 3
Phone 03.87.76.32.51 - Fax 03.87.76.32.52
Contact : Commercial@Loreme.fr - Technique@Loreme.fr
Download manual at : www.loreme.fr

REV 2.6a 29/04/16

Table of contents

Device presentation

The CPL105 is designed for power consumption measurement (building management, workshop, ...). The Ethernet link allows measure supervision while easy and fast integration into existing network. The WEB server embedded can be used to display the different measures.
The CPL105 has several options:

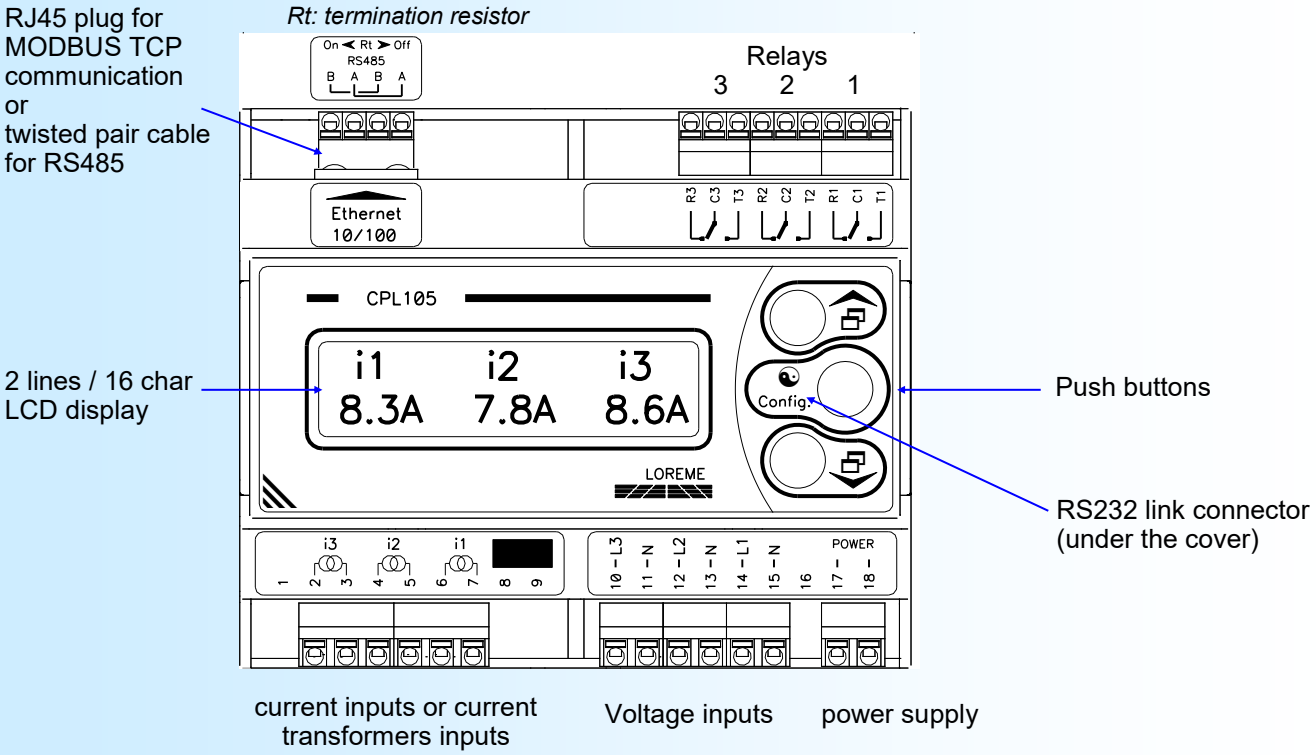
CPL105 /CM	MODBUS RTU on RS485 link.
CPL105 /CMTCP	Ethernet MODBUS TCP link.
CPL105 /BUS	Slave version over internal bus.
CPL105 /R3	3 relays for alarms or energy counter.
CPL105 /SNMP	Ethernet link SNMP protocol (no internal bus).

- The /CMTCP option provide the measures on an Ethernet link (MODBUS TCP protocol). To use it, the IP address and the mask must be configured (see configuration on the next pages).
- The /BUS option can be use to concatenate several device on one Ethernet link. (by combining one device with /CMPTCP option with devices with /BUS option). To use it, the BUS address of each device must be configured.

Note: *There is no internal bus available for /CM and /SNMP options.*

The technical data sheet is downloadable here: http://www.loreme.fr/fichtech/CPL105_eng.pdf

USER INTERFACE



Visualization

The CPL105 can view several measurement pages. Pressing the ⮝ button will display the page in the order page 1 -> page 12 -> page 1. The ⮟ button will display the page in the order page 12 -> page 1 -> page 12.

I1 I2 I3(A) 5.01 5.00 4.98	Page 1: Current value display.
L1 L2 L3(V) 229 230 229	Page 2: Phase voltage.
L12 L23 L31(V) 398 400 398	Page 3: Phase-phase voltage.
P1: 1.14KW/1.00 Q1: 0VAR	Page 4: Display of active power, phase shift and reactive power for the phase #1.
P2: 1.14KW/1.00 Q2: 0VAR	Page 5: Display of active power, phase shift and reactive power for phase #2.
P3: 1.14KW/1.00 Q3: 0VAR	Page 6: Display of active power, phase shift and reactive power for phase #3.
ΣP: 1.14KW/1.00 ΣQ: 0VAR	Page 7: Display of total active power, total phase shift and total reactive power
W1: 5.01KWh WQ: 0KVARh	Page 8: Display of active energy for phase #1. Display of reactive energy for phase #1.
W2: 5.01KWh WQ: 0KVARh	Page 9: Display of active energy for phase #2. Display of reactive energy for phase #2.
W3: 5.01KWh WQ: 0KVARh	Page 10: Display of active energy for phase #3. Display of reactive energy for phase #3.
ΣW: 15.03KWh WQ: 0KVARh	Page 11: Display of total active energy. Display of total reactive energy.
DELTA U: 0% DELTA I: 0%	Page 12: Display of voltage asymmetry (0 to 100 %). Display of current asymmetry (0 to 100 %).

Note:
The U or I asymmetry is calculated as following: DELTA U,I = max gap of (L1,L2,L3) / average of (L1,L2,L3).

Configuration

The CPL105 is fully configurable with the front face buttons. A press on '**Config**' button access to the configuration. The following message is displayed:

CONFIGURATION Rev 2.6a	A temporised message show the actual version (Hard.Soft) of the device.

1) Password configuration access

If the « Password » function is activated, entering a code is necessary to access at the configuration.

PASSWORD? ----	Use the ▲ and ▼ button to change the character. (only alphanumeric characters are accepted: '0' to '9' and 'A' to 'Z'). The '**Config**' button validate the character.

The message 'INVALID CODE' is displayed for 3 seconds if the password is wrong then the device return to measure mode.

2) Language configuration

LANGUAGE?	Language choice, FR: French, ENG: English
<FR> ENG	Use ▲ or ▼ buttons to change the language, '**Config**' to validate.

3) Voltage inputs configuration

Press the ▲ (Yes) for access to the value. Press the ▼ (No) to skip the menu.

PT RATIO? (Y-N)	Configuration of voltage transformer ratio.
PT RATIO? 1.00	The actual value is showing. Use the buttons ▲ (+) and ▼ (-) to change it and validate with '**Config**' (allowed value : 0.01 to 100000).

4) Current inputs configuration

Press the ▲ (Yes) for access to the value. Press the ▼ (No) to skip the menu.

4.1) Device with internal current transformers

CT RATIO ? (Y-N)	configuration of current transformer ratio.
CT RATIO ? 5/5A	The actual value is showing. Use the buttons ▲ (+) and ▼ (-) to change it and validate with '**Config**'.

4.2) Device with external current transformers (Tio)

RATED CURRENT? (Y-N)	Configuration of split-core current transformer caliber (Tio). *(Look at the end of this manual for more details).*
RATED CURRENT? 5A	The actual value is showing. Use the buttons ▲ (+) and ▼ (-) to change it and validate with '**Config**'.

5) Configuration of special measure mode

SPECIAL MEASURE? (Y-N)	
SINGLE VOLTAGE? YES <NO>	Use the buttons ▲ and ▼ to select the choice. Validate with '**Config**'.
SINGLE PHASE? YES <NO>	Use the buttons ▲ and ▼ to select the choice. Validate with '**Config**'.
THREE PHASE? <YES> NO	Use the buttons ▲ and ▼ to select the choice. Validate with '**Config**'.

The "single voltage + single phase" mode allows to use the device in 3 single-phase wattmeter mode with one reference voltage (L1).

The "single voltage + three phase" mode allows to use the device in 3 three-phase wattmeter mode with on reference voltage (L1) and approximation (by using the measured cosines phi on L1) of active power on L2 and L3 phases.

6) Configuration of communication parameters

COMMUNICATION? (Y-N)	▲ (Yes) button to access to the menu. ▼ (No) button to skip to next menu.

6.1) Device with the CMTCP option

IP ADDRESS ? 192.168.000.253	Modify the field value with ▲ and ▼ buttons. go to next field with '**Config**' button. The default parameter is 192.168.0.253.
IP MASK ? (Y-N)	
IP MASK ? 255.255.255.000	Modify the field value with ▲ and ▼ buttons. go to next field with '**Config**' button. The default parameter is 255.255.255.000.
GATEWAY ? (Y-N)	▲ to access to the menu. ▼ to skip to next menu.
GATEWAY ? 000.000.000.000	Modify the field value with ▲ and ▼ buttons. go to next field with '**Config**' button. The default gateway address is 0.0.0.0

6.2) Device with BUS option (without CMTCP option)

BUS ADDRESS ? (Y-N)	
BUS ADDRESS ? 1	Modify the field value with ▲ and ▼ buttons. go to next field with '**Config**' button. The default address is 1.

6.3) Device with CM option

BAUDRATE ? (Y-N)	
BAUDRATE ? <9.6> 19.2	Choose the communication baud rate in kbauds. Buttons ▲ or ▼ to choose and '**Config**' to validate the choice.
STOP BIT? (Y-N)	
STOP BIT? <1> 2	Choose the number of stop bits. Buttons ▲ or ▼ to choose and '**Config**' to validate the choice.
ADDRESS ? (O-N)	
BUS ADDRESS 1	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it. address limit : 1 to 254 . The default parameter is address 1, 9600 bauds, 1 stop bit.

7) Relays configuration (only with R3 option)

The relay configuration is separated in several rubrics:
- Operating mode: alarm or energy counting
- Measure parameters for energy counting mode:
    - monitored phase,
    - energy count : active or reactive,
    - pulse weight.
- Measure parameters for alarm mode:
    - monitored value:
        - star voltage,
        - interlinked voltage,
        - current,
        - active, reactive, apparent power,

- cosines phi (power factor),
- voltage asymmetry (DELTA U),
- current asymmetry (DELTA I),

- monitored phase:
  - phase L1,
  - phase L2,
  - phase L3,
  - sum of three phases (3L) (only with power or cosines phi measure).

- Alarm parameters:
  - Low or high threshold,
  - threshold value,
  - hysteresis value,
  - delay,
  - security.

The **alarm** works in this manner:
- **High threshold detection**:
  .The alarm is activated when the monitored value exceed the threshold,
  .The alarm is deactivated when the monitored value is below the threshold minus the hysteresis.

- **Low threshold detection**:
  .The alarm is activated when the monitored value is below the threshold,
  .The alarm is deactivated when monitored value exceed the threshold plus the hysteresis

The delay value, from 0 up to 3600 seconds, is the delay between the event detection and the relay action.

The security allows to choose the alarm state for relay excitation:
-Positive security : The relays is exiting on alarm.
-Negative security: The relay is exiting out of alarm.

7.1) Configuration access

`RELAY 1?` `(Y-N)`	Use the button ⮝ to access to the parameters, ⮟ to skip to the next menu.
`RELAY 2?` `(Y-N)`	Use the button ⮝ to access to the parameters, ⮟ to skip to the next menu.
`RELAY 3?` `(Y-N)`	Use the button ⮝ to access to the parameters, ⮟ to skip to the next menu.

7.2) Parameters configuration

`RELAY IN:`

`ALARM?`	Use the button ⮝ to validate the parameter, ⮟ for the next choice.
or	After every mode change, the threshold value is reset to 0!
`ENERGY COUNT?`	

7.2.1) Configuration of alarm parameters

`MONITORED VALUE`	Choose the monitored measure.
`STAR VOLTAGE`	Button ⮝ to validate the choice, ⮟ to show the following choice.
`MONITORED PHASE`	Choose the monitored phase.
`<L1> L2  L3`	Buttons ⮝ or ⮟ to change the selected zone, '**Config**' to validate it.
`THRESHOLD?`	Type of alarm detection
`LOW <HIGH>`	Buttons ⮝ or ⮟ to change the selected zone, '**Config**' to validate it.

THRESHOLD? 0V	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it.
HYSTERESIS? 0V	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it.
DELAY? 0s	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it.
SECURITY?	Choose the security mode.
<POS.> NEG.	Buttons ▲ or ▼ to change the selected zone, '**Config**' to validate it.

7.2.2) Configuration of energy counting parameters

MONITORED PHASE	Choose the monitored phase.
<L1> L2 L3 3L	Buttons ▲ or ▼ to change the selected zone, '**Config**' to validate it.
COUNTED ENERGY?	Type of energy counter
<ACT.> REACT.	Buttons ▲ or ▼ to change the selected zone, '**Config**' to validate it.
PULSE WEIGHT 0.01KWh	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it. (mini = 10 Wh or VARh).

8) Configuration of starting value for energies counters

ENERGY ? (Y-N)	▲ to access to the parameter, ▼ to skip to following menu.
PRESET W1: 0KWh	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it. The default value is 0.
PRESET W2: 0KWh	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it. The default value is 0.
PRESET W3: 0KWh	Buttons ▲ and ▼ to modify the value and '**Config**' to validate it. The default value is 0.

Note:
When this values are modify, the reactive energies counter are automatically reset to 0!.

9) End of configuration

MEMORISATION *****	This message is display only if user is enter in COMMUNICATION menu
OK	This message indicates the end of configuration and the parameters have been saved.

Note:
The device return in measure mode if no action is made in a 30 seconds delay. It is only at the end of configuration that changes are saved.

Configuration protection

It is possible to forbid the access to the device configuration's. When the "Password" function is activated, the user must enter a 4 characters code to access the configuration.

1) Activating the function

When the device operate in measure mode, pressing simultaneously on ▲ and ▼ buttons for at least 5 seconds, then the following message appears:

```
PASSWORD?
 YES <NO>
```

Buttons ▲ or ▼ to change the selection, '**Config**' to validate it.

- <NO> : deactivating the "password" function. Access to configuration is free.
- <YES> : activating the function. Enter a new code:

```
PASSWORD?
----
```

Buttons ▲ and ▼ change the character.
(only alphanumeric characters are accepted: '0' to '9' and 'A' to 'Z').
The '**Config**' button validate the character.

Note:
When the function is activated by answering YES, a new code is automatically requested.

2) Protected configuration

On access to the configuration by the '**Config**' buttons, we have:

```
CONFIGURATION
Rev 2.6a
```

A temporised message show the actual version of device.

```
PASSWORD?
----
```

Enter the code.

If the user has entered the wrong password, the message "INVALID CODE" is display during 3 seconds. Then the device returns to measure mode.

RS232 link setting

The device can be 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/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** (x >= 4).

Note:
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 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"**

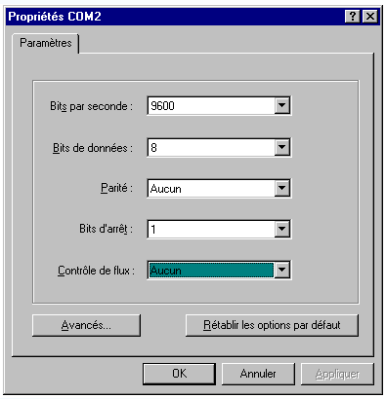
Or if the software was downloaded
- Go to **"All programs \ HyperTerminal Private Edition"**
- Click on **"HyperTerminal Private Edition"**

3 Enter name for the new connection

4 Choose the communication port related to the adapter.

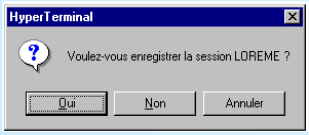
5

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 measure is now 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 will permit to communicate with all LOREME devices.

Note: to modify the parameters of terminal mode whereas this one is already started, it is necessary, after having carried out the modifications, to close the terminal and to open it again so that the modifications are effective.

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 Rev2.2
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 Rev2.2
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.

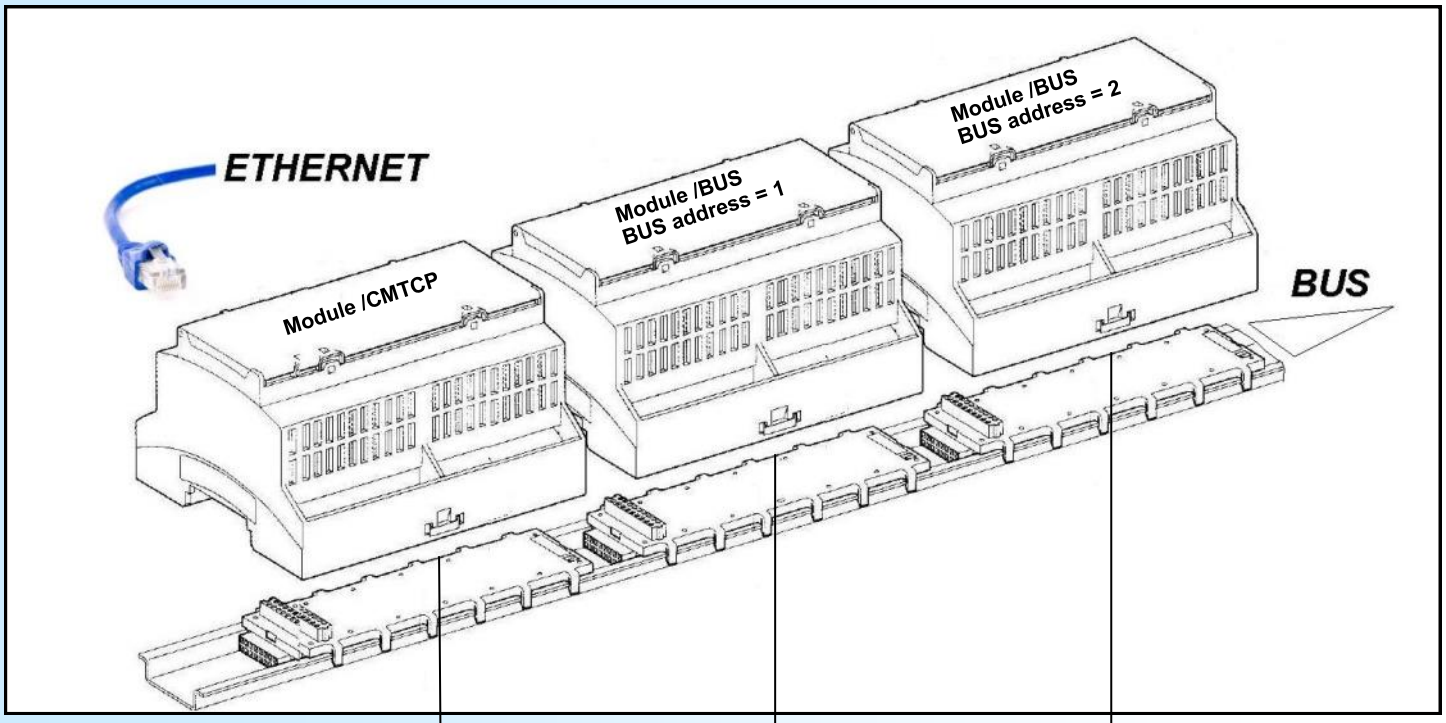
2.3) Inputs / Outputs

- 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.

The BUS100 system

The BUS100 is a modular system composed of one master (CMTCP module. Module with Ethernet link) and slaves modules (BUS model without Ethernet link). All modules are reachable by the Ethernet link. Each module is accessible via its own address range. The master module is always accessible in the address range of 0 to 999. The slaves module (BUS module) are reachable in an address range equal to **1000 x BUS address**. The address parameter is configurable by the front face of device and should be different for each BUS module connected as shown below.

Bus example:



	Possible address range
from	0000
	Range of measure registers
	(The length of this range depends on the type of device)….
	….
	Reserved address for the configuration
	….
to	0999 Reserved address for a device identification code

	Possible address range
from	1000
	Range of measure registers
	(The length of this range depends on the type of device)….
	….
	Address reserved for the configuration
	….
to	1999 Reserved address for a device identification code

	Possible address range
from	2000
	Range of measure registers
	(The length of this range depends on the type of device)….
	….
	Address reserved for the configuration
	….
to	2999 Reserved address for a device identification code

Reserved address for later use.

MODBUS TCP Communication

1) Features

Protocol:	MODBUS TCP.
Link:	Ethernet 10/ 100 base T.
Default IP address:	192.168.0.253.
Port:	502.
Connector:	RJ45.
Read request:	function code 03,04.
Type of data's:	electrical measures.
data format:	measure values in IEEE 32 bits floating point format, unsigned 32 bits integer, unsigned 16 bits integer, unsigned 32 bits integer for energies.

Note: ***The register address mapping is different between MODBUS and MODBUS TCP!!***

2) Data description

2.1) Data available

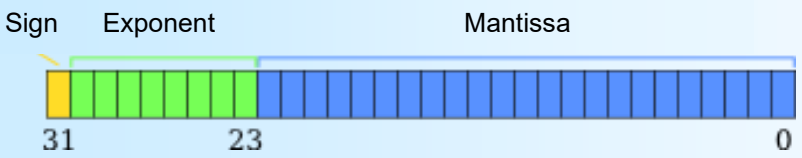
All measures are available for read request. The data are in different format:

- 2 words or 4 bytes for the IEEE 32 bits floating point format and for unsigned 32 bits integer,
- 1 word or 2 bytes for unsigned 16 bits integer.

2.2) Data format

- IEEE 32 bits floating point format (measures).

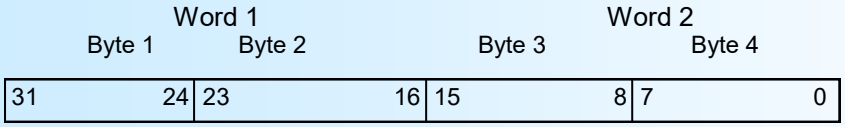
Data send MSB first. 2 words or 4 bytes.



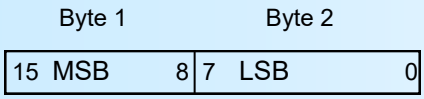
- Data in unsigned 32 bits integer format. For energy, the value is energy x 100.

Ex: value = 15845 => 158.45 KWh

Data send MSB first. 2 words or 4 bytes.



- Data in 16 bits integer format for alarms AL1 (bit 0) , AL2 (bit 1), AL3(bit2).
- Data send MSB first.



Note:

For the BUS module, the address range is shift by : 1000 x Bus address.

Example: The registers address for the master module (address 0) are from 100 ($0064) to 164 ($00A4). For Bus module at address 5, the registers address are from 5100 ($13EC) to 5164 ($142C).

Table of measures in Modbus TCP

3.1) Table for measures (32 bits floating point) and energies (32 bits integer)

This address is for a CPL105/CMTCP or BUS device.

BUS100:

This table show the address range for the CMTCP module (Bus address 0). For other device on bus, you should shift the address range by : 1000 x Bus_address_of_module.

(Ex: Read the current value "I2" for the module at address 4 give a reading of registers address 4108 ($100C) and 4109 ($100D).)

Decimal word address (Hexadecimal)	Designation		Total Words
100 ($0064)	L1-N Voltage	word 1 (MSB)	1
	(V)	word 2 (LSB)	2
102 ($0066)	L2-N voltage	word 1	3
	(V)	word 2	4
104 ($0068)	L3-N voltage	word 1	5
	(V)	word 2	6
106 ($006A)	Current I1	word 1	7
	(A)	word 2	8
108 ($006C)	Current I2	word 1	9
	(A)	word 2	10
110 ($006E)	Current I3	word 1	11
	(A)	word 2	12
112 ($0070)	L1-L2 voltage	word 1	13
	(V)	word 2	14
114 ($0072)	L2-L3 voltage	word 1	15
	(V)	word 2	16
116 ($0074)	L3-L1 voltage	word 1	17
	(V)	word 2	18
118 ($0076)	Active power	word 1	19
	L1 (W)	word 2	20
120 ($0078)	Active power	word 1	21
	L2 (W)	word 2	22
122 ($007A)	Active power	word 1	23
	L3 (W)	word 2	24
124 ($007C)	Reactive power	word 1	25
	L1 (VAR)	word 2	26
126 ($007E)	Reactive power	word 1	27
	L2 (VAR)	word 2	28
128 ($0080)	Reactive power	word 1	29
	L3 (VAR)	word 2	30
130 ($0082)	Active energy L1	word 1	31
	(KWh x 100, 32 bits integer)	word 2	32

Table for measure and energy (continuation)

Decimal word address (Hexadecimal)	Designation		Total Word
132 ($0084)	Active energy L2	Mot 1	33
	(KWh x 100, 32 bits integer)	Mot 2	34
134 ($0086)	Active energy L3	Mot 1	35
	(KWh x 100, 32 bits integer)	Mot 2	36
136 ($0088)	Reactive energy L1	Mot 1	37
	(KWh x 100, 32 bits integer)	Mot 2	38
138 ($008A)	Reactive energy L2	Mot 1	39
	(KWh x 100, 32 bits integer)	Mot 2	40
140 ($008C)	Reactive energy L3	Mot 1	41
	(KWh x 100, 32 bits integer)	Mot 2	42
142 ($008E)	Total active power	Mot 1	43
	(W)	Mot 2	44
144 ($0090)	Total apparent power	Mot 1	45
	(VA)	Mot 2	46
146 ($0092)	Total reactive power	Mot 1	47
	(VAR)	Mot 2	48
148 ($0094)	total Cos phi (power factor)	Mot 1	49
		Mot 2	50
150 ($0096)	Total active energy	Mot 1	51
	(KWh x 100, 32 bits integer)	Mot 2	52
152 ($0098)	Total reactive energy	Mot 1	53
	(KWh x 100, 32 bits integer)	Mot 2	54
154 ($009A)	Cos phi L1	Mot 1	55
		Mot 2	56
156 ($009C)	Cos phi L2	Mot 1	57
		Mot 2	58
158 ($009E)	Cos phi L3	Mot 1	59
		Mot 2	60
160 ($00A0)	Voltage asymmetry	Mot 1	61
	(%)	Mot 2	62
162 ($00A2)	Current asymmetry	Mot 1	63
	(%)	Mot 2	64

3.2) Table of alarms

Decimal word address (Hexadecimal)	Designation	Total Words
164 ($00A4)	Alarms 1, 2 and 3 Byte 1 word 1	1
	Byte 2	

Alarm status : AL1 (bit 0) , AL2 (bit 1), AL3(bit2).

3.3) Table for measure in 16 bits and 32 bits unsigned integer format

This address is for a CPL105/CMTCP or BUS device.
BUS100:
This table show the address range for the CMTCP module (Bus address 0). For other device on bus, you should shift the address range by : 1000 x Bus address of module.
(Ex: Read the current value "I2" for the module at address 4 give a reading of registers address 4204 ($106C))

Decimal word address (Hexadecimal)	Designation	Total Words
200 ($00C8)	L1-N voltage (V x 10)	1
201 ($00C9)	L2-N voltage (V x 10)	2
202 ($00CA)	L3-N voltage (V x 10)	3
203 ($00CB)	Current I1 (A x 10)	4
204 ($00CC)	Current I2 (A x 10)	5
205 ($00CD)	Current I3 (A x 10)	6
206 ($00CE)	L1-L2 voltage (V x 10)	7
207 ($00CF)	L2-L3 voltage (V x 10)	8
208 ($00D0)	L3-L1 voltage (V x 10)	9
209 ($00D1)	Active power L1 (W)	10
210 ($00D2)	Active power L2 (W)	11
211 ($00D3)	Active power L3 (W)	12
212 ($00D4)	Reactive power L1(VAR)	13
213 ($00D5)	Reactive power L2 (VAR)	14
214 ($00D6)	Reactive power L3 (VAR)	15
215 ($00D7)	Total active power (W)	16
216 ($00D8)	Total apparent power (VA)	17
217 ($00D9)	Total reactive power (VAR)	18
218 ($00DA)	Total Cos phi (x 100)	19
219 ($00DB)	Cos phi L1 (x 100)	20
220 ($00DC)	Cos phi L2 (x 100)	21
221 ($00DD)	Cos phi L3 (x 100)	22
222 ($00DE)	Voltage asymmetry (% x 100)	23
223 ($00DF)	Current asymmetry (% x 100)	24

Table of measure (continuation)

Decimal word address (Hexadecimal)	Designation		Total Words
224 ($00E0)	Active energy L1	word 1	25
225 ($00E1)	(KWh x 100)	word 2	26
226 ($00E2)	Active energy L2	word 1	27
227 ($00E3)	(KWh x 100)	word 2	28
228 ($00E4)	Active energy L3	word 1	29
229 ($00E5)	(KWh x 100)	word 2	30
230 ($00E6)	Reactive energy L1	word 1	31
231 ($00E7)	(KVARh x 100)	word 2	32
232 ($00E8)	Reactive energy L2	word 1	33
233 ($00E9)	(KVARh x 100)	word 2	34
234 ($00EA)	Reactive energy L3	word 1	35
235 ($00EB)	(KVARh x 100)	word 2	36
236 ($00EC)	Total active energy	word 1	37
237 ($00ED)	(KWh x 100)	word 2	38
238 ($00EE)	Total reactive energy	word 1	39
239 ($00EF)	(KVARh x 100)	word 2	40

3.4) Table of measures in unsigned 32 bits integer *(On devices with revision 2.4 and more)*
This address is for a CPL105/CMTCP or /BUS device.

Decimal word address (Hexadecimal)	Designation		Total Words
240 ($00F0)	L1-N Voltage	word 1	1
	(V x 10)	word 2	2
242 ($00F2)	L2-N voltage	word 1	3
	(V x 10)	word 2	4
244 ($00F4)	L3-N voltage	word 1	5
	(V x 10)	word 2	6
246 ($00F6)	Current I1	word 1	7
	(A x 10)	word 2	8
248 ($00F8)	Current I2	word 1	9
	(A x 10)	word 2	10
250 ($00FA)	Current I3	word 1	11
	(A x 10)	word 2	12
252 ($00FC)	L1-L2 voltage	word 1	13
	(V x 10)	word 2	14

Table of measures (continuation)

Decimal word address (Hexadecimal)	Designation		Total Words
254 ($00FE)	L2-L3 voltage	word 1	15
	(V x 10)	word 2	16
256 ($0100)	L3-L1 voltage	word 1	17
	(V x 10)	word 2	18
258 ($0102)	Active power L1	word 1	19
	(W)	word 2	20
260 ($0104)	Active power L2	word 1	21
	(W)	word 2	22
262 ($0106)	Active power L3	word 1	23
	(W)	word 2	24
264 ($0108)	Reactive power L1	word 1	25
	(VAR)	word 2	26
266 ($010A)	Reactive power L2	word 1	27
	(VAR)	word 2	28
268 ($010C)	Reactive power L3	word 1	29
	(VAR)	word 2	30
270 ($010E)	Total active power	word 1	31
	(W)	word 2	32
272 ($0110)	Total apparent power	word 1	33
	(VA)	word 2	34
274 ($0112)	Total reactive power	word 1	35
	(VAR)	word 2	36
276 ($0114)	Total Cos phi	word 1	37
	(x 100)	word 2	38
278 ($0116)	Cos phi L1	word 1	39
	(x 100)	word 2	40
280 ($0118)	Cos phi L2	word 1	41
	(x 100)	word 2	42
282 ($011A)	Cos phi L3	word 1	43
	(x 100)	word 2	44
284 ($011C)	Voltage asymmetry	word 1	45
	(x 100)	word 2	46
286 ($011E)	Current asymmetry	word 1	47
	(x 100)	word 2	48

MODBUS communication

1) Features

Protocol:	MODBUS.
Link:	RS485.
Serial format:	8bits data, 1 or 2 stop bits, without parity, 9600 or 19200 bauds.
Default address:	1.
Connector:	2 points spring terminal bloc.
Read request:	function code 03,04.
Type of data:	electrical measures.
data format:	measure values in IEEE 32 bits floating point format, unsigned 32 bits integer, unsigned 16 bits integer.

Note: ***The register address mapping is different between MODBUS and MODBUS TCP!!***

2) Data description

2.1) Data available

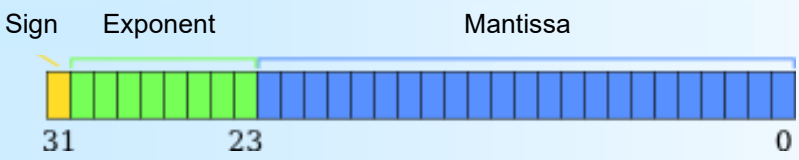
All measures are available for read request. The data are in different format:

- 2 words or 4 bytes for the IEEE 32 bits floating point format and for unsigned 32 bits integer,
- 1 word or 2 bytes for unsigned 16 bits integer.

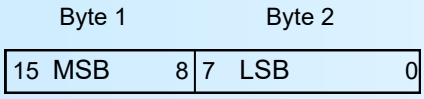
2.2) Data format

- IEEE 32 bits floating point format (measures)

Data send MSB first. 2 words or 4 bytes.



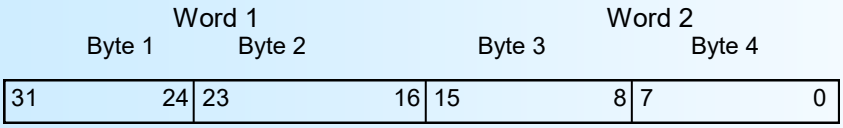
- measures in unsigned 16 bits integer format. (with factor of 10 or 100)



- Data in unsigned 32 bits integer format. For energy, the value is energy x 100.

Ex: value = 15845 => 158.45 KWh

Data send MSB first. 2 words or 4 bytes.



- Data in 16 bits integer format for alarms AL1 (bit 0) , AL2 (bit 1), AL3(bit2).
- Data send MSB first.

Note:

For the CM module, the address range is from 100 ($0064) for the 32 bits format and from 200 ($00C8) for the 16 bits format.

The response time for a reading request can vary from 20 ms to 250 ms.

Tables of measures in Modbus

3.1) Table of measures in 32 bits float number

The address range for the IEEE float point number correspond to the table in page 15 to 16.

3.2) Table of alarms

The address range for the alarms status correspond to the table in page 17.

3.3) Table of measures in 16 bits and 32 bits unsigned integer format

This table is for a CPL105/CM device.

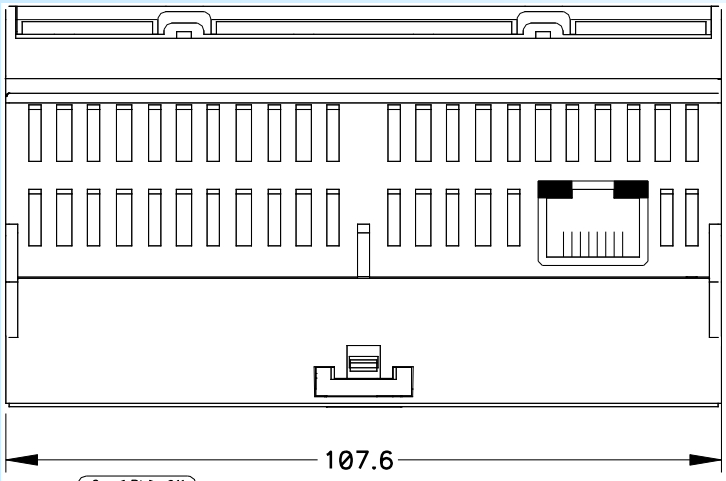
Decimal word address (Hexadecimal)	Designation		Total Words
200 ($00C8)	L1-N voltage (V x 10)		1
201 ($00C9)	L2-N voltage (V x 10)		2
202 ($00CA)	L3-N voltage (V x 10)		3
203 ($00CB)	Current I1 (A x 10)		4
204 ($00CC)	Current I2 (A x 10)		5
205 ($00CD)	Current I3 (A x 10)		6
206 ($00CE)	L1-L2 voltage (V x 10)		7
207 ($00CF)	L2-L3 voltage (V x 10)		8
208 ($00D0)	L3-L1 voltage (V x 10)		9
209 ($00D1)	Active power L1 (W)		10
210 ($00D2)	Active power L2 (W)		11
211 ($00D3)	Active power L3 (W)		12
212 ($00D4)	Reactive power L1(VAR)		13
213 ($00D5)	Reactive power L2 (VAR)		14
214 ($00D6)	Reactive power L3 (VAR)		15
215 ($00D7)	Total active power (W)		16
216 ($00D8)	Total apparent power (VA)		17
217 ($00D9)	Total reactive power (VAR)		18
218 ($00DA)	Total Cos phi (x 100)		19
219 ($00DB)	Cos phi L1 (x 100)		20
220 ($00DC)	Cos phi L2 (x 100)		21
221 ($00DD)	Cos phi L3 (x 100)		22
222 ($00DE)	Voltage asymmetry (% x 100)		23
223 ($00DF)	Current asymmetry (% x 100)		24
224 ($00E0)	Active energy L1	word 1	25
225 ($00E1)	(KWh x 100)	word 2	26
226 ($00E2)	Active energy L2	word 1	27
227 ($00E3)	(KWh x 100)	word 2	28
228 ($00E4)	Active energy L3	word 1	29
229 ($00E5)	(KWh x 100)	word 2	30

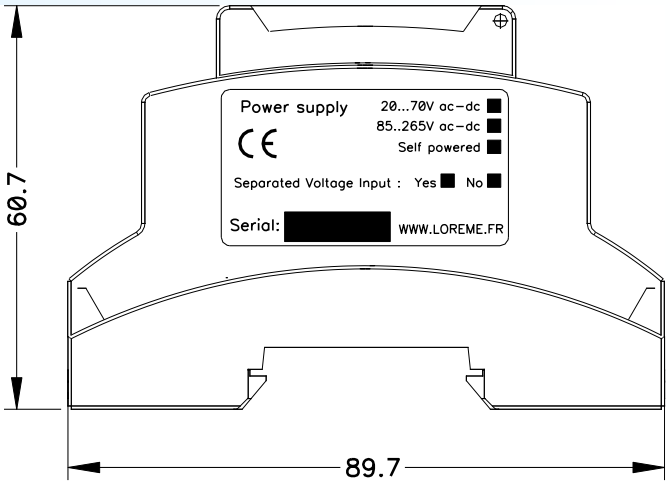
Table of measure (continuation)

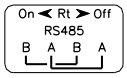
Decimal word address (Hexadecimal)	Designation		Total Words
230 ($00E6)	Total active energy	word 1	31
231 ($00E7)	(KWh x 100)	word 2	32
232 ($00E8)	Reactive energy L1	word 1	33
233 ($00E9)	(KVARh x 100)	word 2	34
234 ($00EA)	Reactive energy L2	word 1	35
235 ($00EB)	(KVARh x 100)	word 2	36
236 ($00EC)	Reactive energy L3	word 1	37
237 ($00ED)	(KVARh x 100)	word 2	38
238 ($00EE)	Total reactive energy	word 1	39
239 ($00EF)	(KVARh x 100)	word 2	40

3.4) Table of measures in 32 bits unsigned integer *(on device with revision 2.4 and more)*
The address range for the measures in 32bits float format correspond to tables in page 18 to 19.

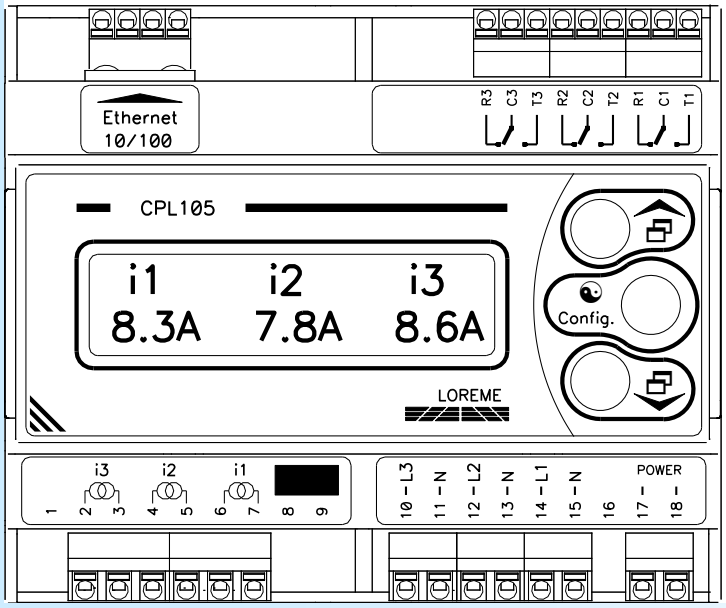
Outline dimensions

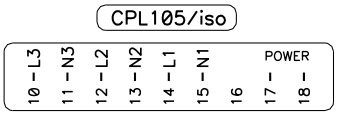






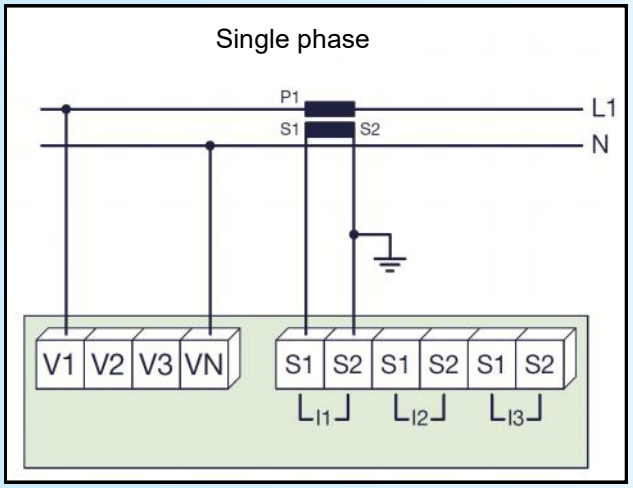
RT: termination resistor

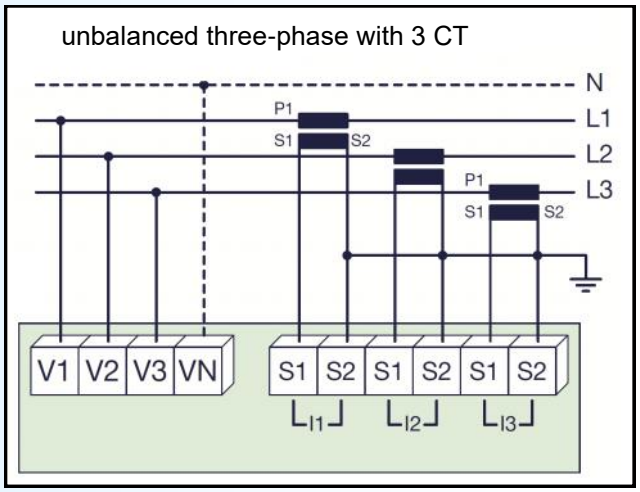




Wiring diagram

CPL105 standard



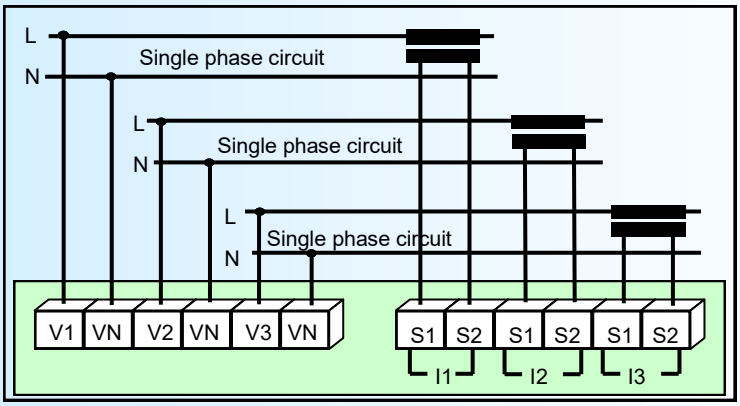


The wiring of three-phase may be with or without neutral.
The device is always powered with the 'PWR' terminals.

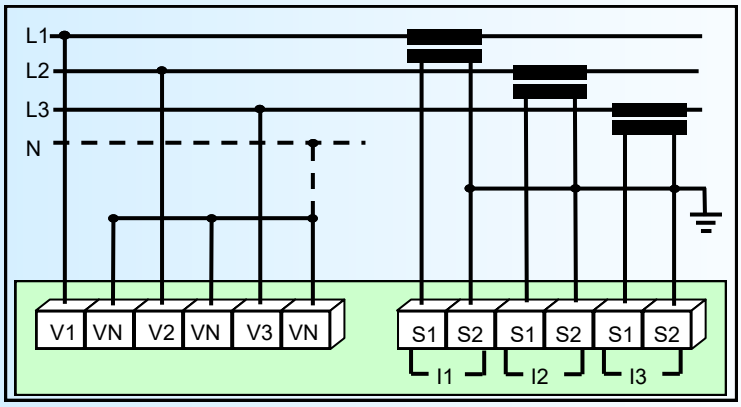
CPL105/ iso

The /iso option designed a CPL105 with separated measures inputs. This feature is useful when you wanted to measure several single phase circuit. For a three-phase using, it is imperative to connect the neutral terminals together. The device is always powered by the 'PWR' terminal.

Use with several single phase circuits



Use in three phase (with or without neutral)

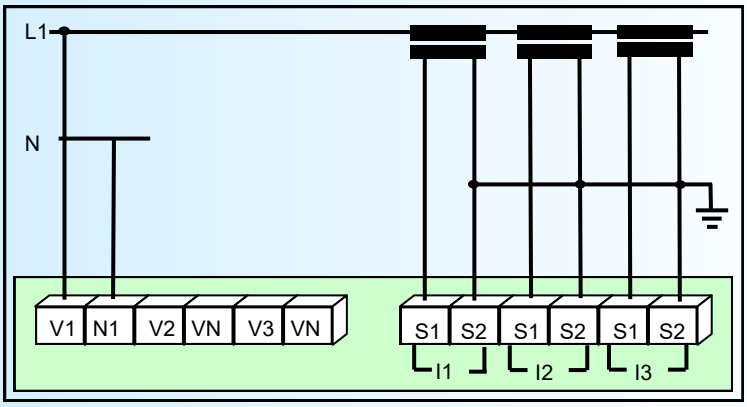


WIRINGS for "SINGLE VOLTAGE" mode

This operating mode is available on CPL105 standard or with /iso option.

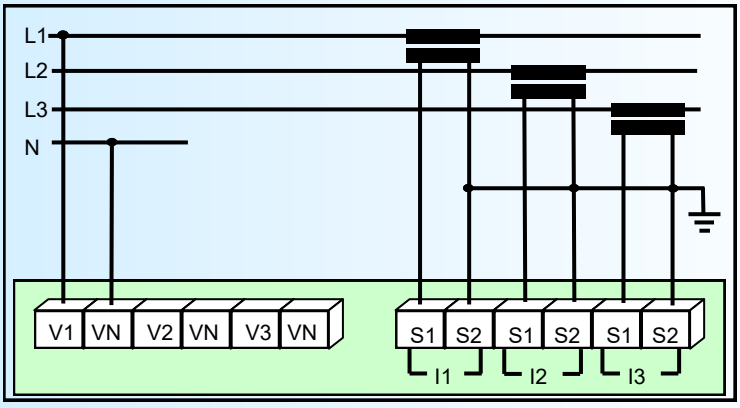
"Single voltage" and single phase

Use the CPL105 like 3 single phase wattmeter's with one reference voltage (L1).



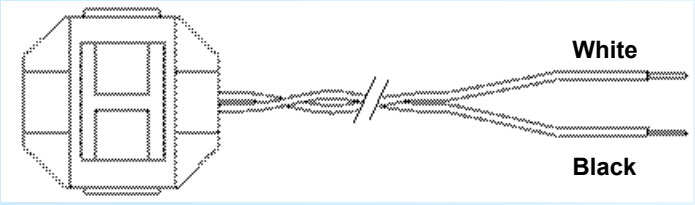
"Single voltage" and three phase

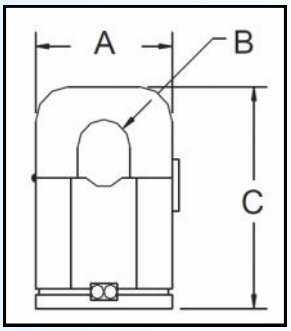
Use the CPL105 in 3 three phase wattmeter's with one reference voltage (L1). An approximation of active power on L2 and L3 is made using the cosines phi on L1.



Split-core current transformer

1) Footprint





	Tio d12	Tio d17
A	32 mm	56 mm
B	12 mm	17 mm
C	57 mm	51 mm

2) Configuration and wiring of split-core transformer

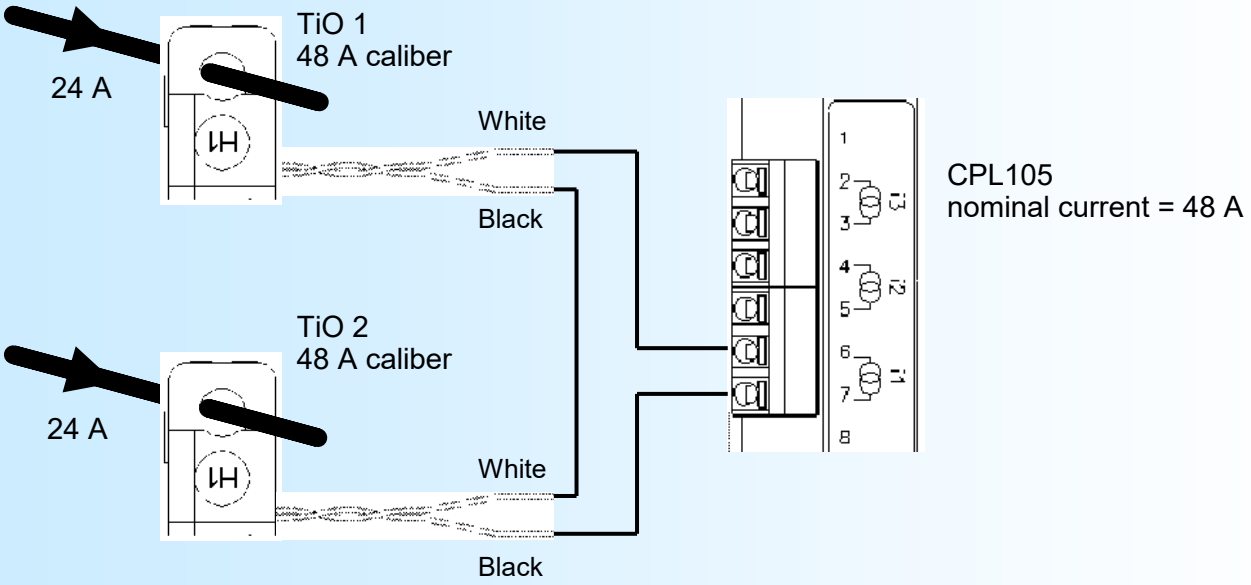
It is imperative that the nominal current setting in CPL105 is the same as the current transformer caliber.
When use several transformers connected in series, they must have the same caliber.

2.1) Example

We want to measure 2 circuits with current transformers. Each branch consume a maximum of 24 A.
So, we use 2 current transformers of 48 A caliber connected in series on the I1 input. The CPL105 is also configured with a 48 A nominal current.
If the CPL105 measure 3 circuits, the transformers should have a 72 A caliber and the CPL105 also.

If the caliber of transformers are not adapted, this can lead a saturation of the CPL105 input and wrong measures.

Connect split-core current transformers in series:



Note:
It is essential to respect the sense and the orientation of the current transformers when they are connected in series. Otherwise the current measured by the CPL105 will not correspond to the sum of currents.

Commissioning

Check to made at commissioning:

The nominal current parameter in CPL105 should be the same as the caliber of current transformers:
- display the current's measure page on the LCD screen and check the consistency of measures.

In three phase, the couple current/voltage should be respected:
- Display the phase power page on the LCD screen,
- If the current / voltage are in the same line, the display of Cos phi is around of 0.8 / 0.9.
- If the current is not in voltage line, the display of Cos phi is more around 0.4 / 0.5. In this case, change the current wiring.

When split-core current transformers are connected in series, the direction of each is important:
- Display the current's measure page on the LCD screen. The measure should increase during the transformers installation. If the measure decreases, the last installed transformer is not in the good direction. Return this transformer in the good direction.

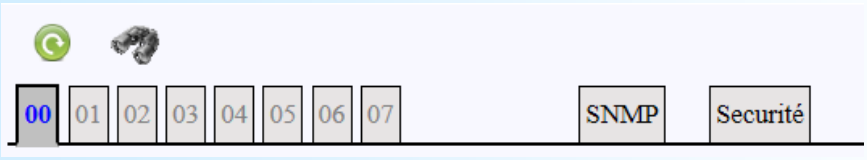
WEB Server

The CPL105/CMTCP have an embedded web server to show the measurements via a simple web browser. Enter the IP address of device to access to the visualization page.

The measure page is displayed like this:

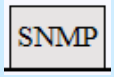
This page give an overview of all measures provided by the CPL105.
Refresh this page to have the last measures.

Details of the tabs:
The module present on the bus have there number displayed in green. The greyed tab show at which module belong the displayed measures page.

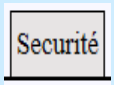


Refresh/ Update : click on this icon to refresh the page.

Scan: click on this icon to start a new scan of bus. that is the head module (bus address = 0) scan all bus address (from 1 to 7) to know the number and the address of slave modules present on the bus.



SNMP configuration: This tab is for setting the SNMP parameters



Security: this tab define a password for the SNMP configuration page access.

Measure page for a module
After selecting the tab for the module, the measure page is refreshed once. Click on the icon to refresh and display new measures.

Bus discovery (Scan)
At the power ON, the CPL105/CMTCP scan the bus to identify all present modules. A new scan may be needed if the bus constitution changed.

Change in the composition of the BUS
It is recommended to turn the rail OFF when a module is added or removed.

Important note on the BUS discovery
During a scan, make sure that all modules are present on the BUS are display as good on the web page. If it not, restart a scan.
It is important to understand that all module reported missing on the web page, will be missing on the MODBUS TCP communication !

=> This case may be arrive if a module is in configuration mode when a scan is running.

After each modification on the BUS constitution, a scan is recommended.

SNMP

1) General information's

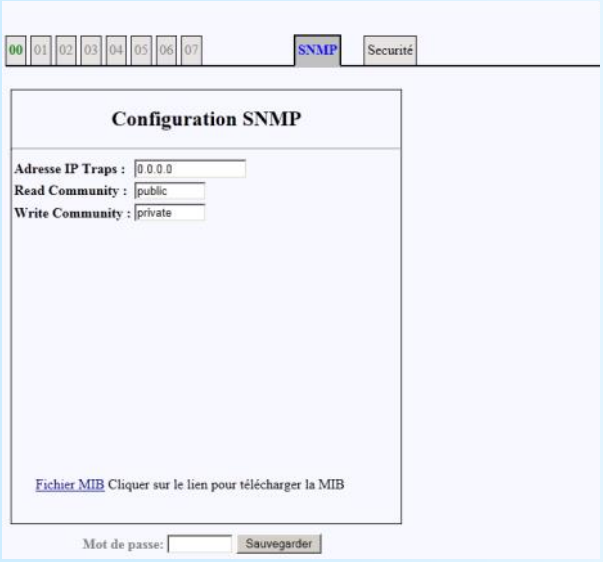
SNMP (Simple Network Management Protocol) is the most widely used protocol for managing network devices. It is based on UDP protocol and provides the control code transmission and reception of response between different network devices. It is based on two main elements: a manager (which generates commands and receives the response messages) and agents (that answer to commands and can generate messages).

To communicate with the different agents, the manager use a database (MIB) dedicated to this agent. This MIB forms a tree structure that includes various accessible parameters of the agent. To access a data item, the manager must know the location of this item in the MIB tree. This location (OID) is represented by a sequence of numbers separated by dots.

The manager sends request to agents by the UDP port 161. This requests therefore contain the OID (the path) of the parameter and the type of action to perform (read or write).
But an agent can also sends message (traps) on UDP port 162. This traps are alert messages issued by agent to the SNMP manager to report abnormal events.

2) Usage

The SNMP option is not compatible with the BUS100 system.
The CPL105 is an SNMPv1 agent. The type and the format of data available correspond to the measure table describe at pages 18-19 and with alarms state.
The CPL105 can generated traps on the alarm relay activation.
The SNMP parameters can be configured only via the web page. This configuration page can be protected by password.



The SNMP parameters are : SNMP supervisor IP address (trap recipient), community names ("public" and "private" by default). To deactivate the traps, enter 0.0.0.0 for the recipient IP address.

3) MIB file

The MIB file can be downloaded on the SNMP page of device.

4) Protection by password

Go to the "security" tab, to activate the password. Enter a new one and confirm it. Save the change with the button "save". At this time, you must enter the new password to save any modification.
It is always possible to deactivated or change the password. At every password activation, a new password is requested.