



**PROCESS CONTROL
TEMPERATURE AND
LOAD CELL INDICATOR**

INSTRUCTION MANUAL



DM4500U

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1. OVERVIEW

1.1 Introduction to model DM4500U

The DM4500U model is a digital multifunction instrument which allows the user to program the input as a:

- PROCESS INPUT (V, mA)
- LOAD CELL INPUT (mV)
- Pt100 INPUT
- THERMOCOUPLE INPUT (J, K, T)

The basic instrument is a soldered assembly composed of a main board, a **tricolor programmable display** and a power circuit. Standard features of the basic instrument include the reading of the input variable as well as remote hold, reading and memorisation of max and min values (peak/ valley), tare and reset function, and a full complement of programmable logic functions.

In addition, a variety of **output** options can be installed at the factory from the list below :

COMMUNICATION

OPT4500/485 Serial RS485

CONTROL

OPT4500/mA Analogue (4 to 20) mA

OPT4500/V Analogue (0 to 10) V

OPT4500/2R (2 x Relays SPDT 8A)

OPT4500/4R (4 Relays SPST 5A)

OPT4500/NPN (4 NPN output)

OPT4500/PNP (4 PNP output)

All the output options are opto isolated from input signal and power supply.



This instrument conforms to the following community standards: 89/336/CEE and 73/23/CEE

Warning: Refer to the instruction manual to preserve safety protection.

2. GETTING STARTED

Packing contents

- Instruction manual
- Digital panel meter DM4500U
- Accessories for panel mounting (sealing gasket and fixing clips).
- Accessories for wiring connections (plug-in terminal block connectors with a fingertip key).
- Wiring label (fixed to the product housing).
- Legend label with engineering units.
- ✓ ***Check the packing contents.***

Programming instructions

- The Instrument is programmable via the front panel keyboard and allows access to several independent programming menus for configuration of the input, the display and the logic functions. If additional options are installed (serial outputs, analogue output and relays output) once recognised by the instrument, they activate their own programming software.

Programming lock-out (See section 6).

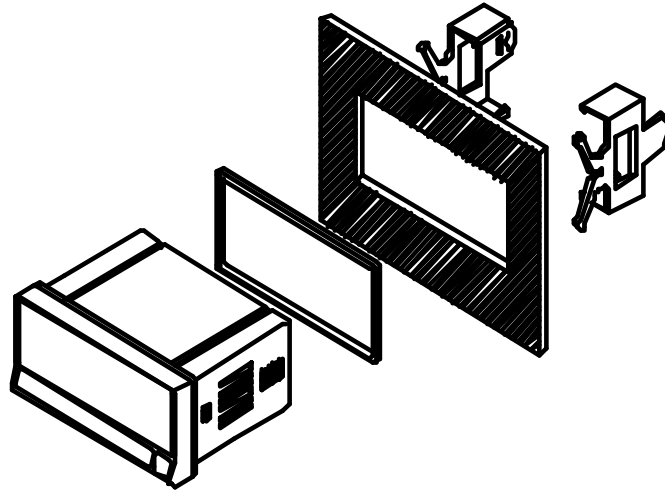
The software can be configured to allow total programming lockout but also selective lockout of the programming parameters.

- The instrument is delivered from the factory with unlocked programming, e.g., with all the programming levels accessible to the operator

TIP! - Write down the security code and keep it in a secure place.

Dimensions and mounting


Front: 96 x 48 mm
Depth: 60 mm
Panel cut-out: 92 x 45 mm




CLEANING:
Front cover should be cleaned only
with a soft cloth soaked in neutral
soap product.
DO NOT USE SOLVENTS

Programming the instrument.


First, connect the instrument to the corresponding supply; automatically, a display test will be done and the software version will be shown, then the instrument will go to run mode.


Next, press the  key to enter into the programming mode; the indication "-Pro-" will appear on the display.

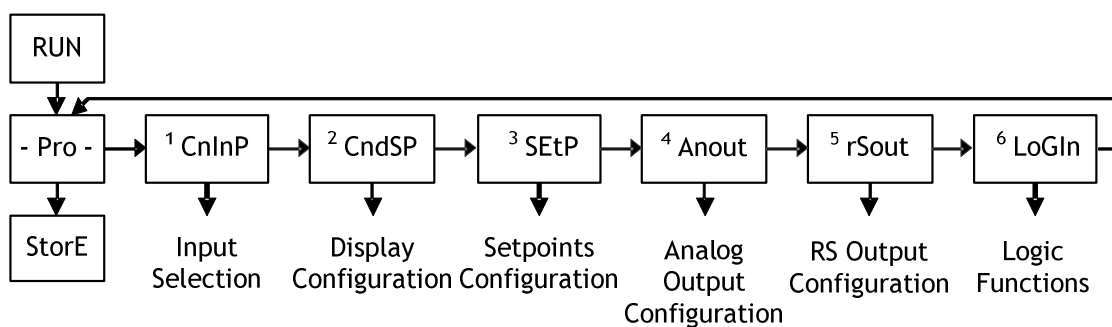
How to store programmed parameters?

To save the changes that have been programmed, the operator must complete the programming of all the parameters contained in the current routine. In the last step of the routine, by pressing the , "StorE" will be displayed and all changes are stored in memory. Then the instrument will return to the run mode.

How is programming routine organised?

Programming software is composed by a number of menus and submenus. In the diagram below, beginning with indication "-Pro-", press repeatedly  to get access to programming menus. Blocks 3, 4 and 5 relate to output options and will only be shown if the option is fitted.

Selecting one menu, access to the different programming submenus is done by pressing  .






Module selection level

Access to programmed parameters

Because of the menu structure, the programming routines allow access to change one parameter without passing through the whole list of parameters.

To advance through programming


Progress through programming routines is done by pressing  key.


In general, push  key a certain number of times to select an option and push  key to validate the change and to go forward to the next step of the program.

The numerical values are programmed digit by digit as explained in the next paragraph.

Programming numerical values

When the parameter is a numerical value, the display will show the first digit to be programmed flashing.


Digit selecting: Press repeatedly the  key to shift from left to right over all the display digits.

Changing the digit value: Press the  key repeatedly to increase the value of flashing digit until it has the desired value.

The minus sign is programmed depending on the variable type. A variable that represents the value of an input will be able to take a value in the range -19999 to 99999, without taking into account the decimal point. When changing the first digit, this shows values from (0) to (9), and then (-1), (-), and comes back to show values from 0 to 9.

A variable that represents a display value will be able to take a value in the range -19999 to 99999, without taking into account the decimal point. In these case the first digit shows 0, 1, -1 or -.

Selecting an option from the list

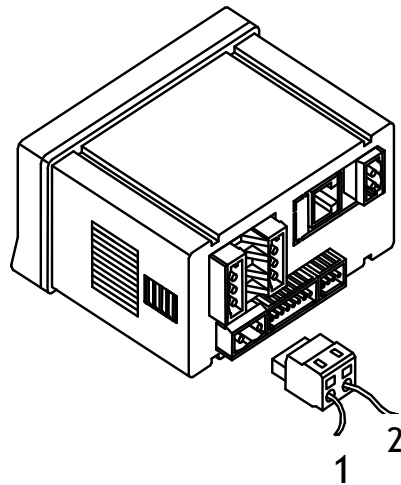
When the parameter is an option to be chosen among different possibilities, the  key allows you to browse through the list of options until you find the desired parameter.

2.1 – Power Supply and connectors

WARNING: If not installed and used in accordance with these instructions, protection against hazards may be impaired.

In order to guarantee the electromagnetic compatibility, the following guidelines should be kept in mind:

- Power supply wires should be routed separately from signal wires.
- Never run power and signal wires in the same conduit.
- Use shielded cable for signal wiring and connect the shield to the ground of the indicator.
- The cable section should be $>0.25 \text{ mm}^2$



INSTALLATION

To meet the requirements of the directive EN61010-1, where the unit is permanently connected to the mains supply, it is obligatory to install a circuit breaking device within easy reach of the operator and clearly marked as the disconnect device.

WIRING and POWER SUPPLY RANGE

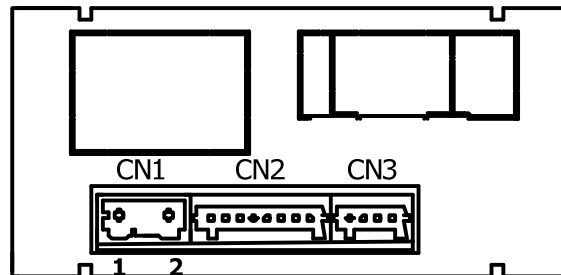
DM4500/S1

(85 to 265) VAC (50 to 60) Hz, or (100 to 300) VDC

DM4500/S2

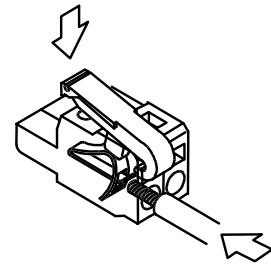
(22 to 53) VAC (50 to 60) Hz, or (10.5 to 70) VDC

Pin 1: Live
Pin 2: Neutral

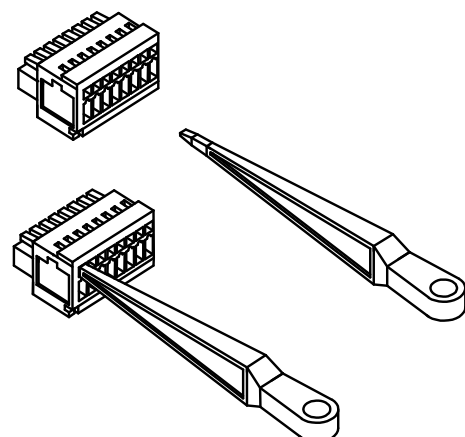


CONNECTORS

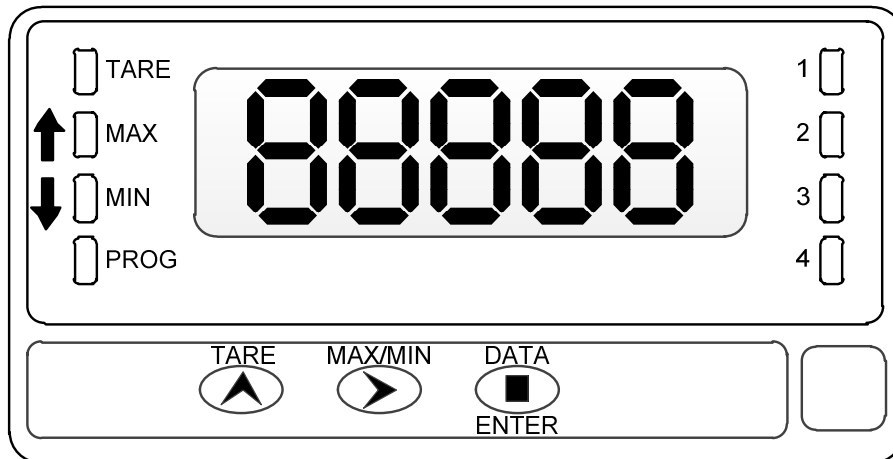
CN1 To perform wiring connections, strip the wire leaving between (7 and 10) mm exposed and insert it in the required terminal while pushing the clamp tool down to open the clamp inside the connector as indicated in the figures. CN1 terminal accepts cables of section between 0.33 mm² and 2 mm² (22 to 14 AWG)
Recommended cables size 2.0 mm²



CN2 & CN3 To perform wiring connections, strip the wire leaving between (5 and 6) mm exposed and insert it in the required terminal while pushing the fingertip tool in to open the clamp inside the connector as indicated in the figures. Each terminal accepts cables of section between 0.08 mm² and 0.5 mm² (28 to 20 AWG)
Recommended cables size 0.5 mm²



2.2 –Instrument frontal view



2.3 – Programming guide

To programme the product to accept different sensor types, please see the sections below. To save time we have marked paragraphs as obligatory (**O**), recommendable (**R**) or optional (**op**).

As Process indicator:

1. Input Configuration (Sec. 3.1) (**O**).
2. Input Connection (Sec. 3.1.1/2 & 3) (**O**).
3. Display Configuration (Sec. 4) (**O**).
4. Program remote inputs (Sec. 5.2) (**R**).
5. Install and configure output option(s) (Sec. 7) (**op**).
6. Programming lock-out (Sec. 6) (**R**).

As thermometer Pt100:

1. Input Configuration (Sec. 3.3) (**O**).
2. Input Connection (Sec. 3.3.1) (**O**).
3. Program remote inputs (Sec. 5.2) (**R**).
4. Install and configure output option(s) (Sec. 7) (**op**).
5. Programming lock-out (Sec. 6) (**R**).

As Load cell indicator

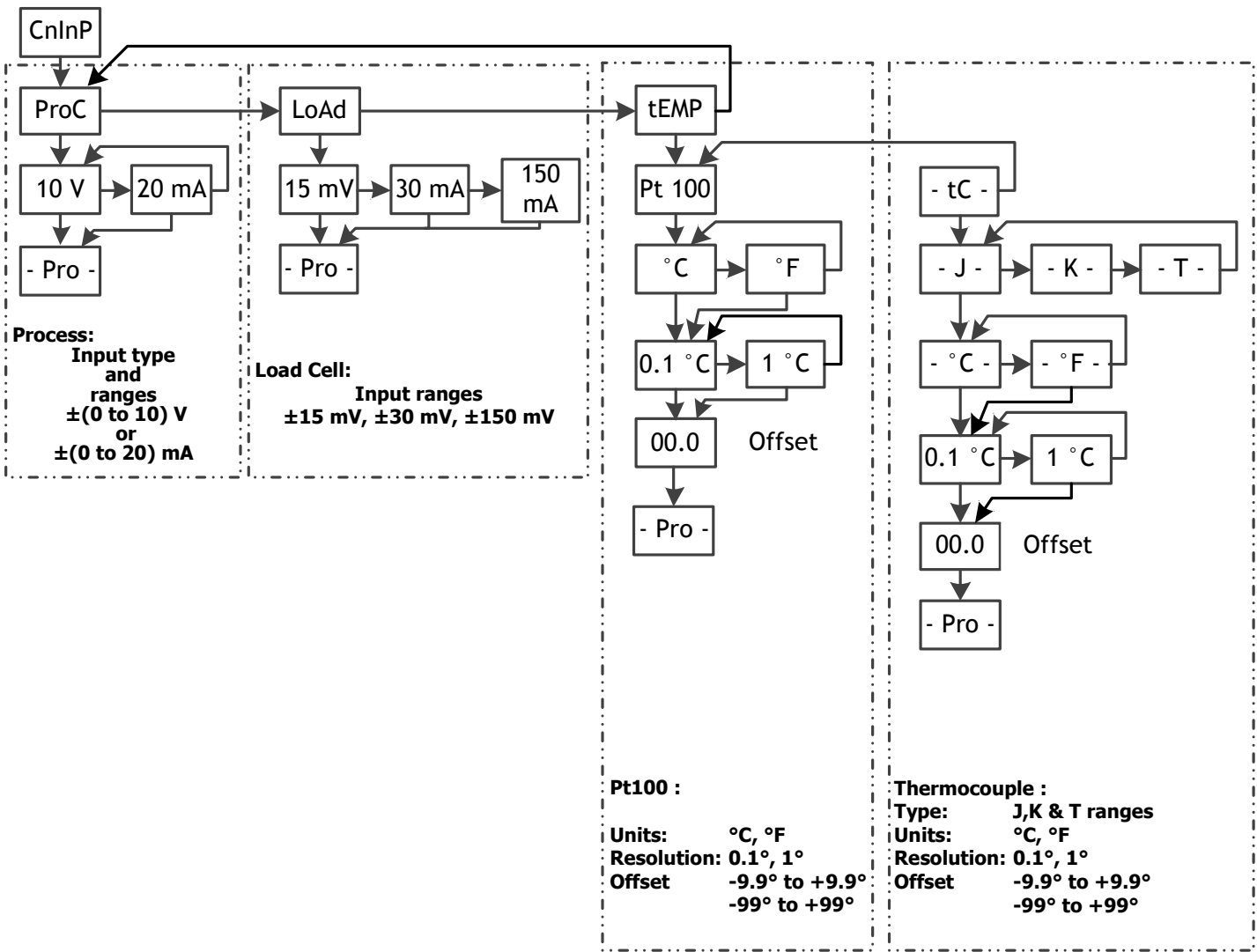
1. Input Configuration (Sec. 3.2) (**O**).
2. Input Connection (Sec. 3.2.1) (**O**).
3. Display Configuration (Sec. 4) (**O**).
4. Program remote inputs (Sec. 5.2) (**R**).
5. Install and configure output option(s) (Sec. 7) (**op**).
6. Programming lock-out (Sec. 6) (**R**).

As thermometer thermocouple:

1. Input Configuration (Sec. 3.4) (**O**).
2. Input Connection (Sec. 3.4.1) (**O**).
3. Program remote inputs (Sec. 5.2) (**R**).
4. Install and configure output option(s) (Sec. 7) (**op**).
5. Programming lock-out (Sec. 6) (**R**).

3. INPUT CONFIGURATION

The figure below shows the input configuration menu. Divided into four submenus, each one of them separated by the dotted line in the manual, each menu corresponds to the programming of the different types of input: process, load cell, thermometer Pt100 and thermometer thermocouple. The data requested in each case is indicated below.



Pro		Top Level (Programming menu entry point)	
CnInp		Level 1	
<p>Channel Input; for selecting the correct type of input configuration for the sensor to be used. Options available; Proc, LoAd, tEMP</p>			
<p>Proc Level 2 (See Sec. 3.1)</p> <p>Process input type selection.</p> <p>Options available; 10 V, 20 mA</p> <p>10 V Sub level</p> <p>Input range +/- (0 to 10) V</p> <p>20 mA Sub level</p> <p>Input range +/- (0 to 20) mA</p>		<p>LoAd Level 2 (See Sec. 3.2)</p> <p>Load cell input selection</p> <p>Options available; 15 mV, 30 mV, 150 mV</p> <p>15 mV Sub level</p> <p>Input range (-15 to 15) mV</p> <p>30 mV Sub level</p> <p>Input range (-30 to 30) mV</p> <p>150 mV Sub level</p> <p>Input range (-150 to 150) mV</p>	
Temp		Level 2	
<p>Temperature input type selection. Options available are PT100 and TC</p>			
<p>Pt100 Level 3 See 3.3</p> <p>Pt100 input type configuration, options available are: Display unit, Display resolution, User offset</p>		<p>tC Level 3 See 3.4</p> <p>Thermocouple input type configuration, options available are: TC type, Display unit, Display resolution, User offset</p> <p>J, K, T Sub level</p> <p>TC type selection.</p>	
°C or °F		Sub level	
<p>The displayed temperature unit can be selected.</p>			
0.1° or 1°		Sub level	
<p>The display resolution can be selected.</p>			
Offset		Sub level	
<p>A value can be entered by the user which will be applied to the measured value before it is displayed. The value entered is applied across the entire measurement range. This can be used to tune out system errors.</p>			

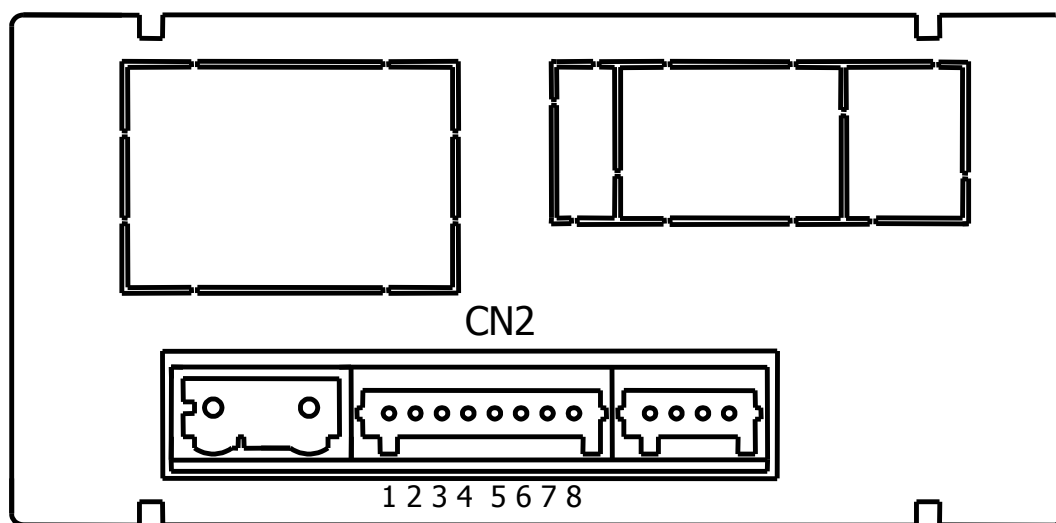
3.1 – Program process input

When used as a process indicator, the parameter to configure is the input type, in volts (-10 to 10) Vdc range or in milliamperes (-20 to 20) mA range.

3.1.1 – Sensor connection (V, mA)

Refer to wiring guidelines in (Sec. 3.1.2/3)

Instrument rear view



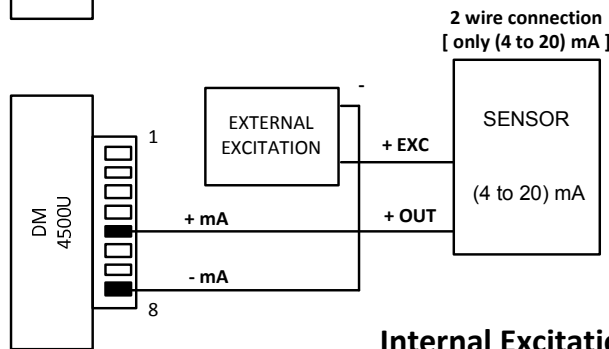
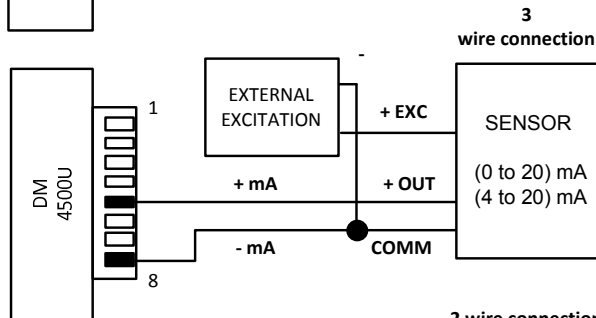
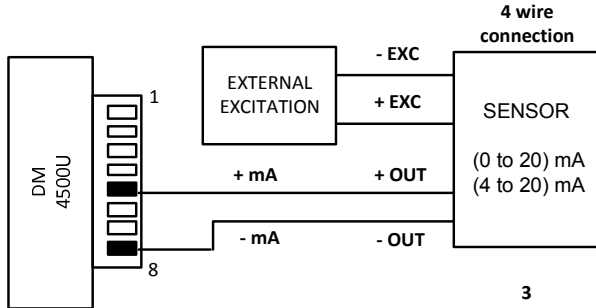
CONNECTOR SIGNAL INPUT

CN2

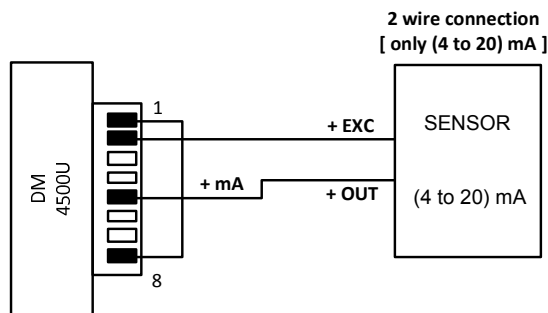
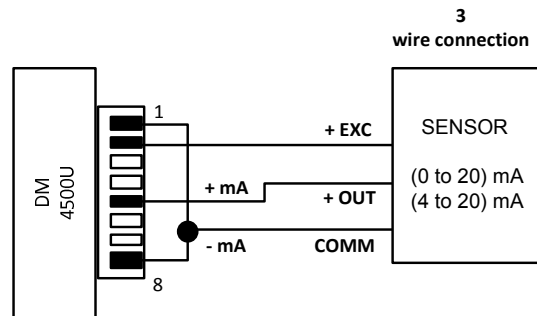
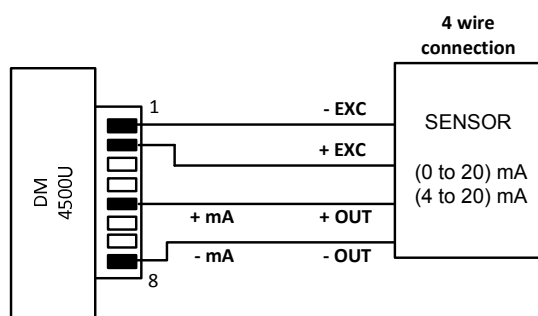
PIN 1 =	-EXC	[excitation output (-)]
PIN 2 =	+EXC	[excitation output +24 V (+)]
PIN 3 =	+EXC	[excitation output +5 V or 10 V (+)]
PIN 4 =	N/C	[no connection]
PIN 5 =	+IN	[input mA (+)]
PIN 6 =	+IN	[input V (+)]
PIN 7 =	N/C	[no connection]
PIN 8 =	-IN	[input V (-), mA (-)]

3.1.2 WIRING DIAGRAM FOR INPUT Ma (±0 to 20) mA / (4 to 20) mA

External Excitation

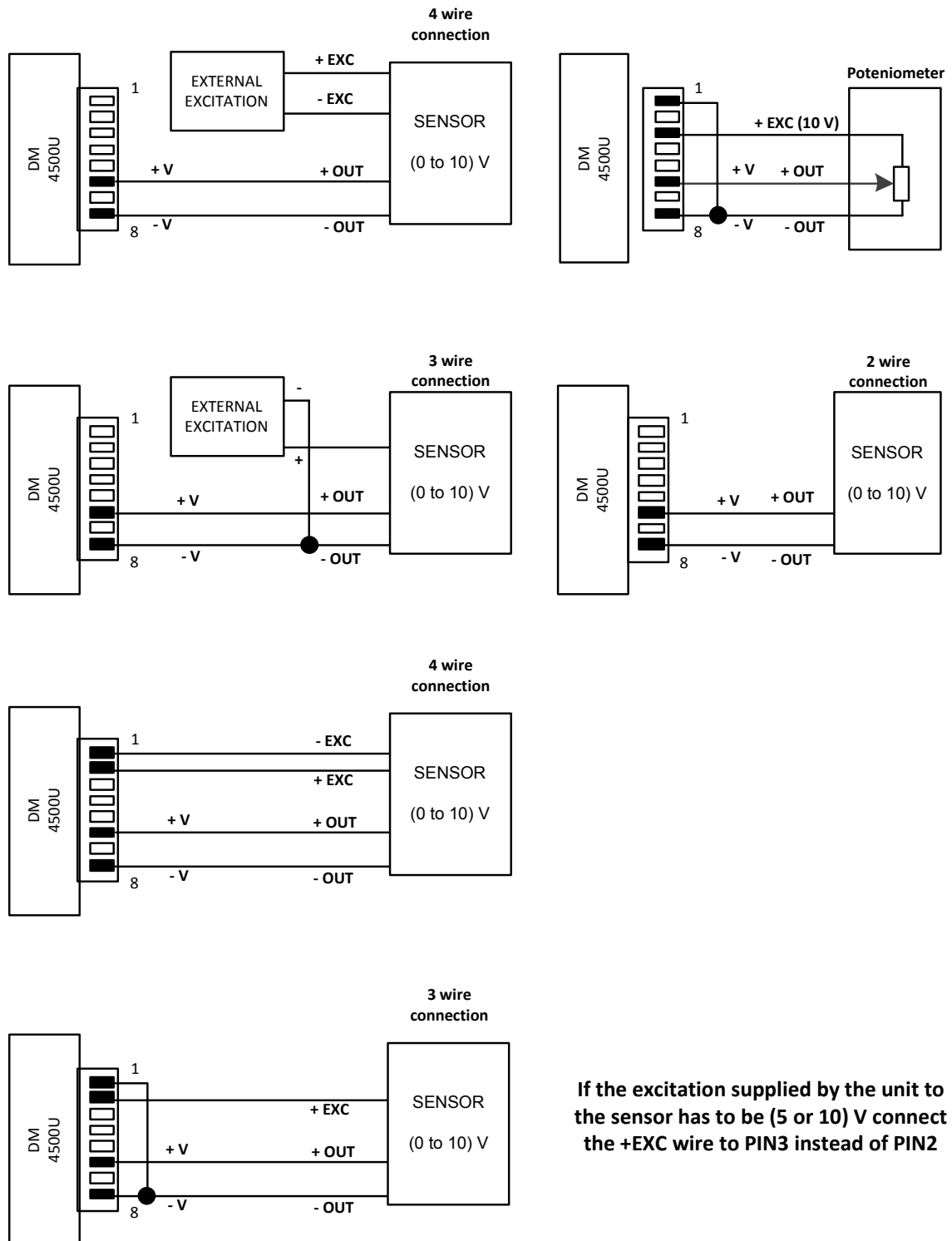


Internal Excitation



If the excitation supplied by the unit to the sensor has to be (5 or 10) V connect the +EXC wire to PIN3 instead of PIN2

3.1.3 WIRING DIAGRAM FOR INPUT V (± 0 to 10) V



If the excitation supplied by the unit to the sensor has to be (5 or 10) V connect the +EXC wire to PIN3 instead of PIN2

3.2 – Programming of Load cell input

Refer to cell manufacturer's documentation, particularly with respect to the cell sensitivity and supply voltage specifications.

As load cell indicator, the meter's function is to measure forces (weight, pressure, torque...) applied to a sensing element connected to several bridge type transducers, such as load cell, which supply signal levels up to ± 150 mV.

The two excitation voltages supplied by this instrument are 10 V and 5 V. The selection is realised through the configuration of the internal bridge excitation (see diagram below). This way up to 2 cells can be connected in parallel with 10 V excitation and up to 4 cells with 5 V excitation, without need for an external source (see connection (Sec. 3.2.1)).

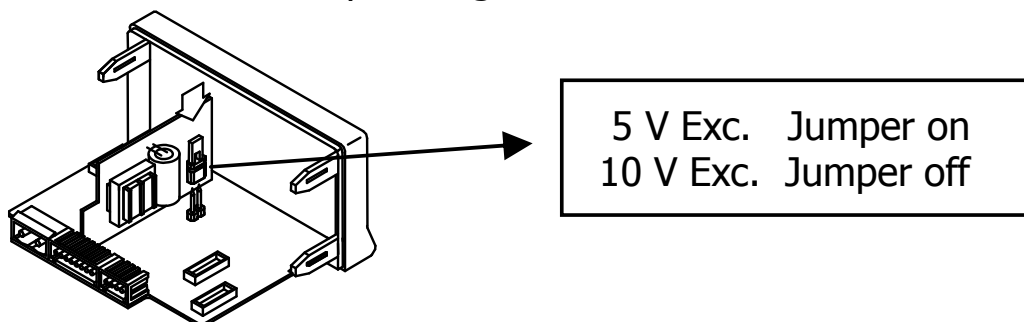
Example:

2 cells with 2 mV/V output are supplied with an excitation voltage of 10 V; the voltage generated by each cell at full load is 20 mV. Therefore 20 mV is the maximum output as the cells are connected in parallel. In the same case but with a 5 V excitation, the maximum voltage generated will be 10 mV.

Software configuration requires programming of the input mV range which can be selected from a choice of 3 ranges to avoid 'out of range' signals. There are three ranges: ± 15 mV, ± 30 mV and ± 150 mV

Example:

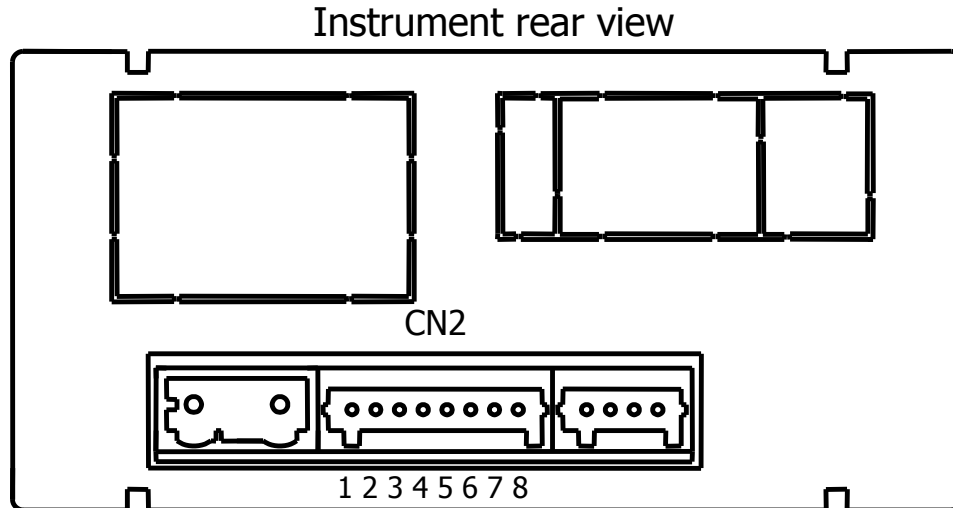
If a weighing process gives 12 mV to the meter input with maximum load, the best input range to select will be "15 mV".



Selection of voltage excitation 10 V or 5 V

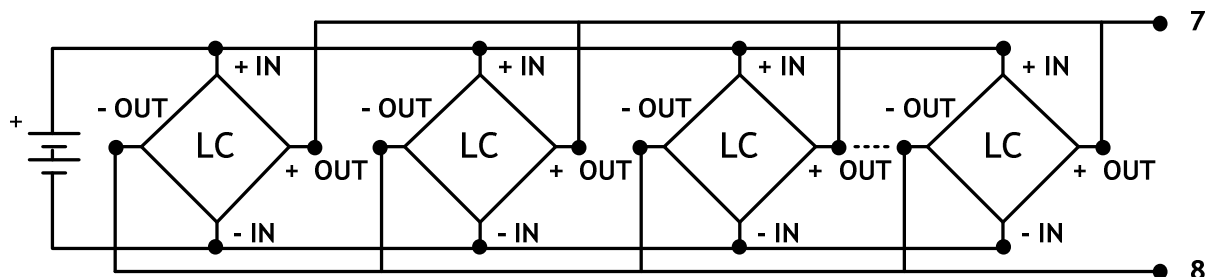
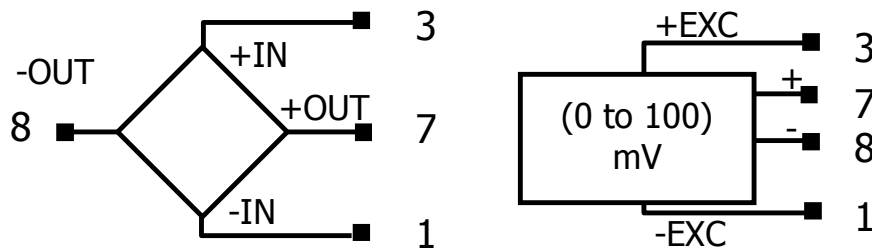
3.2.1 – Load cell connection (mV/ V)

Refer to wiring guidelines (Sec. 2.1).



CONNECTOR SIGNAL INPUT (CN2)

PIN 1 =	-EXC	[excitation output (-)]
PIN 2 =	+EXC	[no connection]
PIN 3 =	+EXC	[excitation output +5 V or 10 V (+)]
PIN 4 =	N/C	[no connection]
PIN 5 =	N/C	[no connection]
PIN 6 =	N/C	[no connection]
PIN 7 =	+mV	[input mV (+)]
PIN 8 =	-mV	[input mV (-)]



3.3 - Programming of Pt100 input

When configuring the meter as thermometer for 3 wires Pt100 sensors, the temperature ranges and resolution available are:

Input	Range (res. 0.1 °)	Range (res. 1 °)
Pt100	(-100.0 to +800.0) °C	(-100 to +800) °C
	(-148.0 to +1472.0) °F	(-148 to +1472) °F

The Pt100 software menu allows selection of temperature units (Celsius or Fahrenheit), resolution (degree or tenth of degrees) and a display offset. Provision is made to allow for a sensor offset. If there is a difference between the temperature under measurement and the temperature read by the sensor, this can be corrected by programming an offset from -9.9 to +9.9, with 0.1 ° resolution, or from -99 to +99, with 1 ° resolution. **LED 'TARE' will light up each time that an offset value is programmed.**

Example:

In a process of temperature control the Pt100 sensor is located in a part of the process where temperature is 10 degrees below than in the point in where the control has to be done. By programming an offset of 10 points, with 1 degree resolution, the deviation will be corrected.

Configurable parameters for this input are:

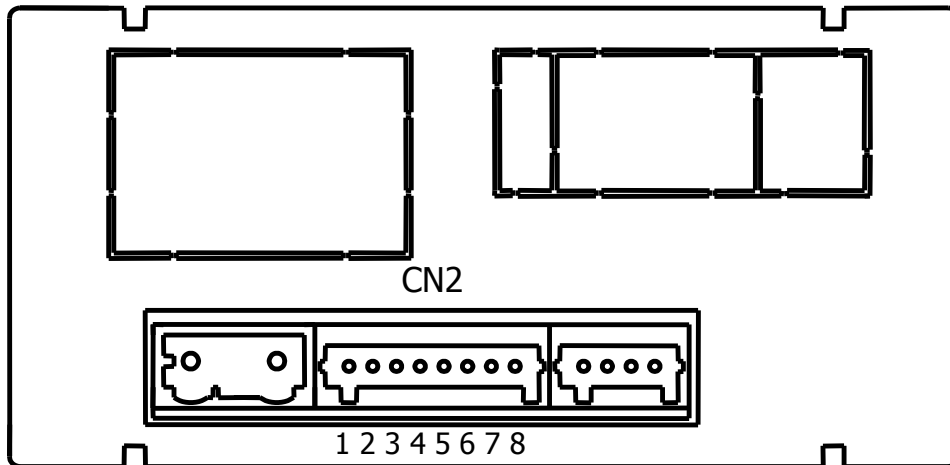
- Reading units in degree Celsius "°C" or Fahrenheit "°F".
- Resolution in tenth of degrees "0.1 °" or in whole degrees "1 °".
- Offset. Offset value is programmable up to ± 9.9 ° with tenths resolution, or up to ± 99 ° with degree resolution.

The instrument comes from the factory with offset=0

After entering these parameters, the display range and linearization are adjusted automatically.

3.3.1 - Pt100 input connection

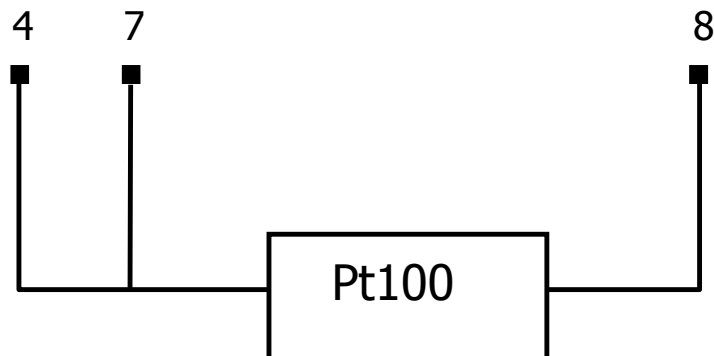
Instrument rear view



CONNECTOR SIGNAL INPUT CN2

- PIN 1 = No connection
- PIN 2 = No connection
- PIN 3 = No connection
- PIN 4 = Pt100
- PIN 5 = No connection
- PIN 6 = No connection
- PIN 7 = Pt100
- PIN 8 = Pt100 Common

Pt100 wiring diagram



3.4 – Programming of Thermocouple input

When configuring the meter for thermocouple input, the temperature ranges and resolution available are:

Input	Range (res. 0.1 °)	Range (res. 1°)
Thermo-couple J	(-50.0 to +850.0) °C	(-50 to +850) °C
	(58.0 to +156.0) °F	(58 to +156) °F
Thermo-couple K	(-50.0 to +1250.0) °C	(-50 to +1250) °C
	(-58.0 to +2282.0) °F	(-58 to +2282) °F
Thermo-couple T	(-200.0 to +400.0) °C	(-200 to +400) °C
	(-328.0 to +752.0) °F	(-328 to +752) °F

The Thermocouple software menu allows selection of temperature units (Celsius or Fahrenheit), resolution (degree or tenth of degrees) and a display offset. Provision is made to allow for a sensor offset. If there is a difference between the temperature under measurement and the temperature read by the sensor, this can be corrected by programming an offset from -9.9 to +9.9, with 0.1 ° resolution, or from -99 to +99, with 1 ° resolution. **LED 'TARE' will light up each time that an offset value is programmed.**

Example:

In a process of temperature control the thermocouple sensor is located in a part of the process where temperature is 5 degrees below than the point at which the control has to be done. By programming an offset of 5 points, with 1 degree resolution, the deviation will be corrected.

Configurable parameters for this input are:

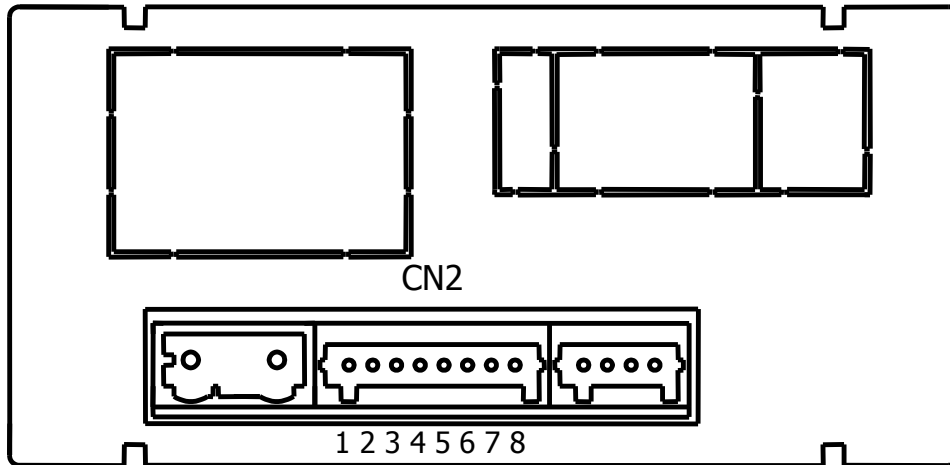
1. Thermocouple type [J, K, T].
2. Reading units in degree Celsius "° C" or Fahrenheit "°F".
3. Resolution in tenth of degrees "0.1°" or in whole degrees "1°".
4. Offset. Offset value is programmable up to $\pm 9.9^\circ$ with tenths resolution, or up to $\pm 99^\circ$ with degree resolution. The instrument comes from the factory with an offset=0

After introducing these parameters, the display range and linearization for the selected thermocouple input are adjusted automatically.

3.4.1 – Thermocouple (J, K, T) input connection

Refer to wiring guidelines in (Sec. 2.1).

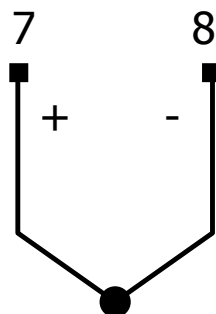
Instrument rear view



CONNECTOR SIGNAL INPUT (CN2)

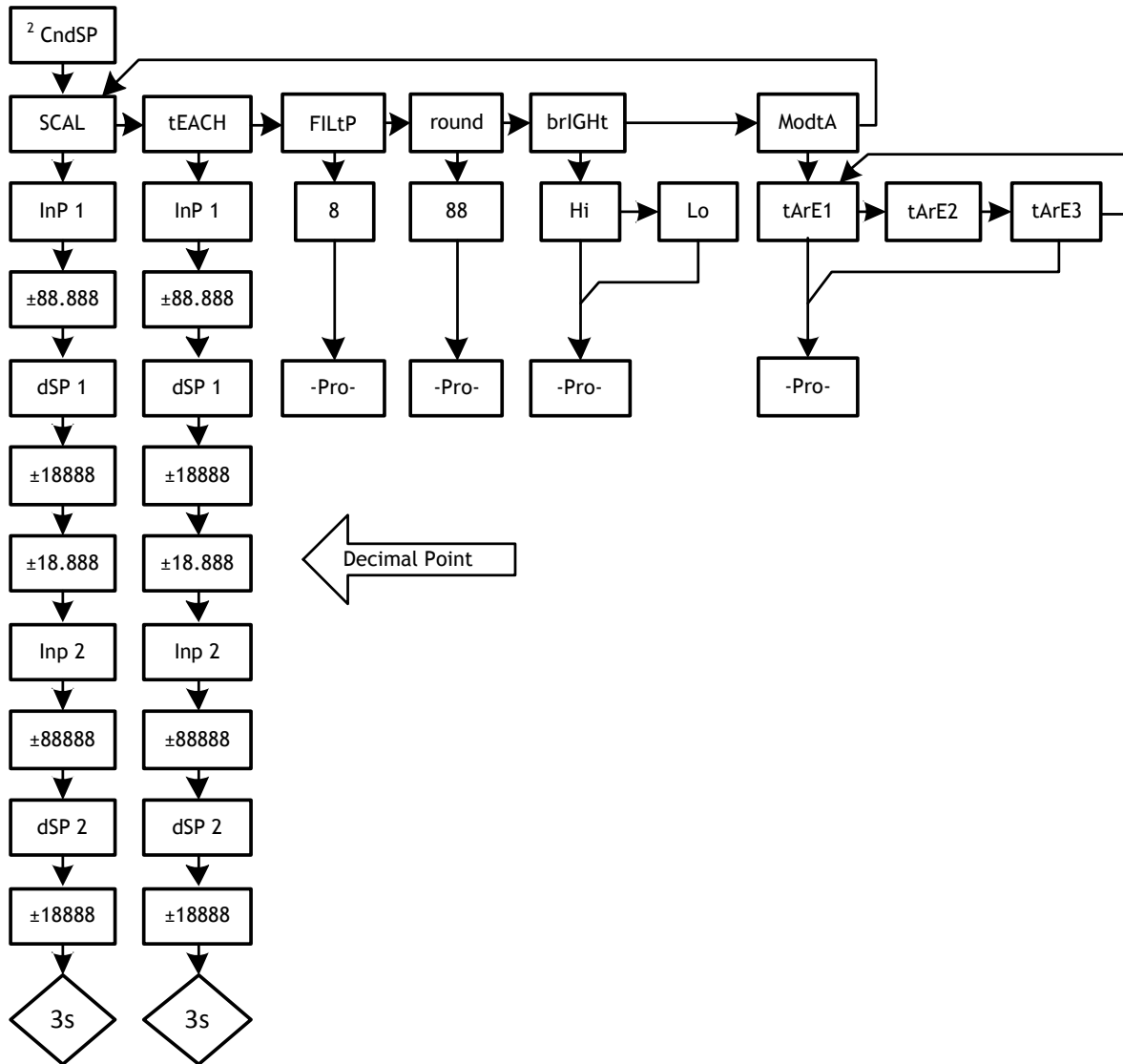
- PIN 1 = No connection
- PIN 2 = No connection
- PIN 3 = No connection
- PIN 4 = No connection
- PIN 6 = No connection
- PIN 7 = +TC
- PIN 8 = - TC

Thermocouple wiring diagram



Thermocouple
type J, K, T

4. DISPLAY CONFIGURATION



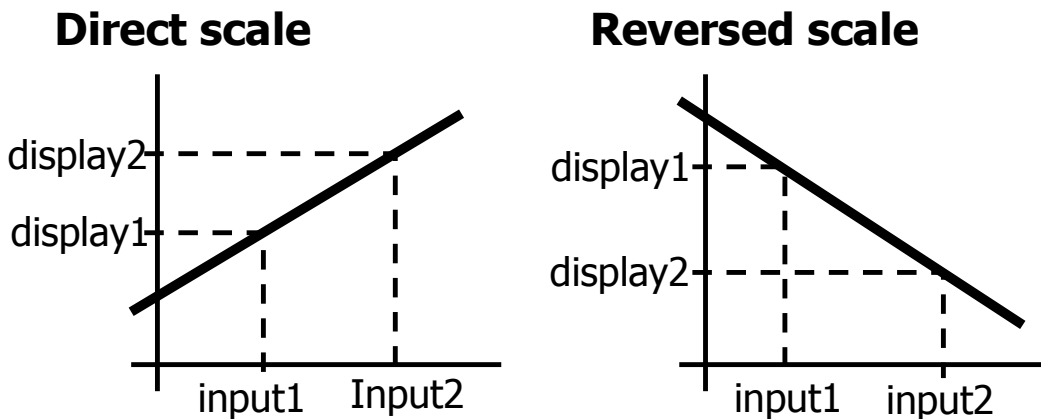
Pro Top Level (Programming menu entry point)	
CndSP Level 1	
Channel display: for setting the display parameters Options available: SCAL, tEACH, FILtP, round, brIGht, and ModtA	
SCAL Level 2 (See Sec. 4.1) Scale: input to output/display values are programmed manually.	tEACH Level 2 (See Sec 4.1) Teach: input to output/display values are programmed with the input taken directly from the process value applied.

<p>FILtP Level 2</p> <p>Filter: apply a filter value to the process value</p> <p>brIGHT Level 2 (See Sec. 4.4)</p> <p>Brightness level selection: the options available are high and low.</p>	<p>round Level 2 (See Sec. 4.3)</p> <p>Rounding to the displayed value can be applied. Three options are available</p> <p>ModtA Level 2 (See Sec. 4.5)</p> <p>Tare mode: three options are available.</p>
--	---

4.1. Scaling

It is only necessary to scale the meter when it has been configured for **process or load cell**.

Scaling allows assigning a display value to each input signal value.



In linear processes it is achieved by programming two coordinates (input1, display1) and (input2, display2), between which is established a linear relation where to each input signal value corresponds a display value.

The relationship can be direct or reversed. In order to obtain more accuracy, points 1 and 2 should be located approximately at both extremes of the process.

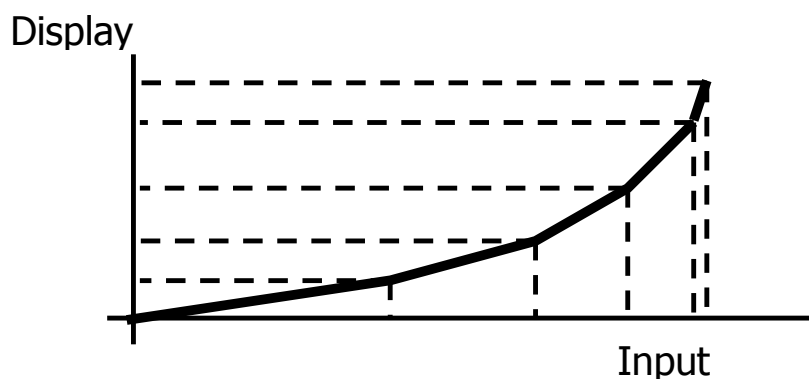
In a nonlinear process it is possible to program up to 11 points input-display. Each two points are connected by a straight line and the whole curve represents the relationship between the input value and the display value.

In order to obtain more accuracy in the measuring it is recommended to program the highest possible number of points and reduce the segment length.

Input values must always be programmed in an increasing or decreasing order. Avoid assigning two different display values to two equal input values.

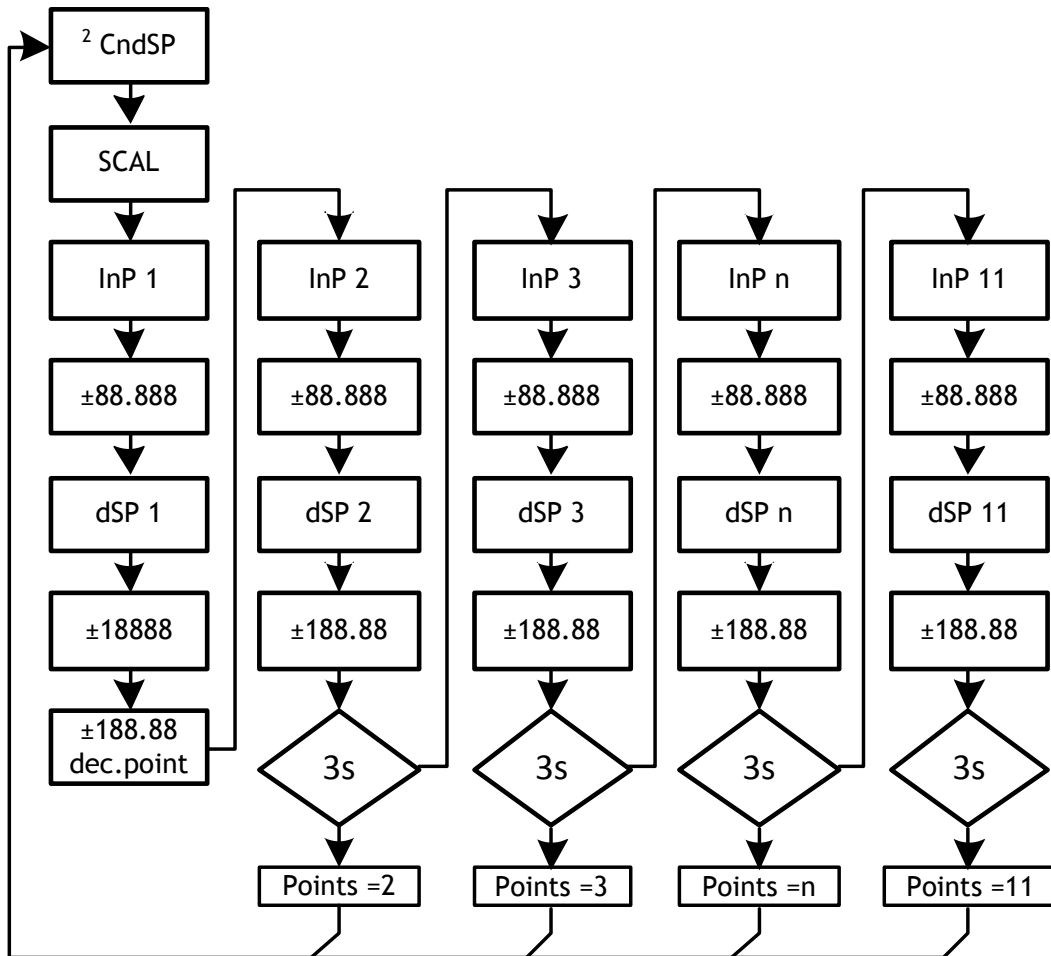
Display values can be entered in any order and even be repeated for different inputs.

Below the first point programmed, the relationship established between the two first points of the scale is followed. Above the last point programmed, the relationship established between the two last points of the scale is followed.



4.1.1 Programming of the scale

There are two methods for programming the scale, the **SCAL** method and the **TEACH** method. In the following diagram the SCAL menu is shown as an example; it is exactly the same menu as the TEACH menu.



SCAL method

Level 2





The Process Value and display values are programmed manually. This method can be used when the value of the signal supplied by the transducer at each points of the process is known. For example input 1 = 4 display 1 =0: input 2 = 20 display 2 = 100. In process mode, with mA range selected, this will display (0 to 100) for a (4 to 20) mA input signal.

tEACH method

Level 2

The input values are introduced directly from the signal present on the input connector when each point is programmed. The display values are programmed manually. This method can be used when it is possible to bring the process to the conditions of each one of the points to be programmed.

Programming of the linearization points

Access the first two input-display co-ordinates by pressing on the  key. To access the rest of the points, press on  key for approximately 3 s from the display value of point 2. This will allow access to linearization points 3 to 11. After each process and display value has been added press  key. This allows the next point to be programmed. When all points have been programmed (to a max of 11), press  for 3 s to exit linearization. Any points (up to 11) that have not been programmed are omitted from the display calculation.

InP 1 to 11

Level 3

Input points

-19999 to 99999

dSP 1 to 11

Level 3

Display points


-19999 to 19999

88.888

Level 3

Display decimal point

0 0.0 0.00 0.000 0.0000


Accessible from the SCAL or tEACH menu, following the first display point. Once accessed, it will start to blink in its present position and through the  key will be able to shift to another position.

Please note: moving the decimal point will also affect the setpoint value and the value of the analog output scale, if output option has been fitted.

4.2 Filter

0 to 9

Level 2


Filter of average process value. The value will be modified in the filter menu by pressing the  key. This parameter will set in reverse order the cut-off frequency of the low pass filter; the filter is deactivated with a 0 value.

Not available when the instrument is configured for temperature measurement.

4.3 Round

01 05 10

Level 2

There are 3 values of rounding. In the 'round' menu by pressing successively on the  key, the different values can be set. Selection of 01 = no round and is the default setting. Selecting 05 will round the display value to the nearest multiple of 5. Selecting 10 will round the display value to the nearest multiple of 10.

This feature is not available when the instrument is configured for temperature measurement.

4.4 Brightness

Hi, Lo

Level 2


Display brightness level selection.

Hi: high brightness

Lo: low brightness



4.5 Tare mode


Level 2


There are 3 different methods of applying the 'tare' mode. By pressing  key, these can be selected. Each time this menu is accessed, the tare value stored in the instrument memory will reset, and the TARE LED will stay off.

tArE 1

tArE 1



In mode tArE1, pressing on the  key, stores the current displayed value unless it is over scaled, the TARE LED will light up and from this moment the value displayed is the net value, i.e., the measured value minus the value stored in the tare. Pressing on the  key for 3 s, the instrument will set the tare value to zero, and the TARE LED will not illuminate, indicating the GROSS value.

 = Set tare (zero the display)


 > 3 s = Clear tare and return the display to normal operation

tArE 2

tArE 2



In this mode, a short press on the  key has no effect. The tare value is introduced manually. The edit menu can be accessed from the "RUN" mode, by pressing on the  key for 3 s. Following the diagram below.

 = No effect

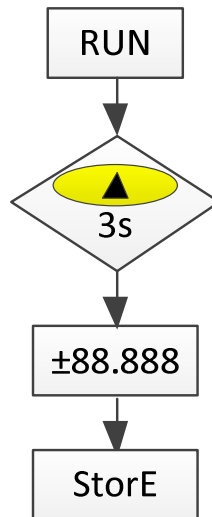
 > 3 s = Manually enter a value for tare (entering a zero will clear the tare function). The display will show the measured value minus the entered tare value.

tArE 3

tArE 3

In this mode, an unknown tare value can be entered to give the required net value on the display. This can be accessed from "RUN", after pressing on the  key for 3 s following the diagram below. The LED TARE will become active once the tare is applied by pressing the  key.

- ① > 3 s = manually enter the net (displayed) value required once the tare is applied (entering a zero will clear the tare function).
- ① = Set tare (the display will now show the entered net value)



5. KEYBOARD AND CONNECTOR FUNCTIONS

5.1 – Keyboard functions


Several functions can be controlled via the keyboard that will produce different actions depending on the instrument operating mode:

In -RUN- mode:


TARE1, 2 and 3 functions

See Sec. 4.5.

MAX/MIN function

Activated after pressing on the  key. From the normal reading mode, by pressing this button, the maximum value read by the instrument since the last time it has been switched on, (unless a RESET MAX/MIN has been done), the MAX LED will light up. A second press shows the minimum value in the same conditions as before, with the consequent minimum indication through the MIN LED. A third press brings the instrument back to the normal reading mode.

Function RESET MAX/MIN


Pressing continuously the  for 3 s., while the instrument shows the peak value (MAX), will produce a reset of the value. The minimum value can be reset in the same way as above (while the instrument shows the valley value (MIN)).

ENTER 3 s function (PROGRAMMING LOCKOUT)

In mode RUN if the ENTER key is pressed continuously for 3 seconds, the instrument will show the indication CodE, and

following 0000, allowing the user to introduce the security code. If the code that has been introduced is wrong, the instrument will go back to RUN mode; if it is correct, it will allow access to the security menu. See (Sec. 6).

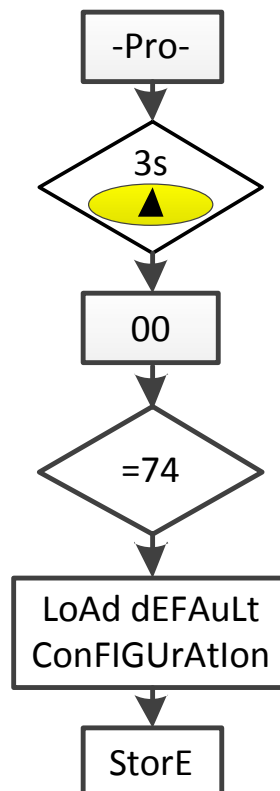
ENTER function

One press on the  key will bring the instrument to the -Prog- mode.

In -Prog- mode:

PRESS KEY FOR 3 s (RETURN TO FACTORY PROGRAMMING)

Allows the instrument to be reset to factory default by entering code '74' as shown below. When this code is entered, the instrument displays 'LoAdIng dEFAuLt ConFIGurAtIon', followed by StorE, this has now been stored in the non volatile memory of the instrument.



Factory configuration

INPUT: Process 0 - 10V

DISPLAY

Input 1: +00.000 Display 1: +00.000

Input 2: +10.000 Display 2: +10.000

Filter P: 0

Round 01

Tare mode: 1

Brightness: High

DISPLAY COLORS Run Mode: Green, Prog Mode.: Amber

SETPOINTS

Setpoint 1: +01.000, Setpoint 2: +02.000

Setpoint 3: +03.000, Setpoint 4: +04.000

Compared with: Net

Mode: HI

Dly: 00.0

Alarm Color: No Change

ANALOG OUTPUT CONFIGURATION


Display HI: +10.000

Display LO: +00.000

LOGIC FUNCTIONS

PIN 2=function 1, PIN 3=function 2 and PIN 4=function 6

DIRECT ACCESS TO SETPOINTS – KEY

If any of the Relay or NPN / PNP options has been installed, the instrument allows direct access to programming the setpoints values, pressing the  key sequentially for each one of the setpoints values available according to the option installed.

5.2 – Connector functions

The connector CN3 provides 3 opto coupled inputs that can be operated from logic levels supplied by an external electronic system. Three different functions may then be added to the functions available from the front panel keys. Each function is allocated to a pin (PIN 2, PIN 3, PIN 4) that is activated by applying a low level to each one with respect to PIN 1 or COMMON. The allocation is achieved through the programming of a number between 0 and 15 corresponding to one of the functions listed in the following table.

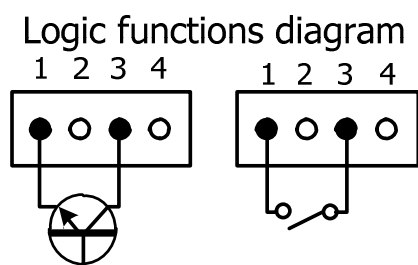
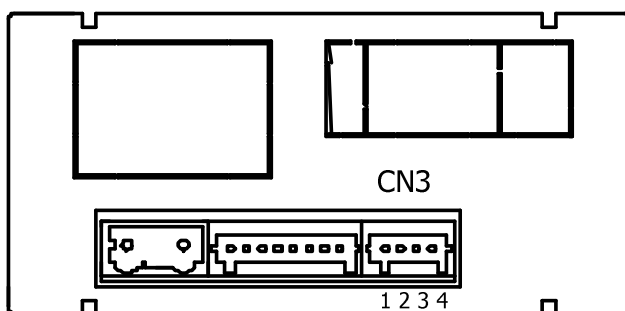
- Factory configuration

As shipped from the factory, the CN3 connector allows the TARE; RESET TARE functions operated from the front-panel keyboard and moreover incorporates the HOLD function.

When a HOLD is made, the display value remains frozen while the corresponding pin is activated. The HOLD state, affects neither the instruments internal operation nor the analog and setpoint outputs.

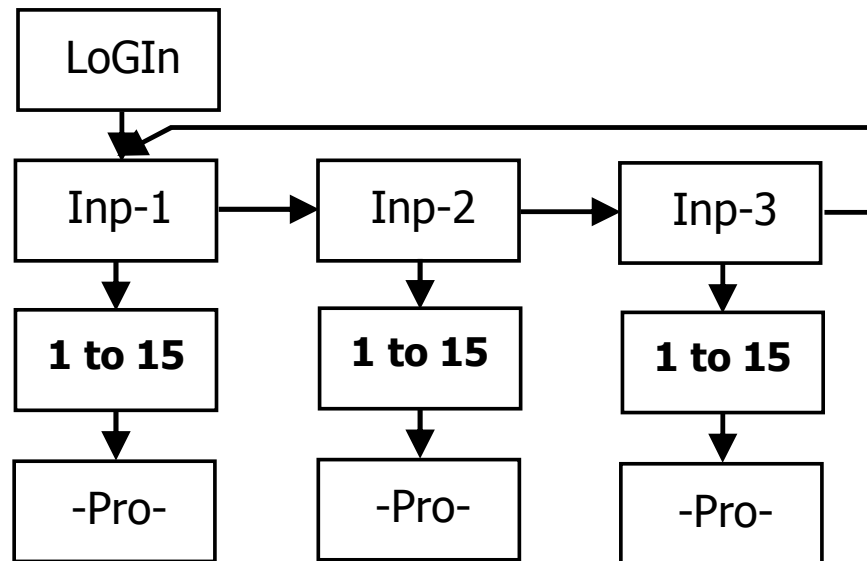
CN3: FACTORY CONFIGURATION

PIN (INPUT)	Function	Number
PIN 1	COMMON	
PIN 2 (INP-1)	TARE	Function n° 1
PIN 3 (INP-2)	RESET TARE	Function n° 2
PIN 4 (INP-3)	HOLD	Function n° 6



The external electronics applied to the CN3 connector inputs must be capable of withstanding a potential of 40 V/ 20 mA present at all terminals with respect to COMMON. In order to guarantee the electromagnetic compatibility please refer to the connection instructions given on (Sec. 2).

5.2.1 – Logic functions diagram



5.2.2 - Table of programmable functions

- No: Number to select the function by software. (Between 1 and 15 as shown in the Logic Function Table)
- Function: Function name.
- Description: Description and characteristics of the function.
- Activation by:

Falling edge: the function is activated by applying a falling edge to the corresponding pin with respect to common.


Low level: the function will remain activated as long as the corresponding pin is held at a low level.

LOGIC FUNCTION TABLE

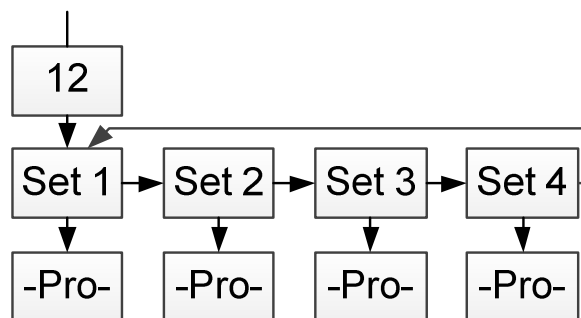
No	Function	Description	Activation by
0	Deactivated	None	None
1	TARE *	Adds the current display value to the tare	Falling edge
2	RESET TARE *	Adds the tare memory to the display value and clears the tare memory.	Falling edge
3	PEAK	Displays the peak value. (MAX.)	Low level
4	VALLEY	Displays the valley value. (MIN)	Low level
5	RESET PEAK/VALLEY	Perform a reset of the peak or the valley, depending on which is being displayed.	Falling edge
6	HOLD	Freeze the display while all the outputs remain active	Low level
11	BRIGHTNESS	Change the display brightness from Hi to Low	Low level
12	SETPOINT VALUE	Displays the selected setpoint value (see diagram next page)	Low level
13	False Setpoints	Simulates that the instrument has a four setpoints option installed	Low level

* Only with mode TARE 1 and TARE 3

5.2.3 – Programming the logic functions

When the menu of logic functions has been accessed, by pressing the  key, a logic function between 0 and 15 can be selected. (As shown above)

If the selected function is number 12 and any of the Relay or NPN / PNP options are installed, it will allow access to either of the two or four setpoints available depending on the option, which will be the value displayed by the instrument when this function is activated.



6. PROGRAMMING LOCK OUT BY SOFTWARE

The instrument is delivered with access to all the programming levels. Once the instrument is configured, it is possible to restrict access to the configuration menus

1. There are two lockout modes: selective and total. If the parameters are going to be readjusted frequently, make a selective lockout. If no adjustment is going to be made, make a total lockout.
2. Access to the lockout routine is allowed by entering a personalised code. We recommend changing the code set at the factory and to write down your personalised code and keep it in a safe place.

TOTAL LOCKOUT

Access to the programming routines to read data is allowed even if all parameters are locked out totLC=1, but **it won't be possible to enter or modify data**. In this case, when entering in the programming mode, the display shows the indication "-dAtA-".

PARTIAL LOCKOUT

When only some parameters are locked out, all configuration data can be read but **only non-protected parameters can be modified**. In such case, when entering in the programming mode, the display shows the indication "-Pro-".


Menus or submenus that can be locked out are:

- Setpoint 1 configuration (SEt 1).
- Setpoint 2 configuration (SEt 2).
- Setpoint 3 configuration (SEt 3).
- Setpoint 4 configuration (SEt 4).
- Input configuration (InPut).

- Scaling (SCAL).
- Filter P and Round (FILt).
- Analog output configuration (Anout).
- Serial output configuration (rSout).
- Logic inputs configuration (LoGIn).
- Programming of the key TARE (tArE).
- Direct access to the Setpoints value configuration (SEtVAL).

The first four and "SEtVAL" only appear if the corresponding relay or NPN/ PNP options have been installed; "SCAL", "FiltP" and "tArE" do not appear when the instrument's configured for temperature measurement. "Anout" will appear when either the mA or Voltage output options are installed, and "rSout" when the RS485 option is installed.

6.1 – Security menu diagram

The following flow chart shows the security menu for the programming lockout. Access to this menu is from the run mode by pressing the  key for 3 seconds, until the "CodE" indication appears.

The instrument is shipped from the factory with the following default code: "0000". When this code is entered, the "LIST" indication will appear, from which the parameters lockout can be entered. Access to the "CHAnG" menu will allow the user to change the default code to one of their own choice. Changing the personal code overwrites the original code.

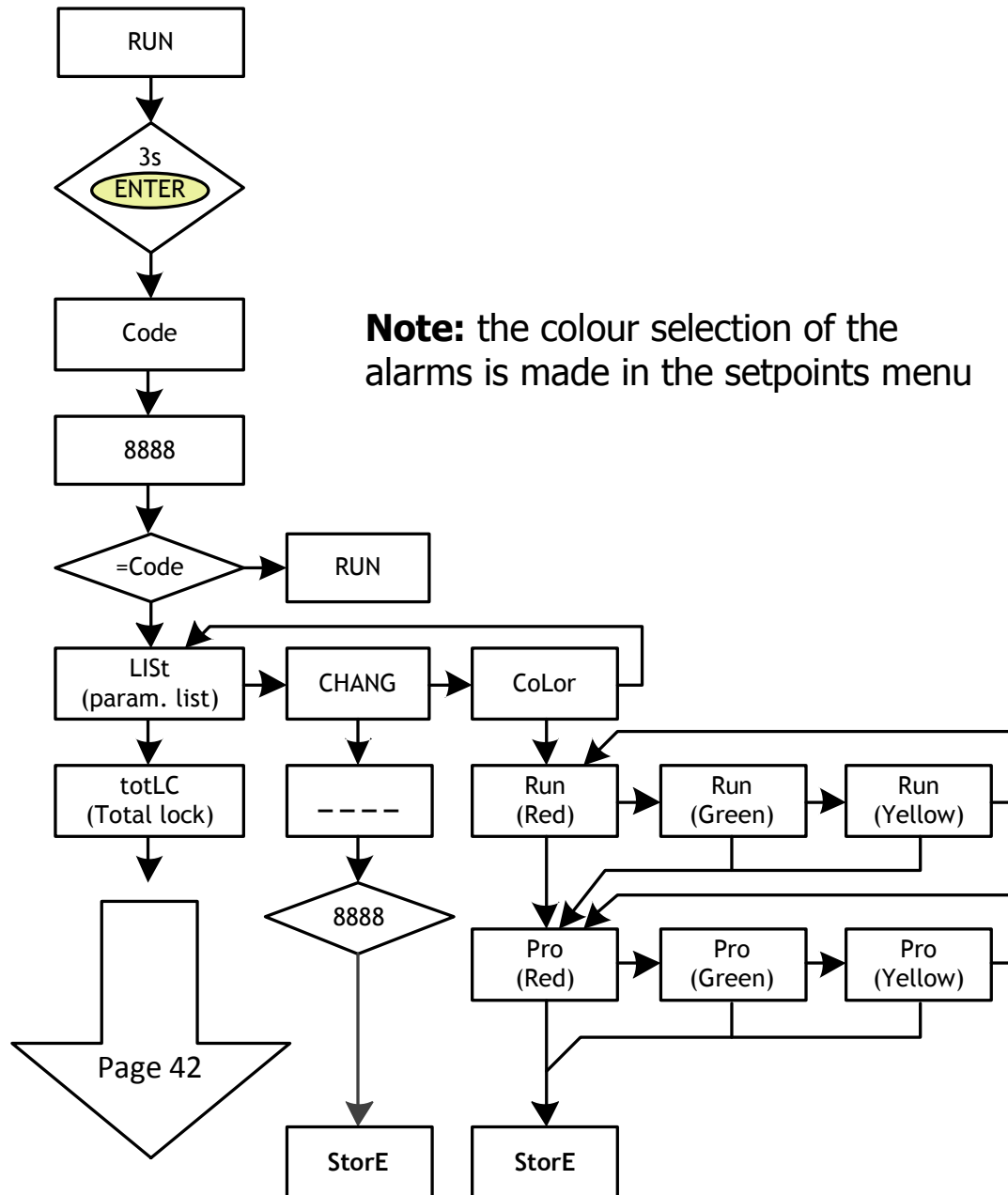
If an incorrect code is entered, the instrument will return automatically to the run mode.

Total lockout programming is achieved by changing "totLC" to 1, changing it to 0, will lead to the selective lockout of the programming variables. Programming each one of the parameters to 1 will enable the lockout; if they are set to 0 programming will be accessible. Though the programming is locked out, it remains possible to view the current programming.

The "StorE" indication informs that the modifications have been stored correctly.

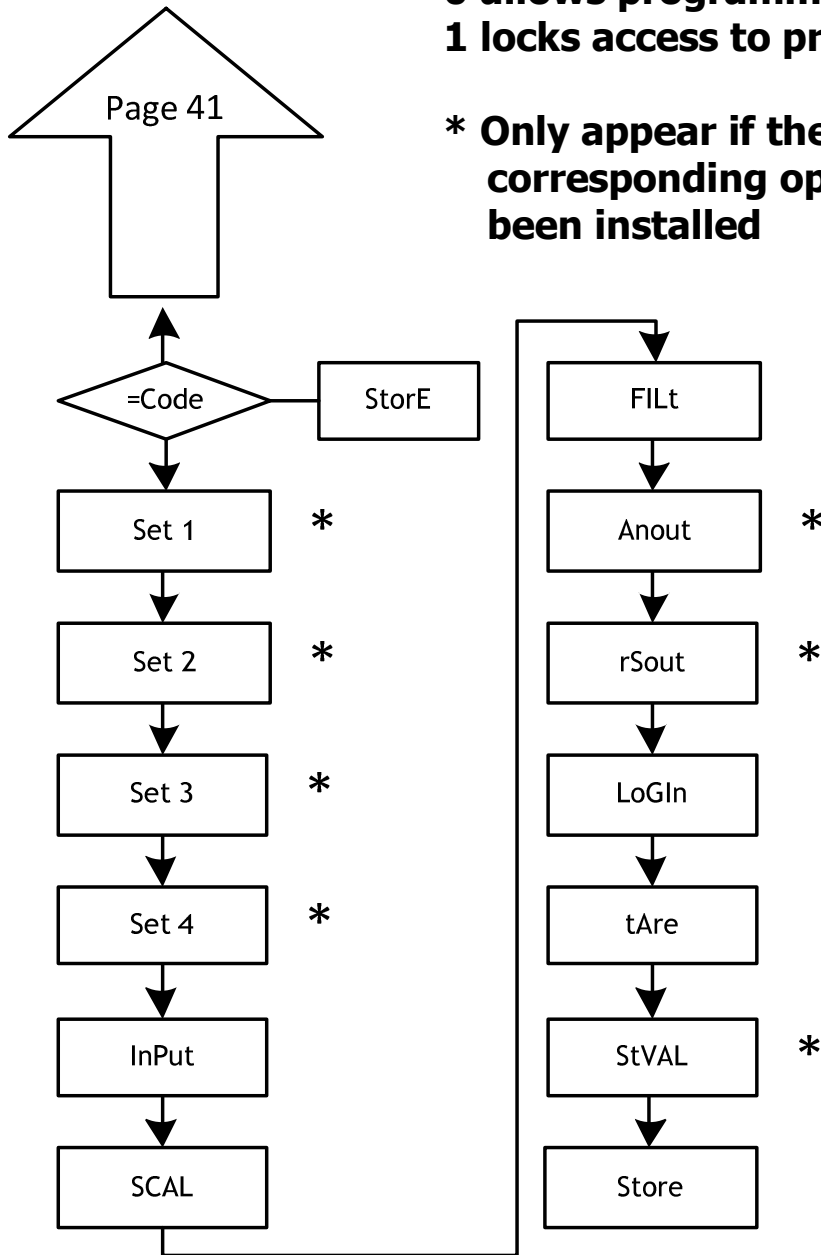
Code

Enter 4 digit pass code (default 0000) and press ENTER key the options are;



0 allows programming
1 locks access to programming

*** Only appear if the corresponding options have been installed**



LISt
totLC

1 = total lockout
 0 = selectable lockout

CHANG

Select new 4 digit
 passcode

CoLor
run

Select display colour for
 run mode

Pro

Select display colour
 for programme mode

7. OUTPUT OPTIONS

The following output options are available for control or communication:

Communication options

OPT4500/485	Serial RS485
-------------	--------------

Refer to the Communications Manual

Control options

OPT4500/mA	Analog (4 to 20) mA
OPT4500/V	Analog (0 to 10) V
OPT4500/2RLY	2 Relays SPDT 8 A
OPT4500/4RLY	4 Relays SPST 5 A
OPT4500/NPN	4 NPN outputs
OPT4500/PNP	4 PNP outputs

All mentioned options are isolated with respect to input signal and power supply, each one activates its own programming modules that provides complete software configuration.

Additional capabilities of the unit with output options:

- Control and processing of limit values via ON/OFF logic outputs (2 relays, 4 relays, 4 NPN outputs or 4 PNP outputs) or proportional output (4 to 20) mA, (0 to 10) V.
- Communication, data transmission and remote programming via serial interface.

The OPT4500RLY, NPN, PNP options are alternative and only one of them can be used.

The OPT4500/mA and V options are alternatives and only one can be used.

Up to three output options can be present at the same time and operate simultaneously:

- One analogue mA or V
- One RS485
- One 2RLY or 4RLY or 4 NPN or 4 PNP

7.1 –SETPOINTS OUTPUT

7.1.1 – Introduction

An option of 2 or 4 SETPOINTS are available depending on outputs fitted. Programmable within the full display range, they can be incorporated to the unit thus providing alarm and control capabilities by means of individual LED indicators and relay or transistor outputs. Programming of the set points can configure; setpoint value, time delay (in seconds), asymmetrical or symmetrical hysteresis (in counts of display value) and selectable HI/LO trip action.

The setpoint option consists of an option card that activates its own programming module, they are totally configurable by the user and their access can be locked out via software.

These are the control output options available:

OPT4500/2R: 2 Relays SPDT 8 A

OPT4500/4R: 4 Relays SPST 5 A

OPT4500/NPN : 4 NPN outputs

OPT4500/PNP : 4 PNP outputs

7.1.2 –Description of operation

The alarm outputs activate when the display value reaches the user-programmed value. Independent alarm programming allows definition of the following basic parameters:

a. COMPARISON NET/ GROSS

In "NET" mode will compare the setpoint value with the display net value. In "GROSS" mode, the comparison will be with the sum net + tare.

b. HI/ LO ACTING MODE.

In HI mode, the output activates when the display value exceeds the setpoint level and in LO mode, the output activates when the display value falls below the setpoint

c. PROGRAMMABLE TIME DELAY or HYSTERESIS.

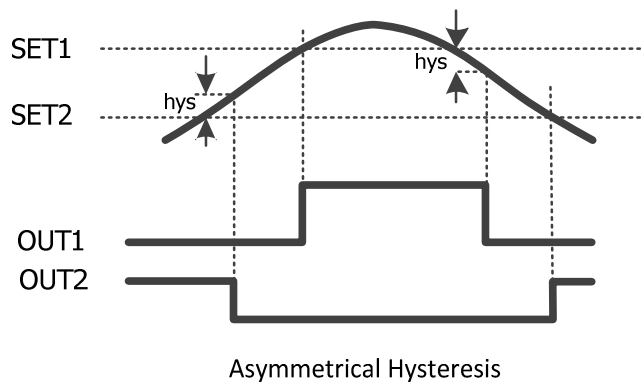
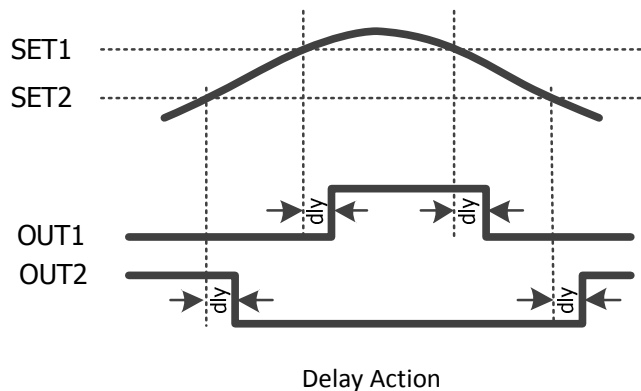
Each output action can be deferred by a programmable time delay or hysteresis level.

The time delay is the time that it takes the output to activate after passing through the setpoint in the up or down direction, while the hysteresis band will be selected asymmetrical i.e. only acts on the output deactivation edge.

The delay is programmable in seconds, from 0 to 99.

The hysteresis can be programmed, in counts, within the full display range. The decimal point appears in the same position as programmed in the display configuration module.

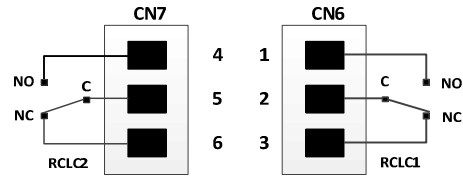
The figures below show the time delay action (dly) and the asymmetrical hysteresis action (hys) of two alarms (SET1 and SET2) programmed to activate in HI mode (OUT1) and LO mode (OUT2)



7.1.3 – Wiring

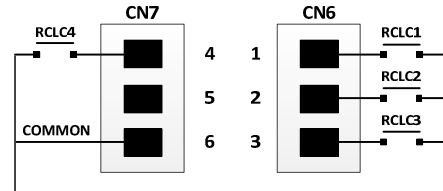
OPT4500/2RLY 2 RELAY OPTION

PIN 4 = NO2 PIN 1 = NO1
 PIN 5 = COMM2 PIN 2 = COMM1
 PIN 6 = NC2 PIN 3 = NC1



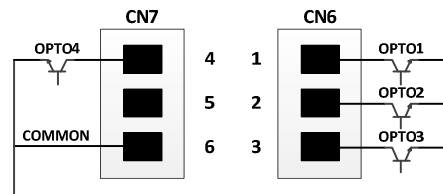
OPT4500/4RLY 4 RELAY OPTION

PIN 4 = RL4 PIN 1 = RL1
 PIN 5 = N/C PIN 2 = RL2
 PIN 6 = COMM PIN 3 = RL3



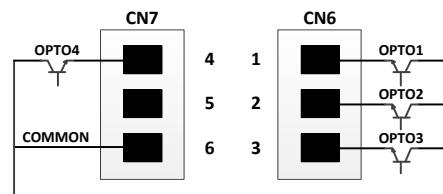
OPT4500/NPN NPN OPTION

PIN 4 = OP4 PIN 1 = OP1
 PIN 5 = N/C PIN 2 = OP2
 PIN 6 = COMM PIN 3 = OP3



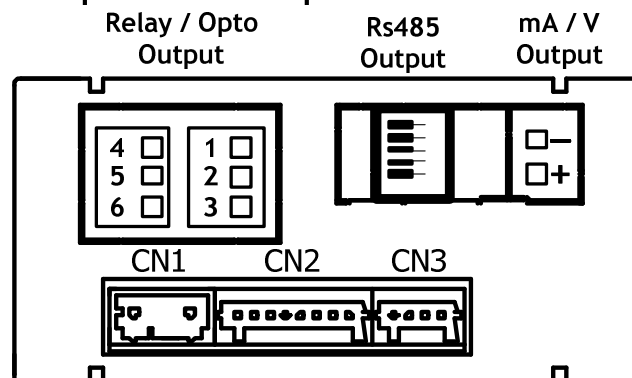
OPT4500PNP PNP OPTION

PIN 4 = OP4 PIN 1 = OP1
 PIN 5 = N/C PIN 2 = OP2
 PIN 6 = COMM PIN 3 = OP3



NOTE: In case that the outputs are used to drive inductive loads, it is recommended to add an RC network between the coil terminals (preferably) or between the relay contacts to limit electromagnetic effects.

Optional Output Connections



7.1.4 – technical specifications

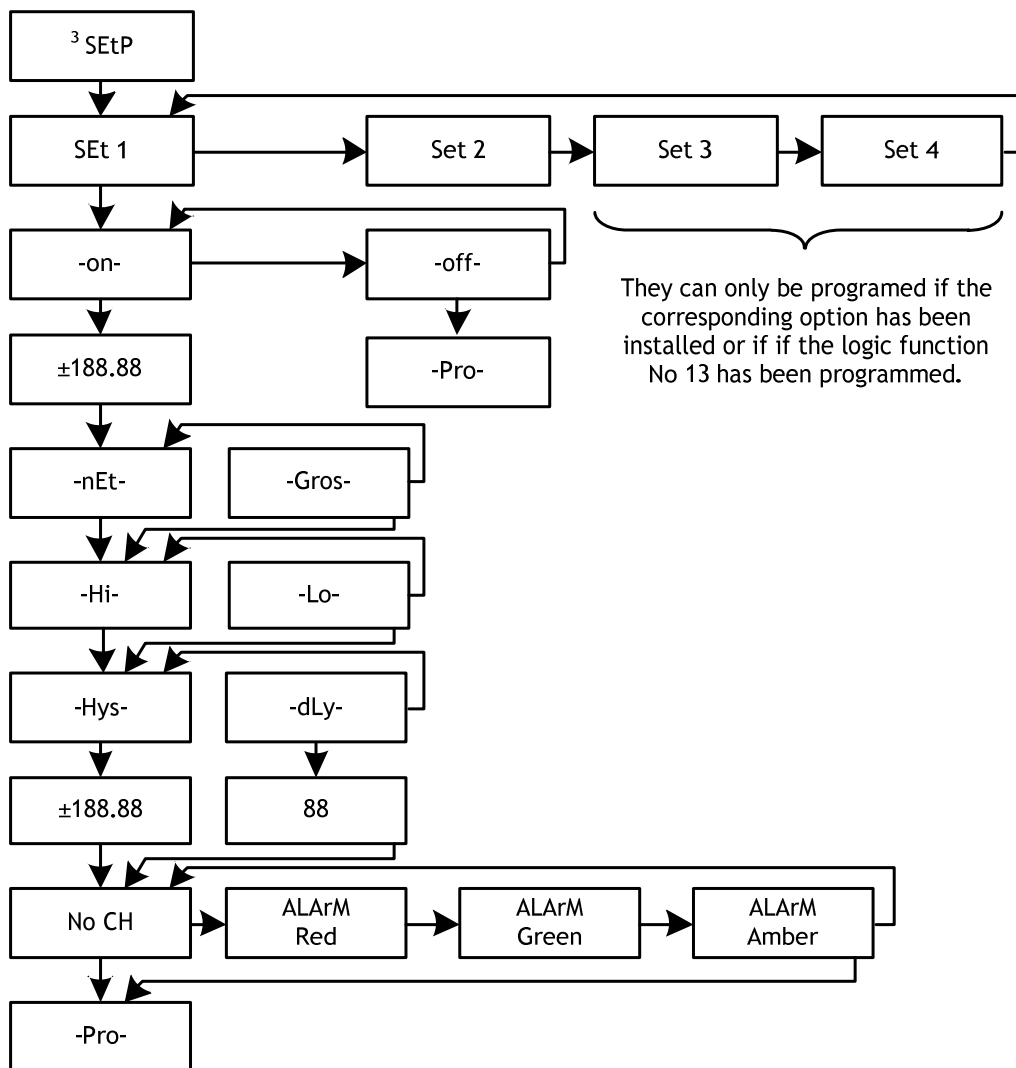
CHARACTERISTICS	OPT4500/2RLY	OPT4500/4RLY
MAX.CURRENT (RESISTIVE LOAD)	8 A	5 A
MAX.POWER	2000 VA / 192 W	1250 VA / 150 W
MAX.VOLTAGE	250 VAC 150 VDC	277 VAC 125 VDC
CONTACT RESISTANCE	Max. 3 mΩ	Max. 30 mΩ
SWITCHING TIME	Max. 10 ms	Max. 10 ms

OPT4500/NPN and PNP	
MAX VOLTAGE	50 VDC
MAX CURRENT	50 mA
LEAKAGE CURRENT	100 μA (max.)
SWITCHING TIME	1 ms (max.)


7.1.5 Setpoints menu diagram

The complete programming of one of the setpoints is showed here, it is valid for the rest of the setpoints.

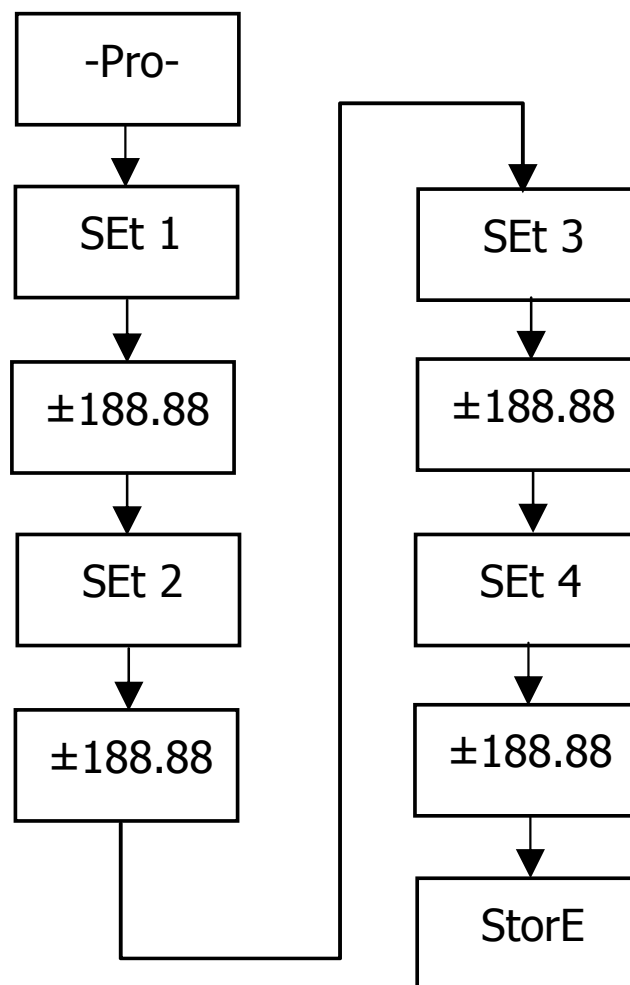
SetP	See 7.1
SEt No.	Setpoint 1, 2, 3, 4 configuration selection
On or Off	On = Active, Off = inactive
+188.88	Enter setpoint value
nEt or Gros	Compare mode see 7.1.2
Hi or Lo	Hi = trip above process value, Lo= trip below
process value	
Hys or dLy	Trip deferring option see 7.1.2, Hys in displayed units, dLy in seconds
no CH	Select the display color when in alarm



7.1.6 – Direct access to the setpoint value programming

If any of the options corresponding to the setpoints has been installed, it is possible to directly access the setpoints value without the need to go through the programming menu just by pressing the  key in PROG mode, as showed in diagram below.

NOTE: The decimal point position will be determined by what has been programmed in the SCAL menu.



7.2 ANALOG OUTPUT OPT4500/mA AND V

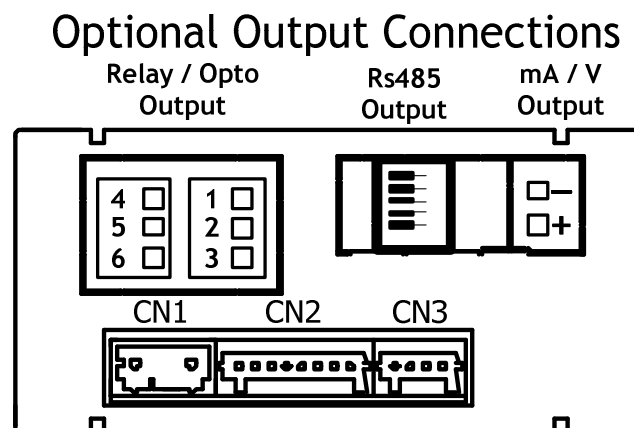
7.2.1 – Introduction

Two ranges of analogue output (0 to 10) V and (4 to 20) mA can be incorporated into the DM4500, either the OPT4500/v option for voltage output or the OPT4500/mA option for current output. Note: Both cards cannot be used simultaneously.

The outputs are isolated with respect to the signal input and the power supply. The option board provides a two terminal connector [(+) and (-)] that drives out a signal variation from (0 to 10) V or from (4 to 20) mA proportional to a user-defined display range.

The instrument will detect the type of option that has been installed and will operate accordingly. The display values producing the full scale output (OUT-HI and OUT-LO) are also introduced via front-panel buttons in the same programming module. The analogue output then follows the display variation between the HI and LO programmed points.

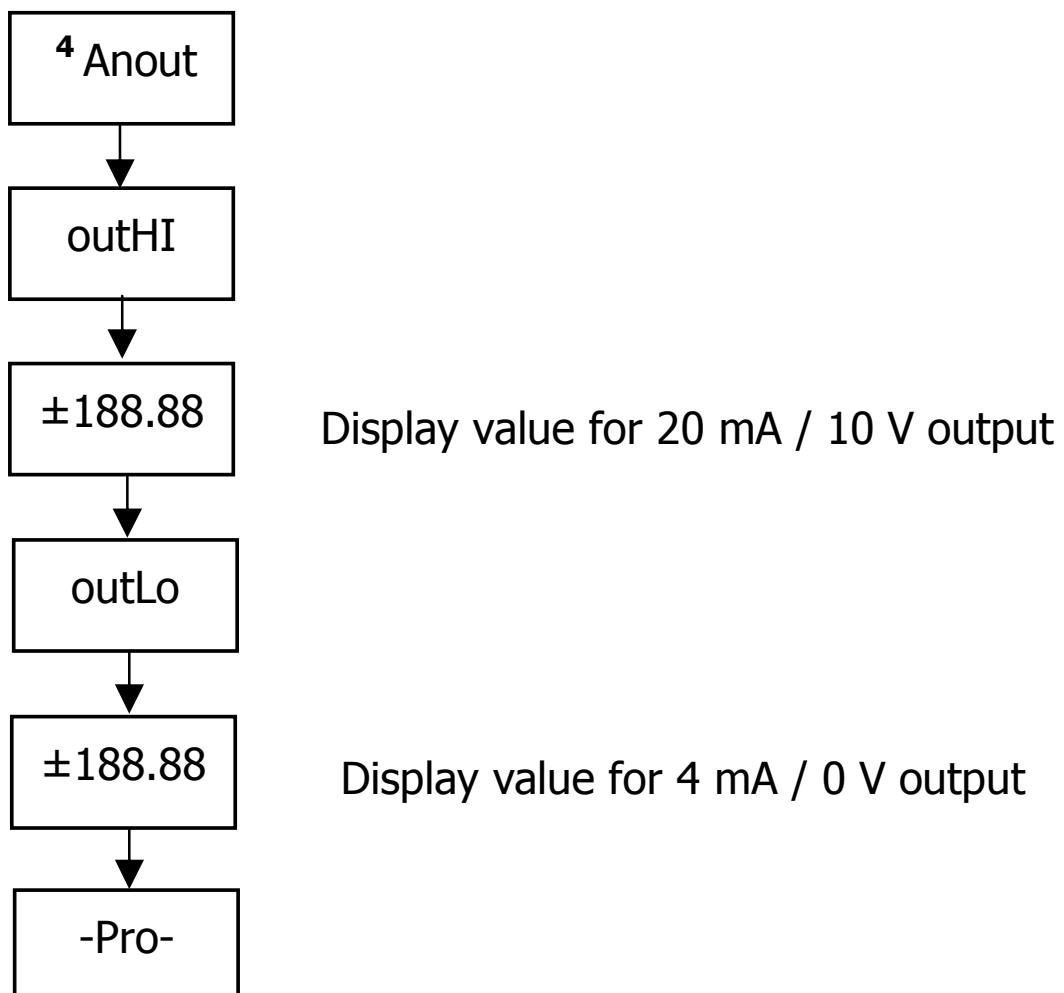
The output signal can be set up for reverse action by programming the low display for the high output (OUT-HI) and the high display for the low output (OUT-LO).



7.2.2 – Technical specifications

CHARACTERISTICS	OPT4500/mA OUTPUT	OPT4500/V OUTPUT
RESOLUTION	13 BITS	13 BITS
ACCURACY	0.1% F.S. ±1BIT	0.1% F.S. ±1BIT
RESPONSE TIME	50 ms	50 ms
THERMAL DRIFT	0.5 μ A/°C	0.2 mV/°C
MAXIMUM LOAD	$\leq 500 \Omega$	$\geq 10 \text{ K}\Omega$

7.2.3 – Analog output menu diagram



TECHNICAL SPECIFICATIONS

INPUT SIGNAL

Configuration	asymmetric differential	
Process input	Voltage	Current
Voltage	±10 V DC	±20 mA DC
Max. resolution	1 mV	1 µA
Input impedance	1 MΩ	15 Ω
Excitation	24 V @ 60 mA, 5 V or 10 V @ 60 mA	
Max. error	± (0.1% of the reading +1 digit)	
Load cell input		
Voltage	±15 mV ± 30 mV ± 150 mV	
Max. resolution	1 µV	
Input impedance	100 MΩ	
Excitation	5 V or 10 V @ 60 mA	
Max. error	± (0.1% of the reading +1 digit)	
Potentiometer input		
Voltage	±10 V DC	
Input impedance	1 MΩ	
Display resolution	0.001%	
Max. error	± (0.1% of the reading +1 digit)	
Potentiometer minimum value	200 Ω	
Temperature input		
Cold junction compensation	(-10 to +60) °C	
Cold junction	± 0.2 °C	
Drift	± 0.05 °C / °C	
Pt100 sensor excitation	< 1 mA DC	
Max. Lead resistance	40 Ω / cable (balanced)	

Input	Range (res. 0.1 °)	Accuracy (res. 0.1°)	Range (res. 1°)	Accuracy (res. 1°)
TC J	(-50.0 to +800.0) °C	0.4% Rdg ±0.6 °C	(-50 to +800) °C	0.4% Rdg ±1 °C
	(-58.0 to +1472.0) °F	0.4% Rdg ±1 °F	(-58 to +1472) °F	0.4% Rdg ±2 °F
TC K	(-50.0 to +1200.0) °C	0.4% Rdg ±0.6 °C	(-50 to +1200) °C	0.4% Rdg ±1 °C
	(-58.0 to +2192.0) °F	0.4% Rdg ±1 °F	(-58 to +2192) °F	0.4% Rdg ±2 °F
TC T	(-150.0 to +400.0) °C	0.4% Rdg ±0.6 °C	(-150 to +400) °C	0.4% Rdg ±1 °C
	(-302.0 to +752.0) °F	0.4% Rdg ±1 °F	(-302 to +752) °F	0.4% Rdg ±2 °F
Pt100	(-100.0 to +800.0) °C	0.2% Rdg ±0.6 °C	(-100 +800) °C	0.2% Rdg ±1 °C
	(-148.0 to +1472.0) °F	0.2% Rdg ±1 °F	(-148 to +1472) °F	0.2% Rdg ±2 °F

MAX input signal applicable

Process mA	±22 mA
Process V	±11 V
Load cell	
±15 mV	±16.5 mV
±30 mV	±33 mV
±150 mV	±165 mV

MAX. continuous overload V and mV inputs	50 V
MAX. continuous overload mA inputs	50 mA

DISPLAY

Principal	-19999 / 19999, 5 digits tricolour 14 mm
Decimal point	programmable
LEDs	4 for functions and 4 for outputs
Display update rate	
Process/ Load cell	20 / s
Pt100	4 / s
Thermocouple	10 / s
Input over range	-OVER, OVER

CONVERSION

Technique	Sigma/ Delta
Resolution	(±15 bit)

Rate	20/s	
temperature coefficient	100 ppm/ °C	
Warm-up time	15 minutes	
POWER SUPPLY		
DM4500/S1	(85 to 265) VAC, (100 to 300) VDC	
DM4500/S2	(22 to 53) VAC, (10.5 to 70) VDC	
EXTERNAL FUSES (DIN 41661)		
DM4500/S1	(230/115 V AC)	F 0.2 A / 250 V
DM4500/S2	(24/48 V AC)	F 2 A / 250 V
FILTERS		
Filter P		
Cut-off frequency	4 Hz to 0.05 Hz	
Slope	20 dB / decade	
ENVIRONMENTAL		
Indoor use		
Operating temperature	(-10 °C to +60) °C	
Storage temperature	(-25 °C to +85) °C	
Relative humidity non-condensed	<95 % to 40 °C	
Max. altitude	2000 meters	
DIMENSIONS		
Dimensions	(96x48x60) mm	
Panel cutout	(92x45) mm	
Weight	135 g	
Case material	polycarbonates / UL 94 V-0	
Sealed front panel	IP65	