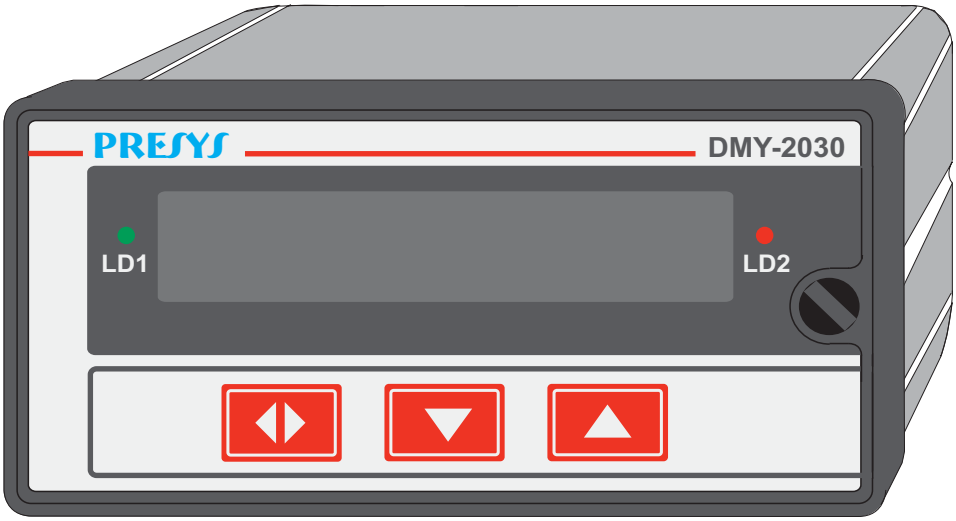
PRESYS | Instruments

DMY-2030 Universal Process Indicator



TECHNICAL MANUAL

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1 - Introduction

1.1 - Description

The PRESYS DMY-2030 Indicator is an instrument based on microprocessor that shows all kind of industrial process variable, such as: temperature, pressure, flow and level. It has non-volatile internal memory (E2PROM) to store calibration values. Its high accuracy is warranted by autocalibration techniques based on high thermal stability voltage reference.

It can communicate with computers by optional communication module RS-232 or RS-422/485.

The Indicator is able to monitor two universal standard inputs and accepts direct connection of thermocouples, RTD, current (mAdc) and voltage (mVdc, Vdc). Thermocouples and RTD inputs are linearized automatically by tables stored in EPROM memory. There is a 24Vdc voltage source isolated from output and with short-circuit protection in order to supply transmitters.

Input type is enabled by jumpers and software configuration. All configuration data can be protected by password and are stored in non-volatile memory.

According to modularity concept, the equipment accepts up to four output cards. The type of outputs are: retransmittion, SPDT relay, SPST relay and solid state relay. The outputs are isolated from inputs.

It permits a power supply from 90 to 240 Vac.

The equipment has an extruded aluminum case which avoids electrical noise, electromagnetic interference, radiofrequency interference, etc. and its robust construction makes it tough enough for the most hostile environment.

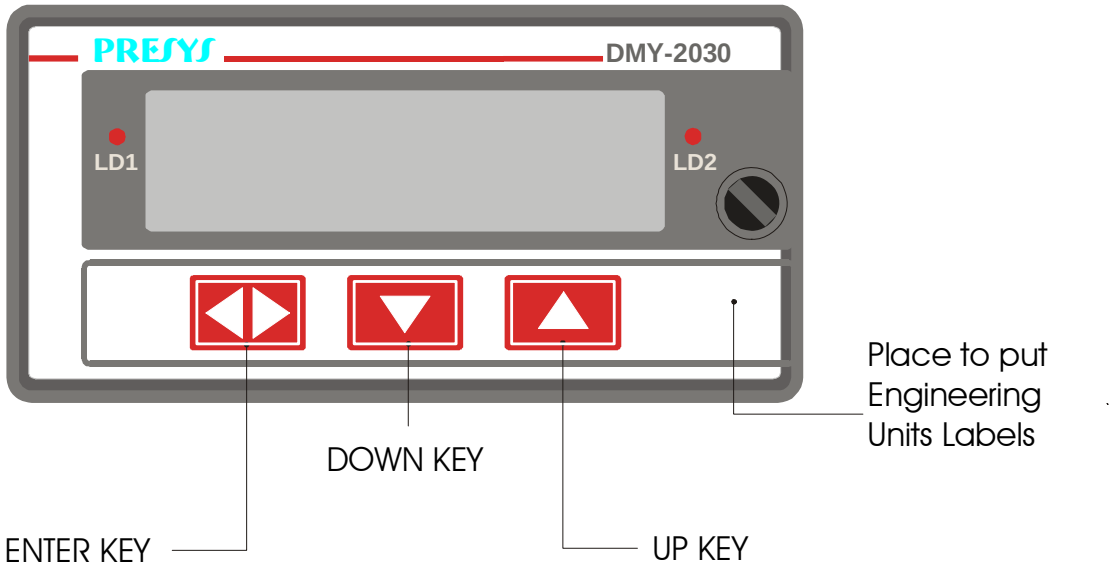


Figure 1 - DMY - 2030 Indicator Front Panel

The front panel equipment has a high visibility display configurable up to 4 ½ digits which can show parameters on channel 1, channel 2 or both.

During the configuration, the display shows mnemonics and parameter values. The couple of leds and the display can be used as alarm view indication or be associated to outputs, relays, open collectors or triacs. Therefore, there are up to seven alarm indications (four alarm cards, the display and two leds). Alarm output can be configured.

Rettransmitter outputs are possible and they provide a linear output signal from 4 to 20 mA, 1 to 5V or 0 to 10V. This signal allows the retransmittions of the variable to distant fields, recorders, or other devices.

1.2 - Order code

Order Code

DMY - 2030 - ___ - ___ - ___ - ___ - ___ - ___ - ___
A B C D E F G

Field A Output 1
- 0 Not used
- 1 4 to 20mA
- 2 1 to 5V
- 3 0 to 10V
- 4 SPST relay
- 5 Open collector voltage
- 6 Solid state relay

Field B Output 2
Same code of Output 1

Field C Output 3
- 0 Not used
- 1 SPDT relay
- 2 Open collector voltage
- 3 Solid state relay

Field D Output 4
Same code of Output 3

Field E		Power supply
	1	90 to 240Vac or Vdc
	2	24Vdc
Field F		Communication
	0	Not used
	1	RS-232
	2	RS-485
	3	RS-422
Field G		Case Protection Grade
	0	General usage, protected place
	1	Front aspersion-proof
	2	Weather-proof

Note 1 - Ranges and input types, indication, relay usage as alarms and alarm points are, among other things, items that the user can program through a front key (if wanted, specify these information so that all the programmation can be made by Presys).

Obs.: Hardware and software features are available under previous consult.

Code example:

1) DMY - 2030 - 0 - 0 - 1 - 1 - 1 - 0 - 0

This code defines a DMY-2030 indicator with two SPDT relays which can be used as high and low alarm, 90-240Vac electric power supply, protected field usage.

1.3 - Specifications

Inputs: Two inputs configurable for thermocouple (J, K, T, E, R, S under ITS-90), 0 to 55 mV, RTD under DIN 43760, 4 to 20 mA, 1 to 5 Vdc, 0 to 10 Vdc. 250 Ω input impedance for mA, 10 MΩ for 5 Vdc and 2 MΩ above 5 Vdc.

Input Sensor	Measuring Range Limits			
Thermocouple	lower limit °F	higher limit °F	lower limit °C	higher limit °C
Type J	-184	1886	-120	1030
Type K	-346	2498	-210	1370
Type T	-418	752	-250	400
Type E	-148	1436	-100	780
Type R	-58	3200	-50	1760
Type S	-58	3200	-50	1760
RTD Pt-100 2 or 3-wire	-346	1256	-210	680*
Linear	Span		Resolution	
Voltage	0 to 55mV		3μV	
	0 to 5V		250μV	
	0 to 10V		500μV	
Current	0 to 20mA		1μA	

(*) includes wire resistance

Table 1 - Input Sensors Span

Outputs:

. 4 to 20 mA, 1 to 5 Vdc, 0 to 10 Vdc Analog Retransmitter, use optional modules with foreseen fitting for up to two modules galvanically isolated from power supply and inputs to 300Vac.

. SPDT relay rated for 3A at 220Vac, or to 10A at 220Vac under order. In this case alarm module is not plugged through a connector, but connected to a base board. Setting up to four modules (taking two of the analog output settings). In case of having to use one analog output, you can use three alarm modules or whenever you use two analog outputs, it is possible to use up to two alarm modules.

. Logic signal, open collector transistor, 40 mA, 24 Vdc maximum compliance with isolation.

. solid state relay rated for 2A at 250Vac with isolation.

Serial-Communication:

RS-232 or RS-485, 50 Vdc isolation, optional module.

Indication:
14mm red leds display with four and a half digits which can be configured together with the decimal point.

Configuration:
By front-panel pushbuttons and internal jumpers.

Sampling rate:
100 ms Standard. One second display update rate.

Accuracy:
± 0.1% of full scale for TC, RTD, mA, mV, Vdc input.
± 0.5% of full scale for analog retransmitter output and 750 Ω maximum load.

Linearization:
± 0.1 % for RTD and ± 0.2 % for TC.

Square root extraction:
± 0.5 % of readings, for input above 10 % of span. 0 to 5 % of programmable Cut-off.

Cold junction compensation:
± 2.0°C at range from 0 to 50°C ambient temperature.

2-wire transmitter power supply:
24Vdc voltage and 50mA maximum, isolated from output, short-circuit protection.

Span temperature coefficient:
± 0.01% / °C of span.

Power supply:
90 to 240 Vac universal, (10 W nominal), 24 Vdc and other values are optional.

Operating ambient:
0 to 50°C temperature and 90% maximum relative humidity.

Dimensions:
1/8 DIN (48mm X 96mm X 162mm) H x W x D, (45mm X 92mm) H x W panel cutout.

Weight:
0.5 kg approx.

Warranty:
One-year warranty.

2 - Installation

2.1 - Mechanical Installation

The DMY-2030 front panel indicator is 1/8 DIN size (48mm X 96 mm)
Prepare the panel cutout according to Figure 2.
Slide the instruments sleeve into the cutout from the front.
Install the mounting brackets from the rear. Verify that the 4 bars are firmly seated in the slots on the sleeve; correctly installed brackets will not fall out.
Tighten the screws firmly.

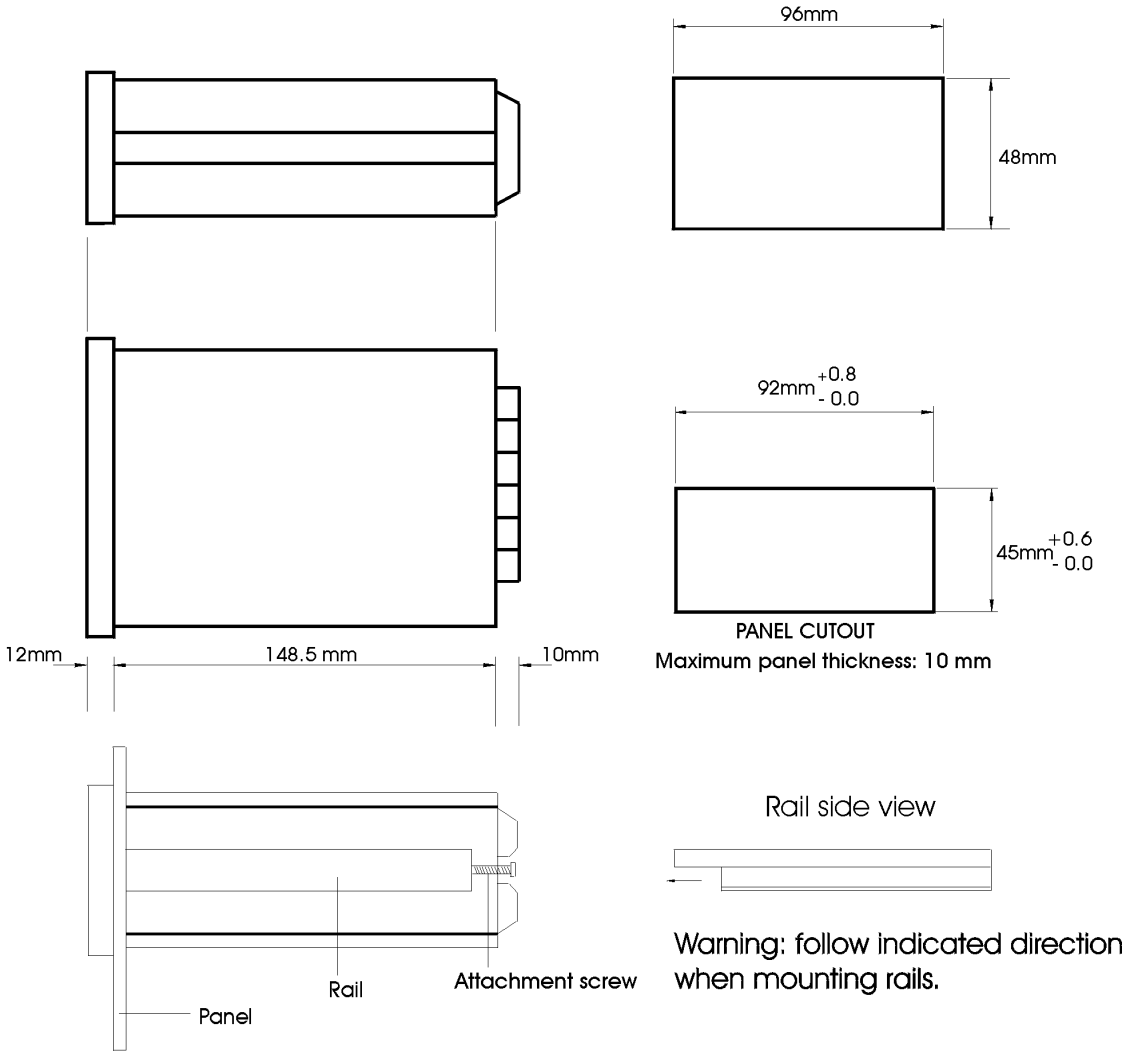


Figure 2 - Dimensional drawing, panel cutout and lateral view.

2.2 - Electrical Installation

The DMY-2030 Indicator may be powered by voltage between 90 and 240Vac or Vdc. Remember power is always applied to the internal circuit when the instrument is connected to the AC supply.

Make input and output terminations to instrument only with the power off.
Refer to Figure 3 for rear terminal designations.
Keep power and signal input separated.

CAUTION: The instrument ground should be directly connected to earth ground. Never connect the ground to neutral terminal.

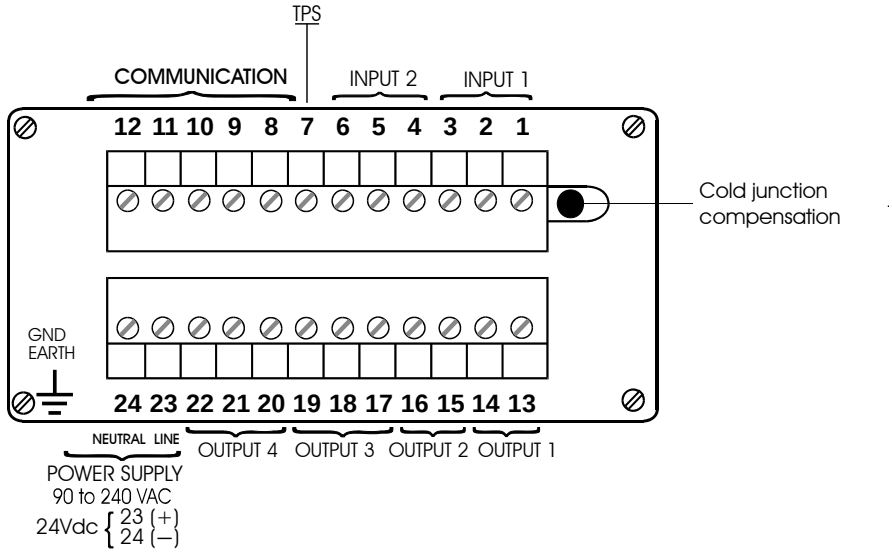


Figure 3 - Indicator I/O Terminals

2.3 - Process Input Signal Connections.

The Indicator in its universal standard inputs can be connected to thermocouples, 2 or 3-wire RTD, milliamperes, millivolts or volts. See table 1, section 1.3.

One input sensor is enabled by internal jumpers (see Hardware Configuration section 4.2) and by configuration (see Configuration - section 3.2). Therefore, it is very important to configure both hardware and software of the instrument.

The wiring of a type of sensor in input 1 doesn't restrict the use of other sensor in input 2.

In order to avoid noise in the wiring, use twisted pair cable and cross sensor connection wire inside a metallic tube or use shielded cable. Take care to connect only one shield wire end either to board terminal or to sensor ground, according to next figures.

WARNING: The grounding of two shield wire ends may cause noise in the Indicator.

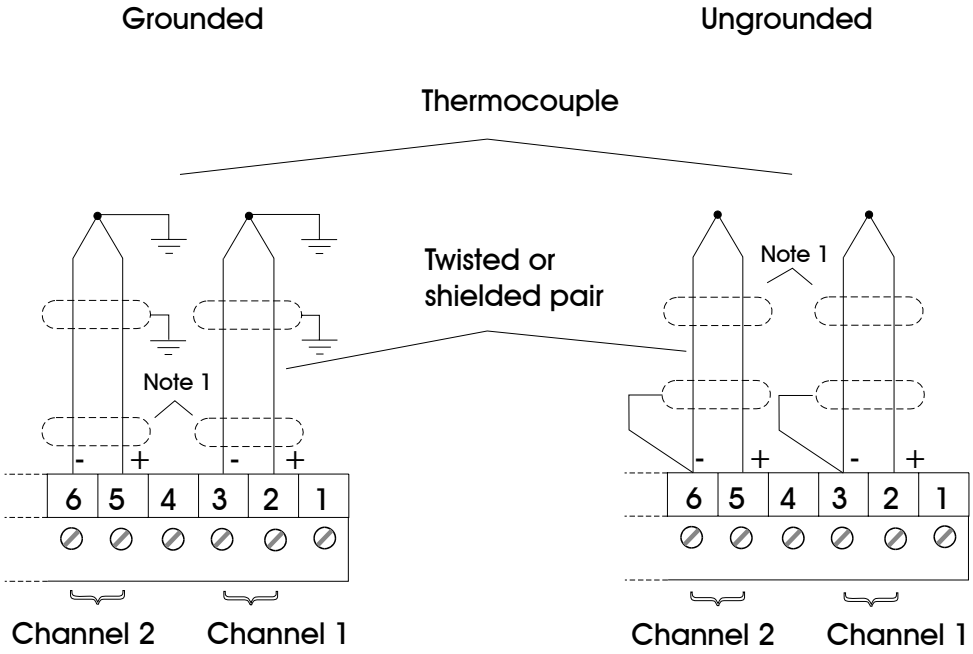
2.3.1 - Thermocouple Input

When there is only one thermocouple, connect it to input 1 in order to get better values in temperature measurement.

Put thermal paste from the terminals of the thermocouple to the cold junction sensor in order to decrease the cold junction compensation error (only if high-accuracy is needed).

Connect the thermocouple to terminals 2 (+) and 3 (-) to use input 1 or to terminals 5 (+) and 6 (-) to use input 2 as shown in Figure 4.

Use appropriate compensating cable (thermocouple extension wire) having the same thermal emf as the thermocouple to which is connected; verify that correct polarity is respected at both the thermocouple-end and instrument-end of the cable.



Note 1: Keep shielded wire disconnected at this end.

Figure 4 - Thermocouple Input

2.3.2 - RTD Input

An RTD input device may be a 2-wire, 3-wire or 4-wire RTD.

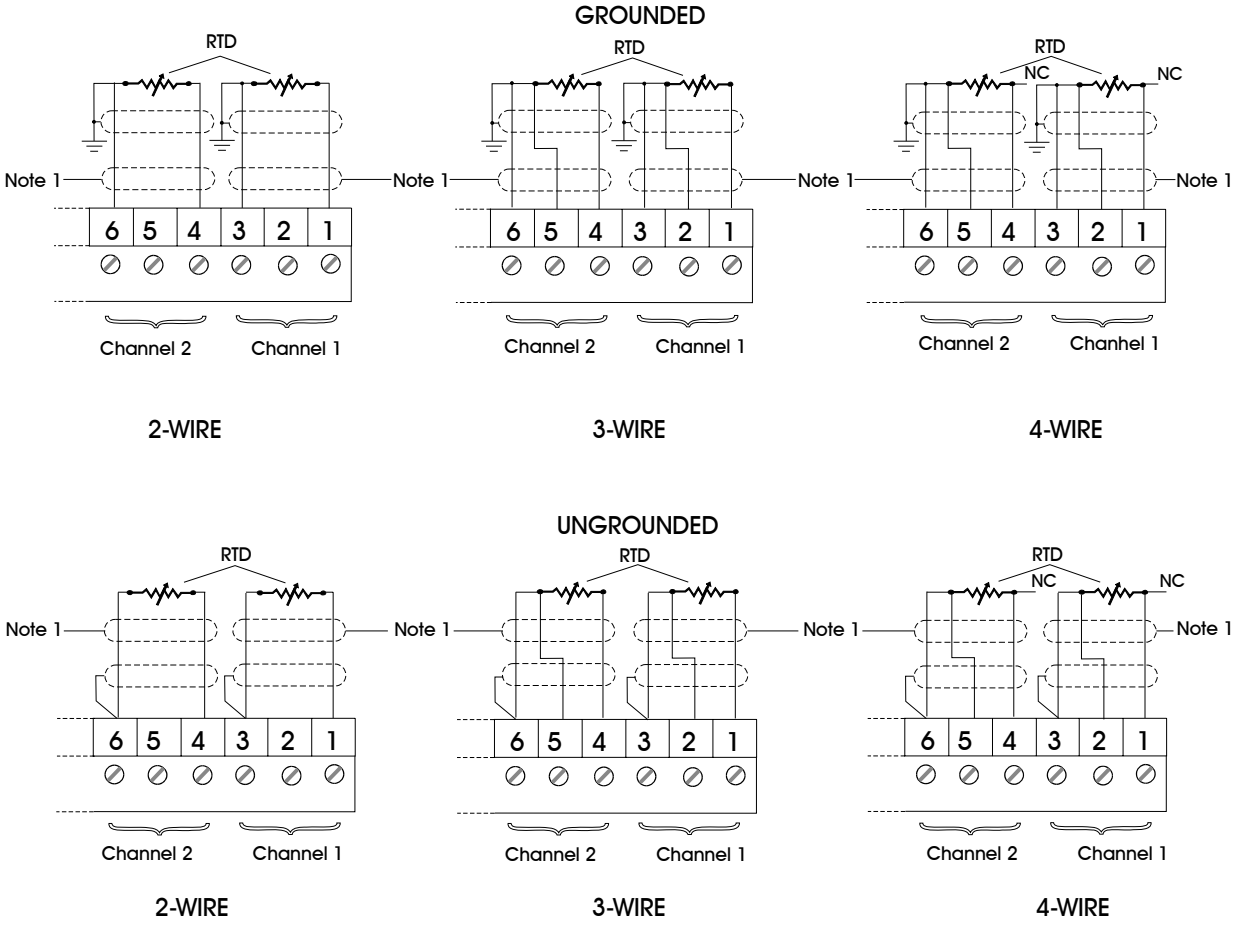
The 2-wire RTD is wired to board terminals 1 and 3 to use input 1 or to terminals 4 and 6 to use input 2 as shown in Figure 5.

The 3-wire RTD is wired like the 2-wire RTD, only connect the third measurement lead to terminal 2 to use input 1 and to terminal 5 to use input 2, as shown in Figure 5.

Use 3-wire RTD to get better values than 2-wire RTD.

The third and fourth leads on an RTD are wire-drop compensation leads. For Indicator applications, the fourth wire on a 4-wire RTD is not used.

Use the same material, gauge and length copper wire on all 3 terminals. The maximum resistance of connection wire is 10 Ω / wire.

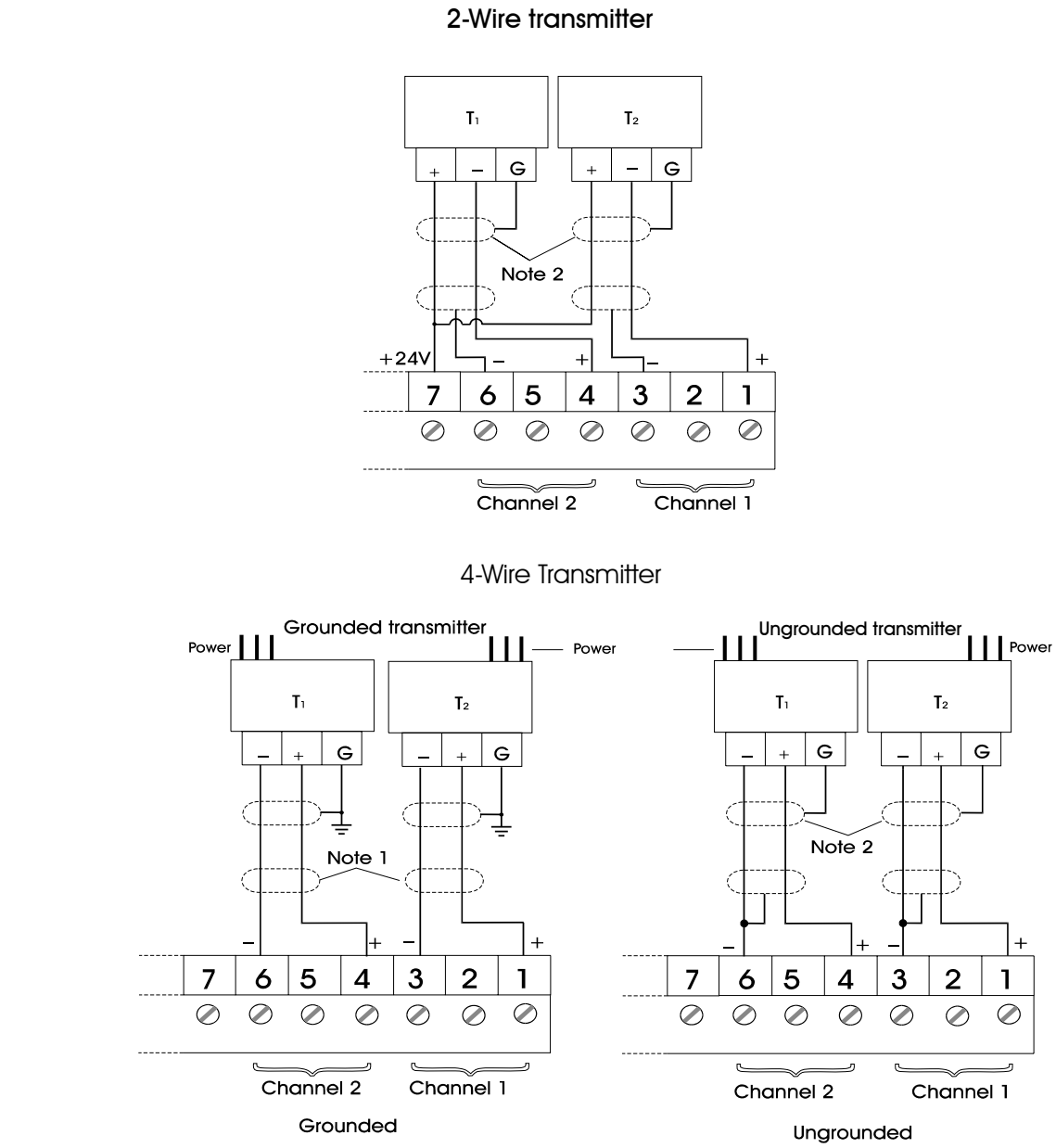


Note 1: Shield to be left unconnected at this end..

Figure 5 - RTD Input

2.3.3 - Milliampere Input

Current source from 4 to 20 mA can be applied between 1(+) and 3(-) terminals to input 1 and between 4(+) and 6(-) to input 2. In case of using a 24 Vdc voltage source to supply a two-wire transmitter, the current is received only by terminal 1(+) for input 1 and received by terminal 4(+) for input 2 (see Figure 6).



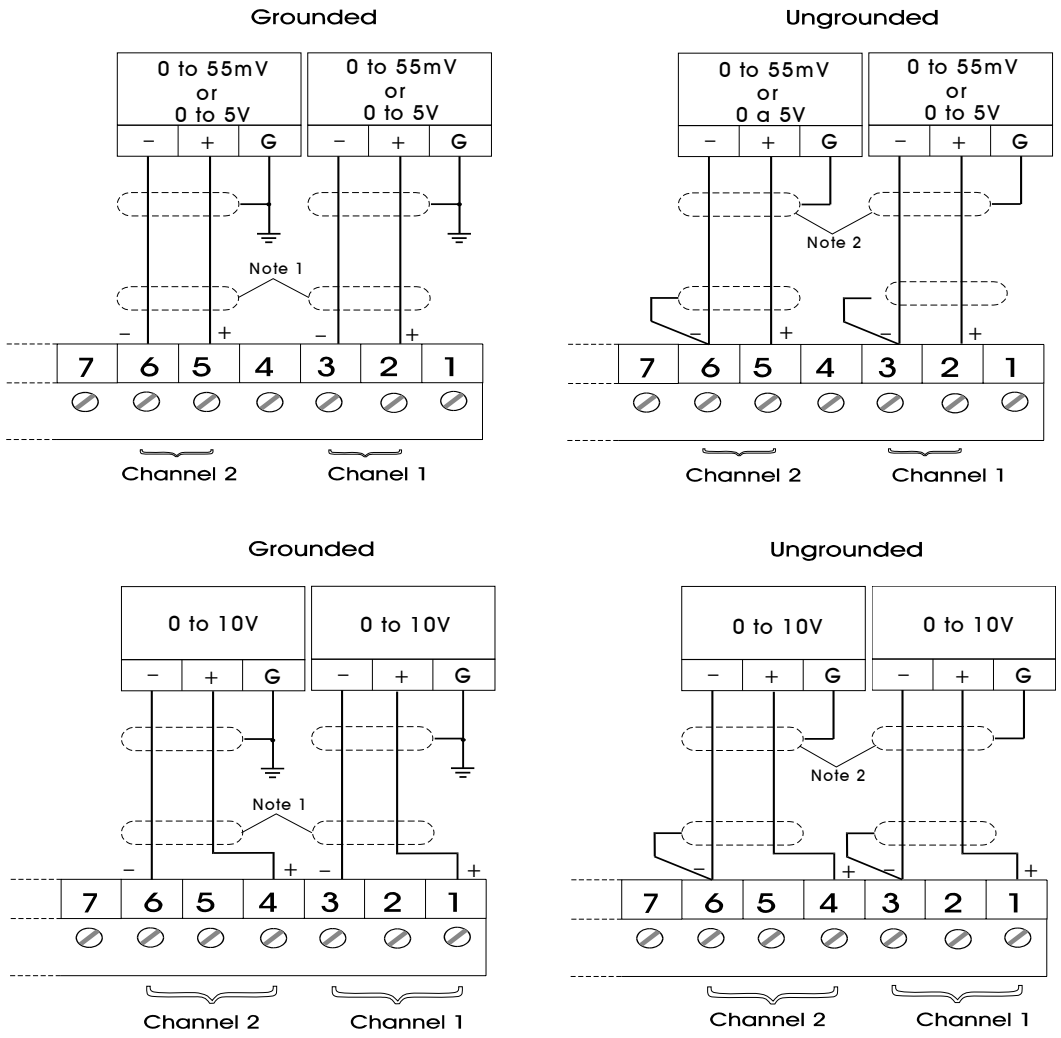
Note 1: Shield to be left unconnected at this end.

Note 2: Connect the shileld wire to the transmitter ground. If there is no ground terminal, let the shield wire disconnected at this end.

Figure 6 - Milliampere Input

2.3.4 - Volt or Millivolt Input

0 to 55 mVdc or to 0 to 5 Vdc must be applied between terminals 2 (+) and 3 (-) in input 1 and between 5(+) and 6(-) in input 2. 0 to 10 Vdc must be applied between terminals 1(+) and 3(-) in input 1 and between terminals 4(+) and 6(-) in input 2 (see Figure 7).



Note 1: Shield to be left unconnected at this end.
Note 2: Connect the shield wire to ground terminal.

Figure 7 - Volt or millivolt Input

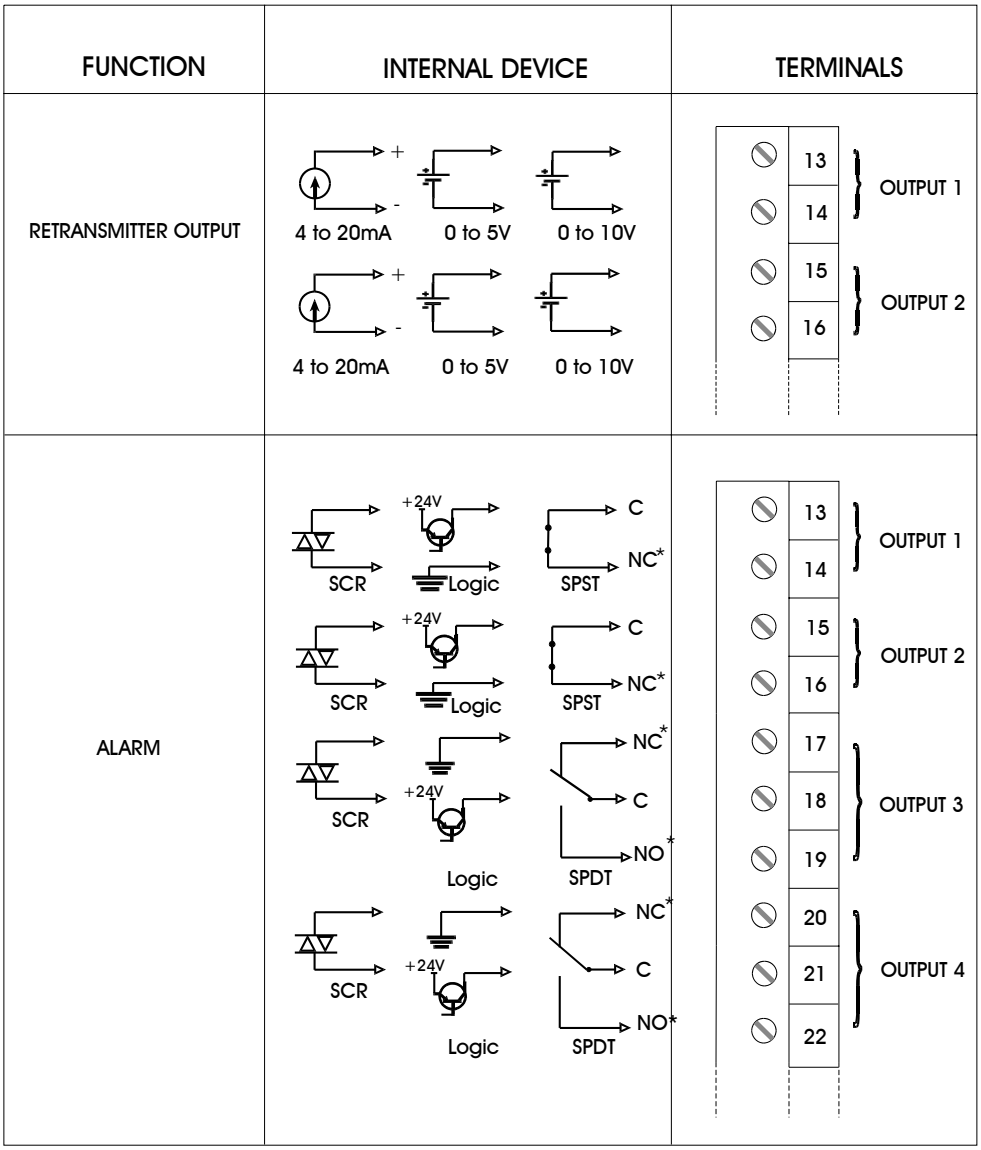
2.4 - Output Signal Connections

The Indicator can have up to four output signal: output 1, output 2, output 3 and output 4. Outputs 1 and 2 are used as retransmittion or alarm output. Outputs 3 and 4 are used as alarm outputs.

Referring to outputs 1 and 2 there are six different types of outputs among I/O terminals: retransmittion (4 to 20mA, 0 to 5Vdc or 0 to 10Vdc), SPST relay, open collector voltage and solid state relay.

There are three different types of outputs for outputs 3 and 4: SPDT relay, open collector voltage and solid state relay (See Figure 8).

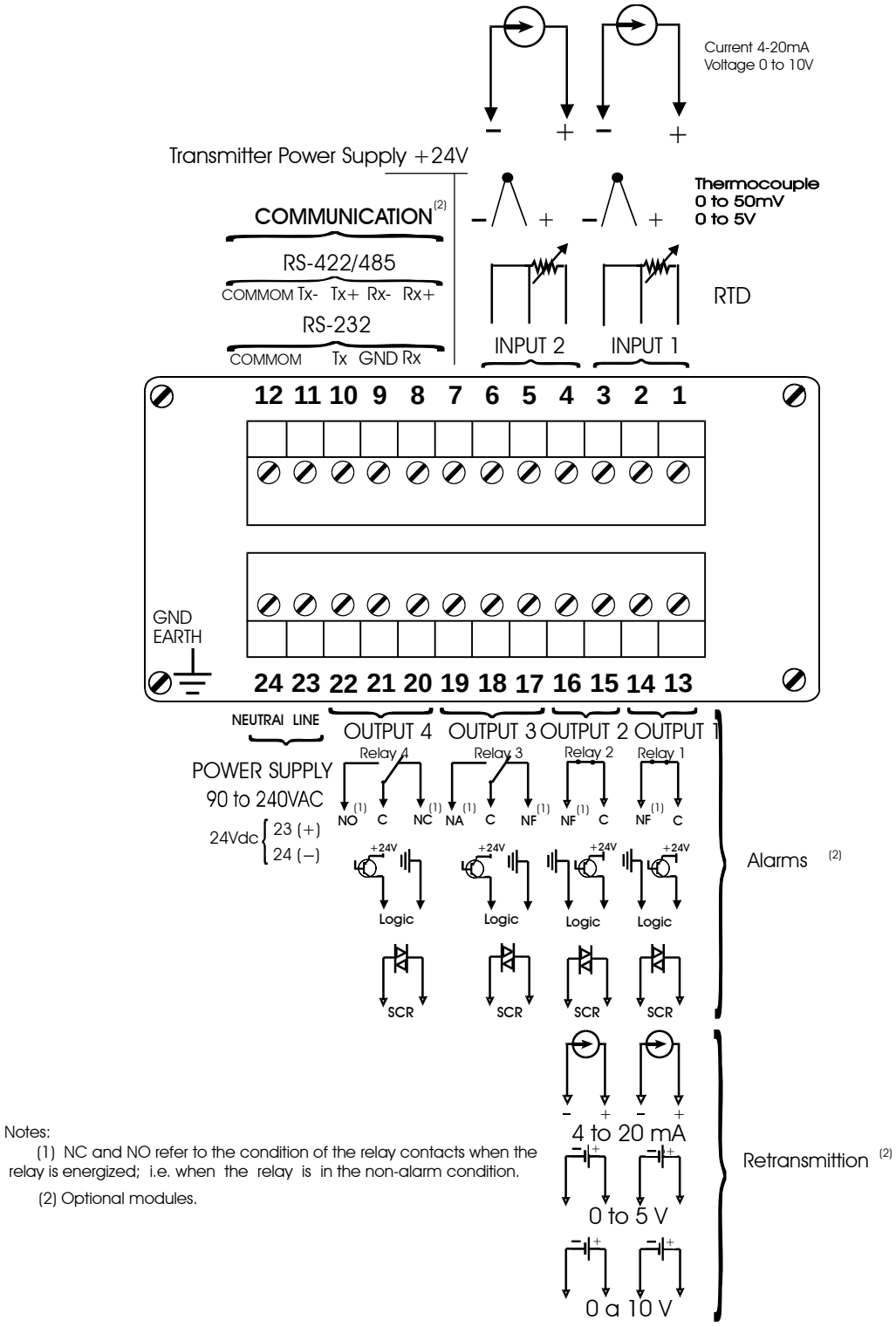
Note that I/O terminals only show output signal if optional module is installed and the output is configured. Refer to Configuration - section 3.2 for further details.



(*) Relay contact condition shown applies when power is off. All relays are energized when power is turned on and in non alarm conditions. It is the SAFE option.

Figure 8 - Output Connection

2.5 - Connection Diagrams



Notes:

(1) NC and NO refer to the condition of the relay contacts when the relay is energized; i.e. when the relay is in the non-alarm condition.

(2) Optional modules.

2.6 - Communication

The Indicator DMY - 2030 can communicate with computers by RS-232 or RS-422/485 since optional module is installed and the communication parameters are configured.

2.7 - Engineering Units

A label containing a selection of Engineering Units is supplied with each Indicator. Select the one corresponding to the variable shown on the display and stick it to the front panel of the controllers.

3 - Operation

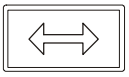
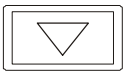
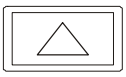
3.1 - Normal Operation

The Indicator DMY-2030 has two modes of operation: normal mode and configuration mode.

During normal operation, the Indicator monitors the two inputs, verifies alarm conditions and activates four outputs if necessary.

Configuration mode is used to select and configure all the Indicator parameters.

Indicator normal operation mode is called level zero. In this level, the three front panel Keys have these functions:

ENTER	Key		It changes from level zero to other levels or asks the password.
DOWN	Key		It changes the channel shown in display. If the display was showing the channel 1(2), then press DOWN , the display will show variable value in channel 2 (1).
UP	Key		It shows the outputs configured as alarms which needs acknowledgment to turn to normal l state. (*)

(*) Go on pressing UP Key in order to show measured variable value. The display will show it if there is no active relay.

3.2 - Configuration

It can be a password installed in the Indicator to get configuration mode. This procedure avoids non-authorized persons to change process parameters.

Therefore, when the ENTER Key is pressed in the normal mode one of these facts can happen:

i. Enter direct in level 1 (GENERAL) of configuration mode; this fact means that the instrument has no password.

ii. The display shows the warning PASS, this fact means that the instrument has a password either by Key or by value (Refer to Figure 9).

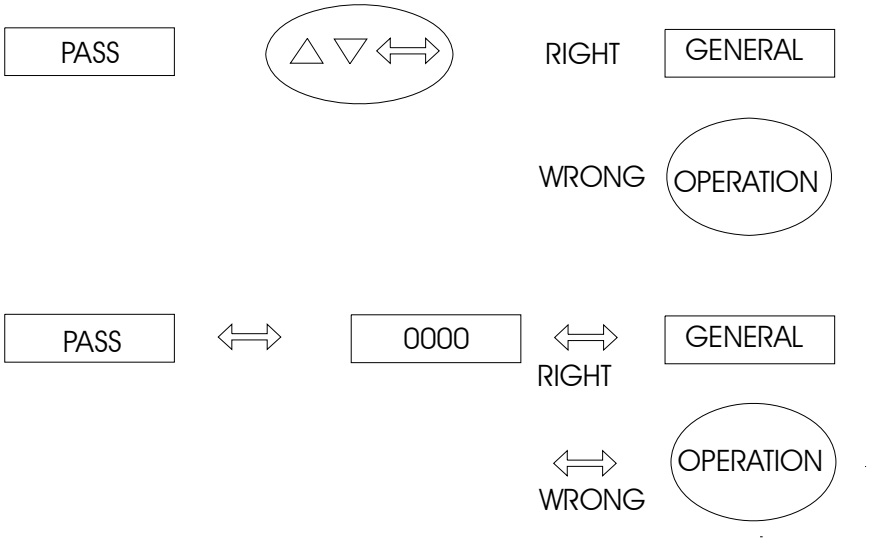


Figure 9 -

Password by Key and by value

Press UP, DOWN and ENTER Keys in this order to enter configuration level for password by Key.

Press the ENTER Key again for password by value. Then, it will appear the number 00000 and the right end digit will flash. The flashed display shows the position of the digit which can be changed. Press the ENTER Key to go to next digit. After entering all digits, press ENTER again to turn to level one if the password is right; otherwise turn to normal operation.

The user can choose password both via Key and value. If the password via Key is wrong, the display will go to password via value.

The password can be a number chosen by the user. Note that in password by value, the number 2030 is always enabled, which helps the user. Use Indicator front Keys in order to set a number as password.

UP	key	Increases values being set.
DOWN	Key	Decreases values being set.
ENTER	Key	Changes into left digits.

All configuration parameters are stored in non-volatile memory and control the normal operation. The user can change the factory configuration by these parameters.

Configuration parameters are distributed in six hierarchical levels shown in figure 10.

Use front keys of instrument to go through the levels and access the parameters of each level.

ENTER	key	Moves into each level.
UP	Key	Moves to higher levels.
DOWN	Key	Moves to lower levels.

Warning: Rectangles mean the Indicator display in figure 10.

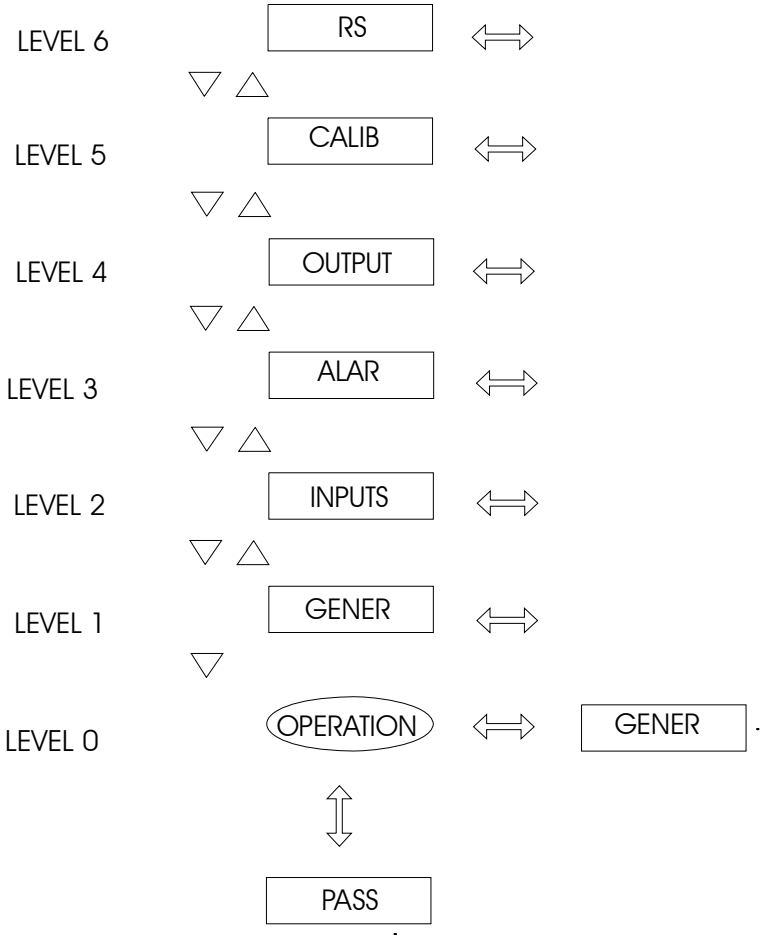


Figure 10 - Parameters Levels Diagram.

Inside each level, front panel Keys have the following functions :

UP	Key	Turn the options to higher.
DOWN	Key	Turn the options to lower.
ENTER	Key	Confirm or advance the options inside the level if the display doesn't show ESC. If there is ESC in display, return one or two positions.

Level 1 - General

There are four options in the level 1: TAG, SOFT, PASS and INDIC (Refer to figure 11).

TAG - Enables an alphanumeric identification for the instrument. The procedure is the same as password by value (Refer to 3.2 - Configuration).

SOFT - Shows the software version.

PASSWORD - allows putting or not a password system in order to access the configuration mode. Password system can be changed by Key, value (number chosen by user or the number 2030) or both. Press UP, DOWN and ENTER Keys in this order to get password by Key.

INDIC - There is a possibility of channel 1 and channel 2 visualization if the user presses the DOWN Key or let the instrument change between both channels. In first situation, NO is selected to option TWO and in second situation YES is selected to option TWO.

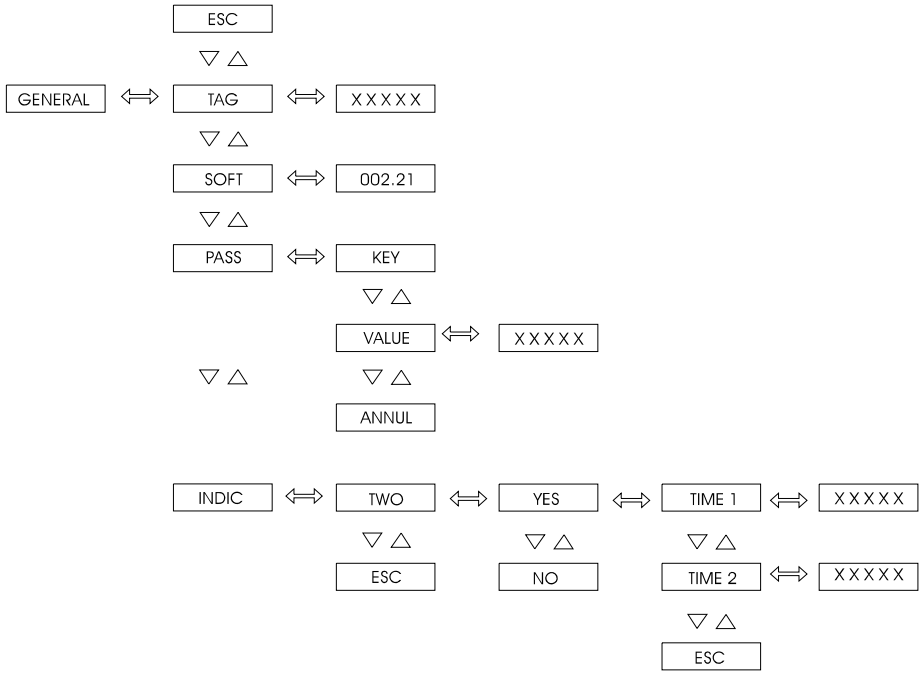


Figure 11 - General Level Options

Referring to figure 11, the table below follows:

Mnemonic	Parameter	Span	Factory Value	Units
TAG	instrument identification	————	P2030	————
SOFT	software version	————	I - 2.21	————
VALUE	user password	-9999 to 99999	0	————
TIME 1	channel 1 exhibition time	1.0 to 3000.0	5.0	seconds
TIME 2	channel 2 exhibition time	1.0 to 3000.0	1.0	seconds

Level 2 - Inputs

The level of inputs allows whether or not to enable (by means of the option CANCEL) the sensor type for input 1 and input 2. For sensor types we have the linear option (0 to 5V, 0 to 55mV and 0 to 20mA) and temperature (option TEMP), as illustrated in figure 14.

Input from 4 to 20mA belongs to option 20mA
Input from 1 to 5Vdc belongs to option 5Vdc

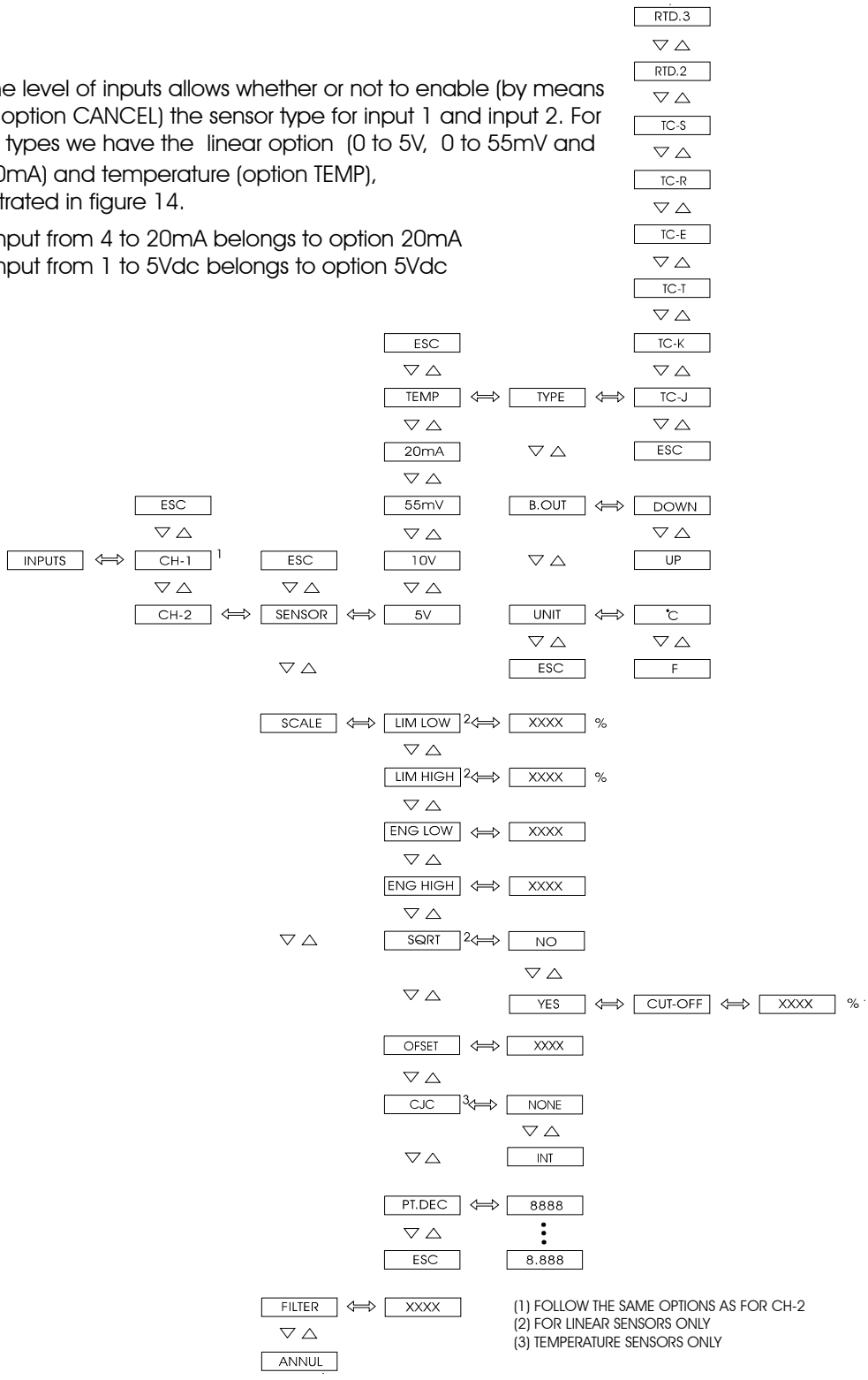


Figure 12 - INPUTS Level Options

Table from Figure 12.

Mnemonic	Parameter	Span	Factory	Units
LIM LOW	input signal associated to Eng Low	0.0 to 100.0	0.0	%
LIM HIGH	input signal associated to Eng High	0.0 to 100.0	100.0	%
ENG LOW	display indication associated to Lim Low	-1009 to 20019	0.0	EU*
ENG HIGH	display indication associated to Lim High	-1009 to 20019	100.0	EU
CUT-OFF	minimum value for square root	0 to 5	0	%
OFF SET	constant added to display indication	-9999 to 30000	0	EU
FILTER	time constant of 1st order digital filter	0.0 to 25.0	0.0	seconds

(*) EU - Engineering Units

Configure the scale when one chooses a linear sensor (option SCALE). So, set two points P1 (Lim Low, Eng Low) and P2 (Lim High, Eng High) as shown in figure 13. Lim Low means, in %, the electrical signal associated to display - Eng Low; and Lim Low means, in %, the electrical signal associated to display - Eng High.

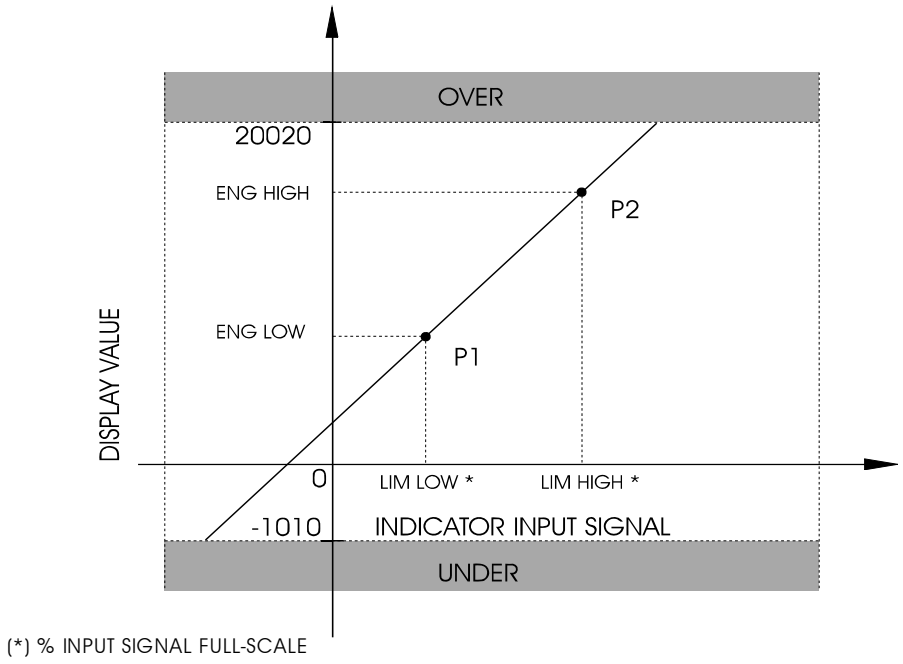


Figure 13 - Linear Input Configuration

SQRT - shows the input signal square root. Refer to figure 14 for further details.

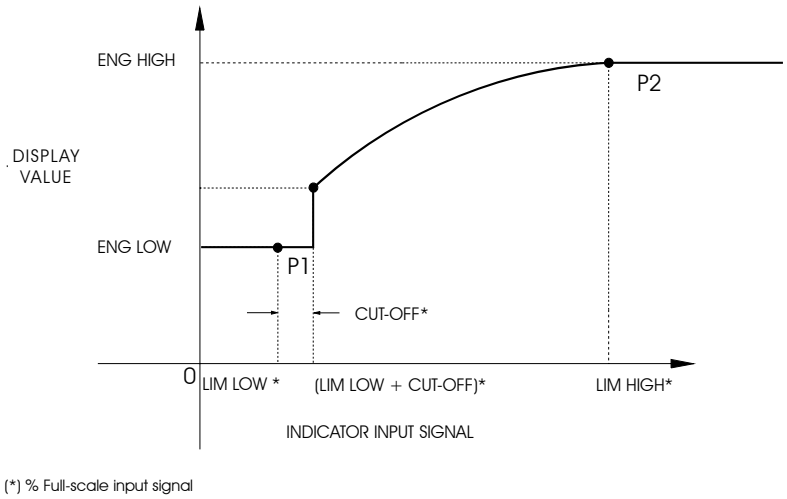


Figure 14 - Input Signal Square Root

DEC.PT - sets the decimal point for visualization of Engineering units in display. There are up to four decimal places in linear processes and for temperature sensors there is one decimal place or none.

OFSET (as displayed) - allows the user to put an off-set value in Engineering Units. OFSET parameter can be used in order to equalize instrument measurements.

CJC - enables or not cold junction compensation for thermocouples. Select (INT) for cold junction compensation; otherwise select NO.

Refer to table 1 - section 1.3 for further details about input sensors.

FILTER - this parameter provides the time constant of first order digital filter associated to input. Make this parameter equal to zero when one don't want a filtered signal.

B.OUT - When the temperature sensors break (thermocouple or RTD) or there are wiring disconnections, the display shows burn-out to each channel. In this case, the UP option in this parameter makes active the high-alarms and the DOWN option makes active the low-alarms.

UNITS - Choose °C or °F for temperature indication.

Level 3 - Alarms

The Indicator has up to seven alarm devices: four are the outputs 1, 2, 3 and 4 used as alarm outputs which are relay 1, relay 2, relay 3 and relay 4. The other three devices are couple of leds LED 1 and LED 2 and the display , in this case the option INDEP is selected. If DEPEN option is selected to leds and display its performance is associated with relays.

The Alarm output is **fail-safe:** the output device is de-energized during the alarm condition or power down. The attached alarm circuit should be fused and designed to have fail-safe operation even in case of a blown fuse.

Each alarm can support up to four channels: low channel 1, high channel 1, low channel 2 and high channel 2. For the configuration of seven alarms, there are 28 set-point alarms (SP) and its hysteresis (HYST).

The user has the possibility of adjusting only the set-point values of alarms through the choice of CONF via UP key. The alarm set-point mnemonics have the codes:

S_1_H_r1	Channel 1 high-alarm set-point associate with relay 1.
S_2_L_L1	Channel 2 low-alarm set-point associated with led 1.

LATCHED - Configures the relay operation to perform a latched conditon, where the relay contacts only return to non alarm conditon if the alarm condition finishes and the operator does the acknowledgment.

DELAY - it delays the relays operation. The Figure 15 shows the behavior of delay for high-alarm.

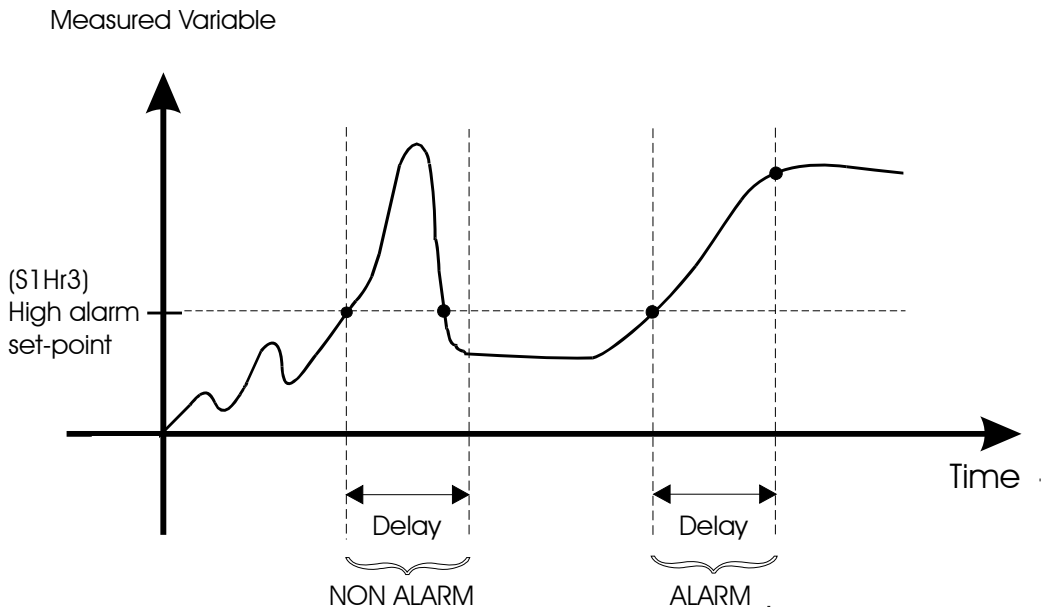


Figure 15 - Relay with delay.

SAFE - provides safety to relays. Safety means that relays are energized when the instrument is powered, and are de-energized in case of alarm or power down.

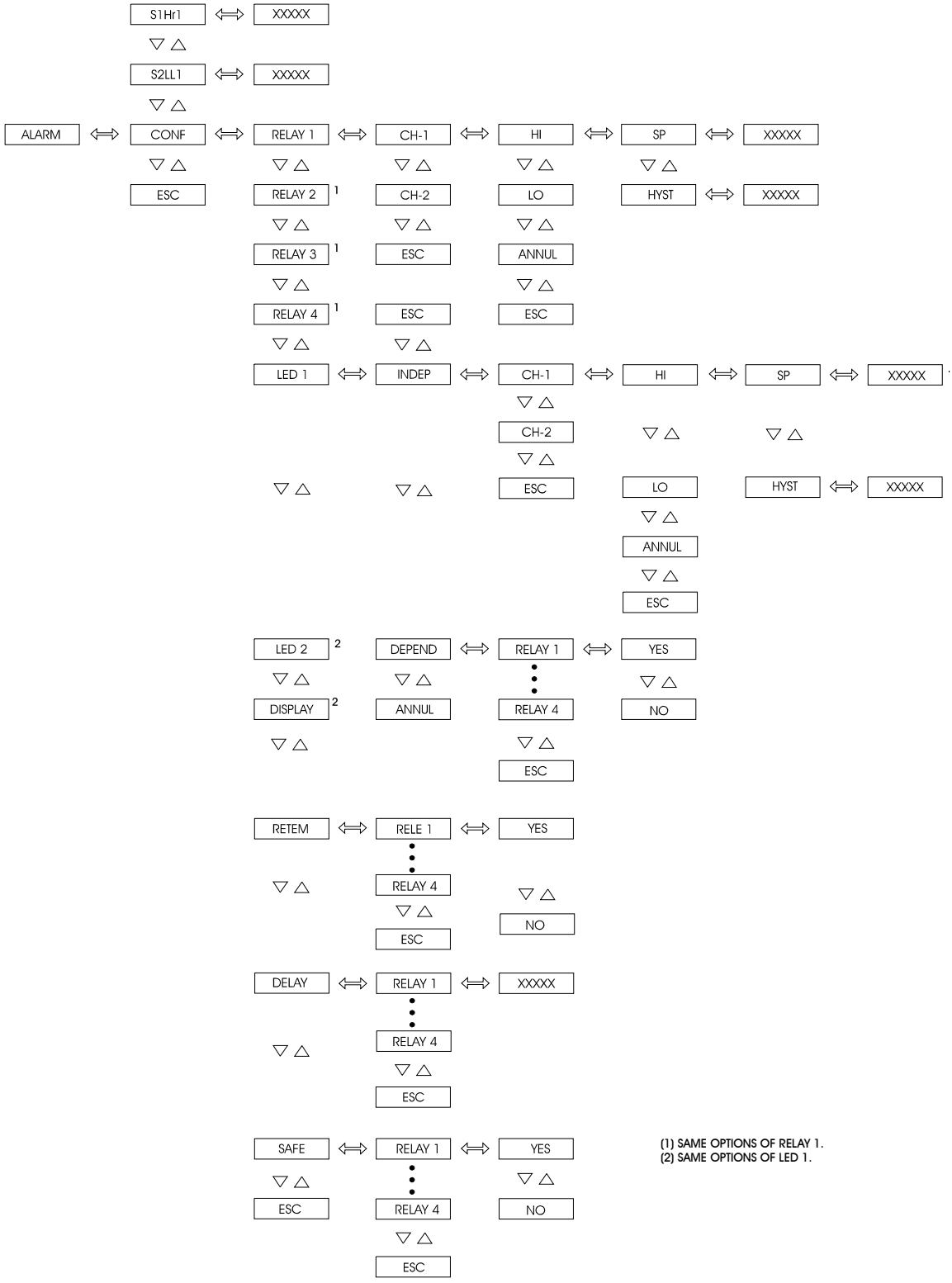


Figure 16 - ALARMS Level Options

The table below shows the parameters from figure 16.

Mnemonic	Parameter	Range	Default Value	Units
SP	Alarm set-point	-1009 to 20019	25.0 - low al. 75.0 - high al.	EU
HYST	alarm hysteresis	0 to 250	1.0	EU
DELAY	delay for activating the relay	0.0 to 3000.0	0.0	seconds

Level 4 - Outputs

Level 4 allows the configuration of two analog outputs (Refer to Figure 17).

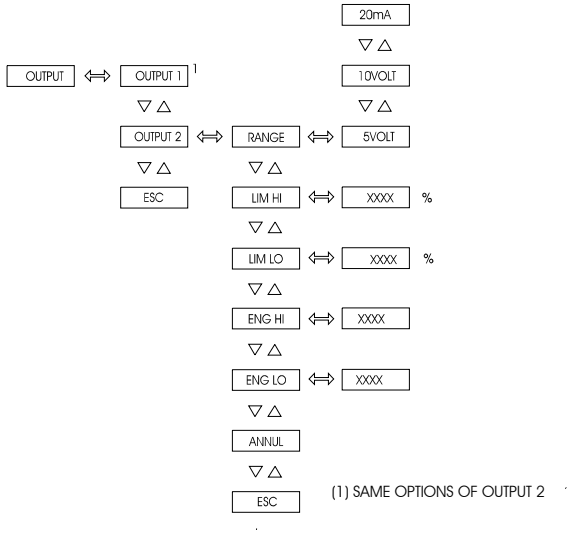


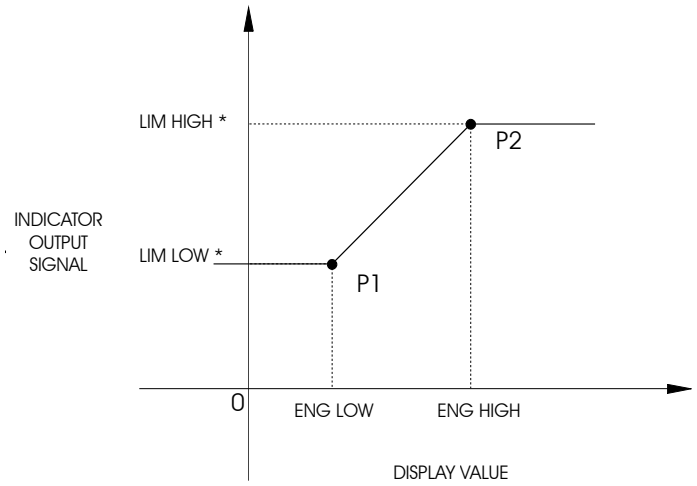
Figure 17 - OUTPUTS Level Options

The table below shows the parameters from figure 17

Mnemonic	Parameters	Range	Factory value	Unit
LIM LOW	output signal refers to Eng Low	0.0 to 100.0	0.0	%
LIM HIGH	output signal refers to Eng High	0.0 to 100.0	100.0	%
ENG LOW	display indication refers to Lim Low	-1009 to 20019	0.0	EU
ENG HIGH	display indication refers to Lim High	-1009 to 20019	100.0	EU

Analog output is enabled after selecting the range of retransmission output via mnemonic RANGE.

RANGE - It selects the range of retransmission output for 20mA, 5V and 10V. The ratio between the Engineering Unit and electric signal from I/O terminals is defined as linear process scale configuration. We define two points P1 (Eng Low, Lim Low) and P2 (Eng High, Lim High) according to Figure 18. Eng Low is the indication in display in Engineering Units associated to electric signal Lim Low, and Eng High is the indication in display in Engineering Units associated to electric signal Lim High. Note that Lim Low and Lim High are defined in percentage of output range and output signal saturates in these points.



(*) % FULL-SCALE OUTPUT SIGNAL

Figure. 18 - Analog Output Configuration

Level 5 - Calibration

Level 5 is described in section 4.4 of Calibration.

Level 6 - RS

Refer to communication manual.

4 - Maintenance

4.1 - Indicator Hardware

The Indicator maintenance demands the user to have access to instrument hardware. The Indicator hardware consists of three main boards: Display Board, CPU Board and Power Supply Board. The three-board-system is fixed to aluminum case by a screw on the right side of the front-panel. Loosen this screw and pull the Indicator front-panel in order to remove the instrument from case.

Display board is located in the Indicator front-panel. The front-panel has four internal staples in its four sides which keep together CPU board and power supply board. A holder between CPU and power supply board is connected in order to provide more stiffness to system.

i) Remove the screw which sets the holder situated in the backside of boards.
ii) Turn the Indicator so that the display is on the opposite side for reading.
iii) Loosen only the connector located on right-top side of front-panel.
iv) Move the top-board to the right and open the boards according to Figure 19.

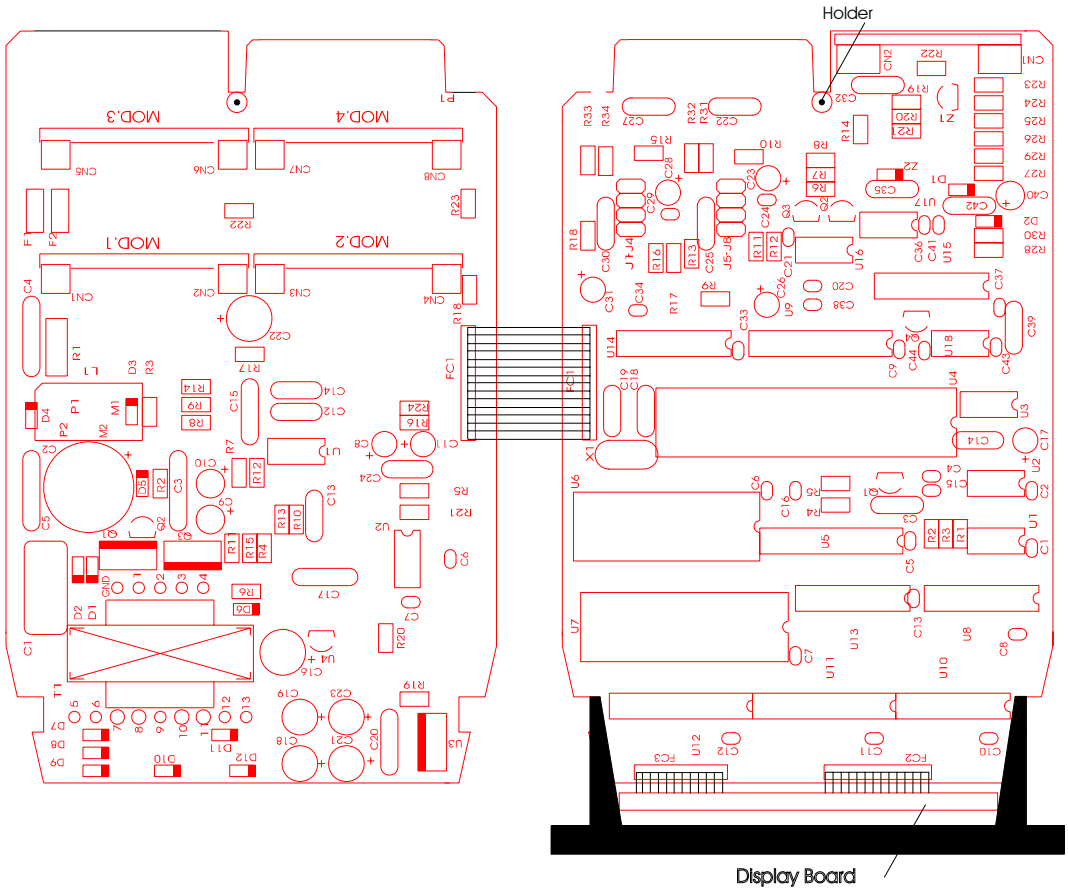


Figure 19 - Indicator Hardware

4.2 - Hardware Configuration

The configuration level by software of inputs (level 2 - Inputs) must be complemented via configuration by process input hardware, through internal jumpers.

There are four places for installation of jumpers into the channel 1: J5, J6, J7 and J8; and also four places for installation of jumpers into the channel 2: J1, J2, J3 and J4. They are located in CPU Board according to Figure 20.

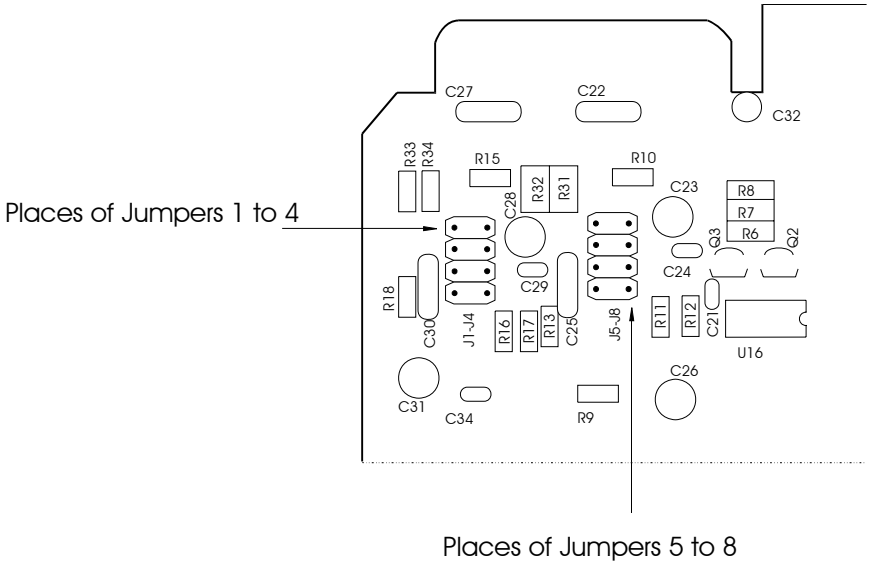


Figure 20 - Location of jumpers in CPU Board

Table 2 shows the jumpers that must be installed for every type of input. Verify every input type required and put the jumpers as specified. Make sure that only the jumpers according to required input are installed.

Input type	Jumpers							
	Channel 2				Channel 1			
Thermocouple	J1			J4	J5		J7	
Voltage (0 to 55mV)	J1			J4	J5		J7	
Voltage (0 to 5V)	J1			J4	J5		J7	
Voltage (0 to 10V)*			J3			J6		
2-wire or 3-wire RTD	J1	J2			J5			J8
Current (0 to 20mA)			J3	J4		J6	J7	

Table 2 - Input Type Configuration Jumpers

(*) For inputs ranging from 0 to 10V input, the second jumper supplied by factory must be kept by the user out of the instrument or set on a conector pin as shown in Figure 21.

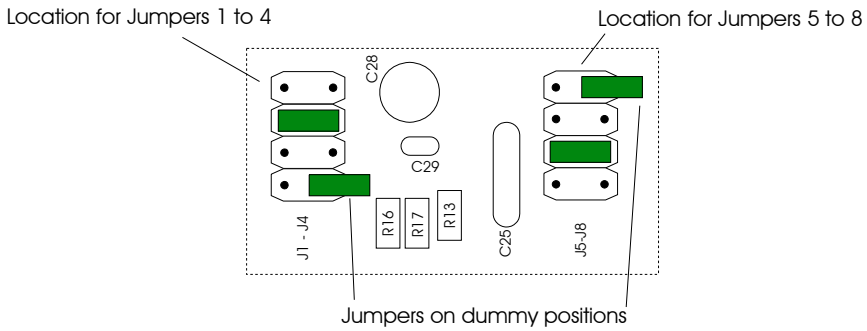


Figure 21 - Jumpers put in the board pin but with no use for 0 to 10V input.

4.3 - Installation of optional modules

The Module Indicator can have up to four output signals and the communication module. One must install the optional modules in order to get these specific features. Open the Indicator as shown in section 4.1 in order to access four connectors in power supply board and other connector in CPU board. (Refer to Figure 22).

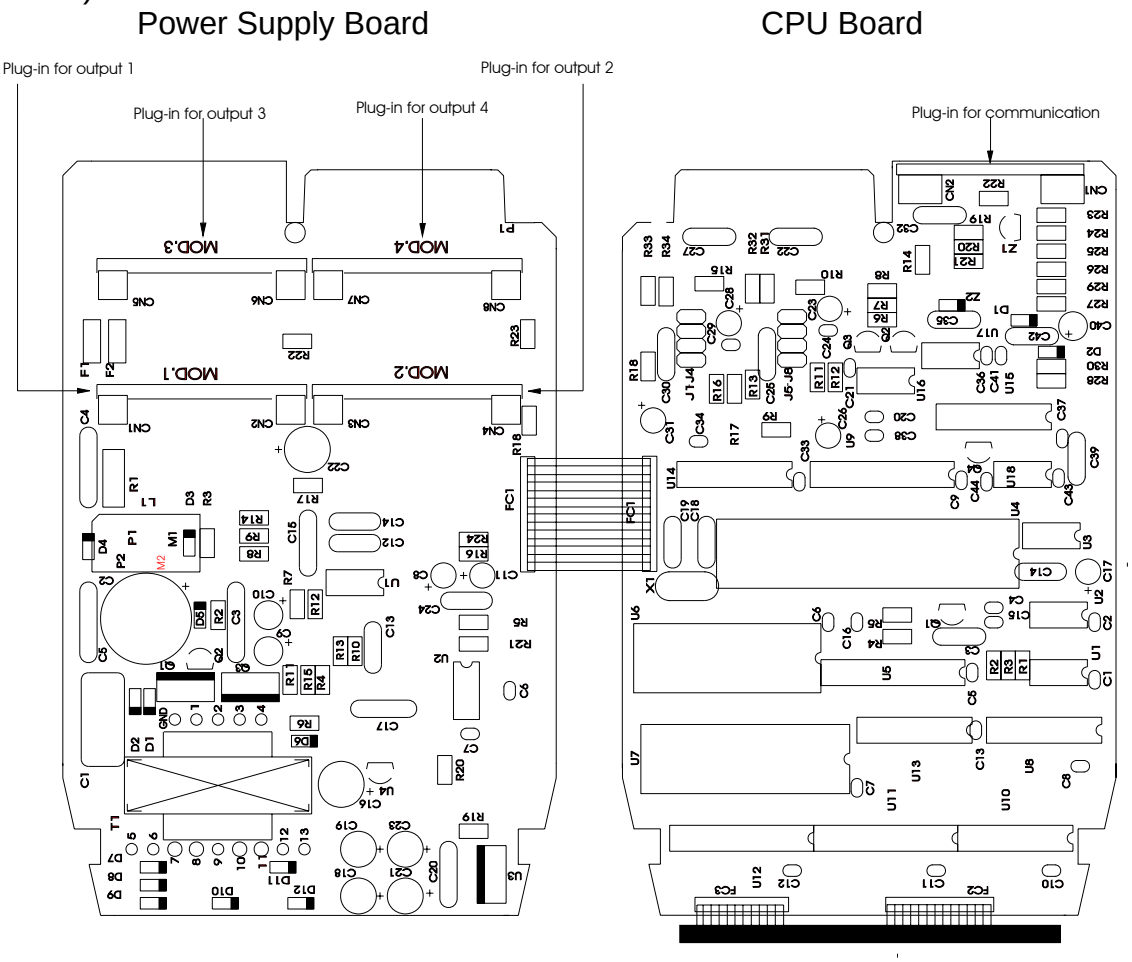


Figure 22 - Optional Module Connectors

The connectors in power supply board are called MOD 1, MOD 2, MOD 3 and MOD 4, and are associated in this order with output 1, output 2, output 3 and output 4 signals, in Indicator I/O terminals as shown in Figure 3. The communication module connection is situated in CPU board. Every optional module must be installed with component side in direction of instrument display, as shown in Figure 23.

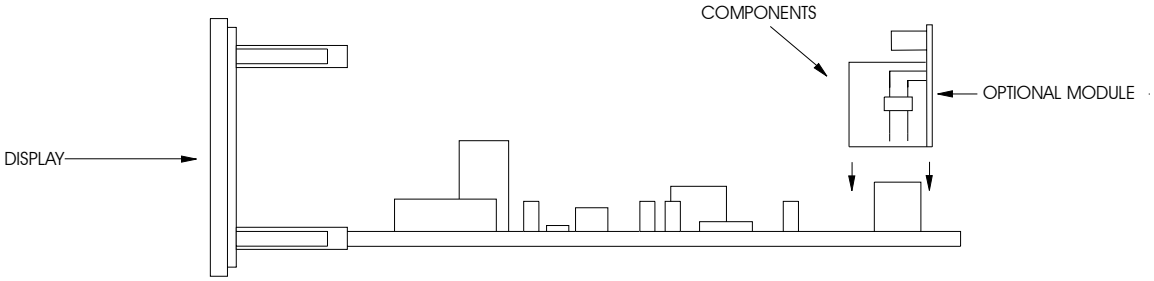


Figure 23 - Installation Of Optional Modules

Outputs 1 and 2 as retransmission outputs (optional: Module Code MSAN-20)

If one needs output 1 to be a retransmission output (4 to 20mA, 1 to 5V or 0 to 10V) connect the optional module of analog output in connector called MOD 1. If one needs other retransmission output connect the second module to connector called MOD 2.

The output 1 retransmits the measured variable of input 1 while output 2 retransmits the measured variable of input 2.

The optional module of analog output has two places for installation of jumpers: J1 and J 2, according to Figure 24.

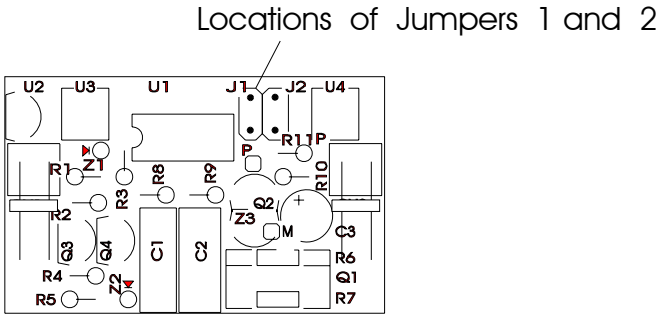


Figure 24 - Place of jumpers in analog output board

In order to configure the optional module analog output for retransmittion output 4 to 20mA, 1 to 5V or 0 to 10V, install the jumper according to table 3.

Retransmission Output Type	Jumpers	
4 to 20mA*		
1 to 5V	J1	
0 to 10V		J2

Table 3 - Retransmission Output Type Configuration Jumper

(*) In case of retransmission output in current of 4 to 20mA, one must keep the jumper out of the instrument or put it on only one connector pin without using as shown in Figure 21.

Outputs 1 and 2 as alarm outputs

If one wants output 1 or output 2 to work as alarm, connect the optional module to connectors called MOD 1 and MOD 2, in this order. The output depends on the optional module installed in MOD 1 and MOD 2. There are three types of alarm output: the SPST relay, the solid state relay and the open collector voltage. The Alarm output type and the optional module correspondence are shown in the table below.

Alarm Output Type	Optional Module Code
SPST Relay	MALRE - 20
Solid state relay	MALRS - 20
Open collector voltage	MSD - 20

Table 4 - Types of alarm output for outputs 1 and 2

Outputs 3 and 4 as alarm outputs

The outputs 3 and 4 work as alarm when one connects the optional module to connectors MOD 3 and MOD 4, in this sequence. There are three types of alarm outputs: SPDT relay, solid state relay and open collector voltage. The Alarm output type and the optional module correspondence are shown in the table 5.

Alarm Output Type	Optional Module Code
SPDT Relay	MALRE - 20
Solid state relay	MALRS - 20
Open collector voltage	MSD - 20

Table 5 - Types of alarm output for outputs 3 and 4

4.4 - Calibration

The DMY-2030 Indicator is accurately calibrated in factory and doesn't need periodic recalibration in normal conditions. Follow this procedure when the instrument needs recalibration.

Disconnect the process signals of I/O terminals.

Apply power to the instrument and let it warm up for at least 30 minutes.

This section contains two parts: input calibration and output calibration.

Input Calibration

This section describes the procedure for calibration of input 1 and input 2.

The accuracy of equipment used in calibration, in order to obtain references, must be better than Indicator specifications.

The references are linked to type of input to be calibrated in the following tables. The right column of these tables are the mnemonics shown in display during calibration process.

Verify if the internal calibration jumpers are properly placed.

Before the calibration, access the level 5 of Calibration. The Calibration level has a password system which avoids damage to the calibration parameters. The number 5 is the password to access the Calibration level.

After the instrument accept the password, select the type of input to be calibrated inside the option INPUT. Choose the channel to be calibrated and press ENTER. The display shows the mnemonics associated to references of calibration process. The references must be put before the mnemonic in display and calibration is started when you press ENTER. At this moment, the Indicator starts calibration process and the display flashes the mnemonic CAL.

The reference must remain invariable while it is connected to input channel and the display is flashing.

When the display stops flashing and returns to mnemonic, the first point calibration process is finished.

Change to the next reference and press DOWN key in order to select the next point. Wait one minute between two calibration points. After the time gap, press ENTER in order to start the calibration in this point.

After running all the references in the table, the calibration process is finished.

You can recalibrate one point again without damaging other points.

In order to access the normal mode again, return to level zero.

Figure 25 shows the options of input and output calibration for level 5 of Calibration.

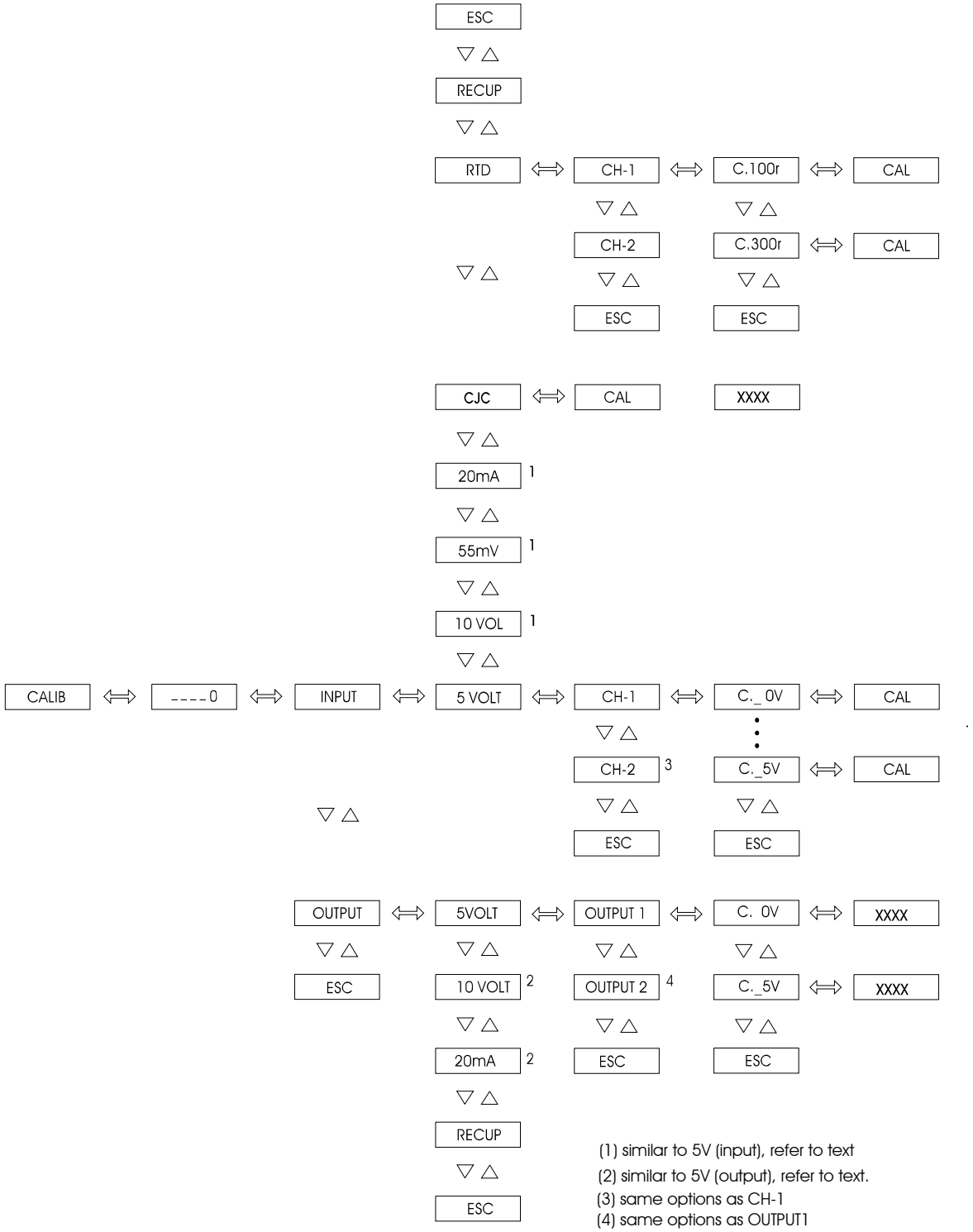


Figure 25 - CALIBRATION Level Options

Input Calibration in voltage (0 to 55mV)

For input calibration in voltage from 0 to 55mV connect a dc voltage source to channel to be calibrated (terminals 2(+) and 3(-) for channel 1 or 5(+) and 6(-) for channel 2). The 6 voltage references are shown in table 6.

Reference	Mnemonic
0.000 mV	C. 0nV
10.000 mV	C.10nV
20.000 mV	C.20nV
30.000 mV	C.30nV
40.000 mV	C.40nV
50.000 mV	C.50nV

Table 6 - Calibration Input Voltage from 0 to 55mV

Input Calibration in voltage (0 to 5V)

For input calibration in voltage from 0 to 5V connect a dc voltage source to channel to be calibrated (terminals 2(+) and 3(-) for channel 1 or 5(+) and 6(-) for channel 2). The 6 voltage references are shown in table 7.

Reference	Mnemonic
0.0000V	C. 0V
1.0000V	C. 1V
2.0000V	C. 2V
3.0000V	C. 3V
4.0000V	C. 4V
5.0000V	C. 5V

Table 7 - Calibration Input Voltage from 0 to 5V

Input Calibration in voltage (0 to 10V)

For input calibration in voltage from 0 to 10V connect a dc voltage source to the channel to be calibrated (terminals 1(+) and 3(-) for channel 1 or 4(+) and 6(-) for channel 2). The 6 voltage references are shown in table 8.

Reference	Mnemonic
0.0000V	C. 0V
2.0000V	C. 2V
4.0000V	C. 4V
6.0000V	C. 6V
8.0000V	C. 8V
10.0000V	C.10V

Table 8 - Input Calibration in Voltage
from 0 to 10V

Input Calibration in current (0 to 20mA)

For input calibration in current from 0 to 20mA, connect a cc current source to the channel to be calibrated (terminals 1(+) and 3(-) for channel 1 or 4(+) and 6(-) for channel 2). The 6 current references are shown in table 9.

Reference	Mnemonic
0.000 mA	C. 0nA
4.000 mA	C. 4nA
8.000 mA	C. 8nA
12.000 mA	C.12nA
16.000 mA	C.16nA
20.000 mA	C.20nA

Table 9 - Input Calibration in Current
from 0 to 20mA

Input Calibration in thermocouple

There are two steps for calibrating the thermocouple input. Firstly, there are the calibration of input from 0 to 55mV and input from 0 to 5V for the channel to be calibrated (terminals 2(+) and 3(-) for channel 1 or 5(+) and 6(-) for channel 2) according to tables 6 and 7. Access mnemonic CJC inside the option INPUT in level 5 of calibration (Refer to figure 25).

CJC - is the mnemonic related to cold junction temperature.

Press ENTER after mnemonic CJC and the program calculates the cold junction temperature. During this gap, the display flashes the mnemonic CAL.

After 16 seconds the program finishes the calculations for cold junction temperature and shows it in °C in display.

This value is the first approximation of cold junction temperature. The user must measure accurately the temperature of I/O terminals and correct the value shown by program as shown in section 3.2 of Configuration.

At last the thermocouple input calibration is finished.

Access the level zero and return to normal mode

Calibration of 2 or 3-wire RTD input

For 3-wire RTD input calibration, connect a resistance according to table 10 to the channel to be calibrated (between terminals 1 and 2 with 2 and 3 short-circuit for channel 1 or between terminals 4 and 5 with 5 and 6 short-circuit for channel 2).

The 2-wire RTD calibration is made automatically.

If one has a resistance decade, the three connection wires must have the same gauge, material and length.

Reference	Mnemonic
100.000 Ω	C.100r
300.000 Ω	C.300r

Table 10 - Resistances for calibration of 3-wire RTD input

Output Calibration

For the output calibration, follow this procedure for retransmittion outputs 1 and 2.

The output 1 is calibrated by input 1 and the output 2 is calibrated by input 2.

The configuration of input hardware must be the same of output (0 to 5V, 0 to 10V or 0 to 20mA) since the Indicator will measure the output signal. Therefore, verify if the configuration of internal jumpers of Optional Output Board and CPU are right.

Verify if the input type is calibrated previously.

Make the connections according to table 11.

Output Type	Output 1 and Input 1	Output 2 and Input 2
current (0 to 20mA) voltage (0 to 10V)	terminal 13 (+) and 1 (+) terminal 14 (-) and 3 (-)	terminal 15 (+) and 4 (+) terminal 16 (-) and 6 (-)
voltage (0 to 5V)	terminal 13 (+) and 2 (+) terminal 14 (-) and 3 (-)	terminal 15 (+) and 5 (+) terminal 16 (-) and 6 (-)

Table 11 - I/O Terminals Connections for Output Calibration

Enter level 5 of Calibration and select the output to be calibrated. Choose the type of output (0 to 20mA, 0 to 5V or 0 to 10V) and press ENTER.

The display will show the mnemonic related to the first point of calibration. There are two points for output calibration.

For current output, the mnemonic are related to electric signals from 0 to 20mA. For voltage, the mnemonics are related to signals 0 and 5V or 0 and 10V.

Press ENTER after the display shows the mnemonic related to first or second point of calibration, so that the display starts to show the output value. Then adjust output value for mnemonic electric level. During the first point calibration (0mA, 0V) be careful not to saturate the output signal.

Finally, go down to level zero and return to normal mode.

Return to factory calibration

The Indicator stores in non-volatile memory the parameters value of factory calibration, which can be recalled at any time.

If one might have doubts about the performance of instrument due to bad recalibration, use the option RECUP (refer to figure 25).

RECUP - is the option that allows the recuperation of factory calibration. This option is enabled both input and output.

Enter level 5 of Calibration and decide if recuperation must be made for input or output. Select the option RECUP and press ENTER in order to recall the factory values.

4.5 - Maintenance and hardware instructions

Before returning the instrument to factory, verify these conditions:

Instrument shows error on display

After turning on the equipment, it starts up normal tests about RAM and E2PROM.

When one of these components has problems, the display shows the error code below.

Err. 01 - RAM error
Err. 02 - E2PROM error

For RAM error, turn off the instrument and turn it on again. If the error remains, send it to factory.

For E2PROM error, press ENTER key and reconfigure the equipment. Turn off and turn on the instrument again. If the error remains, send it to factory.

During configuration the display can show this error message: Err. 03.

This error can happen when there are differences between analog output and alarm configuration. In order to avoid this case, don't forget to disable relays 1 and 2 before enabling analog output 1 and 2 and vice-versa.

Instrument with no display

Verify if power is being supplied to terminals 23 and 24 of I/O terminals.

Verify the conditions of fuse F1 of 1.0A set on power supply board as shown in figure 19.

Bad Conditions Instrument

Verify if the Indicator is correctly configured both software and hardware (internal jumpers).

Verify if optional modules are set according to manual.

Measure if flat-cable 1 voltages shown in figure 26 are the same of table 12 and if they power the CPU.

Flat-cable 1 Points	Voltage
Between point 13(-) and point 1(+)	5V
Between point 13(-) and point 7(+)	8V
Between point 13(-) and point 8(+)	0V
Between point 13(-) and point 9(+)	- 8V
Between point 13(-) and point 12(+)	24V
Between point 11(-) and point 10(+)	5V

Table 12 - Inspection Points for Flat-Cable 1

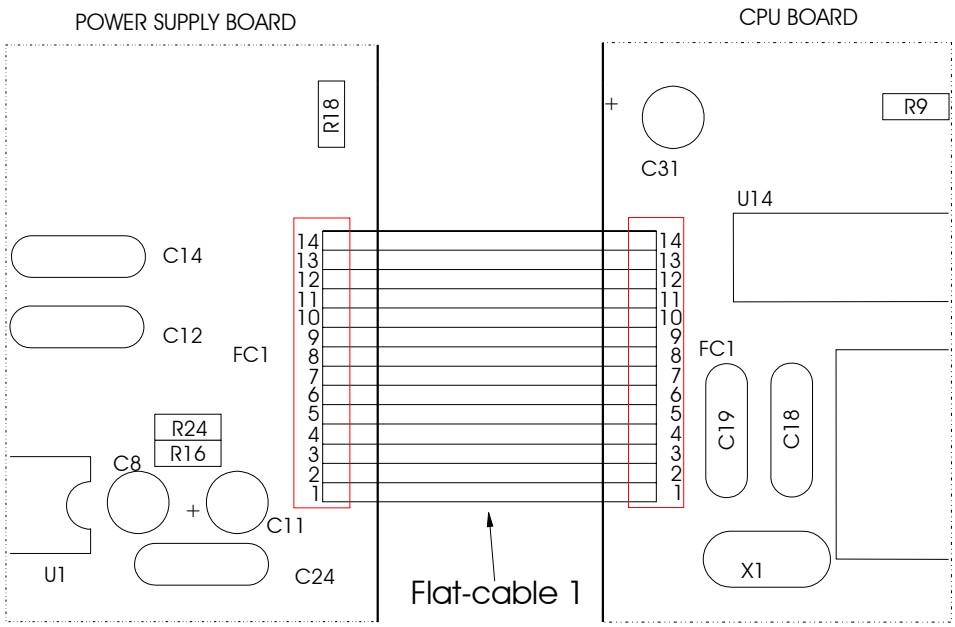


Figure 26 - Voltage Test Points of Indicator

If there is no solution for the problem, the Indicator must be sent to factory.

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