



## PROGRAMMABLE NETWORK

### ANALYZER

- IPL50L
- IPL50L/R
- IPL50L/S
- IPL50L/C
- AND
- IPL50L/R3

## CONFIGURATION HANDBOOK

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## DIALOGUE - TERMINAL MODE

Numeric devices can converse with all terminal emulation mode systems. As the dialogue and configuration part are in device's memory, no software or specific interface are necessary for their configuration.

Two terminal emulation mode systems are presented: the PSION and the PC. Different procedures are enumerated below.

### 1) **PSION serie 2:**

First of all manipulation, plug in "COMMS LINK" on the PSION. To start up the PSION, push on the "ON" key.

The PSION displays this menu:

**RECH SAUV AGENDA  
CALC PROG EFFACE**

Push on the "C" key until the menu "COMMS", and validate with "EXE".

The PSION displays this menu:

**TRANSMIT RECEIVE  
SETUP TERM AUTO**

Push on the "T" key until the menu "TERM", and validate with "EXE" to obtain a empty screen. The PSION is now in terminal mode and you can link the PSION to the device, by plugging in the RS 232. The measure is displayed, to configure, push on the "C" key.

### 2) **PSION Workabout:**

To start up the PSION push on the "ON" key.

At the presentation, push on the "MENU" key. Select "SYSTEM SCREEN" mode and validate by "ENTER".

Icons display: **DATA CALC SHEET PROGRAM COMMS**

Select icon "COMMS" and validate by "ENTER", on display, a cursor flashing. The PSION is in terminal mode. Plug in "RS232" on PC. The measure is displayed and, to configure, push "C" on keyboard.

To quit terminal mode and switch off PSION, push on "OFF" key. When you re-start the PSION in terminal mode, it start automaticaly and directly in terminal mode without re-start configuration.

### 3) PC with DOS:

The terminal emulation mode software with DOS "IBM®-PC KERMIT-MS V2.26" is available at simple request. After the PC has booted, type "a: K" then press "ENTER". The PC is in terminal mode and uses COM port 1.

If you want to use the second serial communication port (COM2), type:

- "A:KERMIT" and "ENTER" to launch the program,
- "SET PORT 2" and "ENTER" to select COM2,
- "SET BAUD 9600" and "ENTER" to select speed,
- "CONNECT" and "ENTER", to enter in the terminal mode.

The PC is now emulating a terminal and may be connected to the device by plugging in the RS 232 link cable. Measure is now displayed and configuration's access allowed by a press on "C" key.

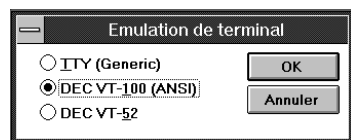
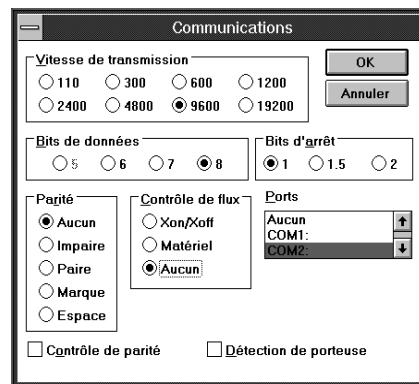
To quit kermit, press "CTRL-\$" then press the key "C". When the message KERMIT-MS appears, type "QUIT" to return to MS-DOS commands.

### 4) PC with WINDOWS 3.11:

Start WINDOWS and in "ACCESSORIES" group, double-click on icon which get access to terminal mode.

In "PARAMETERS" menubar, click on "COMMUNICATION" sub-menu. We access to the following windows. Configure communication parameters, 9600 bauds, no parity, 8 data bits, 1 stop bit, no flow control and validate.

Begin terminal emulation by click on "PARAMETERS", then on "EMULATION TERMINAL". the following board is displayed.



Choose terminal mode DEC-VT-100(ANSI) and validate. The PC is in terminal mode, connect it to device by plugging the RS232 link cable. Measure is now displayed and to access at configuration, press on "C" key.

### 5) PC with WINDOWS 95/98:

- To start up terminal program:
- 1 - Cliquez on button "START",
- 2 - Tick off "PROGRAMS", "ACCESSORIES", and "HYPER TERMINAL",
- 3 - Click twice on 

Hypertrm.exe

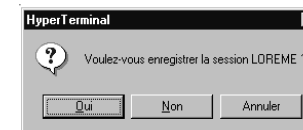
The following window is displayed. Enter a name for a new connection and validate, the hereunder window will appear



Choose a communication port and validate. The following window is displayed




Configure communication parameters, 9600 bauds, no parity, 8 data bits, 1 stop bit, no flow control and validate. The PC is in terminal mode, connect to device by plugging the RS232 link cable. Measure is now displayed and to access the configuration, press on "C" key .



When quitting HyperTerminal, it will display the following window. To dialog with all LOREME devices without re-start all the method, click on "OK"

To load LOREME session directly:

- 1 - Click on button "Start".
- 2 - Tick off "Programs", "Accessories", and "HyperTerminal".
- 3 - Click twice on the icon 

LOREME.ht

### 6) Display on terminal

When switching on, the analyzer is automatically put in operating mode and displays the measures. The user will be able to visualize the measures on two tables, each one including a part of the pieces of information.

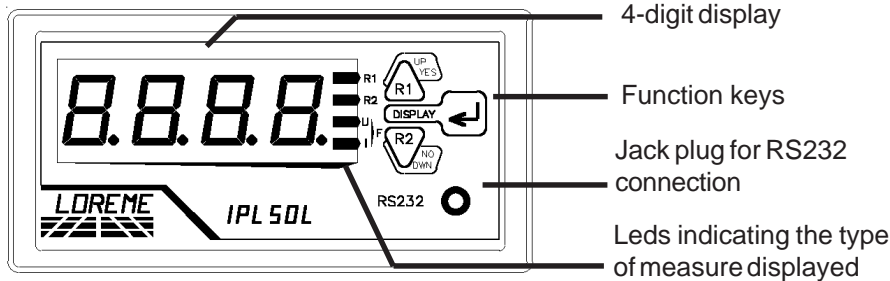
The two tables of displayed measures are the following ones:  
 VOLTAGE or CURRENT  
 FREQUENCY FREQUENCY

**DEVICE PRESENTATION**

**A) Devices models:**

- IPL 50L: Voltage, current, frequency measure,
- IPL 50L/R: + 2 relays,
- IPL 50L/S: + 1 analog output,
- IPL 50L/C: + 1 RS 485 Modbus link.

**USER INTERFACE**



**1) Operating mode:**

The key allows: -to change the type of measure displayed, voltage, current, frequency.

Four LEDS give the following informations:

R1: Alarm 1	U: Voltage display	) F: Frequency display
R2: Alarm 2	I: Current display	

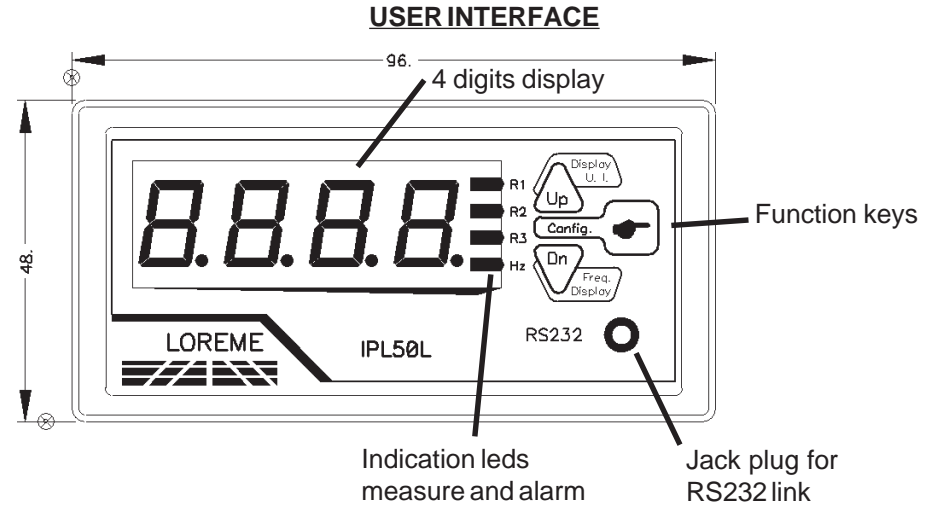
**2) Configuration mode:**

The key allows: - to access the adjustment of the alarm thresholds 1.  
 - to increment the value of the alarm threshold.

The key allows: - to access to the adjustment of the alarm thresholds 2.  
 - to increment the value of the alarm threshold.

Note: The relay, 1 or 2, and the type of measure on which is allocated the alarm, voltage, current or frequency, are marked out by one of the leds R1, R2, U, I and F.

**B) IPL50L/R3 model:**



**1) Operating mode:**

The key -to switch the display in voltage or current measure.  
 -to increment the selected alarm threshold value.

The key -to switch the display in frequency measure.  
 -to decrement the selected alarm threshold value.

Four LEDS give the informations below:

R1: Alarm 1	R3: Alarm 3
R2: Alarm 2	F: frequency display

**2) Configuration mode:**

The key allows, by successive pressing, the relay 1, then relay 2, then relay 3 alarm threshold adjustment access. The R1 or R2 or R3 led is flashing during the adjustment. The Up, Dn keys allow to increment or to decrement the alarm threshold if the adjustment is authorized (see relay configuration).

Note: the access to adjustment is possible only if the alarm is validate. If the 3 alarms are inactive so press the <config> key is without effect.

## CONFIGURATION

The handbook explains in detail different possibilities of configuration: Language, input, output, relay, communication, display.  
To enter configuration mode, just press "**C**" key.

### **1) Method:**

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

#### **1.1) Menu selection:**

exemple: INPUT  
Y - N

The user makes a choice by pressing the keys "**Y**" or "**N**". This choice allows to access the different menus of configuration.

#### **1.2) Parameter selection:**

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

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

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

Choice is made by pressing "**Y**" or "**N**" keys, and validation is made by pressing corresponding key to displayed answer ("**Y**" for YES and "**N**" for NO) or "←" (PC)/"**EXE**" (PSION). Pressing key "← / **EXE**" without modification allows to validate the previous answer.

#### **1.3) Value acquisition:**

exemple: LOW SCALE  
4 mA

Two cases are possible:

- validation without modification, just press "← / **EXE**",
- value modification on keyboard, simultaneous display, followed by validation with "← / **EXE**".

Note:

- It is possible, when a mistake is made during a value acquisition, before validating it, to go back by pressing "DEL" key (PC + PSION), which re-displays the message without taking notice of the wrong value.
- In configuration mode, if there is no action, device goes back in operating mode after a two minutes delay without taking notice of modifications made before.
- In configuration mode, if you want to shift to measure mode without taking notice of the modifications made before, you just have to press "ESC" (PC) or "SHIFT + DEL" (PSION) key.

### **2) Language:**

The possibilities of language are:

- French,
- English.

### **3) Input used:**

The possibilities of input measure are:

- voltage measure great caliber,
- voltage measure small caliber,
- current measure

in

- direct current,
- alternating current.

It is necessary to configure the measure ratio used.

### **4) Analog outputs:**

The configuration of the analogical output is composed of 2 rubrics:

- output assignement:
  - measured value, voltage, current or frequency,
  - low and high measure scale.
- output parameters:
  - type of output, current or voltage,
  - low and high output scale,
  - answer time,
  - output limit.

**The response time** is adjustable from 200 ms to 60 s. This adjust allows to realize a numerical filter smoothing analogical output of witch measure would be disrupted, fluctuating or exposed to interferences.

**The limitation** allows, for all input signal values, to peak clip the output signal swing at scale configuration.



### **5) Relay:**

The configuration of the relay in alarm is composed of 3 rubrics:

- alarm assignment:
  - measured value, voltage, current or frequency,
- alarm parameters:
  - type of detection, high or low threshold,
  - value of the threshold,
  - value of the hysteresis,
  - access to alarm threshold adjustment in front face.

Alarm operate in following way:

#### **- High threshold:**

Alarm is activated when measure goes beyond threshold,  
Alarm is deactivated when measure goes under threshold minus hysteresis.

#### **- Low threshold:**

Alarm is activated when measure goes under threshold,  
Alarm is desactivated when measure goes beyond threshold plus hysteresis.

- relay parameters:
  - type of security, positive or negative,
  - delay of activation / deactivation.

#### **- Security:**

This function allows to choose between the excitation or the de-excitation of the relays when the alarm is activated.

In positive security, relay is excited when alarm is active and de-excited when alarm is inactive.

In negative security, relay is de-excited when alarm is active and excited when alarm is inactive.

#### **- Delay:**

This function allows to set a delay in seconds at the activation / deactivation of alarms.

### **6) RS485 numerical output:**

The configuration of the communication is composed of 3 rubrics:

- **address** of the device in the communication network, 1 to 255,
- **speed**, 600, 1200, 2400, 4800, 9600, 19200 or 38400 bauds,
- **parity**, even, odd or without.

### **7) Display:**

The configuration of the display is composed of 2 rubrics:

#### **- Display filter**

This function allows a filtering of the display value independently of the analog output and alarms result. That allows to stabilize the displayed value with a great resolution. The gotten value correspond to a measure number on which is realized the calculus of filtering.

#### **- Display modification**

This function active or disactive the press-button which allows to change the display type, voltage, current or frequency.

## **EMC CONSIDERATION**

### **1) Introduction:**

In order to satisfy its policy as regards EMC, based on the Community directive 89/336/CE, the LOREME company takes into account the standards relative to this directive from the very start of the conception of each product.

As the devices are devised to work in industrial environments, the various tests are carried out in the sight of the EN 50081-2 and EN 50082-2 standards, in order to make out a statement of conformity.

As the devices lie in certain typical configurations during the tests, it is not possible to secure the outcomes in any possible configuration.

To ensure the best functioning possible 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 centimetres 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 control of relays, of contactors, of electrogates, ...
- If the switching of thyristor statical groups, of engines, of speed variator, ... causes strong interferences on power supply circuit, it would be necessary to put an insulation transformer especially intended for instrumentation linking the screen to earth.

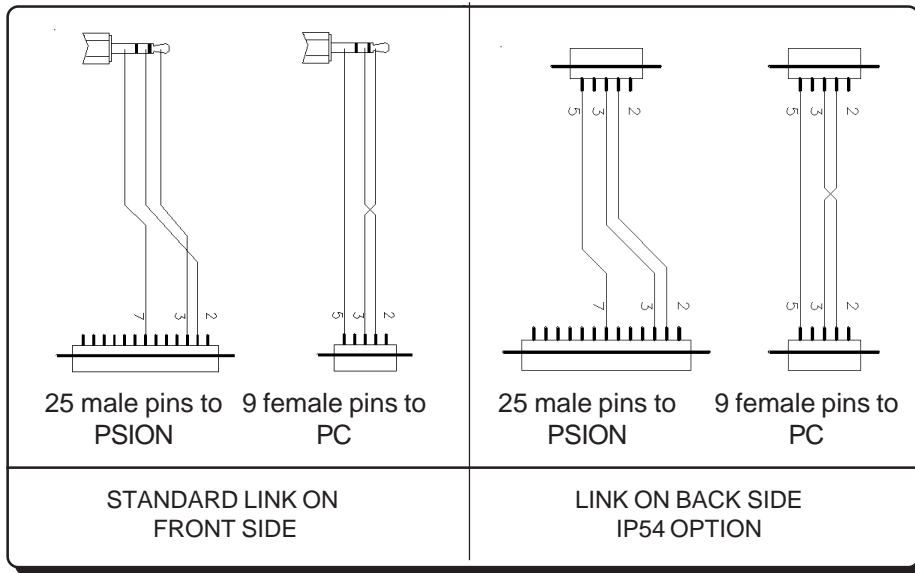
- It is also important that the installation should have a good earth system and it is better that the voltage in relation to the neutral should not exceed 1V, and the resistance be inferior to 6 ohms.

- 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.

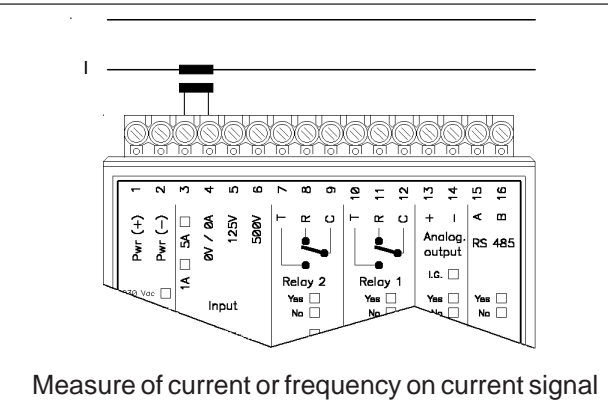
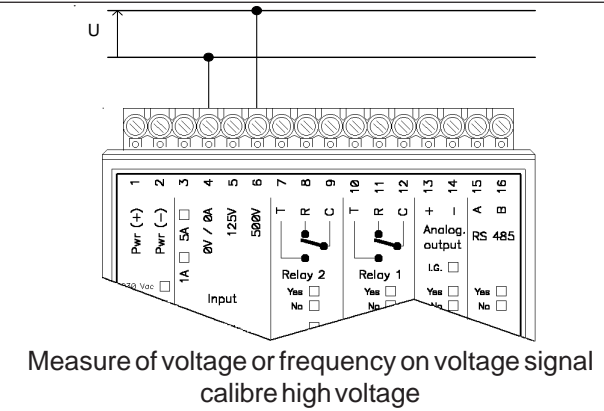
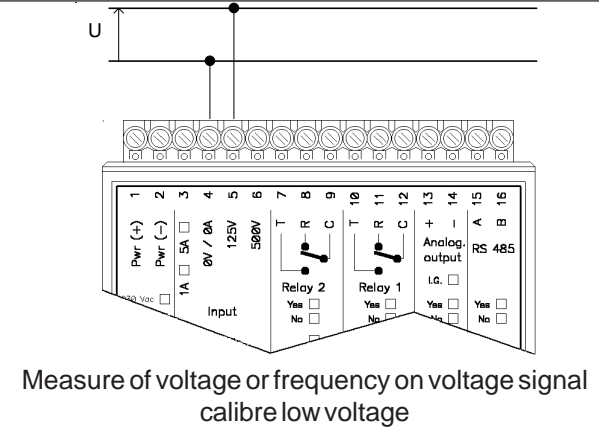
## TERMINAL - DEVICE LINK



## INPUT/OUTPUT CONNECTIONS

Power supply:	terminal 1 (+), terminal 2 (-)
Input current:	terminal 4 (-), terminal 3 (+)
Input low voltage:	terminal 4 (-), terminal 5 (+)
Input high voltage:	terminal 4 (-), terminal 6 (+)
Relay 2:	terminal 7 (work), terminal 8 (rest) terminal 9 (common)
Relay 1:	terminal 10 (work), terminal 11 (rest) terminal 12 (common)
Analogical output:	terminal 13 (+), terminal 14 (-)
RS 485 numerical output:	terminal 15 (A), terminal 16 (B)

## WIRING DIAGRAM



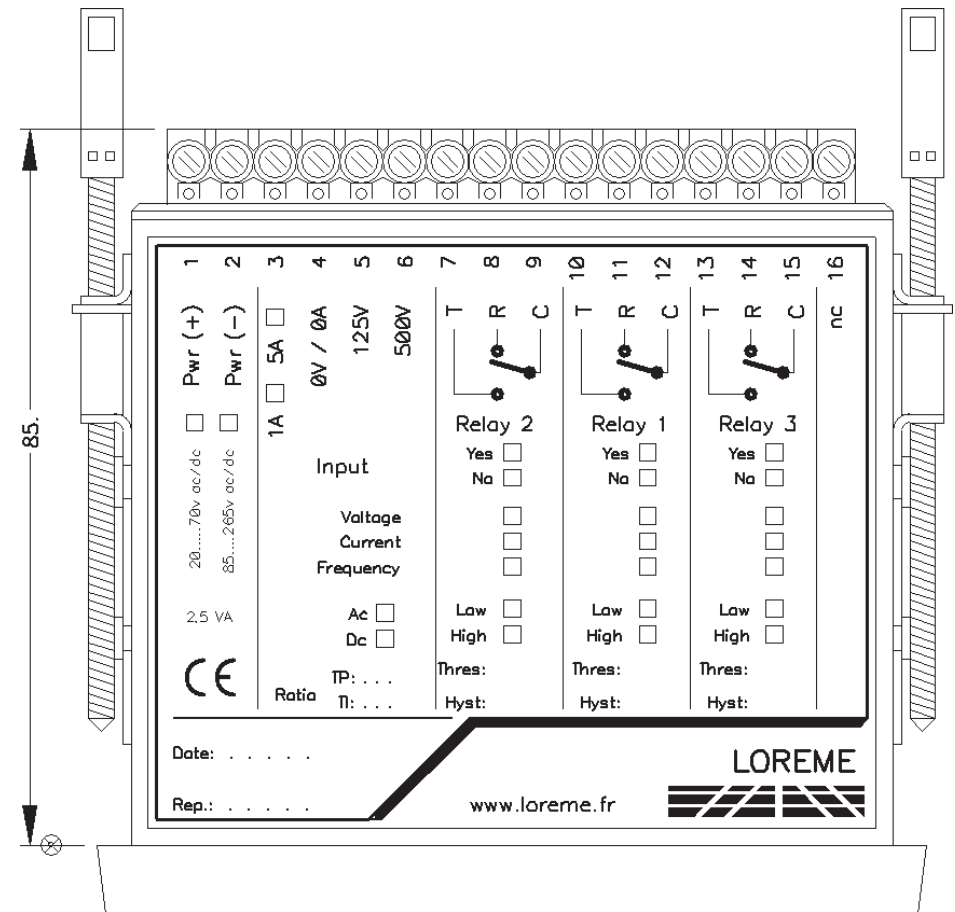


### IPL50L/R3 INPUTS/OUTPUTS CONNECTION

- Power supply: terminal 1 (+), terminal 2 (-)
- Input current : terminal 4 (-), terminal 3 (+)
- Input low voltage: terminal 4 (-), terminal 5 (+)
- Input low voltage: terminal 4 (-), terminal 6 (+)
- Relay 2: terminal 7 (work), terminal 8 (rest)  
terminal 9 (common)
- Relay 1: terminal 10 (work), terminal 11 (rest)  
terminal 12 (common)
- Relay 3: terminal 13 (work), terminal 14 (rest)  
terminal 15 (common)

For the input connection, see previous page.

### IPL50L/R3 WIRING DIAGRAM



**RS 485 MODBUS LINK UTILIZATION**

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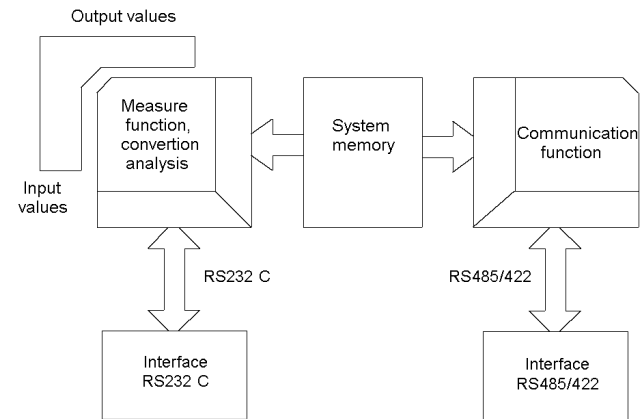
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**1) Internal structure:**

**1.1) Presentation:**

The device is divided in two cells. Each cell has a specific function which keeping a continuous exchange of pieces of information with the second cell. The first cell is in charge of the measure, analysis and conversion function. The second cell is in charge of the communication function. The information exchange is continuous and automatic.



**1.2) Measure function:**

The measure cell runs the acquisition of the different signals and calculates all the values with regards to the configuration of the device. It also runs all the output functions (analogical, alarm, meter, RS 232). All measured or calculated parameters are stored in the system memory and are constantly refreshed.

**1.3) Communication function:**

The communication cell runs the RS485 communication interface in the MODBUS/JBUS protocol. It analyzes the requests of the main station and answers if the device is addressed. It draws all these datas from the system memory that can be continuously accessed.

**1.4) System memory:**

Each cell can continuously access the system memory. The latter has a dual access, which allows a reading/writing of the data without any possible internal conflicts.

## 2) Communication:

The type of used protocol is MODBUS/JBUS in RTU mode. The communication has neither header nor delimitator of frame. The detection of the frame start is made by a silence whose time is at least equal to the transmission of 3.5 bytes. It implies that a frame received can be processed only after a time equal to the silence given before. The time of this silence is directly linked to the speed of transmission of the system:

Ex: Speed 9600 bauds - no parity (10 bits/byte)  
 Silence =  $(3.5 \times 10) / 9600 = 3.64 \text{ ms}$

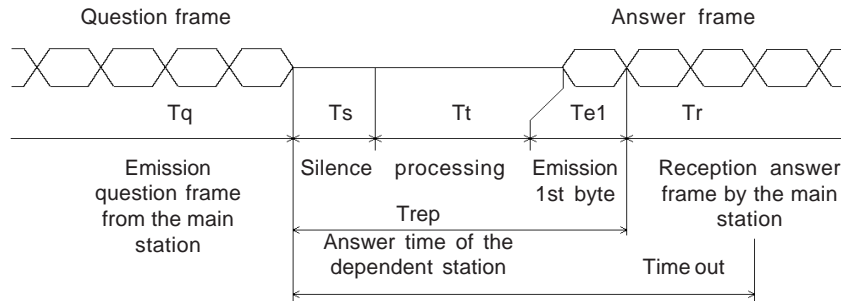
The device starts to process the frame 3.64 ms after receiving the last byte.

Note: The time separating two bytes from a same frame must be inferior to a silence. If the user does not comply with this condition, the second byte will be considered as the first one of a new frame.

The interval of time separating the end of reception of the last byte of the question frame and the end of emission of the first byte of the answer frame (detection of frame of the main station) constitutes the answer time of the device.

This answer time  $T_{rep}$  includes:

- the silence (time of 3.5 bytes)  $T_s$ ,
- the processing of the frame  $T_t$ ,
- the emission of the first byte  $T_{e1}$ .



The time beyond which the device does not answer is called **Time out**. It depends on the transmission parameters (speed, format) and the type of the function asked (reading, writing). This time must be defined by the user and must be superior to the answer time of the device.

A complete cycle of communication includes :

- the transmission of the question frame  $T_q$
- the answer time of the device  $T_{rep}$
- the transmission of the answer frame  $T_r$

Four reasons might cause a **TIME OUT**:

- configuration of the dependent station by the RS232
- wrong transmission data at the time of the question frame
- wrong configuration of the TIME OUT on the main station
- dependent station out-of-order.

## 3) Implementation:

### 3.1) Parametrizing:

Before starting up the RS485 MODBUS/JBUS communication, make sure that:

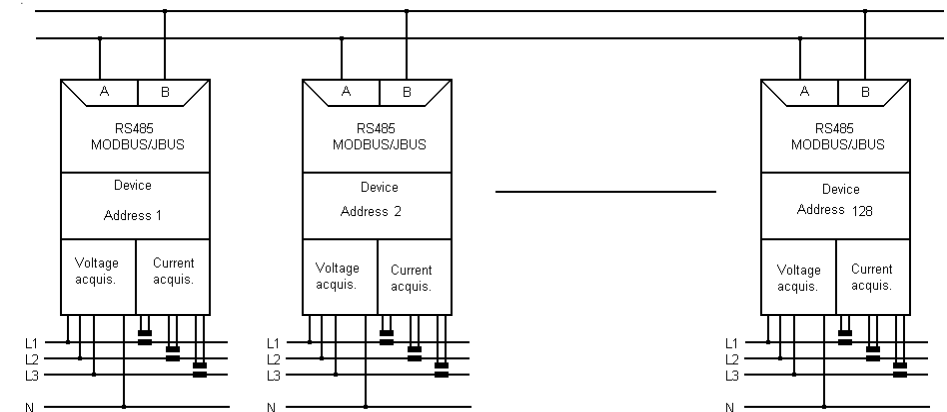
- the speed of transmission is identical between the dependent stations (LOREME devices) and the main station.
- the parity is identical between the dependent stations LOREME devices and the main station.
- the addresses are correctly distributed among the dependent stations (LOREME devices), no identical addresses for two dependent stations.
- the TIME OUT is correctly adjusted on the main station.

All the parameters of speed, parity and address must be configured on the devices with the RS232 link.

The possibilities of configuration of the devices are the following ones:

- address: from 1 to 255
- speed 600, 1200, 2400, 4800, 9600, 19200, 38400 bauds
- parity: even, odd, without.

### 3.2) Interconnection:



The RS485 interface used allows to connect 128 dependent stations on the same network. For better operating conditions (noise immunity), the network will have to be made up of a twisted pair.

**4) Communication times:**

**4.1) Procedure:**

Analysis of the times of communication for parameters of data transmission and for particular cases.

Parameters of transmission:

- speed: 9600 bauds.
- format: 1 start bit, 8 data bits without parity, 1 stop bit.

Explored cases:

- reading of all the measures of the network at the floating format

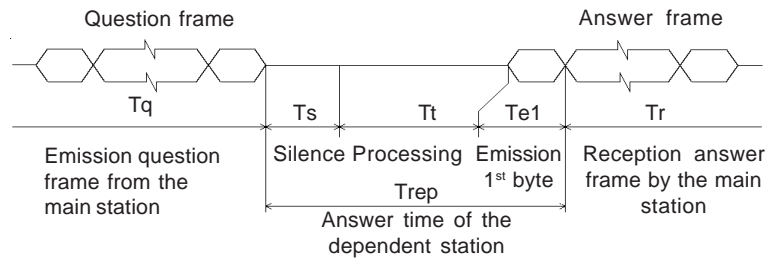
**4.2) Measures reading :**

Reading of 4 words (8 bytes) of the address \$4000 to \$4003

Value made of 2 words, 4 bytes

- Voltage or current
- Frequency

Length of frame: - question: 8 bytes  
- answer: 13 bytes



Calculation of the times:

- Question frame  $Tq = (8 \times 10) / 9600 = 8.33 \text{ ms}$
- Silence  $Ts = (3.5 \times 10) / 9600 = 3.64 \text{ ms}$
- Processing  $Tt = 30 \text{ ms}$
- Emission 1 byte  $Te1 = (1 \times 10) / 9600 = 1.04 \text{ ms}$
- Answer time  $Trep = Ts + Tt + Te1 = 34.68 \text{ ms}$
- Answer frame  $Tr = [(13 - 1) \times 10] / 9600 = 12,5 \text{ ms}$
- Complete cycle  $Tcyc = Tq + Trep + Tr = 55,51 \text{ ms}$

Processing time  $Tt$  is fixed. It depends neither on the speed nor on the format of transmission. Consequently, for new parameters of transmission, all the times are going to change but not  $Tt$ .

To set TIME OUT of the system, you just have to calculate answer time  $Trep$  of dependent station according to parameters of communication.

For a complete reading of measures, cycle time of system is about 55 ms.

**5) Frames structure :**

**5.1) Words reading :**

Function code used: \$03 or \$04

Reading of measures of the network:

- data at the 32-bit floating format address \$4000 to \$4003
- data at the 16-bit integer format address \$5000 to \$5002
- data at the 32-bit integer format address \$6000 to \$6003

Question: length of frame 8 bytes.

Address CNV.	Function Code	Address PF	1st word Pf	Number of words PF	Pf	CRC16 PF
1	1	2		2		2

Answer: length of frame 5 bytes + number of read bytes

Address CNV.	Function Code	Number of bytes	Value of the words	Pf	CRC16 PF
1	1	1			2

**5.2) Exception frame:**

When a physical error of transmission of a question frame occurs (CRC16 or parity), the dependent station does not answer. If an error of frame (data address, function, value) occurs, an answer of exception will be emitted by the dependent station.

Length of frame: 5 bytes.

Address converter	Function code	Error code	Pf	CRC16 PF
1	1	1		2

Features of the exception frame:

- Function code: The function code of the exception frame is identical to the one of the question frame, but its bit of strong load is set to 1 (logical or with \$80)

- Error code:

The error code establishes the reason of a sending of an exception frame.

Error code	Signification
\$01	Function code not used. Only the functions reading of words (\$03 or \$04) are allowed.
\$02	Non-valid data address. Memory access not allowed.

**6) Data of communication:**

**6.1) Accessible data:**

All the measures are accessible in reading mode. Voltage, current, frequency, active power, reactive power, apparent power, cosinus phi, active consumed, generated, reactive inductive, capacitive energy on the phases 1, 2, 3 and the sum of the phases.

The values are:

- on 2 words, i.e. 4 bytes at the 32-bit IEEE floating format, for voltage, current, frequency.
- on 1 word, i.e. 2 bytes at the 16-bit integer format multiplied or not by a coefficient, for voltage, current, frequency and transformer ratio.
- on 2 words, i.e. 4 bytes at the 32-bit integer format multiplied or not by a coefficient, for voltage, current, frequency

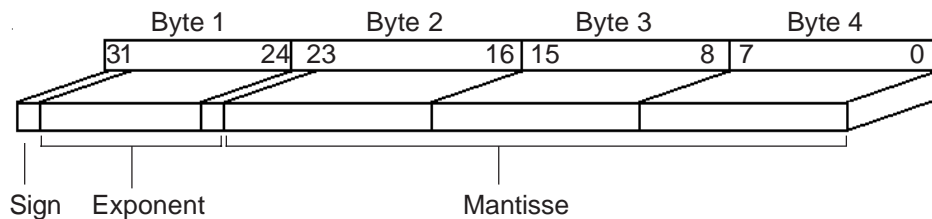
→ Consult the enclosed tables for measures detail.

**6.2) Data format:**

- Data at the 32-bit IEEE floating format.

Transmission of the data, most significant word first.

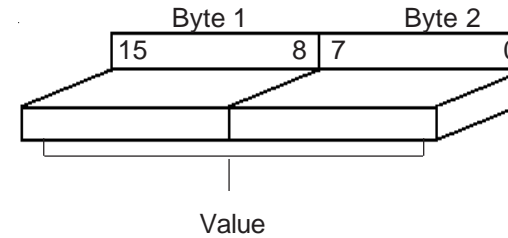
These data are made of 2 words, i.e. 4 bytes.



- Data at the 32-bit integer format.

Transmission of the data, least significant word first.

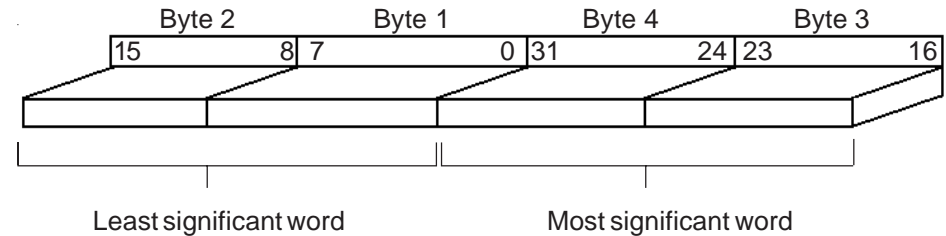
These data are made of 2 words, i.e. 4 bytes .



- Data at the 16-bit integer format.

Transmission of the data, most significant word first.

These data are made of 1 word, i.e. 2 bytes.



**7) Table of data:**

**7.1) 32-bit floating format:**

Address words									Total	
	b7	b6	b5	b4	b3	b2	b1	b0	Word	Bytes
\$4000	Voltage or current				Byte 1		Word 1		1	1
	Byte 2									
\$4001					Byte 3		Word 2		2	3
	Byte 4									
\$4002	Frequency				Byte 1		Word 1		3	5
	Byte 2									
\$4003					Byte 3		Word 2		4	7
	Byte 4									
										8

**7.2) 16-bit integer format:**

Address words									Total	
	b7	b6	b5	b4	b3	b2	b1	b0	Word	Bytes
\$5000	Voltage or current x 100				Byte 1		Word 1		1	1
	Byte 2									
\$5001	Frequency x 100				Byte 1		Word 1		2	3
	Byte 2									
\$5002	Transformer ratio				Byte 1		Word 1		3	5
	Byte 2									

**7.3) 32-bit integer format:**

Address words									Total	
	b7	b6	b5	b4	b3	b2	b1	b0	Word	Bytes
\$6000	Voltage or current				Byte 1		Word 1		1	1
	Byte 2									
\$6001					Byte 3		Word 2		2	3
	Byte 4									
\$6002	Frequency x 100				Byte 1		Word 1		3	5
	Byte 2									
\$6003					Byte 3		Word 2		4	7
	Byte 4									
										8