CONFIGURATION HANDBOOK

CNL35L

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Download manual at : www.loreme.fr

REV2.9 - 17/04/23

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Device Presentation

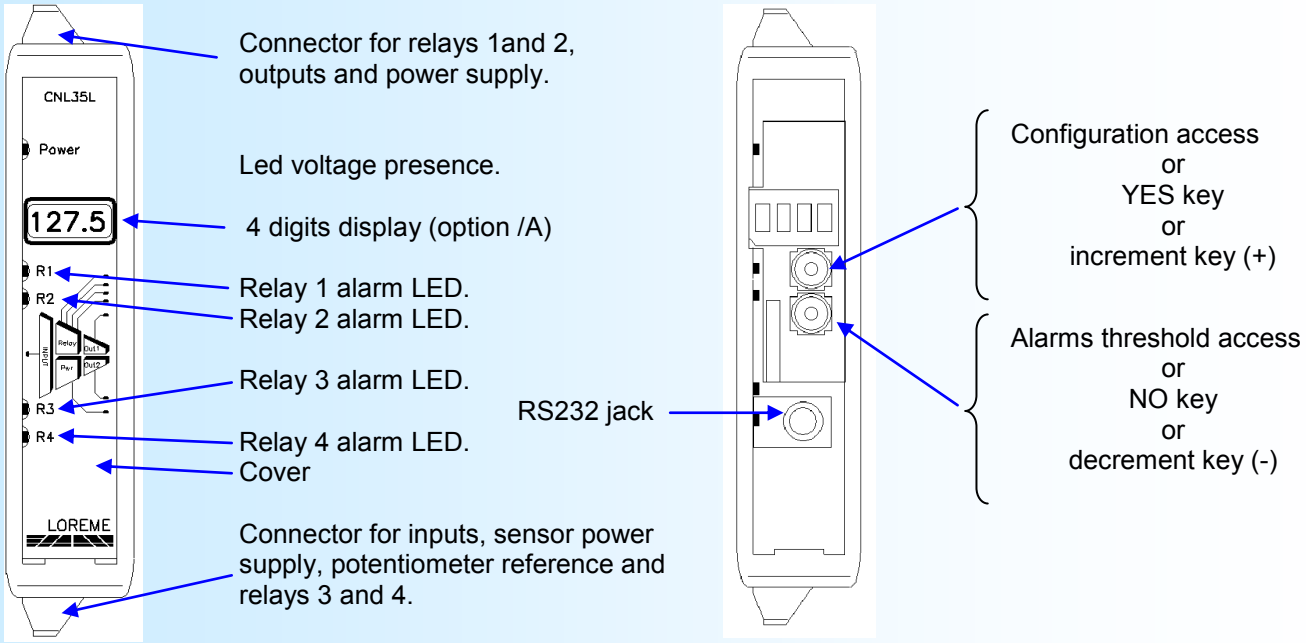
The CNL35L is the programmable converter with the widest choice of inputs and calculation functions of the market, witch can be equipped with two isolated analogue outputs, four alarm relays and a 4-digits display.

Devices have several options:

CNL35L: Universal input, more than 10 types, one isolated analog output.
CNL35L/S2: 2 isolated analog outputs, independently configurable or 1 bipolar output.
CNL35L/R1: 1 relay, 1 isolated analog output.
CNL35L/R2: 2 relays, 1 isolated analog output.
CNL35L/R3: 3 relays, 1 isolated analog output.
CNL35L/R4: 4 relays, 1 isolated analog output.
CNL35L/A: 4 digits display + 2 keys keyboard, 1 isolated analog output.

The technical data sheet is downloadable here: http://www.loreme.fr/fichtech/CNL35L_eng.pdf

USER INTERFACE



1) Alarms threshold visualization/setting

Access to the visualization/setting of alarm thresholds by the front panel keys is dependent on the configuration of the alarms. Threshold detection must be validated. Moreover, in order to change the threshold, it is necessary that the adjustment function is enabled (only possible in terminal mode).

Setting process:

- The choice of the threshold to set is made by pressing the down button, the message 'ADJUST THRESHOLD x?' is displayed and Rx LED is on. Press <YES> to access the setting or <NO> to pass to the next relay threshold or return to measurement mode if there is no more validated threshold detection. After pressing <YES>, the relay x threshold value is displayed and the Rx LED flashes.
- If the setting is allowed, the threshold is adjusted with the + and - keys, otherwise it is only displayed. The adjustment speed is based on the time the key is maintained pressed.
- The displayed threshold value is automatically validated if no key is pressed for more than 4 seconds.

2) Measure Tare/Zero function

This feature is available only on devices with revision 2.3 and more.

procedure:
- The strain gauge bridge is wired on the CNL35L. The measurement is valid.
- Press both buttons simultaneously until you hear a beep and see the message "TARE? " scrolling across the display.
- The button <Yes> (top button) activates the tare of the measurement. The measure falls to 0.
- The button <No> (bottom button) deactivates the tare.

Note:
The tare value is saved in non-volatile memory of the device and therefore remains active after a power failure.

3) Configuration via the front face keys

If the device is equipped with the display and the front face buttons and the configuration access is unlocked, it can be configured with the two push-buttons. The input, display range, outputs, relays and the special functions can so be re-configured without the need of a terminal connection. The parameters are:

- For the input:	input type, low scale, high scale, special features for some inputs.
- For the display range:	unity, low scale, high scale, decimal number.
- For the outputs:	output type, low scale, high scale, security value, response time.
- For the relays:	breaking/watchdog detection, threshold detection, threshold type, threshold value, hysteresis, security type, activation delay and deactivation delay.
- For special functions:	Activate/deactivate the absolute value and square root functions. The detection current of the sensor break in thermocouple input. The storage of the measurement on loss of the input signal, in mA current or V & mV voltage input only.

Pressing the upper key permit to access the configuration. If the configuration is locked, the message '**NOT ALLOWED!**' is displayed.

For each rubric, a message is streaming on the display and the <YES> key permits to access the rubric or validate the function or begin an adjustment procedure for a parameter (for example the low scale). The <NO> key skip the rubric or de-validate the function or skip the adjustment procedure.

During an adjustment procedure, the upper key increment the value and the lower key decrement the value and the relay 1 LED is flashing. All the parameters are limited excepted the low and high scale of the display range (LOW or HIGH is displayed on overflow). The adjustment procedure is terminated automatically after 4 seconds if no key is pressed.

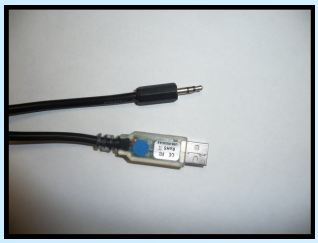
The message < OK ! > is displayed at the end of the configuration and all the parameters are memorized.

See diagrams pages 18 & 19.

RS232 link setting

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

Step 1: Driver installation for USB / RS232 adapter



- download driver at www.loreme.fr:
  http://www.loreme.fr/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)

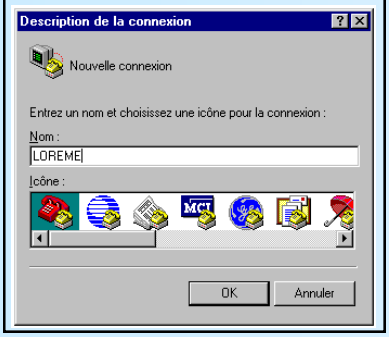
=> Run the downloaded software to install it.

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"**

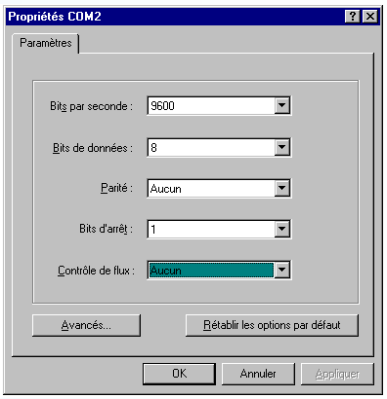
3 Enter name for the new connection



4 Choose the communication port related to the adapter.

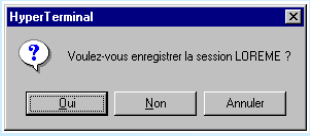
5

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.

Terminal mode

1) Visualization

The CNL35L can be configured using the RS232 link on the front of the device.
This requires a USB/Jack or DB9/jack adapter cable, depending on connectors available on the PC, and have a ASCII emulation program like 'HyperTerminal ' or else.

Once the device is connected to the PC, it displays the following measurements page every 2 seconds.

	10.00 mV	Input measure value.
	11.90 mA	Output 1 value.
or	11.90 mA / 4.02 mA	Output 1 / output 2 value (/S2 option).
or	-5.50 V	Bipolar output value (/S2 option).

2) Measure Tare/Zero function *(for device with revision 2.3 and above)*

Measurement tare activation can be done with the following keys:
- "Ctrl + T": takes the current measurement as the tare, the displayed measure becomes equal to 0.
- "Ctrl + Z": disables the tare.

3) Configuration

The handbook explains in detail the different configurations possibilities:
Language, input, display range, analog output, relays, tag, special functions.
To enter configuration mode, just press the **"C"** key. The message '**CONF**' is displayed in front and on the terminal the following message:

CONFIGURATION	
Rev 2.8	Hard.Soft revision message.
TAG:----------	The tag of the device (not yet initialized).

3.1) Method

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

3.1.1) Menu selection

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

3.1.2) Parameter selection

example: VOLTAGE (Y-N)YES or VOLTAGE (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.

3.1.3) Value acquisition

Example: LOW SCALE
4 mA

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

Notes:

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

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3.2) Language

The language possibilities are:

- French
- English

3.3) Input

The input possibilities are:

- Voltage (mV, strain gauge, V)
- Current (mA)
- Resistance (Ω)
- Frequency (Hz) with choice of normal or fast measurement (see next page), duty cycle 0 to 100 %.
- Thermocouple (°C) internal or external compensation, linearized or not.
- PT100 3 or 4 wires, Ni100 3 wires, linearized or not.
- PT1000, Ni1000 2 wires, linearized or not.

With for each input type, the choice of low scale, high scale and display range.

Special features

- Thermocouple:

Choice of thermocouple type, B, E, J, K, R, S, T, N, W3, W5 (another on request).
Choice of compensation type, internal or external.
Choose **internal compensation** when thermocouple is extended up to device with a compensation cable.
Choose **external compensation** when thermocouple is not extended up to device with a compensation cable, but up to a compensation box where temperature will be known and stabilized. This is the value of temperature that will be typed as the external compensation value (except thermocouple type B).
Choice of the sampling rate, Normal (16 sp/s) and Fast (60 sp/s). In fast mode, the resolution of the measurement is divided by four. In the special functions rubric, it is also possible to deactivate the sensor breaking current (Tc WITHOUT BREAK CURRENT).

- PT100 3 & 4 wires:

Choice to linearize or not the sensor. For temperatures greater than 0 °C, linearization is performed using the following second degree quadratic equation : $T°C = [A + SQRT (A^2 - 4 * B * (1-Rt / 100))] / 2 * B$, with Rt = sensor resistance and A, B, two configurable coefficients. For temperatures below 0 °C , linearization is done by table.

default values

Standard	A Coefficient	B Coefficient
European	3,90775E-03	-5,775E-07
American	3,9848E-03	-5.870E-07
U.S. Industrial	3.9692E-03	-5,8495E-07

- Potentiometer:

Configure voltage input (V):

- low scale: 0 V
- high scale: 5 V

Move potentiometer at the start and at the end of range, notice each value.
Change voltage input (V):

- low scale = start range value,
- high scale = end range value.

See wiring diagram for potentiometer wiring.

- Sensor power supply:

To supply a loop powered converter and measure the loop current, it's necessary to configure the device in 4-20 mA current input. See wiring diagram for sensor power supply and current input wiring.

- Strain gauge:

If you select the secure measurement (only available with revision 2.3 and above), the device sets up a sensor break detection. **It is then necessary to connect the terminal "V / Hz" to the measuring terminal "+ mV".**
The detection algorithm monitors at regular intervals the differential voltage and the voltage of one branches of the bridge. If one of the connections between the sensor and the CNL35L is broken, the device detects it and switches to Sensor break (which could activate a relay or put the output on the fallback value).

Note:
This function generates an measurement offset witch can be canceled with the measurement TARE/Zero function.

To configure the gauge bridge measurement, you also need to know the sensitivity and supply voltage of the bridge.
Ex: sensitivity of 2 mV/V. The bridge is powered by the CNL35L so with 5 V supply.
In this case the measurement scale corresponds to a low scale = -10 mV and a high scale = 10 mV.

- Frequency:
Choice of normal frequency measurement, with automatic switching of the measurement range, on 2 ranges from 0.25 Hz to 25 Hz and from >25 Hz to 350 kHz. Or choice of fast frequency measurement on the 25 Hz to 350 kHz range only (50 ms max measurement response time).

3.4) Display range

The range interpret the input signal in a physical size, thus making the reading of the measured information easier.

Ex: Input 4-20 mA / Range 0-1000 kg
➔ Input = 12 mA, indication = 500 kg.

To configure the range, it is necessary to configure:
- the unit
- the low scale
- the high scale
- the decimal number

The unit of the display range is facultative and is only useful to interpret the real size on the terminal. It is limited to 4 characters.

The decimal number correspond to the number of digit displayed behind the decimal point. This number is limited to 3.

3.5) Analogs outputs

In standard, the device provide only one analog output. It can, by /S2 option, provide a second output. These outputs, insulated between themselves, are independently configurable. They can also be used as one +/-10 V bipolar output (see next "special functions" rubric and wiring p17).

Analog outputs configuration is presented through 2 rubrics:

- Output type (if unipolar):
  - current output (mA),
  - voltage output (V).

And for each output type:
- the low and high scale,
- security value,
- limitation,
- response time.

The security value allows to set the output to a known state when there is a sensor breaking or a measure range over-flow. This value will be transferred to the output.

The limitation allows to bound the output signal swing to the configured output scales for all input signal values. Only security value goes beyond this function.

The response time is adjustable from 0 to 3600 s.

3.6) Relays

The device can, by /R1, /R2, /R3 or /R4 option, provide respectively 1, 2, 3, or 4 independently configurable alarm re-lays. Relays configuration is presented through 2 rubrics:

- Detection type:
  - breaking detection/watchdog function,
  - threshold detection.

The two detection types can be active together.

The breaking/watchdog detection activates alarm on sensor breaking, on internal failure or on measure range overflow.

The threshold detection activates alarm on threshold overstepping. It is necessary to choose threshold type, high or low, threshold and hysteresis value. The two detections types can be activated simultaneously.

The **threshold detection** works in this manner:
- **high threshold** detection:
  .alarm is activated when measure goes above threshold,
  .alarm is removed when measure goes below threshold minus hysteresis.

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

Note:
The hysteresis value is relative to the display range scale and can be configured from 0 % to 99 %.

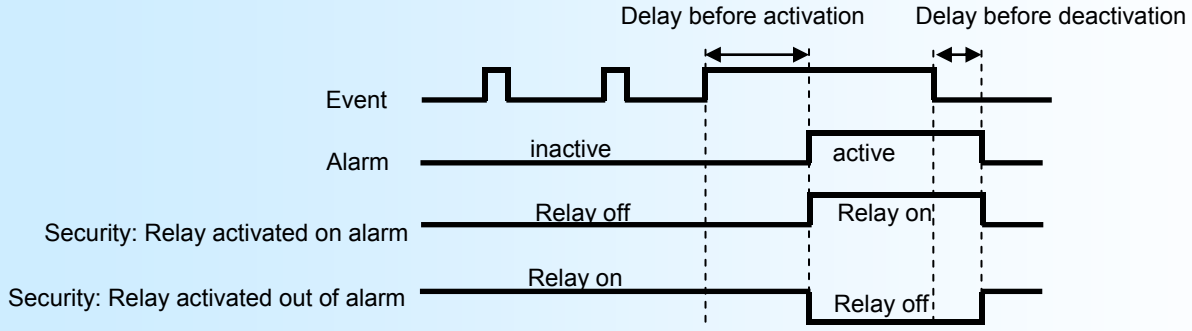
- Relay parameters are:
  - adjustable,
  - security,
  - delay.

When alarm is used in threshold detection, it is possible to access the **threshold adjustment** in front face by the keyboard. This possibility can be deactivated to make this adjustment inaccessible, only the visualization is then possible.

For each relay the security is configurable. This function allows to choose between the activation or the de-activation of the relay when alarm is activated.
The choices are:

RELAY CLOSED IN ALARM *or*
RELAY CLOSED OUT OF ALARM

The delay value, configurable from 0 to 14400 s (4 hour), determines the time above which alarm changes its state after event appearance and disappearance. The device provide for each relay a configurable delay when alarm is activated and when alarm is removed.



3.7) Tag configuration

The tag allows to easily identify the converter. It can be made of up to 10 alphanumerical characters. The user only have to enter the tag on the keyboard and validate it with the "Enter" key. The tag will now be displayed on each configuration access. If a character is not viewable, it is replaced by a "-".

3.8) Special functions

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

BP **front face locking** function can inhibit the pushbuttons of the front face (SIL2 safety). Any action on BP will be ignored by the device.

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

The **bipolar output** allows to use the two unipolar outputs as one bipolar output.

The **input signal fail memo function** makes it possible to freeze the measurement in the event of loss of the input signal. For this, the device continuously stores 1 second of measurements and it is the value at T - 1 sec which is used during the loss of the signal.

Configurable parameters for this function are:
- The **signal variation speed** in mA/s or mV/s or V/s depending on the type of configured input. This parameter is converted internally in difference of measurement between 2 samples with a sampling speed of 60 sp/s. for example for 120 mA/s, the delta between 2 samples is 120 mA/s divided by 60 sp/s = 2 mA. So if the difference between 2 measurements is greater than 2 mA, the device detects a signal loss and uses the stored measurement at T - 1 sec as a valid measure.
- A **memo signal timeout**. This parameter defines a maximum time during which the signal is stored. After this time, the device returns to normal measurement mode. By default it is set to 300 s (5 minutes).
- The **signal ok threshold** corresponds to the low limit beyond which the measurement is considered as present. By default it is set to 4.1.
- The **signal ok delay** corresponds to the delay beyond which the measurement is again present after exceeding the signal ok threshold. By default it is set to 1.0 s.

The **absolute value** function, applies the absolute value of the input range percentage to the analog output and on the displayed value. Please note, the low and high input scales must be positive for a negative percentage in case of negative input.

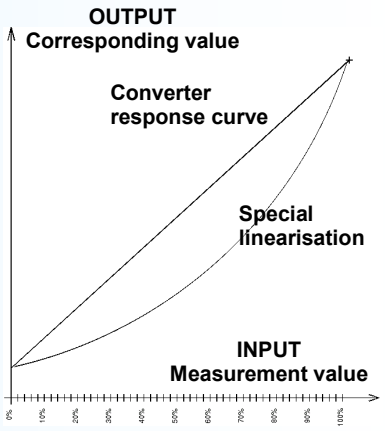
The **square root** function extract the square root of the input range percentage. The result is reported on analog output and on the displayed value.

The **exponential function**, permits to linearized signal of a sensor having a logarithmic transfer function. It is of the form: $A * e^{B*measure}$, the coefficients A and B are configurable. The result of the calculation is applied to the analog output and on the displayed value.

The **special linearization** function allows the user to create a personalized response curve by configuring points of correspondence between measured input signal and the display range. When this function is choose, it is directly activated, but linearization points are not modified. To modify linearization points, it is necessary to validate by YES the configuration question.

When **special linearization** is enabled, the device uses linearization curve corresponding to configured points.

To personalize a response curve, it's necessary to set for each curve point the input value and the corresponding display range value (maximum 26 points including input points 0 % and 100 %). So, for each measured point, the device will make correspondence to the linearized display range value.



3.9) End of the configuration

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

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

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Measure offset

Sometimes, it may be interesting to modify the measure by a simple terminal keyboard intervention.
It can be used in many situations as sensor aging, an input refinement as a result of magnifying effect, etc...

To shift the measure, it is necessary:

- To be in measure mode,
- type on **"+"** or **"-"** to access the function,
- on terminal the display become:

100.5 DC	measure value with offset,
OFFSET 10	offset function, offset value.

- Use keys **"+"** and **"-"** to adjust offset, measure is directly modified.
- Type on **"ENTER"** to memorize offset.

Notes:

*When the device is not supplied or is in configuration mode, offset stay active. To reset offset, it is necessary to start **"OFFSET"** function, put this value to zero with the **"+"** and **"-"** keys, then validate by **"ENTER"**. In offset control mode, when there is no action on **"+"**, **"-"** or **"ENTER"** keys during 20 s, the device leave the mode without keeping the adjusted offset.*

The offset has no effect on the measure when the converter is in frequency or duty cycle measure mode!

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 seconds).
- **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.

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EMC Consideration

1) Introduction

To meet its policy concerning EMC, based on the Community directives **2014/30/EU** & **2014/35/EU**, the LOREME company takes into account the standards relative to this directives from the very start of the conception of each product.
The set of tests performed on the devices, designed to work in an industrial environment, are made in accordance with **IEC 61000-6-4** and **IEC 61000-6-2** standards in order to establish the EU declaration of conformity. The devices being in certain typical configurations during the tests, it is impossible to guarantee the results in every possible configurations. To ensure optimum operation of each device, it would be judicious to comply with several recommendations of use.

2) Recommendations of use

2.1) General remarks

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

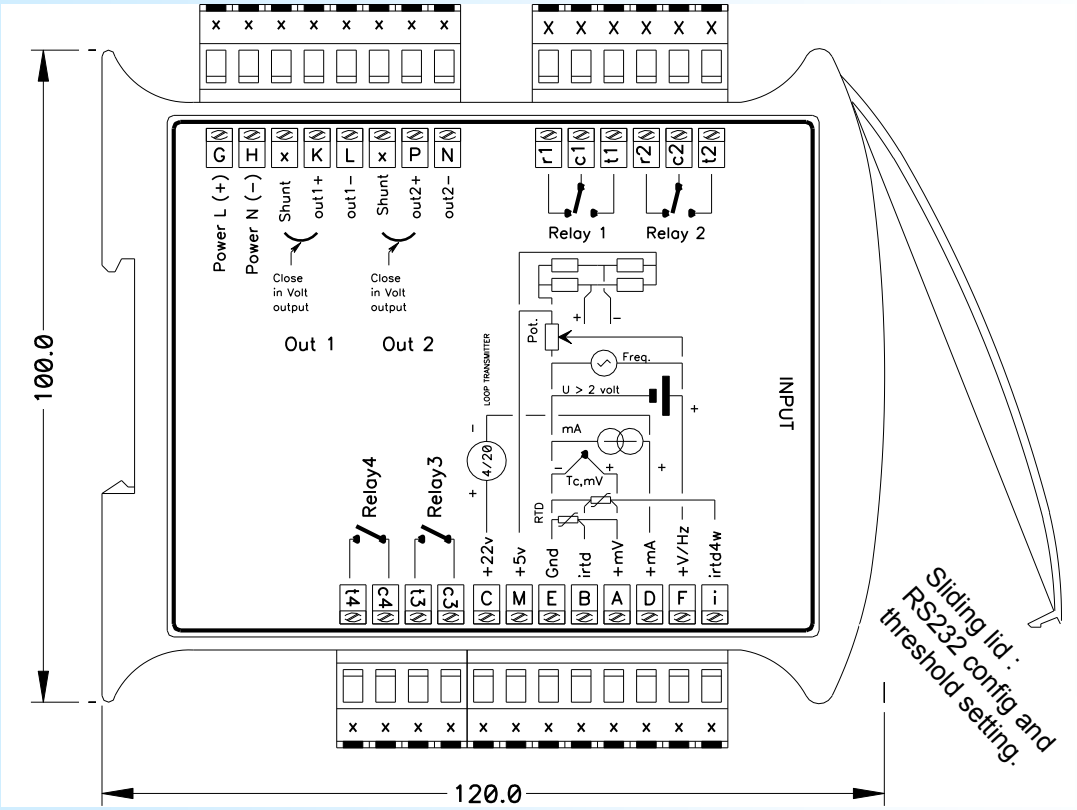
2.2) Power supply

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

2.3) Inputs / Outputs

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

Wirings



mV, Tc input:	terminal A (+), terminal E (-)
mA input:	terminal D (+), terminal E (-)
V/Frequency input:	terminal F (+), terminal E (-)
Duty cycle input:	terminal F (+), terminal E (-)
Potentiometer input:	terminal M (supply), terminal F (+), terminal E (-)
Strain gauge input :	terminal M (supply +), terminal E (supply -) terminal B (measure +), terminal A (measure -)
Resistance 0/390 Ohms, PT100/Ni100 input (3-wires):	terminal A (+), terminal E (-), terminal B (line)
PT100 4 wires:	terminal A (line +), terminal i (+), terminal E (-), terminal B (line -)
Resistance 0/3000 Ohms, PT/Ni1000 input (2-wires):	terminal B (+), terminal E (-),
Sensor supply input:	terminal C (+), terminal D (-)
Analog output 1:	terminal K (+), terminal L (-)
Analog output 2:	terminal P (+), terminal N (-)
Relay 1:	terminal R1 (rest), terminal T1 (work), terminal C1 (common)
Relay 2:	terminal R2 (rest), terminal T2 (work), terminal C2 (common)
Relay 3:	terminal T3, terminal C3
Relay 4:	terminal T4, terminal C4
Power supply:	terminal G, terminal H

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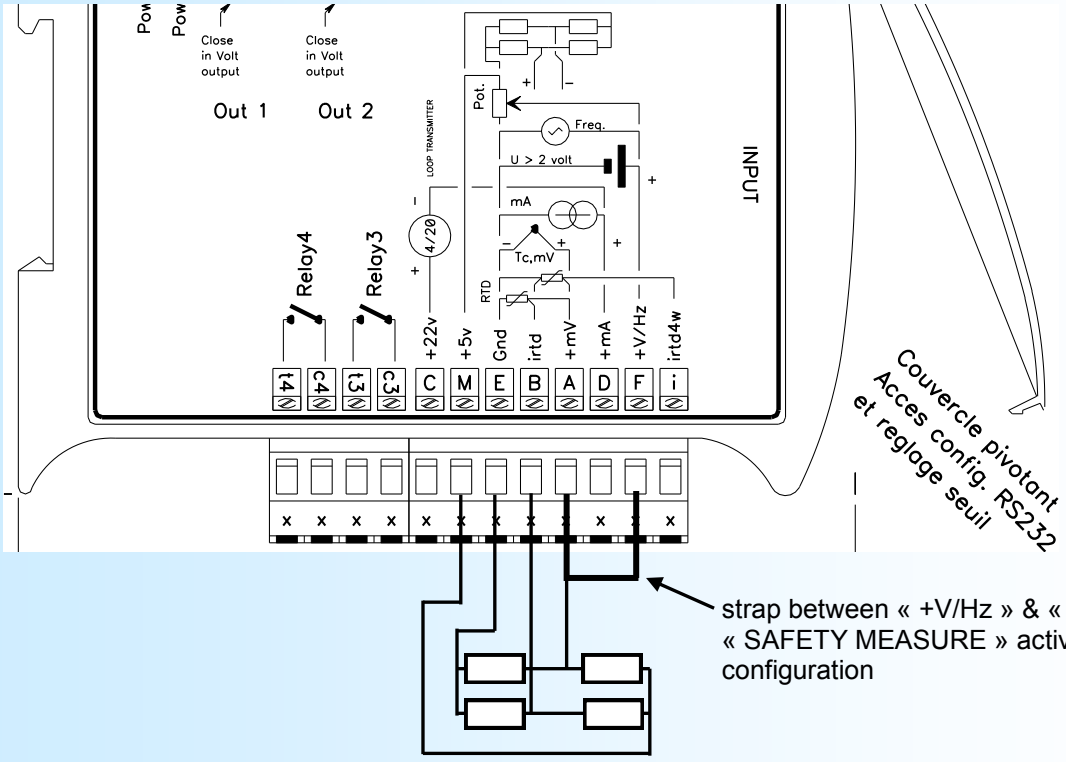
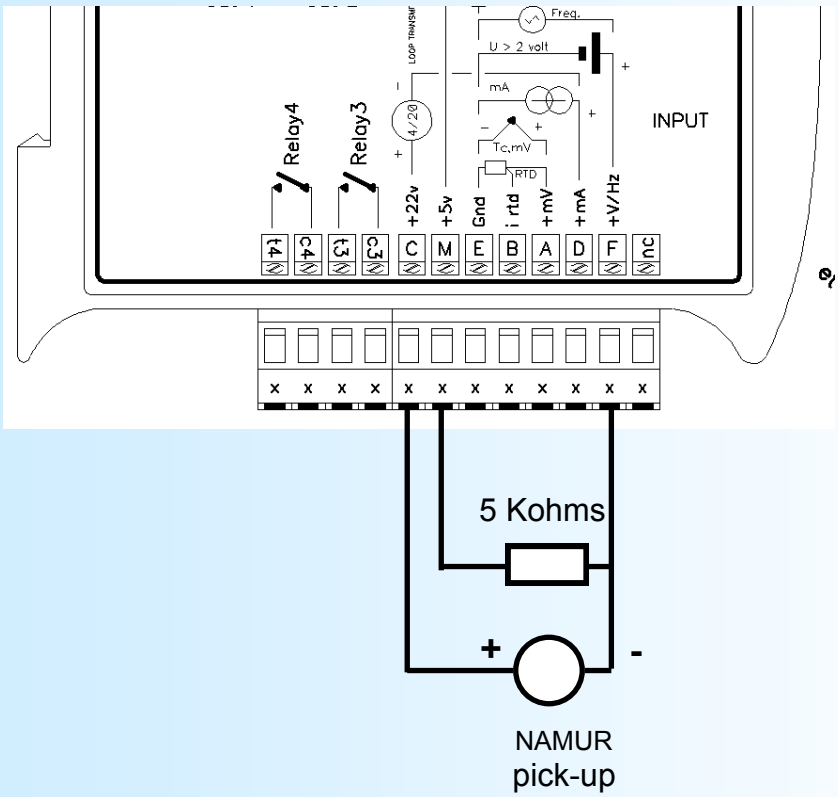
Strain gauge wiring with safety measurement

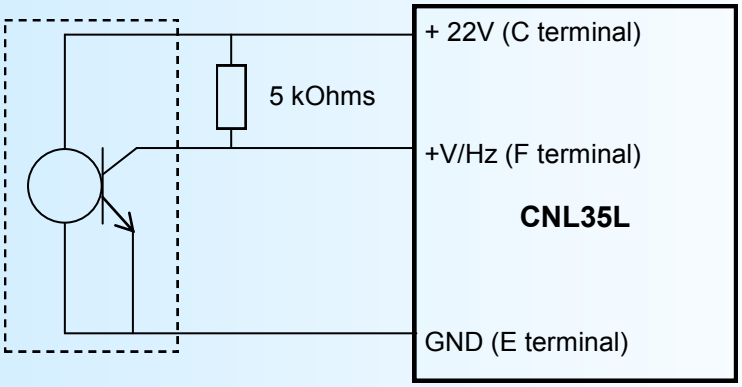


NAMUR sensor wiring

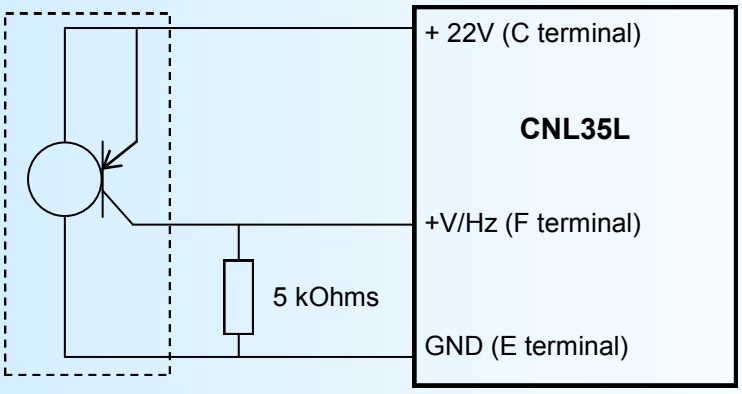


3 wires (NPN, PNP) sensor wiring

1) NPN type sensor



2) PNP type sensor



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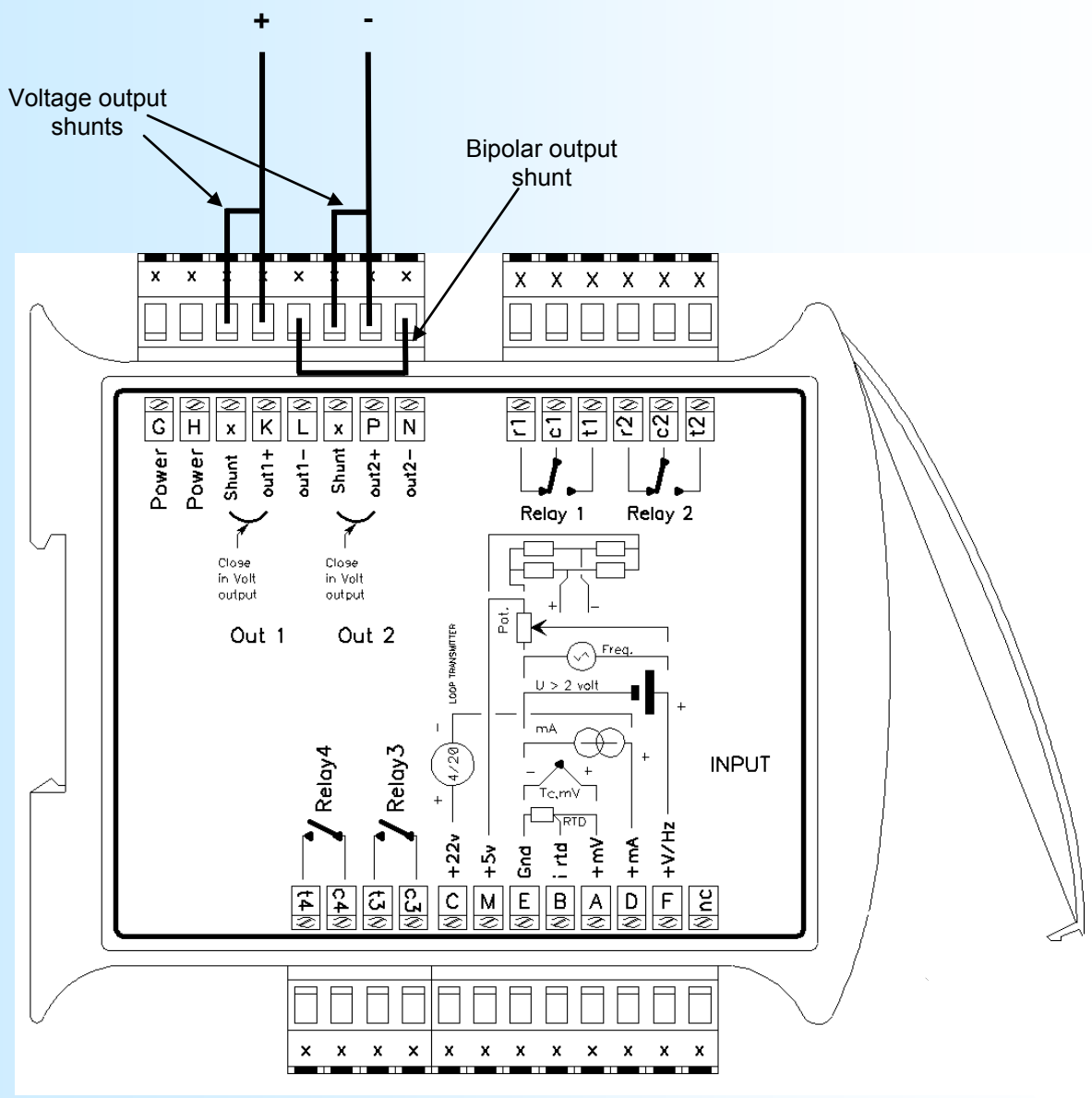
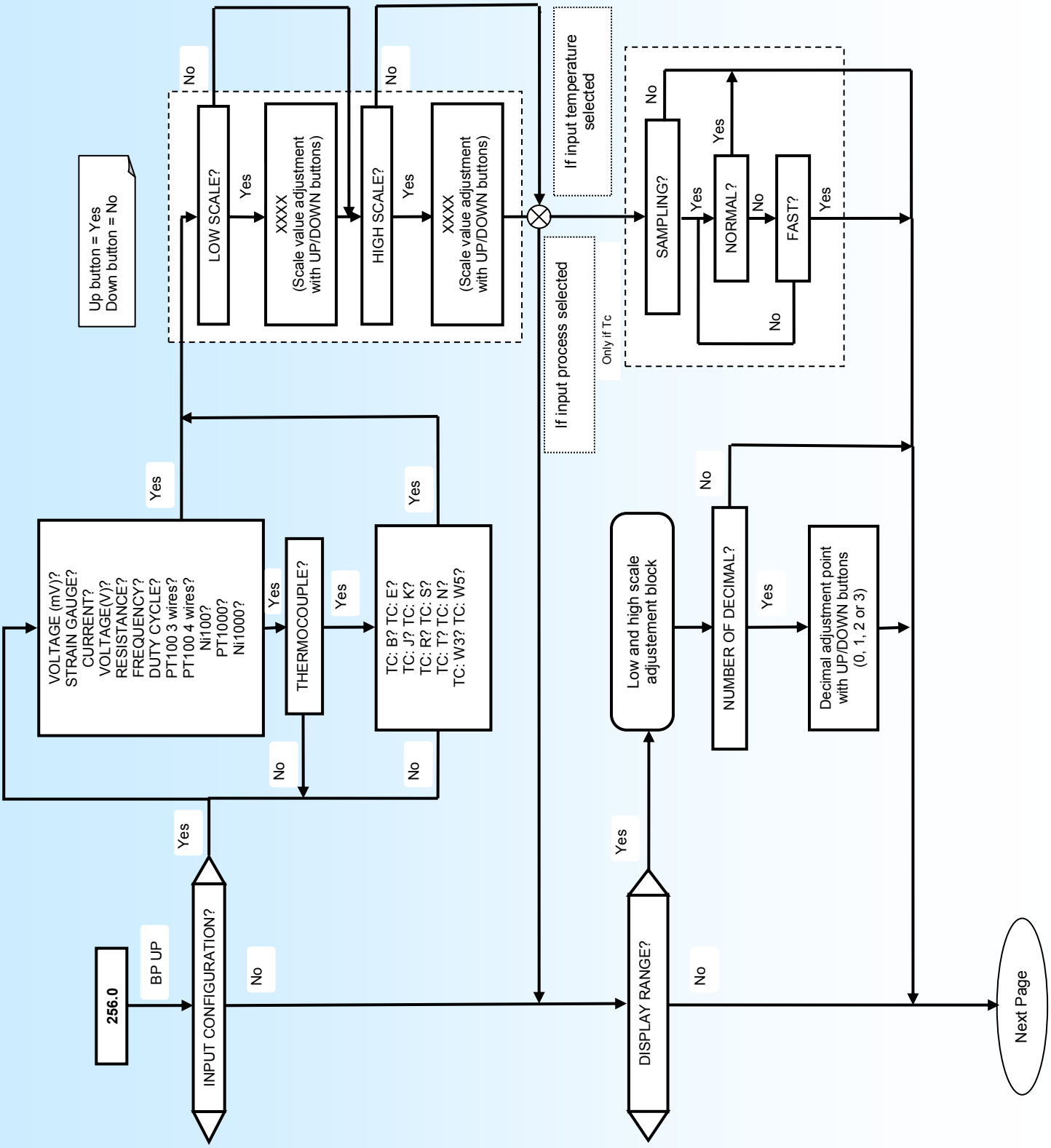
Bipolar output Wirings

+/- 10V output



Front panel configuration diagrams



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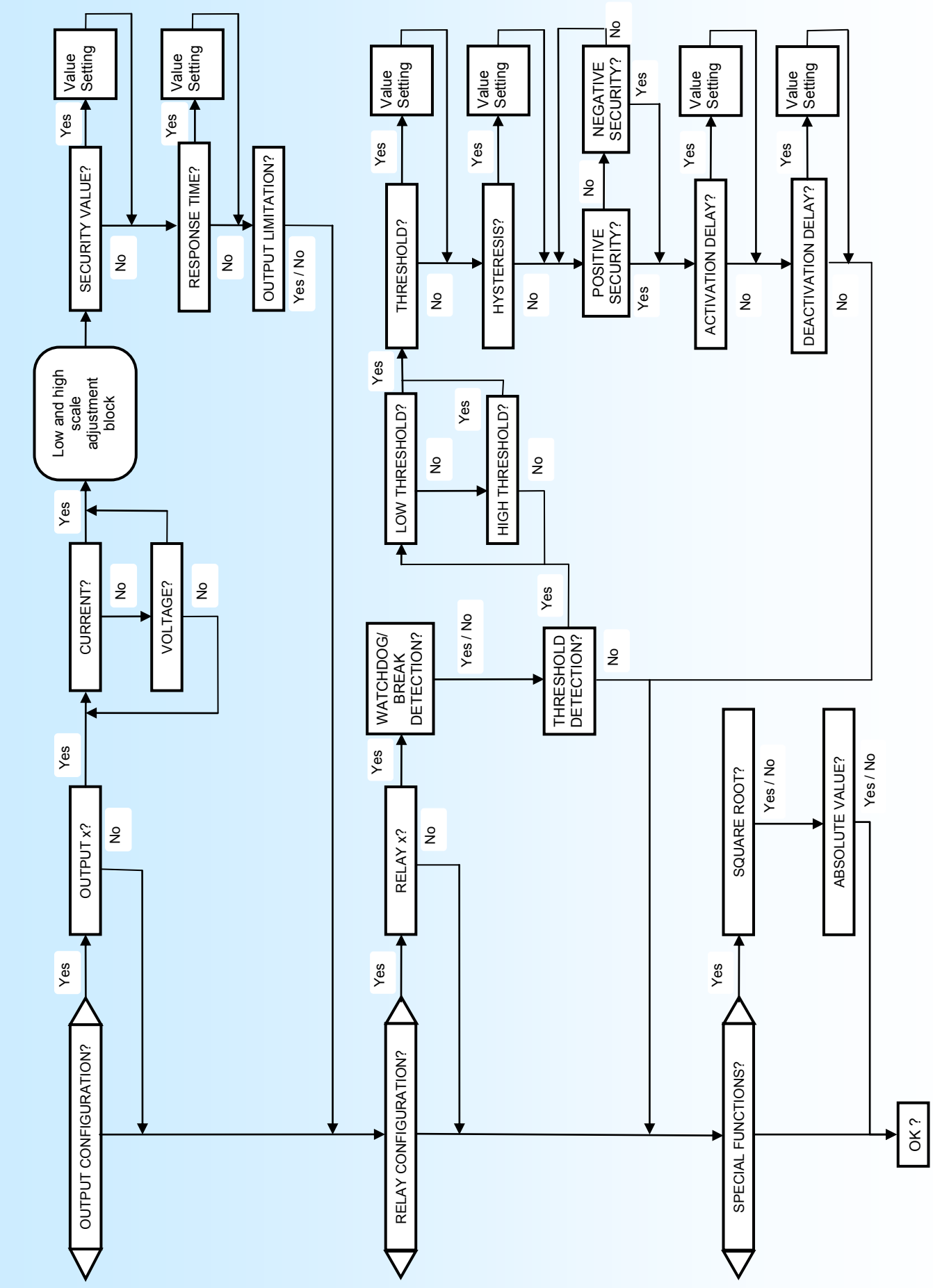
OUTPUT CONFIGURATION?
Yes
OUTPUT x?
No
Yes
CURRENT?
No
VOLTAGE?
No
Yes
Low and high scale adjustment block
Yes
SECURITY VALUE?
No
Yes
Value Setting
RESPONSE TIME?
No
Yes
Value Setting
OUTPUT LIMITATION?
Yes / No
RELAY CONFIGURATION?
Yes
RELAY x?
No
Yes
WATCHDOG/ BREAK DETECTION?
Yes / No
THRESHOLD DETECTION?
No
Yes
LOW THRESHOLD?
No
Yes
HIGH THRESHOLD?
No
Yes
THRESHOLD?
No
Yes
Value Setting
HYSTERESIS?
No
Yes
Value Setting
POSITIVE SECURITY?
No
Yes
NEGATIVE SECURITY?
No
Yes
Value Setting
ACTIVATION DELAY?
No
Yes
Value Setting
DEACTIVATION DELAY?
No
Yes
Value Setting
SPECIAL FUNCTIONS?
Yes
SQUARE ROOT?
Yes / No
ABSOLUTE VALUE?
Yes / No
OK ?