KOSMOS SERIES

MULTI-FUNCTION INTEGRATOR
MULTI-INPUT INDICATOR
LOAD-CELL, PROCESS
POTENTIOMETER

MODEL KAPPA-M

PROTOCOL MODBUS-RTU COMPATIBLE

INSTRUCTION MANUAL

Valid from s/n: 188958
Code: 30727152
Edition: 15-03-2004

100% RECYCLED PAPER

KAPPA-M
English

Introduction to the kosmos series

The KOSMOS SERIES brings a new philosophy in digital panel instrumentation, which is expressed by multipurpose, modular-concept devices providing a rich array of basic functions and advanced capabilities.

With a fully MODULAR DESIGN, it is possible to implement a wide variety of applications by only adding the adequate options.

Intelligence within allows the meter to recognize the options installed and ask for the necessary parameters to properly function within desired margins. The basic instrument without output options omits these data in the program routines.

The instrument's CALIBRATION is made at the factory eliminating the need for adjustment potentiometers.
Any circuit or option that may need any adjust incorporates a memory where calibration parameters are stored, making it possible the optional cards be totally interchangeable without need of any subsequent adjust.

Custom CONFIGURATION for specific applications can be made quickly and easily through five front panel keys, following structured choice menus aided by display prompts at each programming step.

Other features of the KOSMOS family include:

- CONNECTIONS via plug-in terminal blocks without screws and CLEMP-WAGO clips cable retention system.

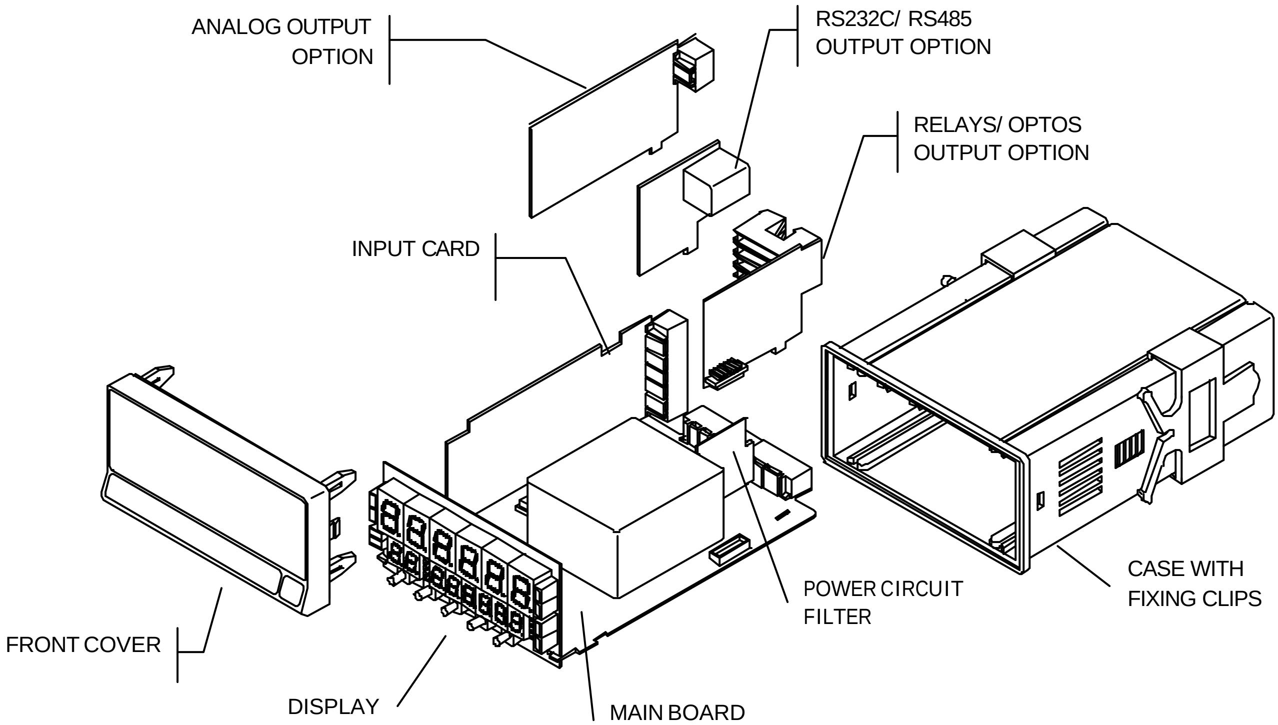
- DIMENSIONS
  Models ALPHA & BETA 96x48x120 mm DIN 43700
  Models MICRA & JR/JR20 96x48x60 mm DIN 43700

- CASE MATERIAL UL-94 V0-rated polycarbonate.

- PANEL INSTALLATION by means of single part fingertip without screws.

To guarantee the meter's technical specifications, it is advised to check its calibration at periodical intervals according to the ISO9001 standards for the particular application operating criteria. Calibration should be performed at the factory or in a qualified laboratory.

INDEX


ANALOG OUTPUT OPTION
RS232C/ RS485 OUTPUT OPTION
RELAYS/ OPTOS OUTPUT OPTION
INPUT CARD
CASE WITH FIXING CLIPS
POWER CIRCUIT FILTER
FRONT COVER
DISPLAY
MAIN BOARD

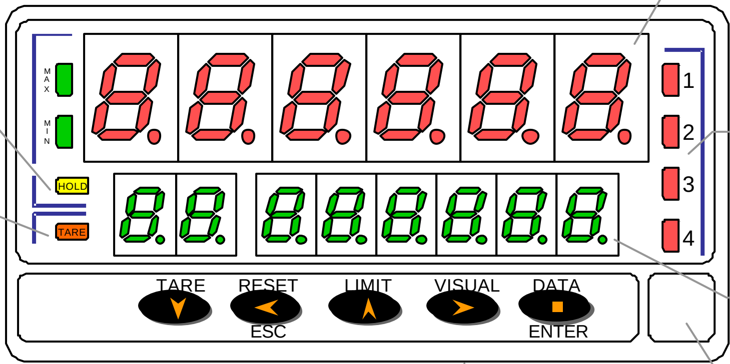
1. GENERAL INFORMATION

1.1. Introduction to KAPPA-M

KAPPA-M instrument designed for measuring and integrating analog signals having two information at the same time, like FLOW and TOTALIZER. Accepts in addition two simultaneous analog input signals allowing arithmetical operation between them.
Every input can be scaled in a lineal way, square root (by two points where is possible to include a multiplier coefficient and an offset) or by segments up to 15 per active channel, not in the mathematical.
The SCAL on every input can be done by Teach method, consisting on putting real signal instead of values by keyboard.
The INTEGRATION (TOTALIZATION) is done only by channel 1 at a rate of 100 per second that means all readings are accumulated with the programmed coefficient. The INTEGRATOR'S base time can be second, minute, hour or day. The accumulate value can be modified by a factor between 0,0001 and 9999. The decimal point position is independent of measuring display value for channel 1.
Also is possible to program a limit display value down of which the readings are not accumulated into de TOTAL. (lo-cut).

Main performances:
Accepts input signals like:
Load Cell, Pressure transducers, Flow meters (measuring of instantaneous **FLOW** as well as **TOTAL** accumulated),
Measuring of DC current through a Current Shunt (ideal for Galvanic processes)
With 26 logical programmable functions.
Instantaneous Display of ±9999 points and Totalizer display from –9999999 to 99999999 points.
Possibility of relating Setpoints to the Net 1 value, Net 2 value, Total value or Mathematic.
Two bright levels of display.
Communication Protocol ModBus RTU.
Up to 14 levels of lockout, by code.
Excitation voltage selectable: 10, 5, 2.2 V and 24 V
Accepts the output options 2RE,4RE, 4OP,4OPP, ANA, RS2 y RS4.
All the output options response is at 100 readings per second.
If both inputs are used, on main display will show the display related to input 1, 2 or mathematical channel, according to the selection done by key VISUAL. On auxiliary display will show the TOTAL of the input 1, no matter what the channel in use.

1.2. Description of panel functions in mode (RUN)



LED HOLD
Shows that display is frozen

LED TARA
Shows that variable on main display has a tare value in the memory

TARE KEY
Stores the actual value on main display as a TARE value for this actual channel

RESET KEY
Allow s to put to zero the value on display, selected by VISUAL routine

LIMIT KEY
Shows at every push the setpoint value if the instrument is carrying a setpoint option

MAIN DISPLAY
Shows the value of selected channel

LED's of setpoint
Show which relay is activated

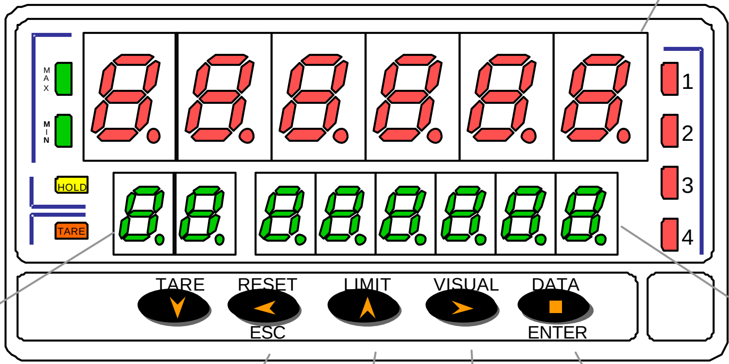
AUXILIARY DISPLAY
Shows the TOTAL value.

LABEL
Engineering units

Key DATA
Access to programming mode.

VISUAL KEY
Gets the 'VISUAL' routine showing at every push, the name and the value of every selected channel

1.2. Description of functions panel in mode (PRO)



MAIN DISPLAY
Shows the variable to be programmed or the parameter to be selected

AUXILIARY DIGITS
Show the program menu number

AUXILIARY DISPLAY
Shows the programming step

ESC KEY
Exit from programming without store the changes

ENTER KEY
Accepts changes and goes to next sep in programming

➢ KEY
SHIFT one right position the flashing digit or the name of different options to be chosen

⮝ KEY
Increase the selected digit value when programming

2. GETTING STARTED

2.1. Package Contents

PACKAGE CONTENTS

- ❑ Instructions manual in English including Declaration of Conformity.
- ❑ D.P.M. model Kappa-M.
- ❑ Accessories for panel mounting (sealing gasket and fastening clips).
- ❑ Accessories for wiring connections (removable plug-in connectors and fingertip).
- ❑ Wiring label stuck to the Kappa-M
- ❑ Set of engineering units labels

- **Check the package contents.**

CONFIGURATION

Power supply (pages 9 and 10)

- ❑ Instruments supplied for 115/ 230 V AC power are factory set for 230 V AC (USA market 115 V AC).
- ❑ Instruments supplied for 24/ 48 V AC power are factory set for 24 V AC.

- **Check the wiring label before power connection.**

Programming instructions (Pages 15)

- ❑ The software is divided into several independently accessible modules for configuration the input, the display, the setpoints, the analog output, the output communication and logic inputs.

✓ **Read carefully this section.**

Input type and connections (Pages 11 to 13)

- ❑ The instrument provides four excitation voltages to supply the transducer 2,2V, 5V, 10V or 24V, are set up at factory for 10V.

✓ **Check the transducer sensitivity, if you have any doubt please consult the transducer specifications**.

✓

Programming Lock-out (page 35)

- The instrument is set at the factory with the lock-out code to **“0000”.**

Warning!

✓ **Note and keep in safe place de lock-out code.**

✓

2.2. Power supply

Should any hardware modification be performed, remove the electronics from the case as shown in figure 9.1.

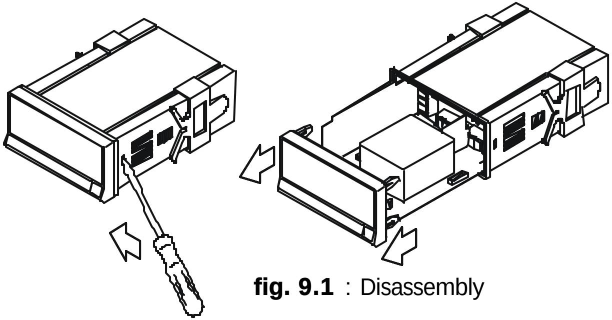


fig. 9.1 : Disassembly

115/230 V AC: The instruments with 115/230 V AC power, are shipped from the factory for 230 V AC (USA market 115 V AC), see figure 9.2. To change supply voltage to 115 V AC, set jumpers as indicated (see table 9.1). The wiring label should be modified to match new setups.

24/48 V AC: The instruments with 24/48 V AC power supply, are shipped from the factory for 24 V AC, see figure 9.2 To change supply voltage to 48 V AC, set jumpers as indicated (see table 1). The wiring label should be modified to match new setups.

Table 9.1: Jumpers situation

<table>
<tr><td>Pin</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>230V AC</td><td>-</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>115V AC</td><td colspan="2"></td><td colspan="2"></td><td>-</td></tr>
<tr><td>48V AC</td><td>-</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>24V AC</td><td colspan="2"></td><td colspan="2"></td><td>-</td></tr>
</table>

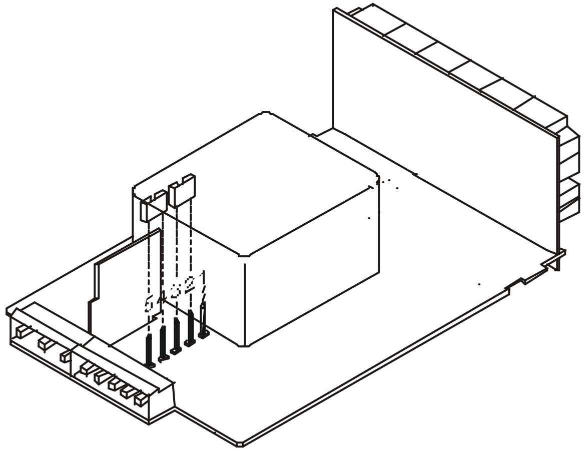
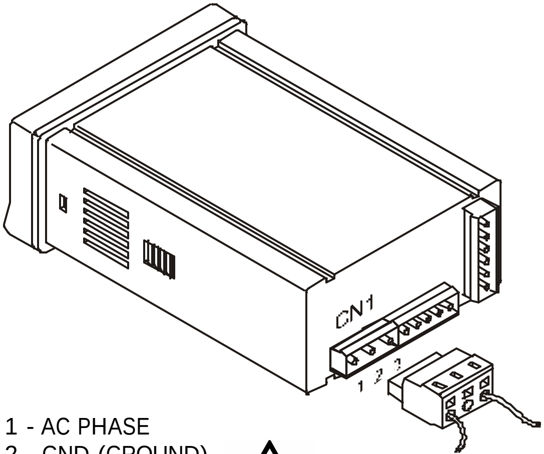


Fig. 9.2 Jumpers situation

POWER CONNECTION - CN1



PIN 1 - AC PHASE
PIN 2 - GND (GROUND)
PIN 3 - AC NEUTRAL

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 easy reachable to the operator and clearly marked as the disconnect device.

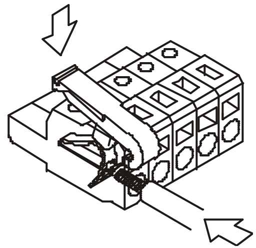
WARNING

In order to guarantee electromagnetic compatibility, the following guidelines for cable wiring must be followed:

- Power supply wires must be routed separated from signal wires. *Never* run power and signal wires in the same conduit.
- Use shielded cable for signal wiring and connect the shield to ground of the indicator (pin2 CN1).
- The cable section must be ≥0.25 mm?

If not installed and used according to these instructions, protection against hazards may be impaired.

CONNECTORS



To perform wiring connections, remove the terminal block from the meter's connector, strip the wire leaving from 7 to 10 mm exposed and insert it into the proper terminal while pushing the fingertip down to open the clip inside the connector as indicated in the figure.

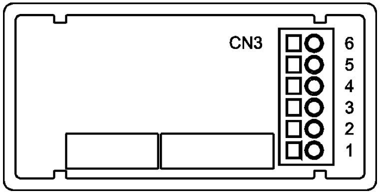
Proceed in the same manner with all pins and plug the terminal block into the corresponding meter's connector.

Each terminal accept cables of section between 0.08 mm^2 and 2.5 mm^2 (AWG 26 ÷ 14).

The blocks provide removable adaptors into each terminal to allow proper fastening for cable sections of <0.5 mm^2.

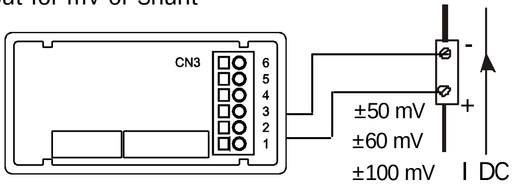
Input type connection

See connections advices on Pág.10

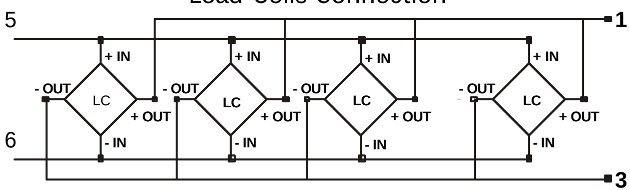


PIN 6 = -EXC[Output excitation (-)]
PIN 5 = +EXC[Output excitation (+)]
PIN 4 = +IN[Input mA (+)] (INP1)
PIN 3 = -IN[Input V ,mV ,mA]
PIN 2 = +IN[Input V (+) (0-10/0-5)]
PIN 1 = +IN[Input mV y 0-1V) (+)] / mA (INP2)

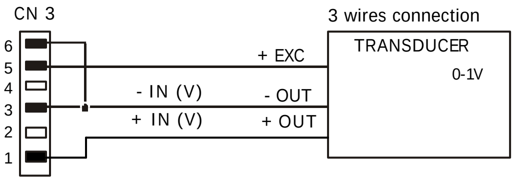
Input for mV or Shunt



Load-Cells Connection

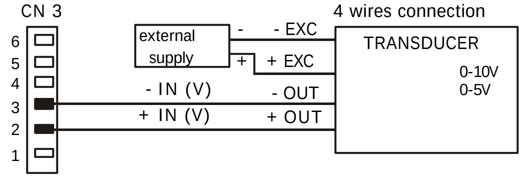


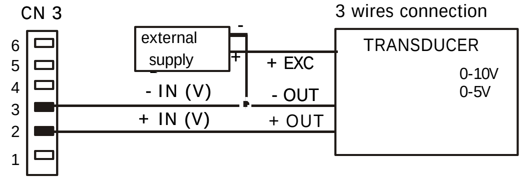
Transmitter connection 0-1 V



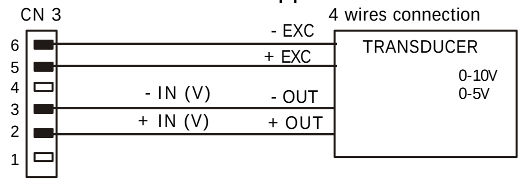
Transmitter connection 0-10 V or 0-5 V

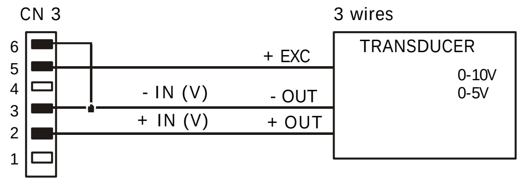
External power supply



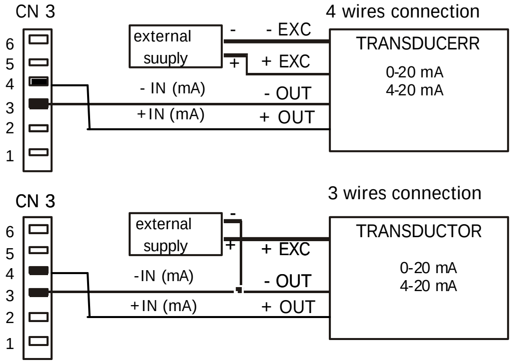


Excitation from Kappa-M

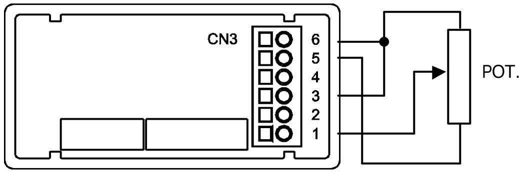




Process input mA with external supply

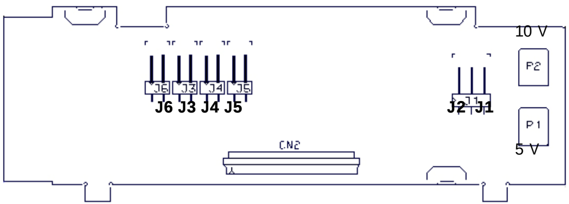


Potentiometer connection with
Input Impedance > 10 MΩ



Excitation = 2.2 V Jumper J4
Input Type = Potentiometer

Excitation selection Jumpers



Sensors excitation voltage selection

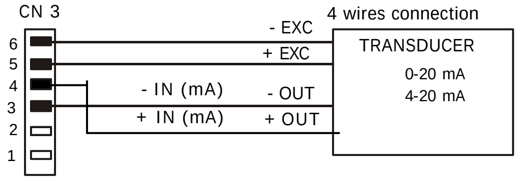
Exc = 24V DC not stabilized **J3**
Exc = 2,2V DC not adjustable **J4**
Exc =5V DC **J5** + **J2** **P1** = with fine adjust 5V
Exc =10V DC **J5** + **J1** **P2** = with fine adjust 10V

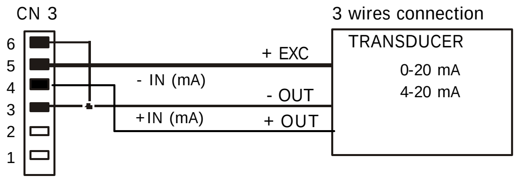
Factory delivered Exc=10V
P2 adjust 10V.
P1 adjust 5V.

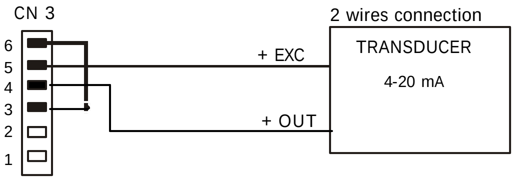
ATENTION! J3, J4, J5 use only one

Put only J6 for 2 input 4-20mA

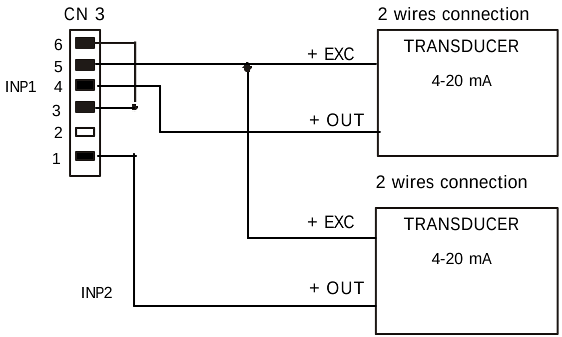
Excitation from KAPPA-M







Connection with two Transmitters 4-20 mA



NOTE: Both inputs use the same common wire

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2.4. Programming instructions

How to get into programming mode?

First, plug the instrument to the corresponding supply, automatically, a display test will be done and after that the software version will be shown, then the instrument will go to work. Second, press the ENTER key to enter into programming mode, on auxiliary display the indication "-Pro-" (Fig. 13.1) will appear.

How to exit from programming mode?

From programming mode, indication "-Pro-", press ◀ key the indication "qUIt" will be for a while on auxiliary display, going the instrument back to work. Non-storing the changes done reminding the last programming.

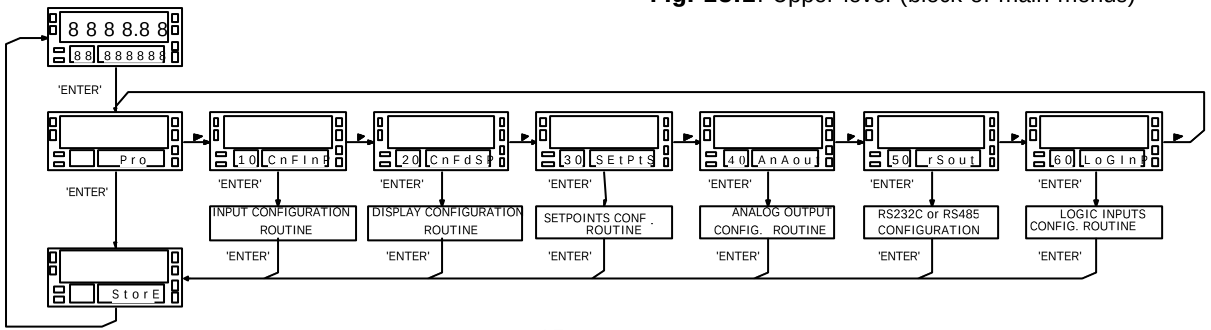
How to store programmed parameters?

To store the changes done, we have to go back to the beginning of programming where the indication "-Pro-" is showed. From here press ENTER key, and the indication "StorE" will appear until all information has been stored into the memory. After that the instrument return to measure according to the new parameter programmed.

How is programming routine organized?

Menus and submenus, organized hierarchically, do programming software. On figure 13.1, beginning with indication "-Pro-", press repeatedly ▶ key to get access to programming menus. The menus 30, 40 and 50 only will be shown if the corresponding option has been plugged-in. Selecting one menu, the access to the submenus is done by pressing ENTER key.

Fig. 13.1: Upper level (block of main menus)



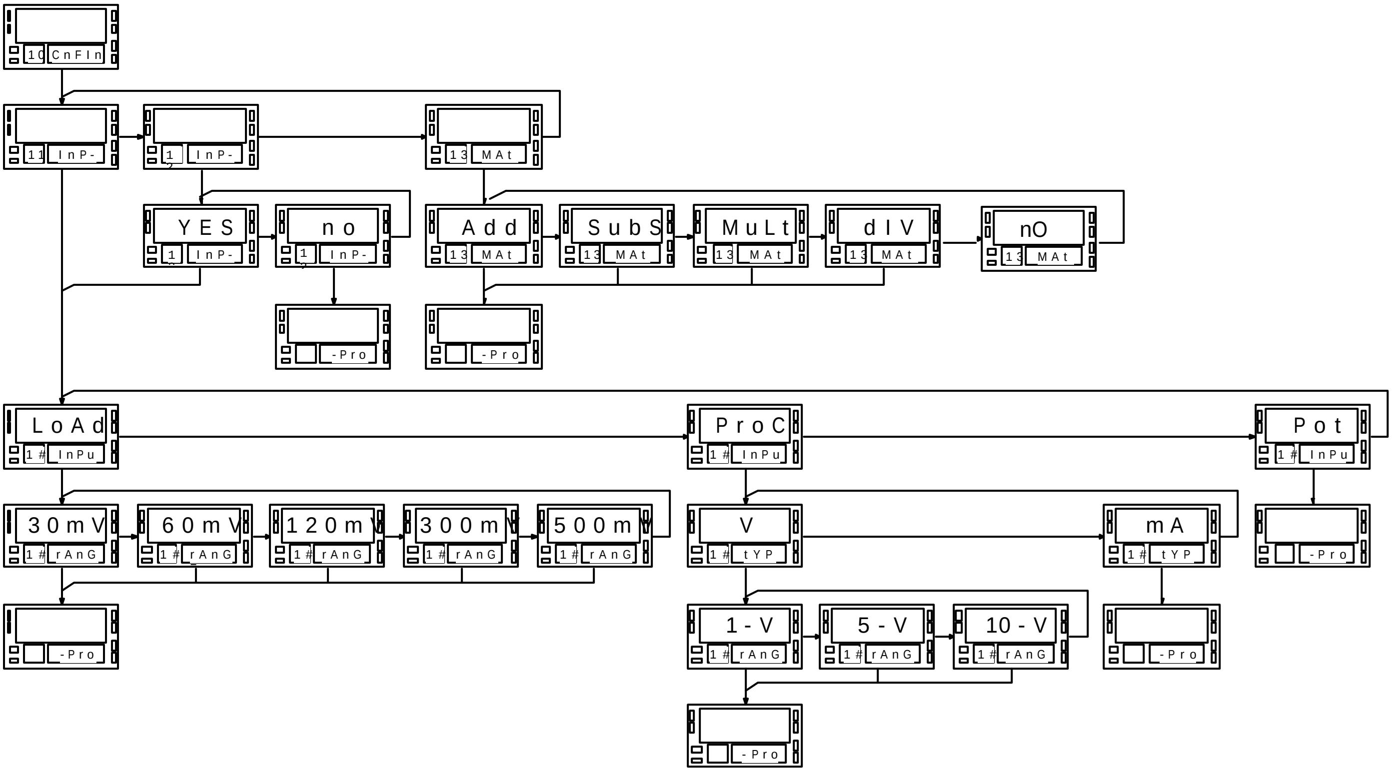
Accessing to programmed parameters
Thanks to the tree structure, the programming routines allows to access to change one parameter without passing through the whole list of parameters.

To advance through programming
The progress through programming routines is done by pushing ENTER key.
In general, the steps to be done will be push ▶ key one or more times to select and option and push ENTER key to validate the change and going forward to the next step of program.
The numerical values are programmed digit -by-digit according the paragraph on the right.

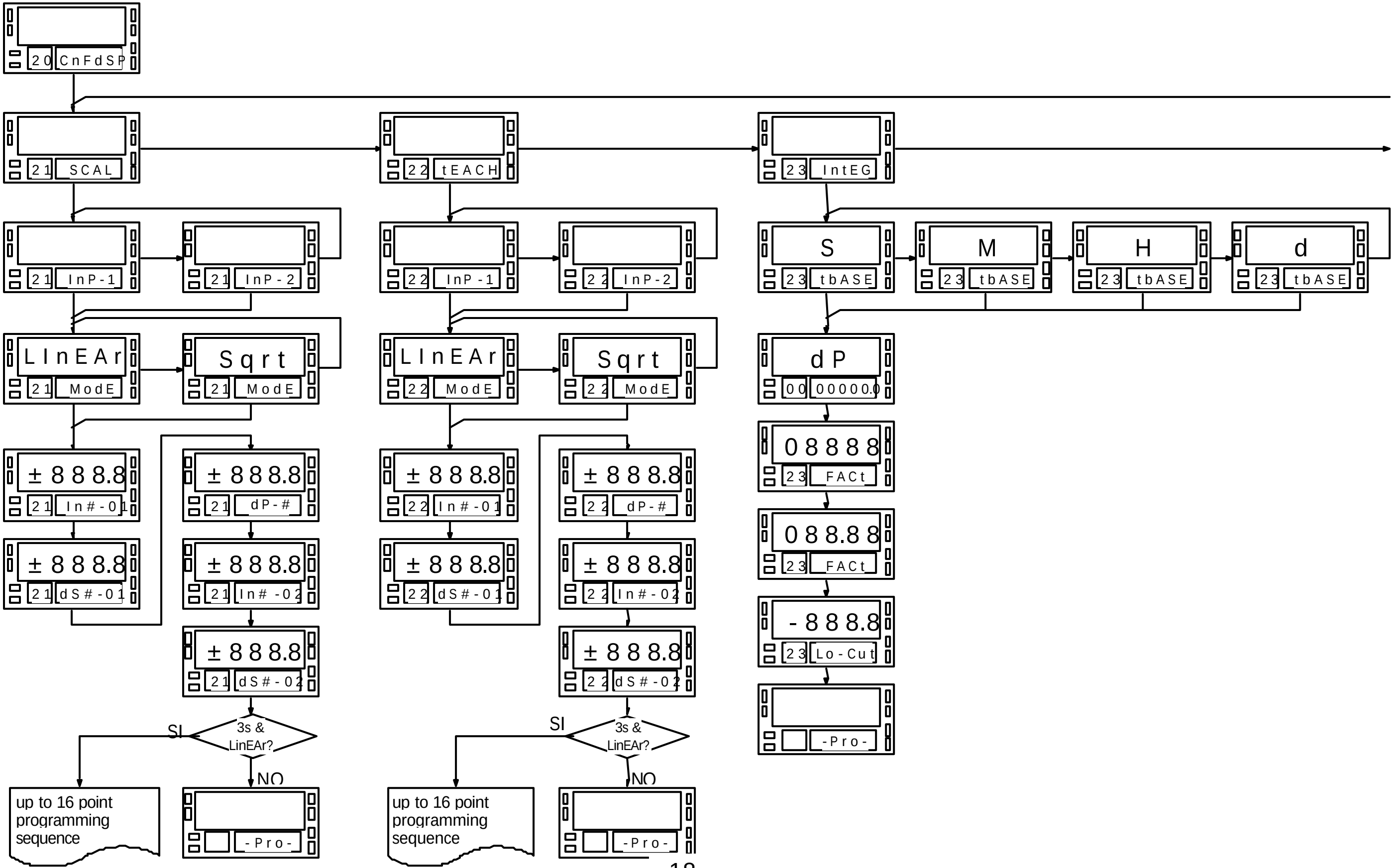
Indications
Numbers and selectable options compound the instrument's configuration.
Generally the parameter's value to be selected will appear on main display and the step number and type of parameter on the secondary display (the menu number on the two most left digits).
The setpoints numerical values or analog output that are referred to the totalizer will be programmed in secondary display using all display digits and the name of parameter will be on main display.

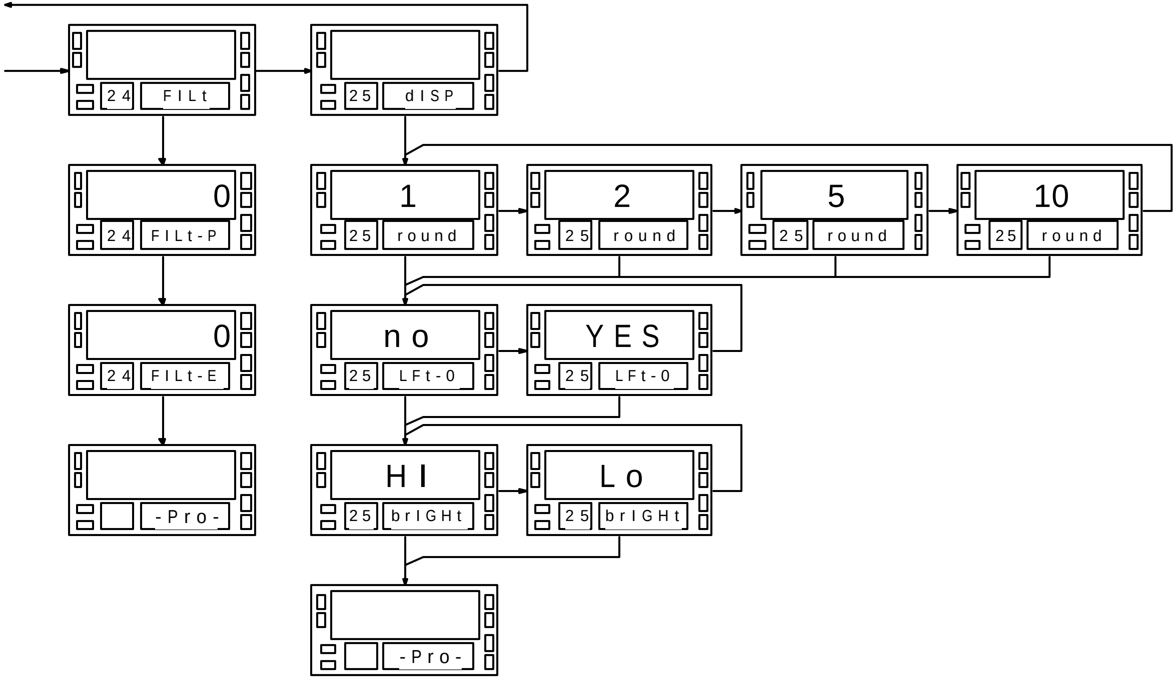
Programming numerical values
When the parameter is a numerical value, the display will show the first digit to be programmed blinking (on main display, exception to the total)
The way to put a value is the following:
Digit selecting: Press repeatedly the ▶ key to shift from left to right over all display digits. The active digit is blinking.
Changing the digit value: Pulsar repeatedly the ▲ key to increase the value of blinking digit up to get the desired value.
The first digit on auxiliary display will show cyclically the values from 0 to 9, then the (–) y and so.
On main display the polarity is programmed on 5 digit from the right.
Selecting an option from the list
When the parameter is an option to be chosen among different possibilities, the ▶ key allows go round through the list of options.

2.5 Input type configuration diagram.



2.6 Display configuration diagram.




24 FILt
25 dISP
0
24 FILt-P
1
25 round
2
25 round
5
25 round
10
25 round
0
24 FILt-E
no
25 LFt-0
YES
25 LFt-0
-Pro-
HI
25 brIGHt
Lo
25 brIGHt
-Pro-

3. INPUT

3.1 – Input configuration

After the connection test is possible to get the input configuration **(The instrument should be without locking the programming access)**

Press ENTER to get **11 InP-1,** which allows programming the input type for channel 1, pressing ▶ get **12 InP-2** and other press of ▶ shows **13 MatH**, if channel 2 is active.

Pressing ENTER on level **11** can program the input type for channel 1.

Pressing ENTER on level **12** can program if use channel 2 or not **(if not used, mathematical channel is not allowed)**

If the input signal is **mV** (Load-Cell, shunt or similar) select **LoAd,** with this input is possible to use signal up to 500mV.

If the input signal is a process signal in V or mA select **ProC** and then **U** or **mA** accordingly. If 1V input signal is used have to be connected to the mV input following the indications on Page 11.

If the transducer used is a **Pot** have to be connected according to figure on Page 16 and put the excitation to **2,2V** (see Page 12) in order to have a greater input impedance and better linearity. If using excitation of 10V should be considered as if it were a standard 10 V and connect it as on Page 11.

If the input is mA, select ProC and **mA** pressing ENTER store the configuration and return to **–Pro-**

When using two inputs, have to be considered the following table:

Input 1	Input 2
Load	Process V (5 y 10 V) y mA
Process mA	Load, Process V (1,5,10 V), Pot. y mA
Pot.	Process (5, 10 V) y mA
Process 1 V	Process (5, 10 V) y mA
Process (5, 10 V)	Load, Process (1 V) y mA

When using a second input in mA have to be put jumper J6 see Figure on Page 12

In case using two input channels is necessary to configure the **InP-1** and the **Inp-2**, after that is possible to activate the channel **Math.** Selecting one of the functions **Add, SubS, Mult (Result divided by 1000) or diV (Result multiplied by 1000)**

Selecting **nO** the math functions are deactivated allowing to have the possibility of showing the channel 1 and channel 2 values without nedd of showing math channel if it is not in use

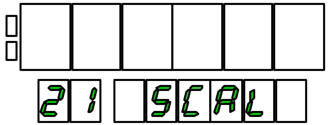
For better comprehension consult page 17.

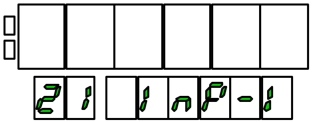
4. DISPLAY CONFIGURATION

4.1 CONFIGURATION by SCAL or TEACH

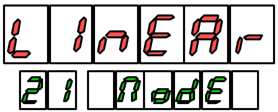
After to have on display **20 CndSP** following indications on Page 15 pressing **ENTER** access to the display programming where we can scale the display range, be by key board or by TEACH mode with actual input signal values, it's also possible to program the Integrator, Filters, Round of last digit as well as level of bright of display. The following explanation is done with input 1 but the procedure is the same for input 2. (See diagrama on pages 18 and 19)

Pressing **ENTER** access to the level where pressing  select **21 SCAL**

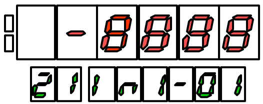


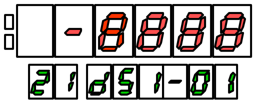


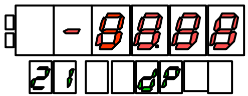
From this point, pressing **ENTER** proceed to scal, be InP-1 or InP-2.
Where in the next step pushing once again **ENTER** access to select if the scale is Liner or square. Every input can be programmed using the desired way then are totally independents.

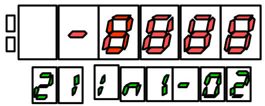


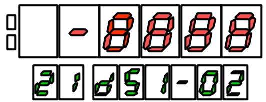
In this point we have to introduce by keyboard the values of InP-1, dS1, decimal point position that will remain fixed for any value related with input 1, InP-2, dS2.
From this point if need more than two linearization points we have to press ENTER more than 3 seconds and follow programming InP-3, dS3, until a maximum of 16 points.









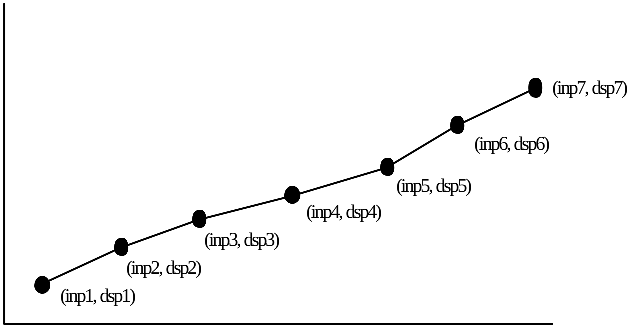


4.2 LINEALIZATION by SEGMENTS

If after programming display 2 of selected input, holding the ENTER key more than 3 seconds, accede to the programming of more segments up to 15, which allow to linearize practically any non-linear signal.

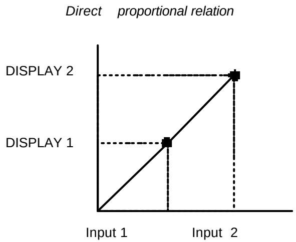
The INPUT values to program on every point must be always increasing or decreasing. Avoid assigning two different display values at two equal input values. The display values can be programmed in any order being possible to put same values for different inputs.

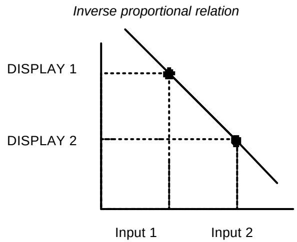
Linealization by segments. Example with 7 points and 6 segments.



Types of relationships

In the figure down are represented graphically the two ways of defining display range.





Direct proportional relation:

- If the input signal increase the display value increase.
- If the input signal decrease the display value decrease.

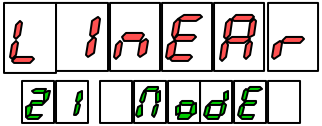
Inverse proportional relation:

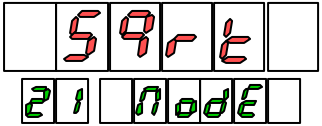
- If the input signal increase the display value decrease.
- If the input signal decrease the display value increase.

4.3 SQUARE ROOT CONFIGURATION

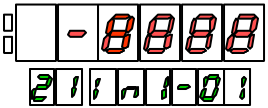
The display configuration in square root application can be done or applying the next formula, **display =offset + coef. *** Ö **input** if the offset and coefficient are known or programming as in a lineal way introducing the input value and display value corresponding to that square function for the two points of this line.

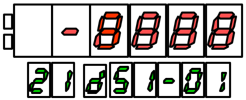
This function can be used indistinctly on every input, being possible to program every input with different way.

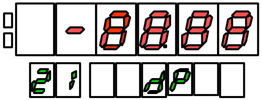


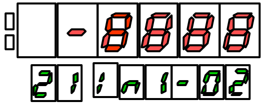


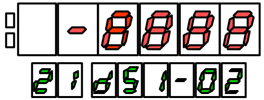
When on display appears the indication **LinEAr**, pressing  can change to **Sqrt** and from this point pressing **ENTER** access to the introduction of values of input, display and decimal point position, as in the lineal way











Examples:

Knowing offset =10 and coefficient =2. Input signal 4-20 mA.

Program **input 1** = 04.00 **Display 1**= (10 + 2 * square root of 4) = 14

Program **input 2** = 20.00 **Display 2**= (10 + 2 * square root of 20) = 18.94

Knowing the relationship between electrical input ranges. 4 mA = 0 and 20 mA = 100.

In this case proceed as if it were a linear scale.

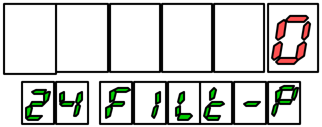
Program **input 1** = 04.00 **Display 1**= 0000

Program **input 2** = 20.00 **Display 2**= 0100

4.4 FILTERS

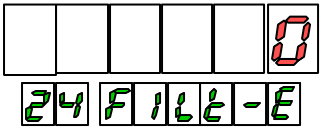
BALANCED FILTER

In this menu can configure the balanced filter to avoid not desired display fluctuations when the input signal is not stable. Allows choosing the level of filter between 0 and 9. The result of greater value of filter is a smooth answer on display to changes of input signal. The "0" level means that the filter is deactivated.



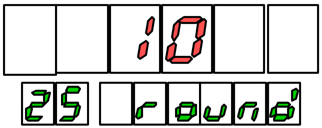
STABILITY FILTER

In this menu can configure the balanced filter to attenuate the response of display in case of abrupt changes of input signal value. Allows choosing the level of filter between 0 and 9. The effects of increasing the filter value decrease the wide of window able to cause display changes. The "0" level means that the filter is deactivated.



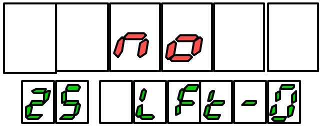
ROUND FILTER

This menu can configure the value of the last digit on display. Allows choosing the number of necessary points to produce a change on display, among 1, 2, 5, and 10.



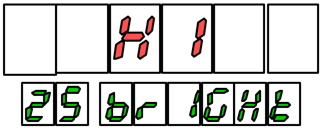
LEFT ZEROS

In this menu can select the possibility to **activate or not** the left zeros on display, being this selection common for both displays (instantaneous and Total)



BRIGHT LEVEL

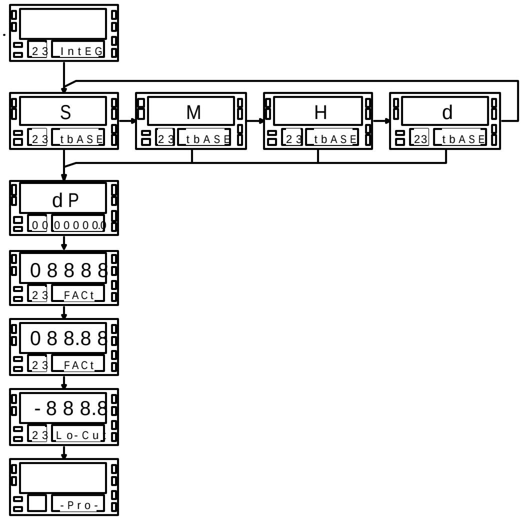
In this menu can select the level of bright for both displays. Allowing choosing between Hi and Lo.



5. INTEGRATOR

INTEGRADOR configuration.

After getting level 20 pressing **ENTER** access to the level where pressing ▶ allows to arrive to 23 **IntEG** where all INTEGRATOR parameter are configured (see diagram)



- Selection (pressing several times the ▶ key) the **Base-Time s, M, H, d** of integration according to the used transducer (Ex. Litres / minute, gallons / hour etc.
- Selection (pressing several times the ▶ key) of decimal point position.
- Selection of multiplying factor value (selectable between 9999 and 0.0001 allowing to adapt the totalised value to other different engineering units different of the measured by the instantaneous display. Ex. (factor of 0,001 will show the TOTAL in m3 when the instantaneous is reading in litres)
- Selection of decimal point position for multiplying factor to get the explained on above paragraph.
- Finally is possible to program a value down of which the INTEGRATOR doesn't make accumulation. So, inputs below the low-flow cotoff value will not affect the totalizer. To disable low-flow cutoff, program cutoff value to zero.

NOTE.

THE INTEGRATOR ONLY TOTALISES the instantaneous signal of INPUT 1.

The integration is done at a rate of 100 readings per second.

Typical application: Using a flow meter giving a 4-20 mA for a flow of 0-100 l/m.
Programming input 1 as process mA and configuring display as
input 1 =04.00 **display 1** =000.0
input 2 = 20.00 **display 2** = 100.0 **IntEG** base- time = H, **decimal point** =0000000.0, **factor** = 0.060, will have a instantaneous indication on main display of 0 to 100.0 l/m and auxiliary display the totalization up to 9999999.9 m3, after this value will show oVEr as over range indication.

6. KEYBOARD AND CONNECTOR FUNCTIONS. LOCKOUT

Index

6.1. Keyboard functions

TARE key

Takes the current reading on display as TARE value and makes the display read 0 for this input.

Only the input 1 and input 2 variables can use the TARE function.

TARE reset

The combination “RESET” y “TARE” keys will remove the TARE and normal reading will be displayed for the actual input.

The TARE led is switched on to show that a TARE exists.

To remove the TARE value of input 1 and, or input 2, the instrument should be showing the desired variable.

To remove TARE follow the method:

1. Press “RESET” and holding it press “TARE”.
2. Release “TARA” first and then “RESET”

The TARE led is switched off after that.

LIMIT key

Shows cyclically, on every press, the setpoint values.

If the setpoint is related to a PROCESS variable its value is shown on main display since on auxiliary display show which setpoint number is.

If the setpoint is related to TOTAL, its value will be shown on auxiliary display and setpoint number on main display.

After 5 s without pressing any key, the instrument automatically exit from setpoint visualization routine.

RESET key

The reset action is done instantaneously at press moment, following the totalizer its functions immediately after be put to zero.

ENTER key

A momentary press allows entering in programming mode.

A press hold more that 3 seconds allows entering in lockout routine to lock programming and keyboard functions.

6.2 – PROGRAMMABLE LOGICAL FUNCTIONS

The rear connector CN2 provides 4 user programmable optocoupled inputs NPN or PNP that can be operated from external contacts or logic levels supplied by an electronic system. Four different functions may be then added to the functions available from the front-panel keys. Each function is associated to one of the CN2 connector pins (PIN 1, PIN 2, PIN 4 and PIN 5) referred to PIN 3. Each pin can be assigned one of the 31 functions listed on the following pages.

6.2.1 WIRING

- Default configuration

As shipped from the factory, the CN2 connector allows the TARE, MAX/MIN and RESET operations be made in the same way as from the front-panel keyboard and incorporates one more function: the display HOLD.

The HOLD state, which is acknowledged by the LED "HOLD", freezes the display.

From factory the logical inputs are **NPN** configured.

CN2 : DEFAULT CONFIGURATION

PIN (INPUT)	**Function**	**Number**
PIN 1 (INP-1)	RESET	Function nº 7
PIN 2 (INP-2)	HOLD	Function nº 9
PIN 3	COMMON	
PIN 4 (INP-4)	TARE	Function nº 1
PIN 5 (INP-5)	MAX/MIN	Function nº 6

The external electronics (see fig. 30.1) applied to the CN2 connector must be capable of withstanding 40V and 20mA present at all terminals with respect to COMMON. In order to guarantee the electromagnetic compatibility, please refer to the instructions given on page 10.

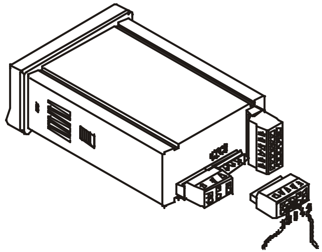
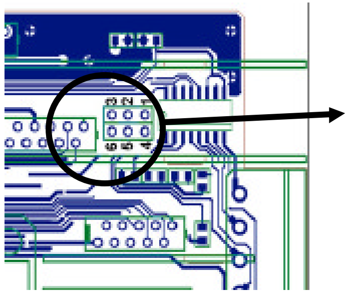
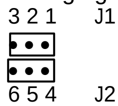


Fig. 29.1



Changing the logical CN2



CN2 type of input
PNP J1 (2-3) y J2 (5-6)
NPN J1 (1-2) y J2 (4-5)

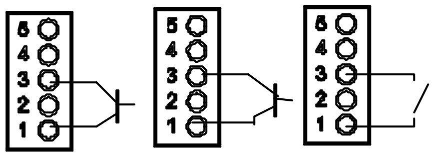


Figure. 29.2 Connection examples. PNP, NPN or switch.

6.2.2. Functions table

Definition of ACTION

Pulse: The function is active on falling down edge at the corresponding pin respect to common

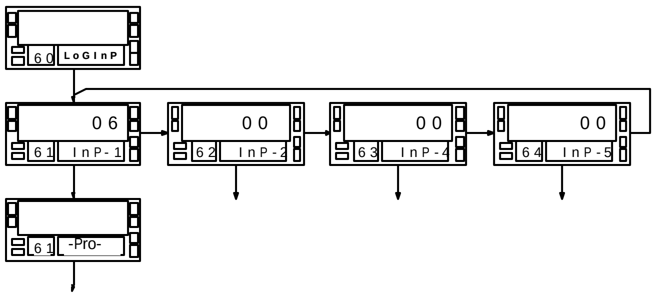
Level: The function will be active as long as the corresponding pin remains at low lever respect to common.

*** Default configuration**

Nº	FUNCTION	DESCRIPTION	ACTION
0	Deactivated	None	-
1*	TARE	Adds the current display value to the tare memory. The display goes to zero. This function over the channel active on display and never over math channel.	Pulse
2	RESET TARE	Adds the tare memory contents to the display value and clears the tare memory. This function over the channel active on display and never over math channel.	Pulse
3	RESET TOTAL	The totalizer goes to zero.	Pulse
4	STOP TOTAL	Stop the totalizer while the function is activated.	Level
5	VISUAL	Display / Change the channel shown in the main display.	Pulse
6*	SEE PEAK / VALLEY	Display at each press, peak and valley value of the channel in use.	Pulse
7*	COMBINED RESET	Combined with function 1 reset tare memory. Combined with function 6 reset the value shown on secondary display (peak, valley or total)	Pulse

Nº	FUNCTION	DESCRIPTION	ACTION
8	HOLD 1	Freeze the display although allows to view other channels (all of them froze at this moment.	Level
9	HOLD 2	Same as HOLD1 but freeze the analog output and the display or total values asked for from RS.	Level
10	DISPLAY INPUT	Replace the value of total on secondary display by the actual input value of in use channel whenever not be the math.	Pulse
11	DISPLAY GROSS	Replace the total on secondary display by the gross indication (net + tare) of channel in use whenever not be the math.	Pulse
12	DISPLAY TARE	Replace the total on secondary display by the tare indication of channel in use whenever not be the math.	Pulse
13	ANA GROSS	Makes the analog output follow the gross value (measured value + tare) but if the assignation is over math channel or total.	Pulse
14	ANA ZERO	Put the output in low level (0 V or 4 mA)	Level
15	DELETE AUX.	Turn off the auxiliary display if it is displaying total value.	Level
16	PRINT TOTAL	Print total value.	Pulse
17	PRINT NETO 1	Print channel 1 display value.	Pulse
18	PRINT NETO 2	Print channel 2 display value.	Pulse
19	PRINT MATH	Print math channel display value.	Pulse
20	PRINT SET1	Print setpoint 1 value and state.	Pulse
21	PRINT SET2	Print setpoint 2 value and state.	Pulse
22	PRINT SET3	Print setpoint 3 value and state.	Pulse
23	PRINT SET4	Print setpoint 4 value and state.	Pulse
24	FALSE SETPOINTS	Grant access to the use and to program of the setpoints when the board is not installed.	Level
25	RESET LATCH	Deactivates all relays in latch condition that be out of alarm condition.	Level
26	ROUND RS	Send through serial channel the values without passing by filters or rounding.	Level

6.2.3. Programming logical functions



The logical functions are programmed on module '**60 LoGInP**'. There are 4 menu every one of them corresponds to one input on connector CN2:
61 InP-1: Input pin 1
62 InP-2: Input pin 2
63 InP-4: Input pin 4
64 InP-5: Input pin 5
The pin 3 is the common.

On every menu can select a function between 0 and 26 according to the desired function.
To change the number, press repeatedly the ▲ key
To program next input, press ▶ key

On the diagram on the left show the whole module with an example for InP-1 (nº 06= DISPLAY PEAK / VALLEY that will be used to show at every pulse the values of peak and VALLEY of the actual channel on display.

6.3. Programming and keyboard functions lockout

The instrument is supplied with all software programming parameters accessible to operator's modifications. After completing the software configuration, it is recommended to take the following steps:

1. Lockout programming parameters to prevent from accidental or unauthorized modifications.

2. Lockout keyboard functions to prevent from accidental or unauthorized modifications.

3. The access to the lockout routine is allowed by entering a safety code. At factory this code is set to **0000**. We recommend changing this code and to write it down and keep safe.

TOTAL LOCKOUT

The access to the programming routines to read data is allowed even if all parameters are locked out, but **it won't be possible to enter or modify data**. In this case, when entering in the programming mode, the second display shows the indication –dAtA- instead of –Pro-.

SELECTIVE LOCKS

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 second display shows the indication –Pro-.

KEYBOARD FUNCTION'S LOCKOUT

All keyboard functions in RUN mode except setpoint visualization values should be inhibit independently by software.

The diagram shows all phases of the lockout routine that allows to lockout the programming parameters and to change the safety code. The access to this routine is accomplished by holding ENTER for approximately 3s until the indication "CodE" appears on the second display.

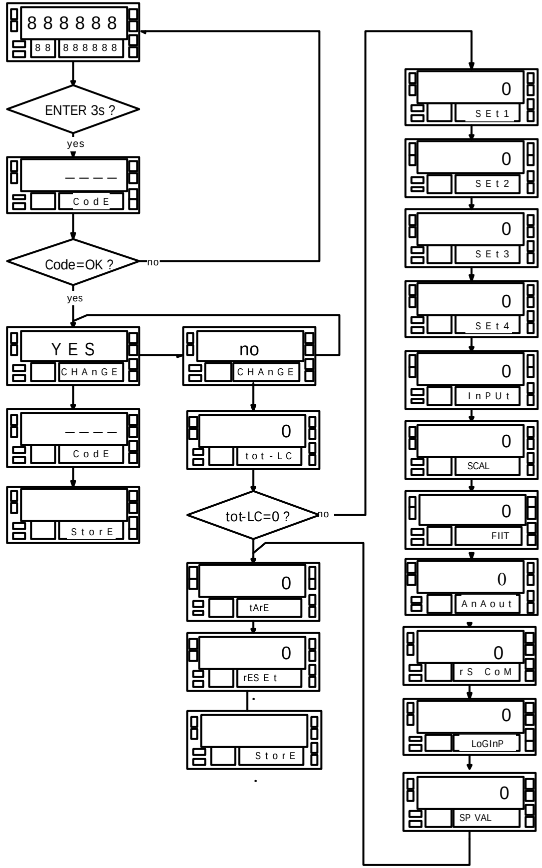
The unit is shipped from the factory with a safety code of **"0000".** Once introduced this code, you are asked to select whether to change it or to enter directly in the parameter lockout list.

If you decide to change the default code, after programming the new one, the instrument returns to the run mode. You will be asked to enter the new code before trying to access the lockout routine for the next time.

If you decide not to change the safety code, the next step ('tot-LC') allows to lock everything and return to the run mode (set digit to 1) or to access the list of parameters that can be locked individually (set tot-LC to 0).

Meaning of menus (**'1' locked, '0' unlocked**):

- **tot-LC**: total lock
- **Set1, Set2, Set3, Set4**: individual lock of setpoints
- **InPut**: Lock of Input module
- **SCAL**: Lock of Display SCAL module
- **FilT**: lock of filter and config. display
- **AnAout**: Lock of analog output option module
- **rS CoM**: Lock of serial output option
- **SP VAL**: Lock of direct access of programming setpoints
- **RESEt**: Inhibit the reset function.
- **TARE**: Inhibit the Tare function and reset of Tare.



7. SPECIFICATIONS

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7.1. Output options

Optionally, model KAPPA-M can incorporate one or several output options for communications or control including:

COMMUNICATION

RS2	Serial RS232C
RS4	Serial RS485

CONTROL

ANA	Analogue 4-20 mA, 0-10 V
2RE	2 SPDT relays 8 A
4RE	4 SPST relays 0.2 A
4OP	4 open-collector NPN outputs
4OPP	4 open-collector PNP outputs

All options are opto-isolated with respect to the input signal and the main supply.

The options are supplied with a specific instructions manual describing characteristics, installation, connections and programming. The output cards are easily installed on the meter's main board by means of plug-in connectors and each one activates its own programming module 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 (4-20 mA or 0-10 V).

- Communication, data transmission and remote programming via serial interface.

For more detailed information on characteristics, applications, mounting and programming, please refer to the specific manual supplied with each option.

The figure shows the installation of different output options.

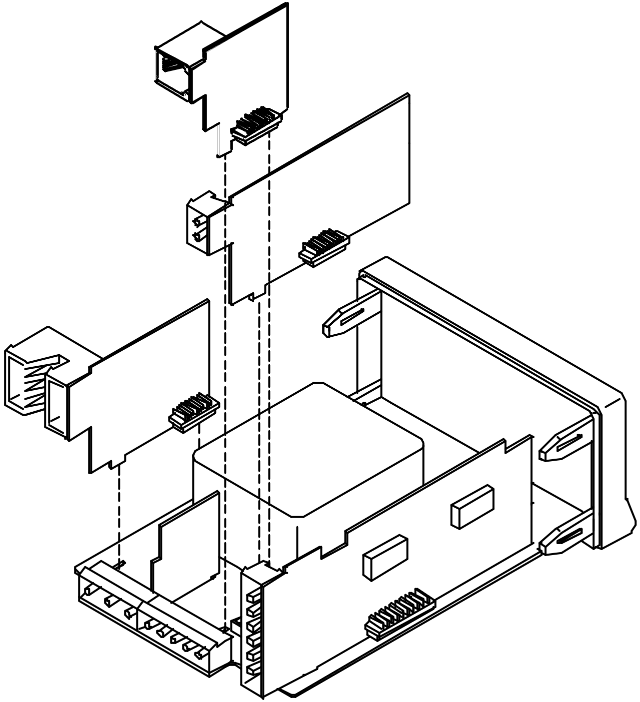
The 2RE, 4RE, 4OP y 4OPP options are alternatives and only one of them could be placed into the connector M5.

The RS2 y RS4 options are also alternatives and only one of them could be placed into connector M1

La ANA option is placed into connector M4.

Can be at the same time and work in a simultaneous way up to 3 output options:

- One analog (ref. ANA),
- One RS232C (ref. RS2) or RS485 (ref. RS4).
- One 2 relays (ref. 2RE) or 4 relays (ref. 4RE) or 4 optos NPN (ref. 4OP) or 4 optos PNP (ref. 4OPP)



7.2 TECHNICAL SPECIFICATIONS

Process Input

- Voltage input (pin 2 versus 3).............. ±(0-5/ 0-10)V
- Input Impedance...1MΩ
- Voltage Input (pin 1 versus 3).........................± 0-1V
- Input Impedance 100MΩ
- Current Input (both)................................ ±0-20 mA
- Input Impedance (both) 11,8Ω

Load-Cell or mV Input

- Voltage input .... ±30,±60,±120,±300,±500 mV
  4-wires, unipolar or bipolar
  Input Impedance....................................... 100MΩ

Potentiometer Input

- Min. resistance..120Ω
- Excitation Voltage..2.2V
- Input Impedance (1 versus 3).......................>10 MΩ

Excitation

2,2 V @ 30 mA not adjustable.
24 V @ 30 mA not stabilized.
5 V ±100 mV @ 120 mA with fine adjust (50 ppm/ºC)
10 V ±10 mV @ 120 mA with fine adjust (50 ppm/ºC)

Display

- Main Display ....-9999/9999
- .... 5 red digits, 7 Segments
- Auxiliary Display ....-9999999 / 9999999
- ....8 green digits 8 mm
- Decimal Point .... Programmable (both displays)
- LED's................................8 (Functions and outputs)
- Display Rate 10/s
- .... 100/s (totalizer)
- Positive overflow .... OVFr
- Negative overflow....................................... - OVFr

Conversion

- Technical .... ΣΔ
- Resolution... ± 15 bits
- Rate 200/s
- Resolution peak measure ....±15 bits

Integrator

- Time base programmable .... s, m, H, D
- Integration rate 100/s
- Low cot-out .... all range programmable

Accuracy at 23ºC ± 5 ºC

- Error max. ....±(0.1% reading +2 digits)
- Temperature coefficient ....100 ppm/ºC
- Warming time....................................... 10 minutes

Power Supply

- KAPPA-M .... 230/115V ±10% 50/60Hz
- KAPPA-M2............................ 24/48V ±10% 50/60Hz
- Consumption...........5W (without options), 10W (MAX)
- Fuses (DIN41661) Recommended (not supplied)
  230/115 V AC .... F 0.2A/250V
  24/48 V AC................................. F 0.5A/250V

7.2 TECHNICAL SPECIFICATIONS

Environmental

- Operational temperature range.............. 0º to +50 ºC
- Storage temperature range.................-25º to +85 ºC
- Relative humidity (not condensed)...... < 95% to 40 ºC
- Max. Altitude .... 2000 meters
- Indoor use

Mechanical

- Dimensions .... 96 x 48 x 120 mm
- Panel Cutout.......................................92 x 45 mm
- Weight .... 600 g
- Case Material .... s/UL 94 V-0 Poly-carbonate

Reaction time

- Capture of peak value
  Minimum time of input signal ....10 ms

- Reaction time
  Hold-Display .... Max. 10 ms
  Hold-Analog output .... Max. 10 ms
  Hold-RS .... Max. 10 ms

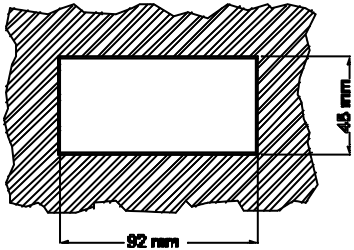
- Logical Inputs
  All .... Max. 10 ms

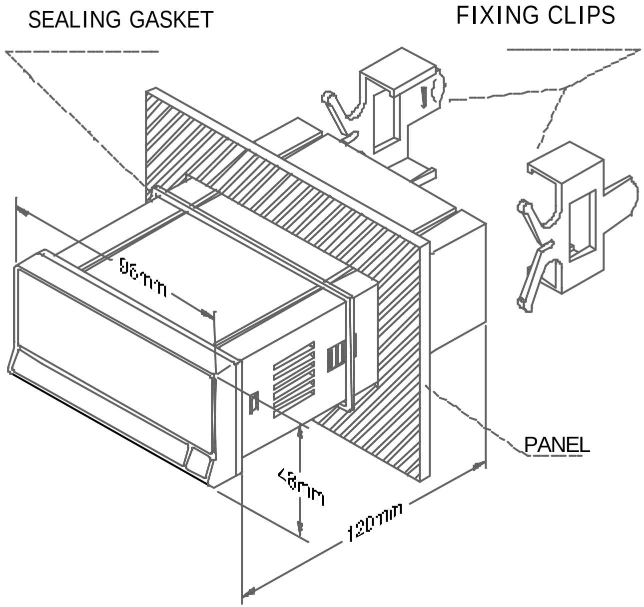
Input ranges

Proc. V	Pins	MIN	MAX.
0-10V	2-3	-13,5	+13,5
0-5V	2-3	-6,6	+6,5
0-1V	1-3	-1,2	+1,2
Proc. mA	**Pins**	**MIN**	**MAX.**
0-20mA	4-3	-25	+25
0-20mA	1-3	-25	+25
Load	**Pins**	**MIN.**	**MAX.**
30 mV	1-3	-38	+38
60 mV	1-3	-75	+75
120 mV	1-3	-150	+150
300 mV	1-3	-305	+305
500 mV	1-3	-600	+600
Pot.	**Pins**	**MIN.**	**MAX.**
2,2 V	1-3	-2,4	+2,4

7.3. Dimensions and mounting

To install the instrument into the panel, make a 92x45 mm cutout. Slide the sealing gasket over the rear of the unit to the bezel and insert the unit into the panel from the front.





Place the fixing clips on both sides of the case and slide them over the guide tracks until they touch the panel at the rear side.

Press slightly to fasten the bezel to the panel and secure the clips in the slots of the case.

To take the instrument out of the panel, pull outwards the rear tabs of the fixing clips to disengage and slide them back over the case.

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

9. WARRANTY

All products are warranted against defective material and workmanship for a period of three years from date of delivery.

If a product appears to have a defect or fails during the normal use within the warranty period, please contact the distributor from whom you purchased the product.

This warranty does not apply to defects resulting from action of the buyer such as mishandling or improper interfacing.

The liability under this warranty shall extend only to the repair of the instrument; no responsibility is assumed by the manufacturer for any damage which may result from its use.

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7.5 CERTIFICATE OF CONFORMITY

Manufacturer : Diseños y Tecnología S.A.

Address : Travessera de les Corts, 180
08028 Barcelona
ESPAÑA

Declares, that the product:

Digital panel multifunction meter

Model: **KAPPA-M**

Conforms with the directives: EMC 89/336/CEE
LVD 73/23/CEE

Date: 15 February 2002
Signed: José M. Edo
Charge: Technical Manager

Applicable Standars :	**EN50081-1** Generic emission
EN55022/CISPR22	Class B
Applicable Standars :	**EN50082-1** Generic immunity
IEC1000-4-2	Level 3 Criteria B Air Discharge 8kV Contact Discharge 6kV
IEC1000-4-3	Level 2 Criteria A 3V/m 80..1000MHz
IEC1000-4-4	Level 2 Criteria B 1kV Power Lines 0.5kV Signal Lines
Applicable Standars :	**EN61010-1** Generic Safety
IEC1010-1	Installation Category II Transient Voltages <2.5kV Pollution Degree 2 Conductive pollution excluded Insulation Type Enclosure : Double Inputs/Outputs : Basic

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ADDENDUM - INDEX

The output options are delivered in a separate way with its own instructions manual describing how to install the card, wiring and characteristics as well as programming instructions.

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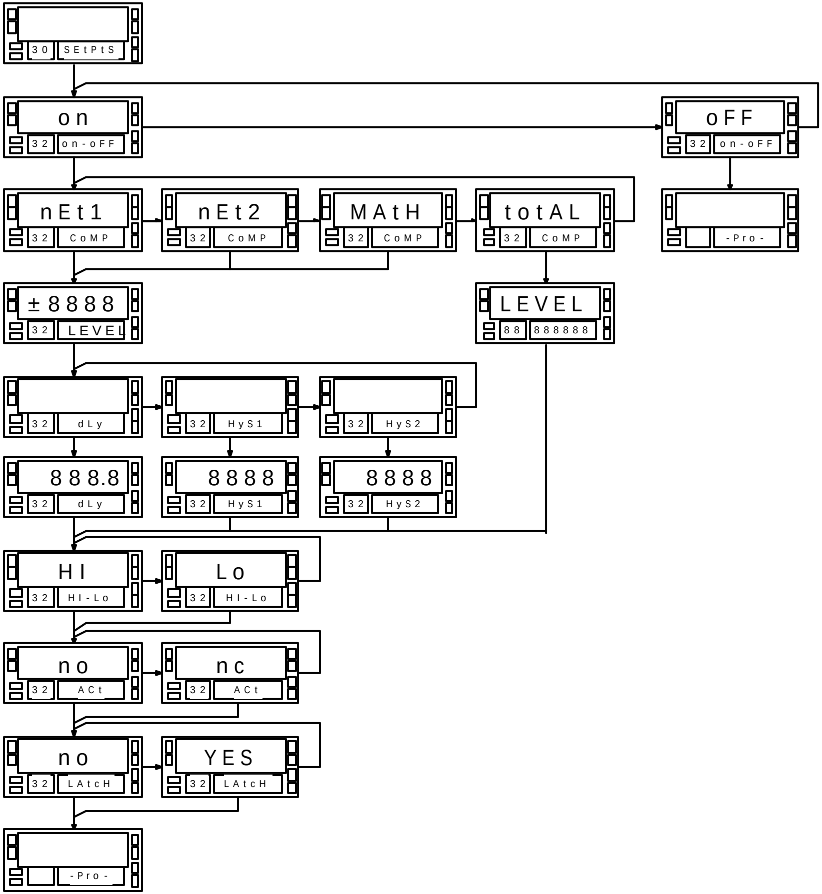
ADDENDUM A. SETPOINTS

Index

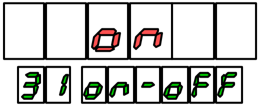
SECTION **Page.**

A.1. Programming setpoint 2 (the same for rest of setpoints)



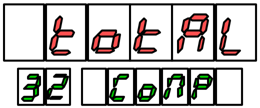
A.2. Ways of working

SELECTION ON-OFF



Selection if this setpoint is working or not.
If selected **oFF** the rest of menus don't appear and pushing ENTER goes directly to **–Pro**-

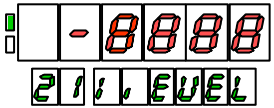
COMPARISON



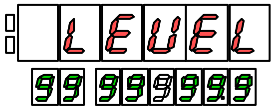
The setpoints can be referred to variables **nEt1**, **nEt2**, **MATH** or **totAL**.
The comparison is done at the actualisation rate of this variable that to say, every 10 ms.

SETPOINT VALUE

Setpoints values are programmable on all display range for the referred variable with polarity and with the same decimal point position as for referred variable.
When referred to Process variable its value is programmed with 4 digit plus polarity on main display.

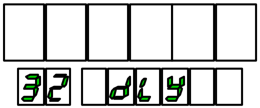


When referred to variable TOTAL, its value is programmed with 8 digits on auxiliary display. The first digit left can be a number from 0 to 9 or a polarity minus.

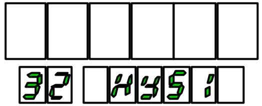


After selected comparison value and pushing **ENTER** access to program if have to work with delay or Hysteresis asymmetrical or symmetrical. (**Not applicable to TOTAL**)

If have been chosen dLY that means delay at switch on or switch off, will be possible to program on next step a value between 000.0 to 999.9 seconds, this delay means the time that the condition have to be maintained before connection or disconnection of output.



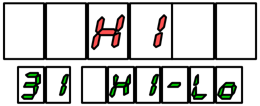
If decided HYS1 o HYS2 the value to be programmed will be a quantity with the same resolution that the variable (Net1 o Net2)

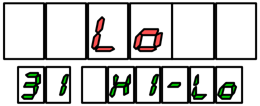


On Page 48 can see a diagram that resume the way of working for different modules.

MODE HI-LO

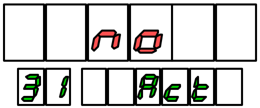
In mode **HI** the output will be activated when the display value is equal or higher than the setpoint value and will deactivate when is lower.
In mode **LO** the output will be deactivated when the display value is equal or higher than the setpoint value and will deactivate when is lower.

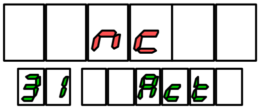




MODE NO - NC

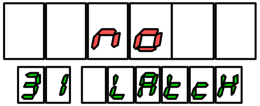
NO (normally open) means that the setpoint output will be deactivated in still condition and activated in alarm condition.
NC (normally closed) means that the setpoint output will be activated in still condition and deactivated in alarm condition.





LATCH

The latch function (latching) is used when is necessary to maintain an alarm activated when the activation condition has disappeared. Example: to know if at the end of a measuring cycle the value has overcomes the programmed limit.



no No latch the output
YES Latch the output on the corresponding edge

When selected the option 'YES', the setpoint output will be activated when display value reach the programmed value and the only way to deactivate is using the logical function 25 (on rear connector)

The output will be activated but not latched if when switch on the instrument the display has a value that is to be in alarm condition. The latch is only produced on the activation output edge, ex. Coming from lower value to higher value, considering the setpoint is working for high.

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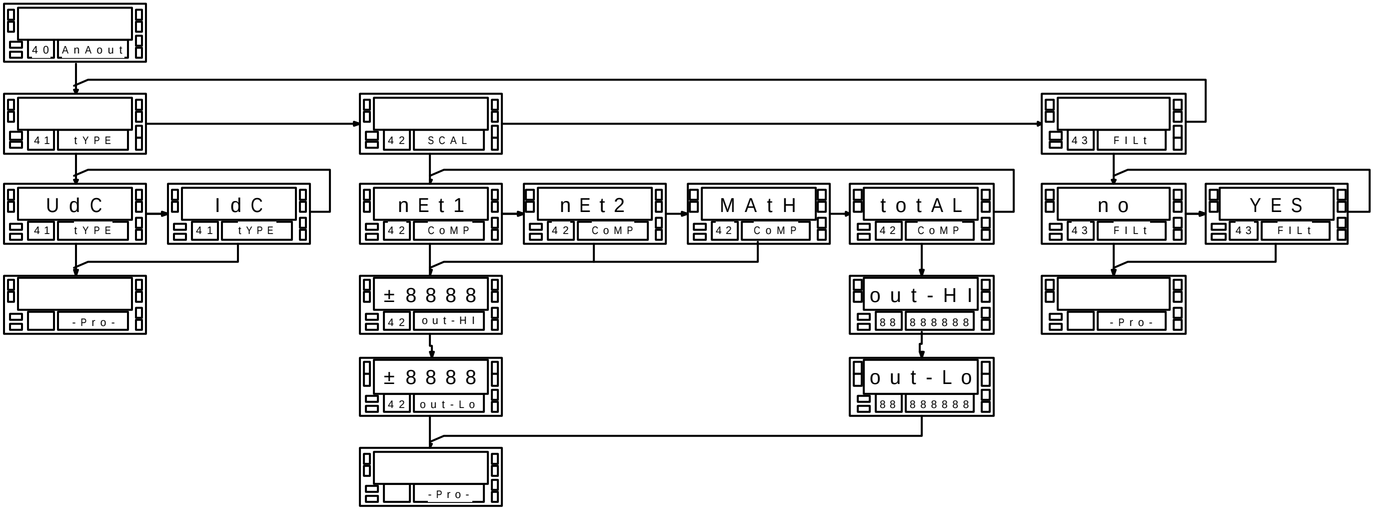
ADDENDUM B. ANALOG OUTPUT



The analog output is refreshed every 10 mS.
The analog output should be related to any display range and be selected to work with Net1, Net2, Math or TOTAL (whenever this variable is authorized)

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ADDENDUM C. SERIAL OUTPUT RS232C or RS485

PROTOCOLS

There are tree communications protocols represented by indication '**Prot-1**', '**Prot-2**' and '**Prot-3**' corresponding to protocols STANDARD, ISO 1745 and MODBUS respectively.

Available COMMANDS

This new one should replace the list of commands given on RS232C or RS485 manuals:

Orders in protocol **1** **2** **3**

	1	2	3
reset PEAK	'p'	'0p'	'p'
reset VALLEY	'v'	'0v'	'v'
reset relays latch	'n'	'0n'	'n'
reset TARE	'r'	'0r'	'r'
set TARE	't'	'0t'	't'
reset TOTAL	'z'	'0z'	'z'

Ask for dates in protocol **1** **2**

	1	2
main display value	'D'	'0D'
TARE value	'T'	'0T'
PEAK value	'P'	'0P'
VALLEY value	'V'	'0V'
TOTAL value	'Z'	'0Z'

Ask for or modification values in protocol **2**

transmitting setpoint # value	'L#'
modify setpoint # value	'M#'

Asking and modifying in protocol **3**

All dates, stored into the instrument's memory can be read and if are on allowed writing area can be modified in blocks up to 250 bytes. The writing area is limited at the programmed parameters. The reading has no limit.

SENDING INFORMATION TO A PRINTER

Through the serial output option RS485 also is possible do a selective transmissions of instrument's information to a PRINTK-180 printer.

The printing logical functions allow do transmissions by instrument's control.

The transmission format is:

- A starting message character followed by instrument direction,
- A blank line,
- One or several lines with the information according the programmed logical function

and, if has been selected to print date and time

- Two blank lines,
- One line with date and time

Finishing with

- a blank line

See section 6.2 on these manual Pages. 28-30 to know how programming logical printing functions