PROGRAMMABLE NUMERIC CONVERTERS

LOREME

CONFIGURATION HANDBOOK

INP101

**CNL40
CNL40IG/H
CNL40IG/H - 4F
CNL40IGNW/H**

**CNL25IGD-
CNL25IG**

CNL70LCD

SPAI-A

SPAE-CNL/H

INP101 rev2 / CNL70LCD rev1 / SPAI-A rev0 / SPAE-CNL/H rev2
*CNL40 rev1.2 / CNL40IG rev2.7 / CNL40IG-4F rev0.1 / CNL40IGNW rev2.0 CNL25IG rev0a.3*

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Device Presentation

LOREME

1) Head mounting sensors

1.1) CNL40

Loop current LED indication
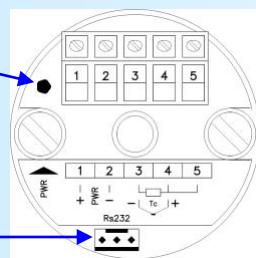
RS232 link

CNL40: 2 wires Loop powered converter.
Measure input: temperature thermocouple or PT100.

The technical data sheet is downloadable here:
http://www.loreme.fr/fichtech/CNL40.pdf

1.2) CNL40IG / CNL40IG-4F

Loop current LED indication
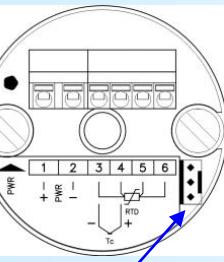
RS232 link

CNL40IG(NW): 2 wires Loop powered isolated converter.
Measure input: temperature (thermocouple or 3 wires PT100),
voltage (mV), current (with external 2.5 Ohms shunt).

CNL40IG-4F: 2 wires Loop powered isolated converter.
Measure input: temperature (thermocouple or 3 wires PT100),
voltage (mV), current (with external 2.5 Ohms shunt).

CNL40IG(NW)H: converter CNL40IG(NW) + HART communication.
CNL40IGH-4F: converter CNL40IG-4F + HART communication.

The technical data sheet is downloadable here:
http://www.loreme.fr/fichtech/CNL40ig.pdf

1.3) INP101 indicator

It's a loop powered field indicator transmitter. It includes in a single case a programmable converter (CNL40IG(-4F) / IGH(-4F) / CNL40IGNW(H)) and a 4 digits display (10000pts).

The technical data sheet is downloadable here: http://www.loreme.fr/fichtech/INP101.pdf

2) DIN rail mounting
2.1) CNL25D

Loop power connector.

Loop current LED indication.

RS232 link
(Located under the cover)

Input connector.

Loop powered not isolated converter.
Input: Temperature measurement (Thermocouple or PT100).

The technical data sheet is downloadable here:
http://www.loreme.fr/fichtech/CNL25D.pdf

2.2) CNL25IG-D

Loop power connector.

Loop current Led indication.

RS232 link
(Located under the cover)

Input connector.
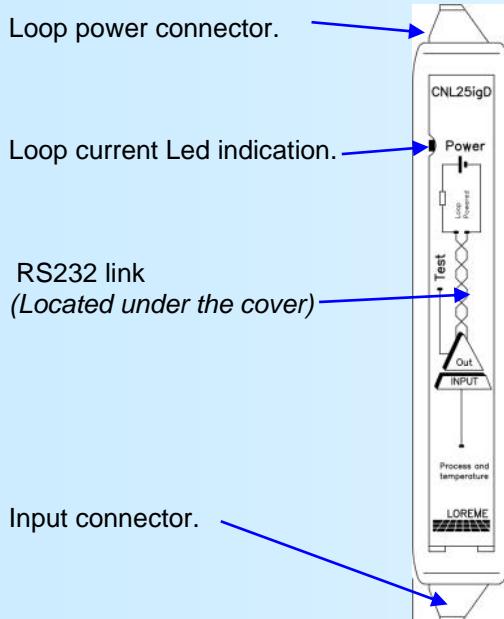
2 wires Loop powered isolated converter.
Measure input: temperature (thermocouple or 3 wires PT100),
voltage (mV), current (with external 2.5 Ohms shunt).
Output reference voltage for potentiometer input.

CNL25IG-D/H : converter + HART communication.
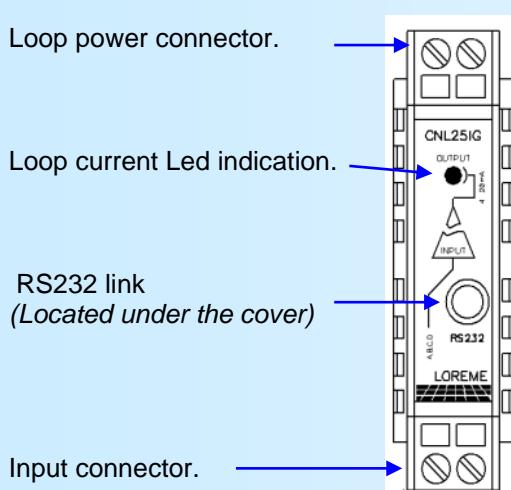
The technical data sheet is downloadable here:
http://www.loreme.fr/fichtech/CNL25IG-D.pdf

2.3) CNL25IG

Loop power connector.

Loop current Led indication.

RS232 link
*(Located under the cover)*

Input connector.

2 wires Loop powered isolated converter.
Measure input: temperature (thermocouple or 3 wires PT100),
voltage (mV), current (with external 2.5 ohms shunt).
Output reference voltage for potentiometer input.

The technical data sheet is downloadable here:
http://www.loreme.fr/fichtech/CNL25IG.pdf

2.4) CNL70LCD indicator
It's a converter (CNL40IG) with LCD display (10000 points).

The technical data sheet is downloadable here: http://www.loreme.fr/fichtech/CNL70.pdf

3) Ambient temperature measurement

3.1) SPAI - SPAE
2 wires loop powered, ambient temperature measure (outdoor or indoor).

3.2) SPAI-A
SPAI with LCD 10000 points display.

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

RS232 Link Configuration

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The device's can visualize the measure and be configured 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
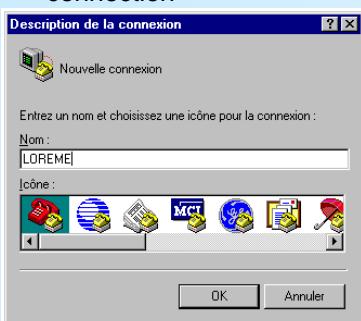
4 Choose the communication port related to the adapter.

5
Choose:
- 9600 bauds
- 8 DATA bits
- no parity
- 1 stop bit
- **XON/XOFF**
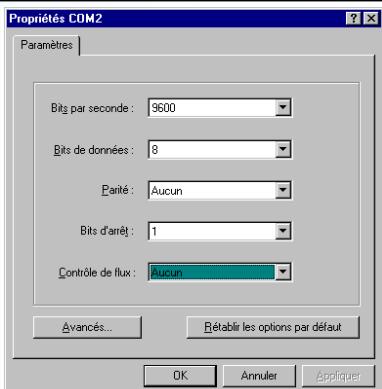
6 The PC is now in terminal mode, connect it to the device by plugging the RS232 cable. The measure is now displayed on the terminal. To access configuration, press 'C' key.

7 When leaving Hyper terminal, the following window will appear. By saving, the terminal session will start with the same configuration.
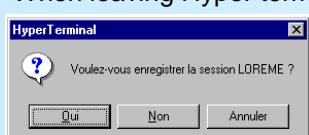
Thus, the shortcut LOREME.ht will permit to communicate with all LOREME devices.

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.

Terminal mode

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Visualization
When switching on, the device is automatically put in operating mode and will send periodically the measures like this:

10 mV	measure
11.99 mA	output current.

Configuration
The handbook explains in detail different possibilities of configuration: Language, input, security value, response time, output limitation, special function.
To enter configuration mode, just press the **"C"** key and follow the configuration procedure.

1) Method
In configuration mode, 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
example: 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
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.

1.3) Value acquisition
example: 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 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.

2) Language
Only the **"IG"** version have the choice of the language and the supported languages are: English or French.

3) Input
The inputs possibilities are: - Pt100 3 wires or 4 wires (depending on the version),
                                  - Thermocouple B, E, J, K, R, S, T, or only N,W3,W5 for the CNL40IGNW.
          for the "IG" versions: - voltage input (mV)
                                  - current input (with external shunt of 2.5 Ohms).

For each input type, you can choose the low scale and high scale of the measurement range.

4) Display range

The display range converts the input signal to an other physical quantity. This one facilitates the measure reading.

 Ex: input 4-20 mA / Range 0-1000 kg.
    -> input measure = 12 mA, display = 500 kg.

For the range configuration it is possible to set:
- The unit.
- The low scale and high scale.
- The number of decimals.

The unit of the range-display is facultative. It allows only to interpret the real value. It is limited to 4 characters and displayed only on the terminal in RS232 communication.

The number of decimals is the number of digit displayed after the decimal point. This number is limited by the input type, the scale of the display range and the device resolution.

5) Analogue output

The devices are 2 wires loop powered transmitters so, the analogue output is a 4-20mA current.
For the output configuration, it is possible to set:
- The security value.
- The response time.
- The limitation.

The security value allows to set the output on a known state when there is a sensor breaking or a measure range overflow.

The response time allows to smooth the analogical output when the measure is fluctuating or exposed to interferences. The value can be set between 0 and 60 seconds.

The **limitation** clamp the output signal swing to 4/20 mA. Only security value goes beyond the limitation.

6) Special function

The Square root function allows to calculate the square root on the measure percentage relating to the input range (only available with the voltage or current input).

7) Measure offset

Sometimes, it may be interesting to modify measure by a keyboard intervention.
It can be used in many situations:
     - Sensor's degradation,
     - To calibrate an input with magnifying effect and thus obtaining a better accuracy in the measure window.

To shift the measure, it is necessary: - to be in measure mode,
                                        - press **"+" or "-"**, the message **"OFFSET"** is send on the RS 232:

                                        100.2 DEG   measure value corrected
                                        OFFSET 2   indicate present offset value.

                                        - use **"+"** and **"-"** keys to decrement and increment the measure,
                                        - type on **"ENTER"** to save the offset.

Note:
- The value of the offset is memorized and remains active after a power off/on.
*- To cancel the offset, recall the function, put back offset at zero and validate by **"ENTER"**.*

EMC Consideration

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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 data sheet (direction of assembly, spacing between the devices, ...).
- Comply with the recommendations of use indicated in the technical data 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.

HART communication Protocol

The HART protocol use the BELL 202 standard to superimpose a modulated signal to the 4-20mA analogue signal. HART provides a bi-directional numeric communication between devices. The HART communication is base on a Master-Slave data exchange. Two master can be present in the loop and a multi-drop operating mode accommodating up to 15 slave devices.
The HART protocol provides 3 command groups :
- Universal commands : All the slave should implement this commands.
- Common Practice commands : Many slave device implement this commands but not all.
- Device Specific commands : This commands are define to a particular device.

For communicate with the CNL40IGH, a PC + Hart modem with a specific software or a Hand-Held HART communicator as the HC275 can be use.

1) Implemented commands in the CNL40IGH

Universal commands in HART revision 5
0   READ UNIQUE IDENTIFIER
1   READ PRYMARY VARIABLE
2   READ CURRENT AND PERCENT OF RANGE
3   READ CURRENT AND FOUR DYNAMIC VARIABLE
6   WRITE POLLING ADRESS
11   READ UNIQUE IDENTIFIER ASSOCIATE WITH TAG
12   READ MESSAGE
13   READ TAG,DESCRIPTOR, DATE
14   READ PV SENSOR INFORMATION
15   READ OUTPUT INFORMATION
16   READ FINAL ASSEMBLY NUMBER
17   WRITE MESSAGE
18   WRITE TAG,DESCRIPTOR, DATE
19   WRITE FINAL ASSEMBLY NUMBER

Common-practice commands
34   WRITE DAMPING VALUE
35   WRITE RANGE VALUES
38   RESET "CONFIGURATION CHANGE" FLAG
40   ENTER/EXIT CURRENT MODE

The data provides in the command #3 are :   - PV : Input measure,
                                            - SV : Display information,
                                            - TV : Cold junction temperature.

2) Input configuration change

The input configuration is display in the Descriptor message field. The first three characters are used :
- MV   : Millivolt input voltage.
- MA   : Current input.
- PT   : PT100 temperature input.
- TCx : Thermocouple temperature input, the third character is for the type of thermocouple (B,E,J,K,R,S,T).
The descriptor message fields is a 16 characters long string. Only the first 3 characters are modify.

To modify the input configuration, write at the beginning of the descriptor message the selected type. If the first three characters are correct, the CNL40IGH will modify its measurement and its scales consequently (the scale of measurement will take the limiting values of the new entry.)

Example: Input type : voltage mV, scale : 0 / 100 mV
                  Descriptor message: MV
                  Type the "P" and "T" letters in the Descriptor field. Send to CNL40IGH.
                  => The new input is : PT100 and the scale: -200 / 800°C
                  The Descriptor message is :   PT

**3) Connections for a modem or a HART communicator**
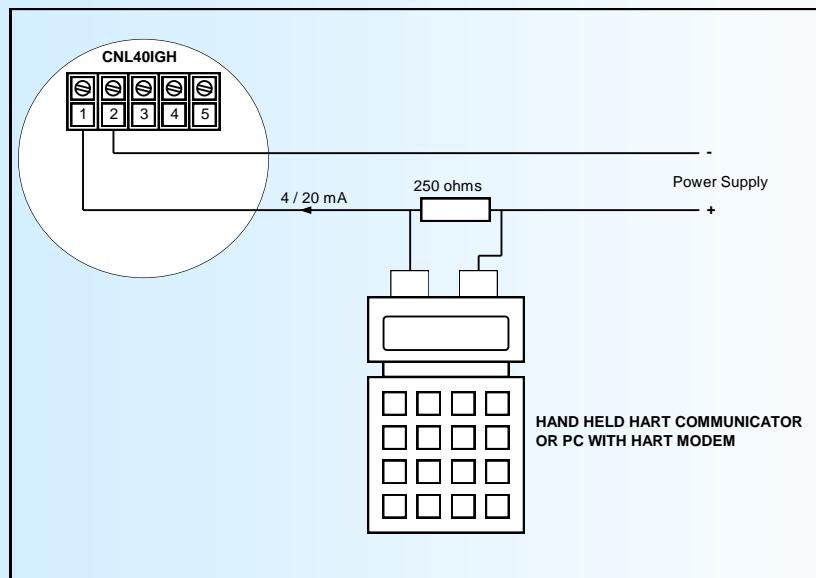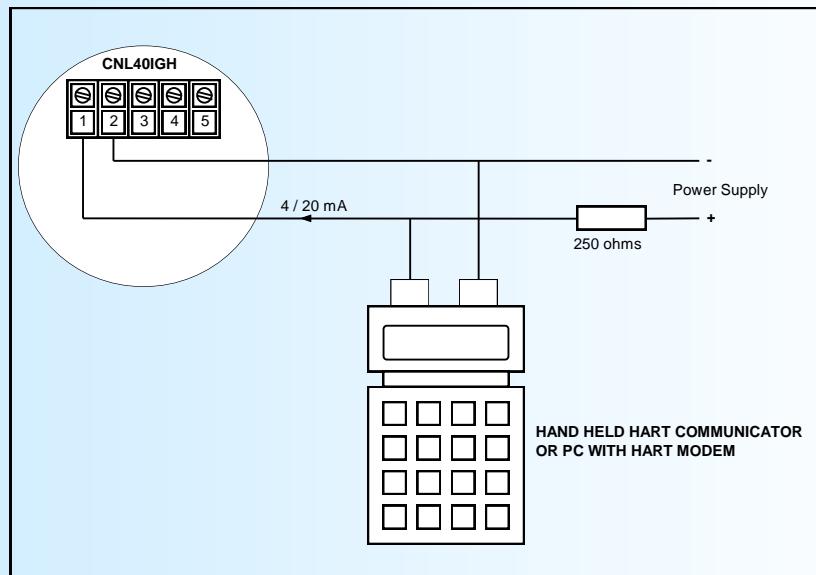
4) Using a HC275 HART communicator

Power On the CNL40IGH, connect and power on the communicator. The information display are GENERIC : XXXXXX and ON-LINE.(XXXXXXX define the TAG. LOREME as default), the input measure, the output current and the scale. At this point and using this fast key sequence, you can access to different parameters. For example:

Low scale	:	4
High scale	:	5
Damping	:	1, 3, 6
TAG	:	1, 4, 4, 2
Input type	:	1, 4, 4, 4

=> The first three characters define the input : MV, MA, PT, TCB, TCE, TCJ, TCK, TCR, TCS, TCT

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Generic Online Menu Tree:

Menu ON-LINE

1- Device setup
2- PV
3- A0
4- LRV
5- URV

1- Process variable
- 1- Present variables
- 2- Percent range
- 3- Analog output

2- Diagnostics and service
- 1- Test device
- **2- Loop test**
- 3- calibration
  - 1- 4mA
  - 2- 20mA
  - 3- Other
  - 4- End

3- Basic setup
- 1- Tag
- 2- PV sensor unit
- 3- Range value
- **4- Device info**
- 5- transfert fct
- 6- PV Damp
  - 1- Model
  - 2- Tag
  - 3- Date
  - 4- Descriptor
  - 5- Message
  - 6- PV sensor s/n
  - 7- final assembly #
  - **8- Revision**
    - 1- Univ rev
    - 2- Fld Dev rev
    - 3- Soft rev

4- Detailled setup
- **1- Sensors**
  - 1- Process variables
  - 2- PV sensor unit
  - **3- Sensor info**
    - 1- PV LSL
    - 2- PV USL
    - 3- PV min span
- **2- Signal condition**
  - 1- PV dump
  - 2- PV URV
  - 3- PV LRV
  - 4- Transfert fct
  - 5- PV % range
- **3- Output condition**
  - **1- Analog output**
    - 1- AO %
    - 2- AO alarm type
    - 3- Loop test
    - 4- D/A trim
    - 5- Scaled D/A trim
  - **2- HART output**
    - 1- Poll adress
    - 2- Number of request preamble
- **4- Device information**
  - 1- Model
  - 2- Tag
  - 3- Date
  - 4- Descriptor
  - 5- Message
  - 6- PV sensor s/n
  - 7- final assembly #
  - **8- Revision**
    - 1- Univ rev
    - 2- Fld Dev rev
    - 3- Soft rev

5- Review

FDT technology

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1) General

The FDT technology standardizes the communication interface between field devices and systems.
FDT is an open standard, manufacturiers independent for configuration and integration of field instruments in systems.
FDT is the result of a discussion begun in the 90's to solve the problems generated by the proliferation of digital instruments. It provides a comprehensive and uniform management of the various equipments in workshops software, control system, etc...

2) Organization

FDT-JIG (Field Device Tool Joint Interest Group).

3) Main technical characteristics

- Technology based on COM/DCOM.
- A DTM is an ActiveX that run in a container (software frame).

4) Operation

- Software frame (Pactware, Fieldcare, FieldMate,...) can open drivers (DTM) to manage, configure and optimize field equipment.
- Each manufacturer develops its equipment to a descriptive file called DTM (Device Type Manager).
- The DTM of active equipment in the process are called DeviceDTM, an equipment who have only a communication function are called CommDTM.
- The DTM contains all specific parameters of the device, the features available and the user interface.
- A DTM can only provide a basic setup. It can also provide access to diagnosis or maintenance functions.
- It is mandatory to have a DeviceDTM for each unit. If the manufacturer doest not deliver, this equipment may still be configured with the standard profiles.

5) Performance

- A single tool for configuring various types of equipment from different manufacturers communicating in different protocol.
- Centralization of operations thought communication « meshed ».
- Access to settings and improved ergonomics.
- Better use of the capabilities of digital instruments.
- Suitable for process and manufacturing.
- The DTM are often free and provided with equipment.

HART protocol and FDT

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1) Using PACTWARE software

1.1) DTM LoGenhart FDT Driver installation
Unzip the LoGenHart_setup.zip file (download at www.loreme.fr) and run the SETUP program. At the end of installation, restart the PC.
Run the Pactware program. Press the 'F3' key or go to 'View/device catalog'
Once the catalog open, click on 'update device catalog'. A new device must appears in the list : 'Generic Hart DTM' with 'Loreme SA' as vendor.

1.2) Device configuration with Pactware
In this example, the modem is a hart modem connect to the serial port 'COM1'.
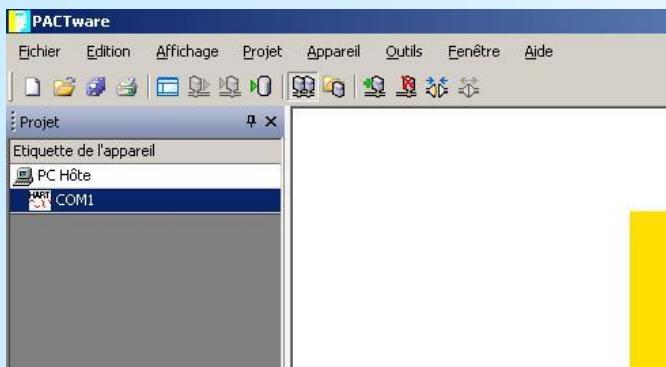
To communicate with a HART device, define a 'GENERIC' device.
In the 'Device' menu, choose 'Add device' and select 'GENERIC HART DTM / Loreme SA'.
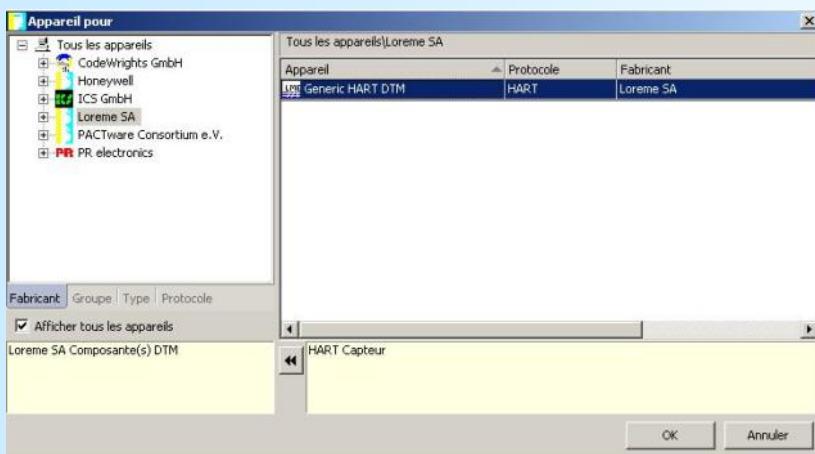
Once the link established, read the device information with the 'Load from device'.
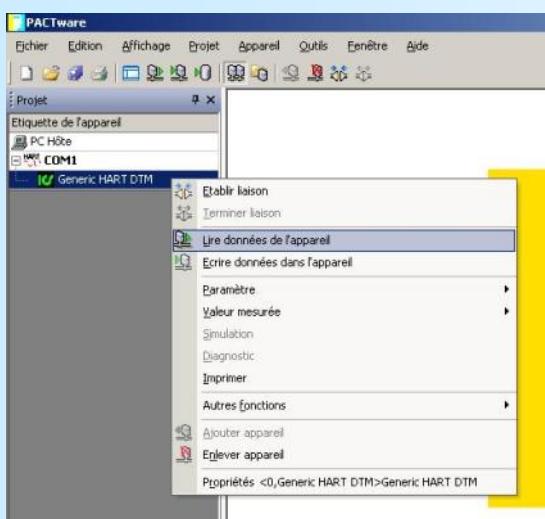
At the end of the reading, the name of the device become 'LOREME'. This name is the TAG name.

We can change the measure scale,...

..., the filter time,...

..., The TAG or the input configuration
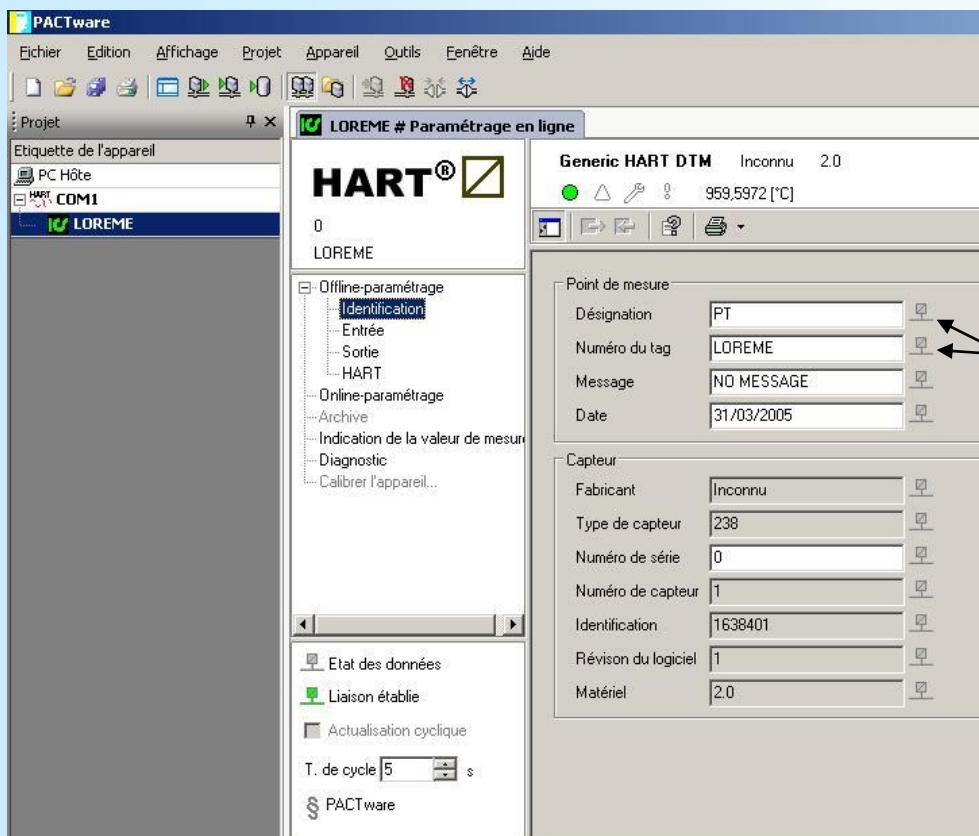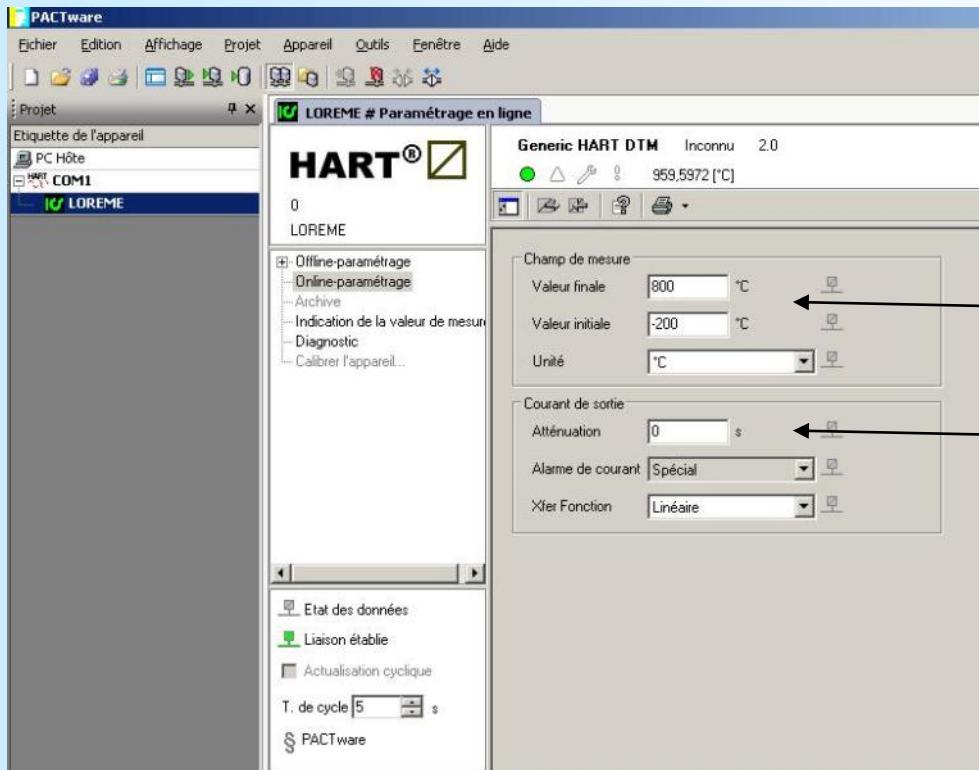
The input configuration is contained in the first three characters of the 'DESIGNATION' message:
=> MV, MA for respectively a voltage or a current input,
=> PT, TCB, TCE, TCJ, TCK, TCR, TCS, TCT for a RTD input or B,E,J,K,R,S,T Thermocouple input.

After any change in the configuration, you have to write the new configuration in the device.
For that, in the 'Device' menu, choose 'Store to device'.

Wiring

LOREME
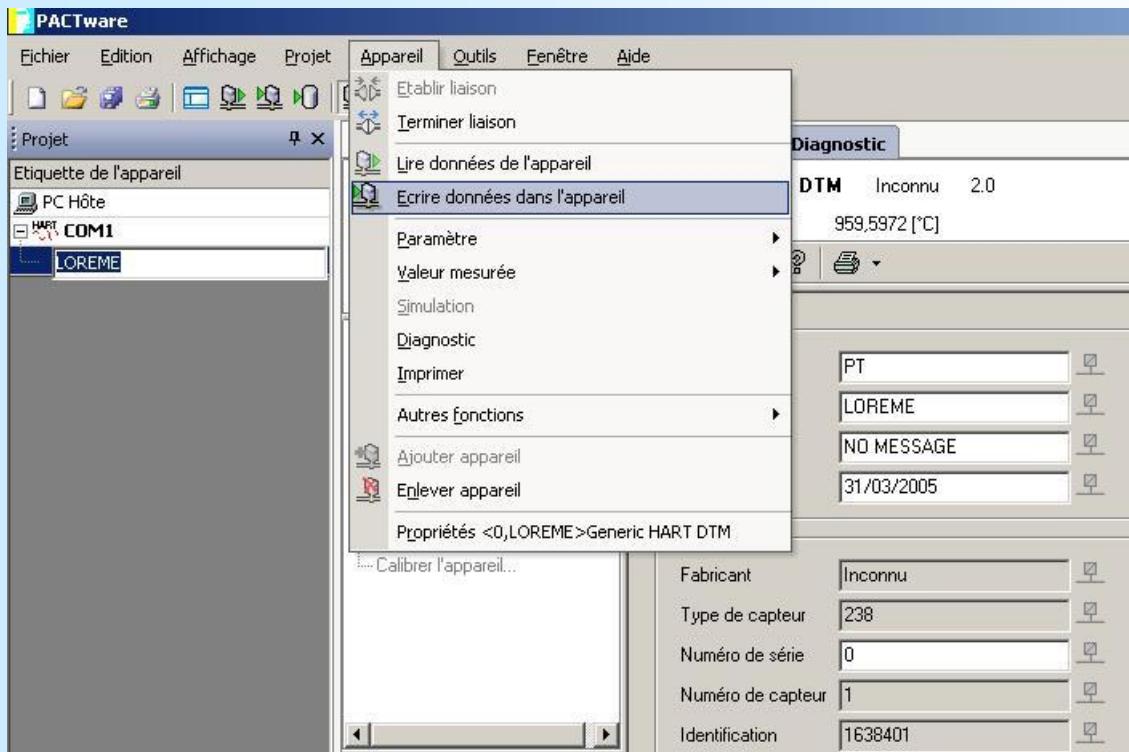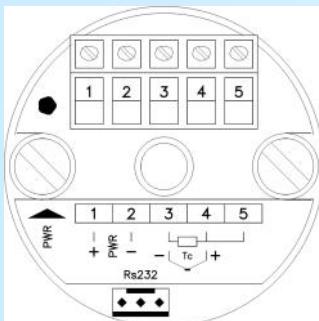
CNL40 - CNL40IG/H

- mV input : Terminals 4 (+), 3 (-)
- mA input with 2.5 Ω external shunt : Terminals 4 (+), 3 (-)
- RTD 100 Ω (3 wires) : Terminals 4 (+), 3 (-), 5 (line)
- Thermocouple input : Terminals 4 (+), 3 (-)
- Loop power supply : Terminals 1 (+), 2 (-)

CNL40IG/H - 4F
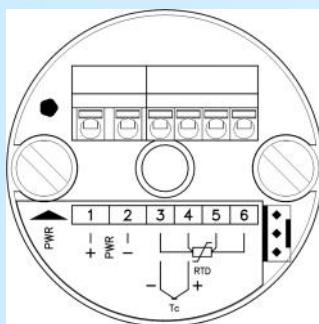
- mV input : Terminals 4 (+), 3 (-)
- mA input with 2.5 Ω external shunt : Terminals 4 (+), 3 (-)
- RTD 100 4 wires : Terminal 6 (polarization +), 5 (measure +), 4 (measure -), 3 (polarization -)
- Thermocouple input : Terminals 4 (+), 3 (-)
- Loop power supply : Terminals 1 (+), 2 (-)

CNL25D
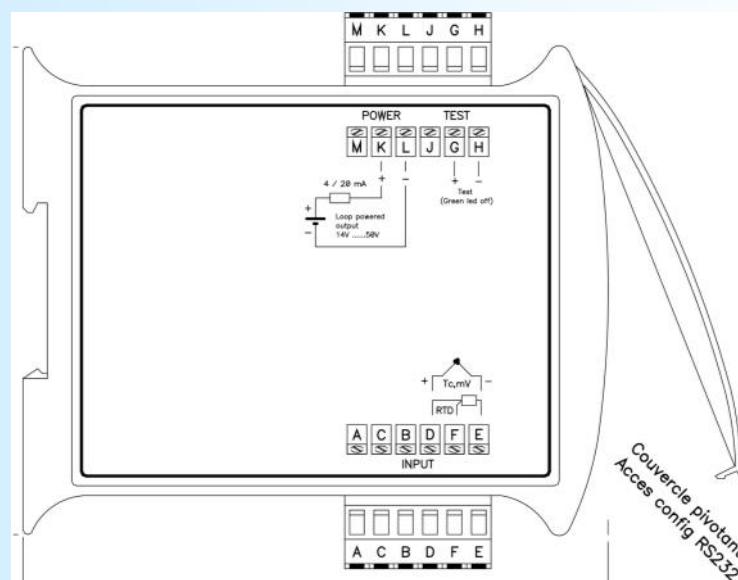
- RTD 100 3 wires : Terminals D (+), E (-), F (line)
- RTD 100 2 wires : Terminals D and F(+), E (-)
- Thermocouple input : Terminals D (+), E (-)

- Loop power supply : Terminals K (+), L (-)
- 'TEST' loop current : Terminals G (+), H (-)

LOREME

CNL25IG-D/H

- mV input : Terminals D (+), E (-)
- mA input with 2.5 Ω external shunt : Terminals D (+), E (-)
- RTD 100 Ω (3 wires) : Terminals D (+), E (-), F (line)
- RTD 100 Ω (2 wires) : Terminals D and F(+), E (-)
- Thermocouple input : Terminals D (+), E (-)
- Potentiometer input : Terminals A (+Réf), D (+), E (-)

- Loop power supply : Terminals K (+), L (-)
- 'TEST' loop current : Terminals G (+), H (-)

CNL25IG
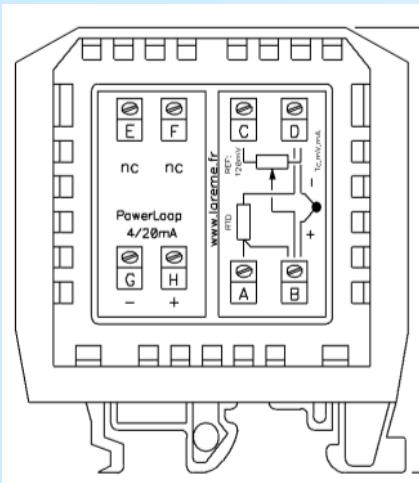
- mV input : Terminals B (+), D (-)
- mA input with 2.5 Ω external shunt : Terminals B (+), D (-)
- RTD 100 Ω (3 wires) : Terminals B (+), D (-), A (line)
- RTD 100 Ω (2 wires) : Terminals A et B(+), D (-)
- Thermocouple input : Terminals B (+), D (-)
- Potentiometer input : Terminals C (+Réf), B (+), D (-)

- Loop power supply : Terminals H (+), G (-)

CNL70LCD
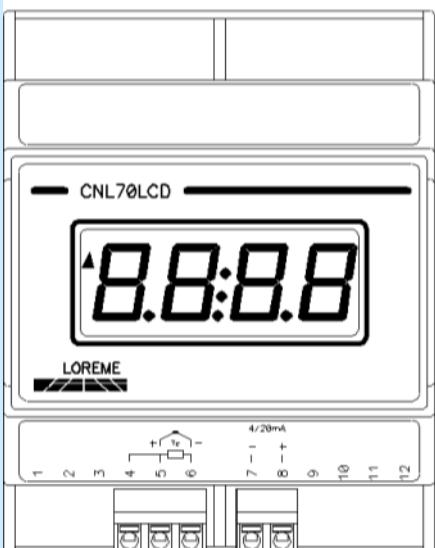
- mV input : Terminals 5 (+), 6 (-)
- mA input with 2.5 Ω external shunt : Terminals 5 (+), 6 (-)
- RTD 100 Ω (3 wires) : Terminals 5 (+), 6 (-), 4 (line)
- Thermocouple input : Terminals 5 (+), 6 (-)

- Loop power supply : Terminals 8 (+), 7 (-)

Outline dimensions

LOREME

SPAI-A
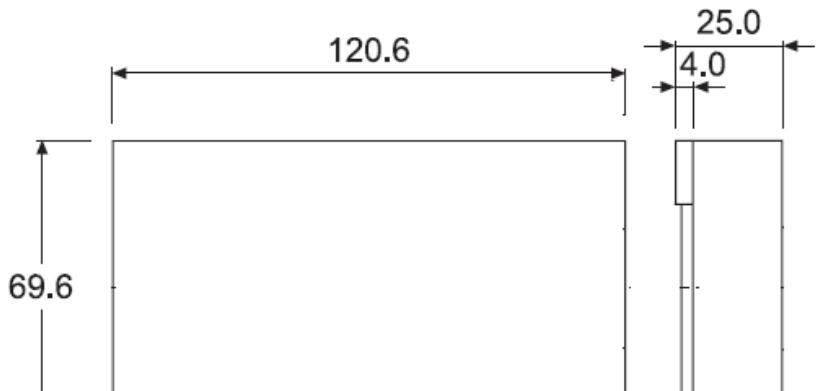
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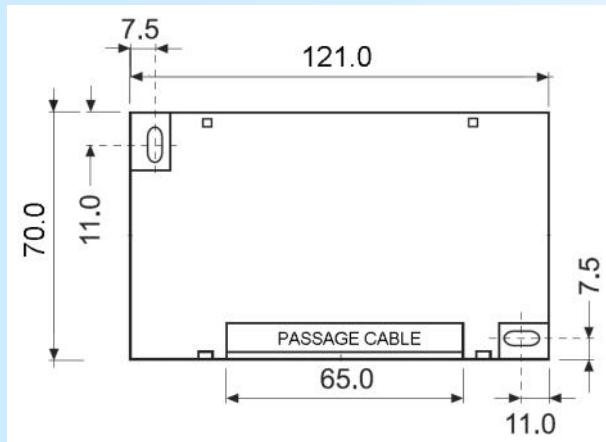
CNL70LCD
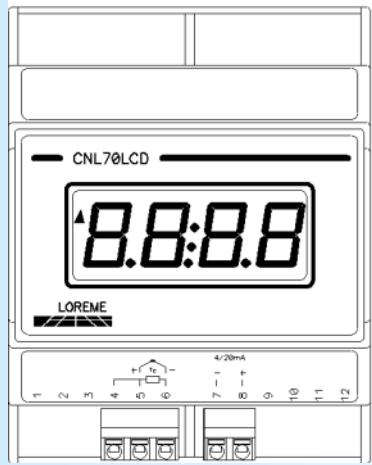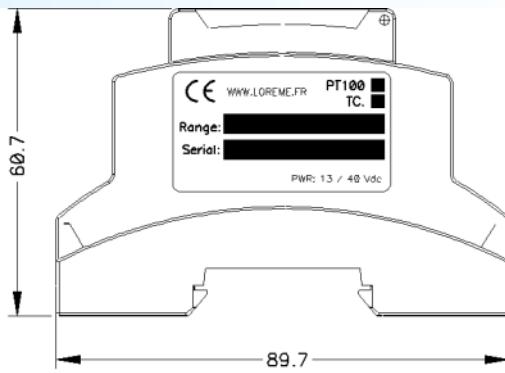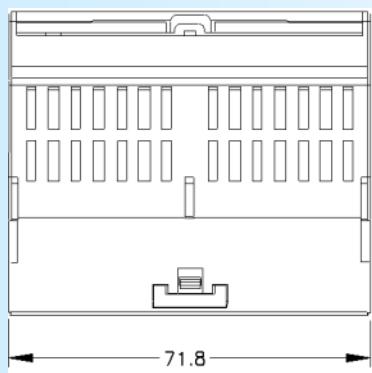
INP101
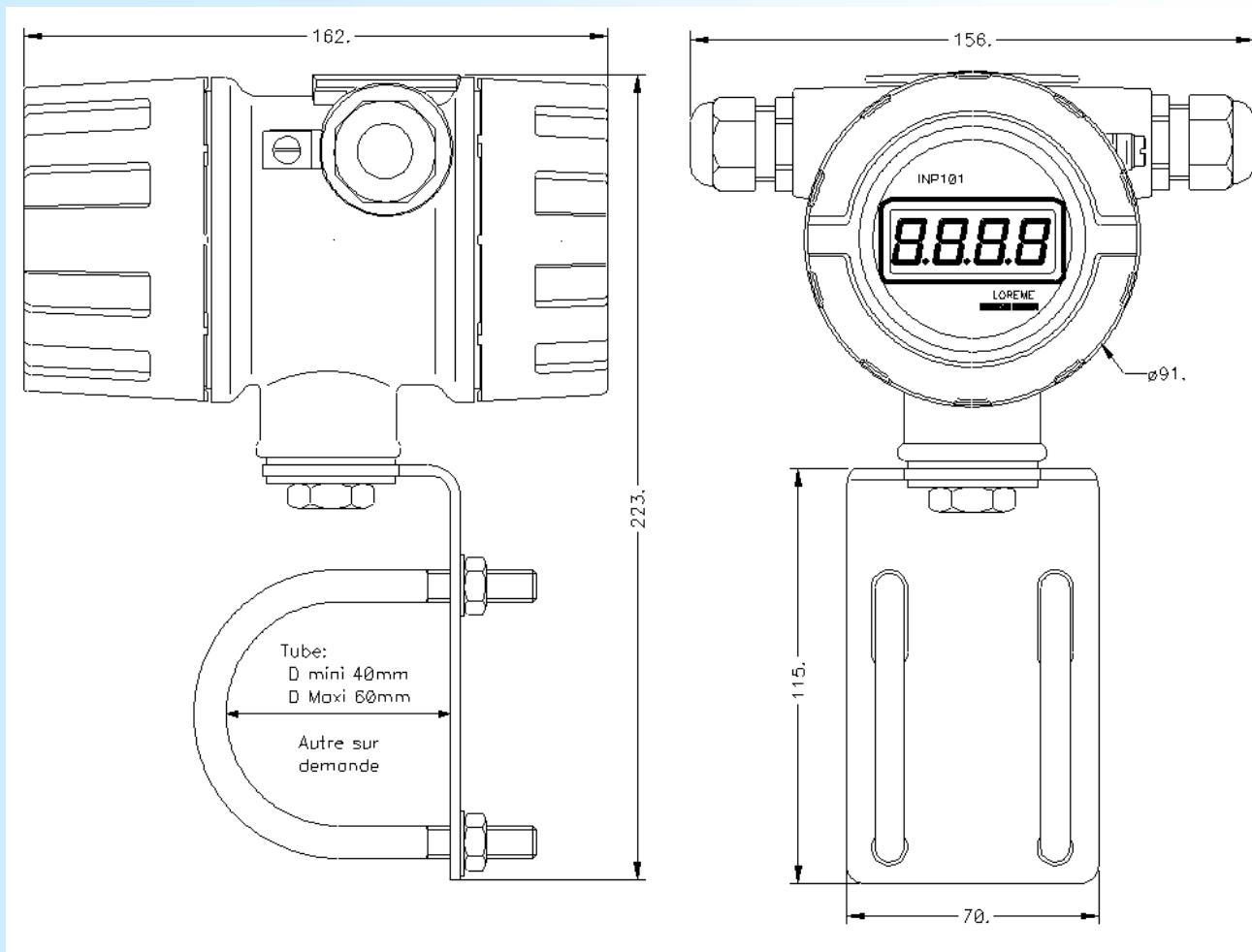
Terminal - Device link

LOREME

CNL40 - CNL40IG

3 pin female connector to the device

5 (gnd)
3 (tx)
2 (rx)

DB9 female connector to the PC

CNL25IG - CNL25IG-D

3.5 mm Jack stereo plug to the device

2
3
5

DB9 female connector to the PC