Installation user's manual

Version 1.0

JOLLYW100
W100

CE **2004/108/CE**

EN55022 EN61000-6-2 EN61000-6-4

SYSTEM IDENTIFICATION

LEGENDA

Below are shown the simbologies used in the manual in order to warn the reader:

Caution ! High Voltage !

Caution ! This operation must be executed by skilled workers.

Read carefully the following indications.

Further information.

Disposal of Waste Equipment by Users in Private Household in the European Union

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at this time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the reseller.

CONTENTS

RECOMMENDATIONS FOR CORRECT INSTALLATION OF THE LOAD CELLS

INSTALLING LOAD CELLS : The load cells must be placed on rigid and stable structures; it is important to use the weigh modules for load cells to compensate for misalignment of the support plates.

PROTECTION OF THE CABLE OF THE CELLS: Use water-proof sheathes and joints in order to protect the cables of the cells.

MECHANICAL RESTRAINTS (pipes, etc.) : We recommend the use of flexible pipes and elastic joints; in case of rigid pipes, place the end of the pipe as far as possible to the supporting structure (at least 40 times the diameter of the pipe).

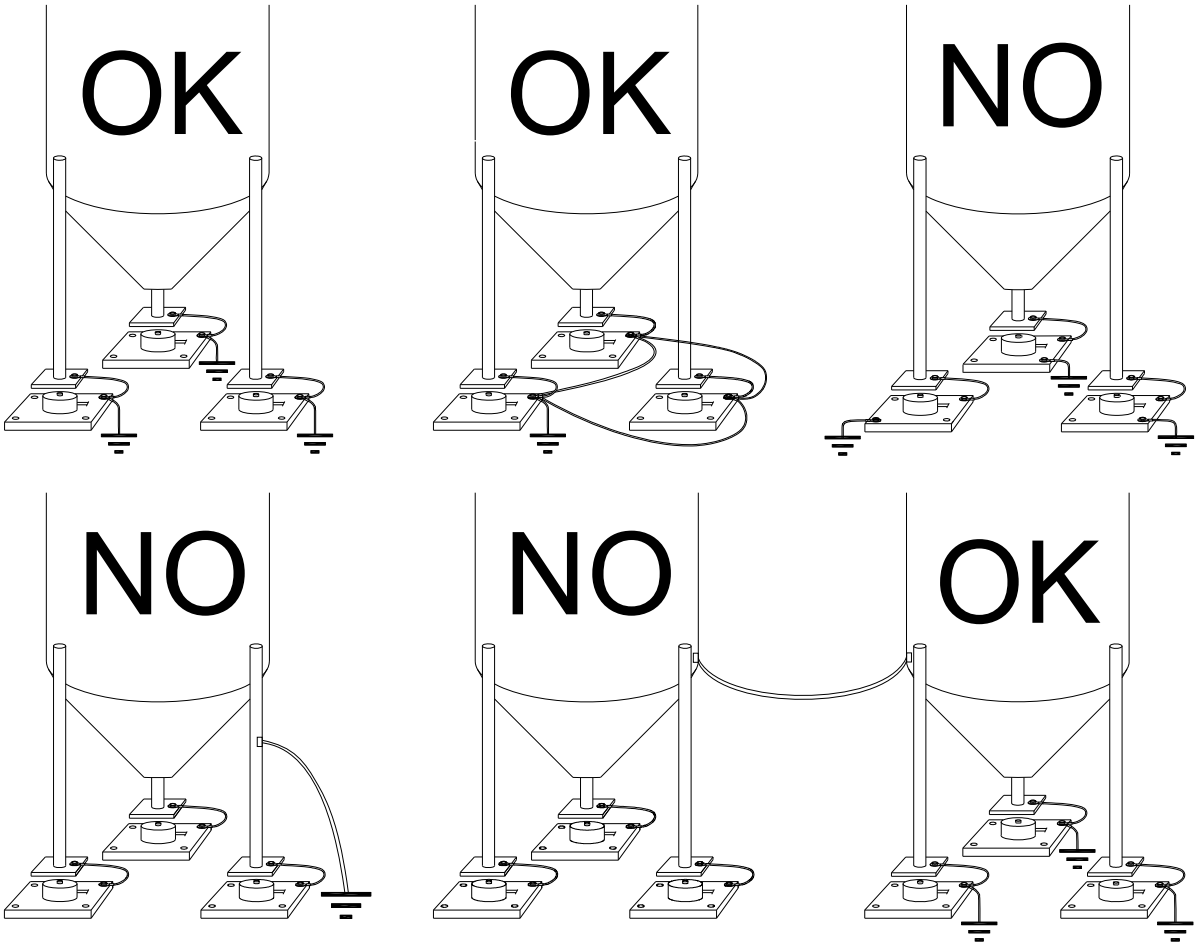
LOAD CELLS IN PARALLEL : Carry out the parallel connection of the cells by using if necessary a water-proof junction box with terminal box. The junction boxes are provided with up to 8 cable glands plus one cable gland for cable exit. The extension cables, connected to the load cells, must be shielded, led alone into the piping or trough and laid as far as possible from the power cables (in case of 4-wire connection: cable 4 x 1 mmq minimum section).

WELDING : Avoid welding while the load cells are installed.

WIND - KNOCKS - VIBRATIONS : The use of weigh modules is strongly recommended to compensate for misalignment of the support plates and especially to achieve optimal accuracy and reliability. To ensure the stability of the structure the designer must consider further contrivances according to the following conditions: Knocks and vibrations; Seismic conditions; Hardness of support structure; Wind effect.

EARTHING THE WEIGHING SYSTEM : By means of a copper wire, connect the upper supporting plate with the lower supporting plate, then connect all the lower plates to the earthing system. Electrostatic charges accumulated by the rubbing of the product against the pipes and the walls of the container weighed are discharged to the ground without damaging the load cells. Failure to carry out a proper earthing system, could not compromise the operation of the weighing system, but does not exclude the future possibility of damages to load cells and instruments connected to them.

FAILURE TO FOLLOW THE RECOMMENDATIONS FOR INSTALLATION IS TO BE CONSIDERED MISUSE OF GOODS.



RECOMMENDATIONS FOR CORRECT INSTALLATION OF WEIGHING INSTRUMENTS

The entry into the cable board of cells must be independent (on one side or the other of the board) and directly connected to the terminal board of the device without breaking by bearing terminal boards or passing through troughs containing other cables.
Use the " RC " filters on the instrument-driven coils of the remote control switches.
Avoid inverter, if inevitable, use filters and separate with sheets.
The installer of the board is responsible for securing the electrical safety of the indicators.
It is a good norm to let the indicators always switch on to prevent the formation of condensation.

LOAD CELLS CHECK

Load cells resistance measure:

Use a digital multimeter (tester).

- Disconnect the load cells from the instrument (or amplifier), make sure that there is not any moistness caused by condensed water or infiltration of water. If so, keep cleaning the system or replace it, if necessary.

- The value between the positive signal wire and the negative signal must be equal or similar to the one indicated in the load cell data sheet (Output resistance).

- The value between the positive supply wire and the negative supply must be equal or similar to the one indicated in the load cell data sheet (Input resistance).

- The insulation value between the shield and any other wires and between any wire and the body of the load cell must be higher than 20 MOhm (mega Ohm).

Load cells tension measure:

Use a digital multimeter (tester).

- Take off the load cell you intend to check from underneath the container.

- Make sure that the supply of the load cell connected to the instrument (or amplifier) is 5 Vdc +/- 3 % .

- Measure the signal between the positive and the negative signal wires directly connected to the tester, make sure that there is a signal included between 0 and 0,5mV (thousandth of a Volt).

- Load the cell and make sure that there is an increasing of the signal.

IN CASE ONE OF THE ABOVE CONDITIONS IS NOT MET, PLEASE CALL THE TECHNICAL ASSISTANCE SERVICE.

MAIN SPECIFICATIONS OF THE INSTRUMENT

Weight Indicator with load cell input (6 wire connection), in DIN box (48x96x130 mm, drilling template 41x91mm) for panel mounting. IP54 front panel protection (IP67 panel - optional).
Six-digit semialphanumeric display (14 mm h), 7 segment with 8 alarm LED. Four-key membrane keyboard. Real-time clock with buffer battery.
The instrument is equipped with RS232 and RS485 serial ports for connection to:
- PC/PLC by ASCII Laumas protocol or ModBus RTU. Optionals Profibus DP and Ethernet/ModbusTCP by appropriate converter.
- Remote display.
- Printer and/or RD data recorder.

THEORETICAL CALIBRATION is performed via the keyboard. Reading the load cells value expressed in mV. Continuous checking the load cells connection. Keyboard lock and block display.

INPUTS: 3 inputs they can be set to operate as gross/net, zero, peak, and they can be remotely read by a PC or PLC.

OUTPUTS: 5 outputs they can be set as 5 set-points or they can be remotely commanded by a PC or PLC.

ANALOG OUTPUT (only for W100ANA and JollyW100ANA): Optoisolated analog output 16 bit (65535 div.). Available settings: 0-20mA; 4-20mA (max 300Ohm); 0-10 Vdc; 0-5 Vdc; +/- 10 Vdc; +/- 5 Vdc (min 10kOhm).

TECHNICAL SPECIFICATIONS OF THE INTRUMENT

POWER SUPPLY AND POWER ABSORBED	12 - 24 VDC +/- 10% ; 5 W
No LOAD CELLS IN PARALLEL AND POWERED	max 8 (350 Ohm) ; 5VDC/120mA
LINEARITY / LINEARITY OF THE ANALOG OUTPUT	< 0.01% F.S. ; < 0.01% F.S.
THERMAL DRIFT/THERMAL DRIFT OF THE ANALOG OUTPUT	< 0.0005 % F.S. /°C ; < 0.003 % F.S./°C
A/D CONVERTER	24 bit (ca 16.000.000 points)
MAX DIVISION (with measure range: +-10mV = sens. 2mV/V)	+/- 999999
MEAUSRE RANGE	+/- 39 mV
MAX LOAD CELL'S SENSITIVITY	+/-7mV/V
MAX CONVERSIONS PER SECOND	300 conversions/sec
DISPLAY RANGE	- 999.999 ; + 999.999
DECIMALS / DISPLAY INCREMENTS	0 - 4 / x 1 x 2 x 5 x 10 x 20 x 50 x 100
DIGITAL FILTER / CONVERSION RATE	0.060 – 7 sec / 5 - 300 Hz
LOGIC OUTPUTS (relays)	N.5 - max 115 VAC ; 150mA
LOGIC INPUTS	N.3 - optoinsulated 5 - 24 VDC PNP
SERIAL PORTS	RS232, RS485
BAUD RATE	2400, 4800, 9600, 19200, 38400, 115200
HUMIDITY (condensing free)	85 %
STORAGE TEMPERATURE	- 30°C + 80°C
WORKING TMEPERATURE	- 20°C + 60°C

COMMISSIONING THE INSTRUMENT

Upon switching on, the display shows in sequence the instrument model, "SU" followed by the software code, "r"followed by the software version, "HU"followed by the hardware code, the serial number.

Verify that the display visualises the weight and that when loading the load cells that there is an increase in weight. If this is not so, check and verify the connections and proper positioning of the load cells.

- If the instrument has already been calibrated (see plant system identification tag on the cover), verify the calibration with a sample weight and if necessary see to the correction of the weight indicated (see paragraph **REAL CALIBRATION** with the verification of the indicated weight).
- If the instrument is not calibrated proceed with its calibration (see paragraphs **THEORETICAL CALIBRATION** and **REAL CALIBRATION**).
- If the analogue output is used, set the type of analogue output desired, the zero and the full scale (see paragraph **ANALOGUE OUTPUT** - only for W100ANA and JollyW100ANA).
- If set-points are used, set the weight values desired and their relative parameters (see paragraphs **SETPOINTS** and **OUTPUT SETTINGS**).

OPERATION

W100, JollyW100

- Achieves the parallel of a maximum of 8 load cells.
- Visualises the weight and in a stable weight condition the stability LED lights up;
- Transmits the weight by way of RS485 and RS232 serial port (MODBUS-RTU or ASCII protocol, continuously (as, for example, with a repeater) or upon interrogation (with settable instrument).
- Possibility to print current date and time, net/gross weight and peak if present
- It has three inputs, which can perform different functions:
    - Gross/Net weight function
    - Zero set function
    - Peak weight memorisation
    - Display the real weight or the weight scaled by the coefficient (COEFF)
    - These may be remotely read by way of the ASCII or MODBUS RTU protocol
    - Print commad

- It has five outputs that :
    - Allow the establishment of two set points with commutation of the contact with a greater or equal weight to the threshold if the weight is increasing and commutation tot he threshold set less the possible hysteresis value if the weight is decreasing.
    - These may be remotely commanded by way of the protocol

The possibility of reading three inputs and commanding five outputs by way of a remote protocol allows the realisation of small automation programs.

W100ANA, JollyW100ANA

The following features differentiate this from the W100:

- it provided an analogue output proportional to the weight, with settable zero and full scale for the entire weighing range.
- it has two inputs.
- it has four outputs.

LED AND KEY FUNCTIONS

Main LED functions:

NET : net weight LED: it lights up when the visualisation is in net weight (semi-automatic tare) or a preset tare has been set)

→0← : Zero LED (lights up when the weight is at zero)

: Stability LED (lights up when the weight is stable)

kg : The LED lights up when the unit of measure is in kilograms

g : The LED lights up when the unit of measure is in grams

W1,W2,W3: not used

Secondary LED function:

During the visualisation of the weight pushing and holding down the MENU Enter and PRINT ▲ buttons at the same time (push MENU Enter first and then PRINT ▲) the LEDs will indicate:

NET : LED lighted input 1 closed

→0← : LED lighted input 2 closed

: LED lighted output 2 closed

W1 : LED lighted output 1 closed

W2 : LED lighted output 2 closed

W3 : LED lighted output 3 closed

kg : LED lighted output 4 closed

g : LED lighted output 5 closed

Key function:

MENU Enter Setting set-points and hysteresis.

MENU Enter + →0← ESC Setting general parameters (push MENU Enter first and then →0← ESC).

MENU Enter + TARE ◀ Setting preset tare (push MENU Enter first and then TARE ◀).

PRINT ▲ (pressed less than 3 sec) Sends main data to printer: weight, date and time.

PRINT ▲ (3 sec) Quick access to load cell mV response test.

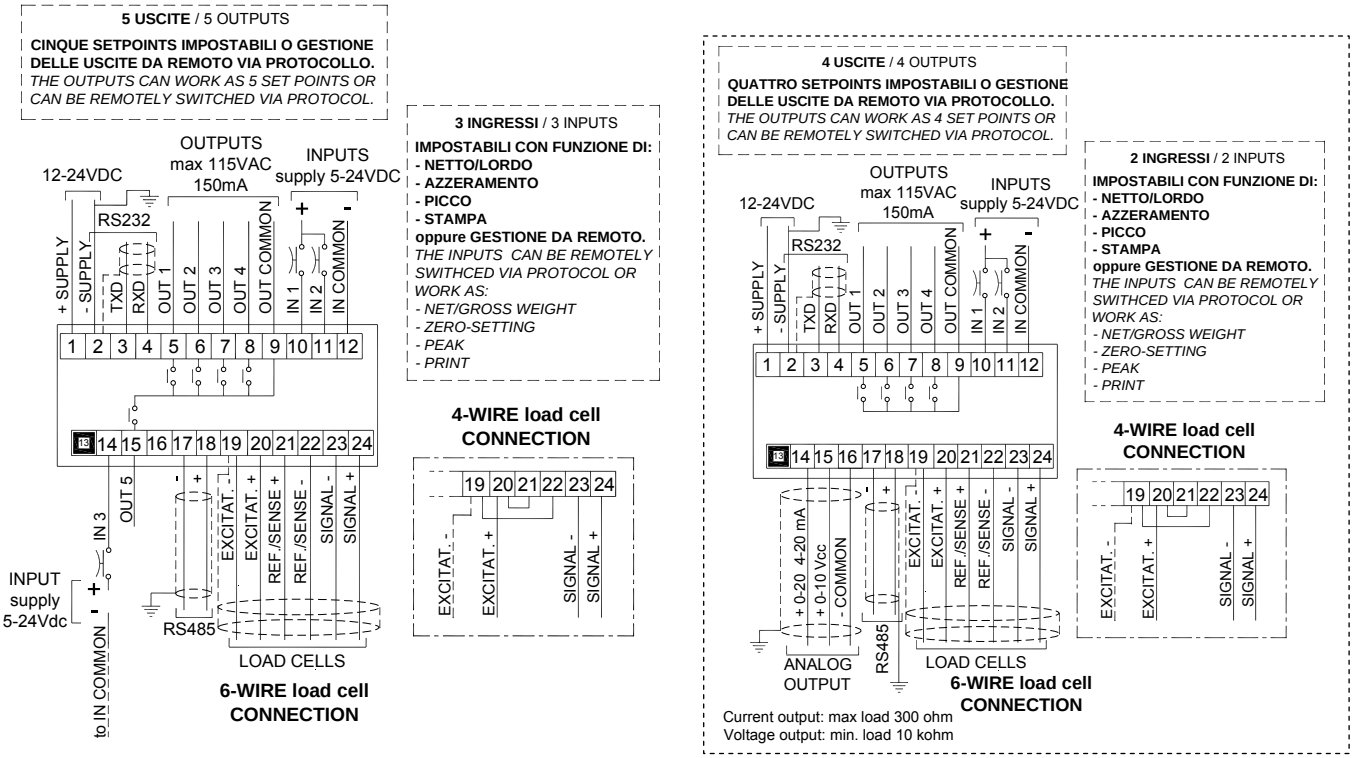
TARE ◀ Net function (semi-automatic tare).

→0← ESC (3 sec) Quick access to the weight zeroing.

WIRING DIAGRAM

- Connect terminal 2 to the RS485 common of the instruments connected in the event that these are alternately powered or that they have an optically isolated RS485.
- In the case of an RS485 network with several devices it is recommended insert the 120R termination resistances on the two devices located at the ends of the networks, as described in the paragraph **RS485 COMMUNICATION**.
- It is recommended that the power supply negative pole be grounded.

ANALOG OUTPUT OPTION



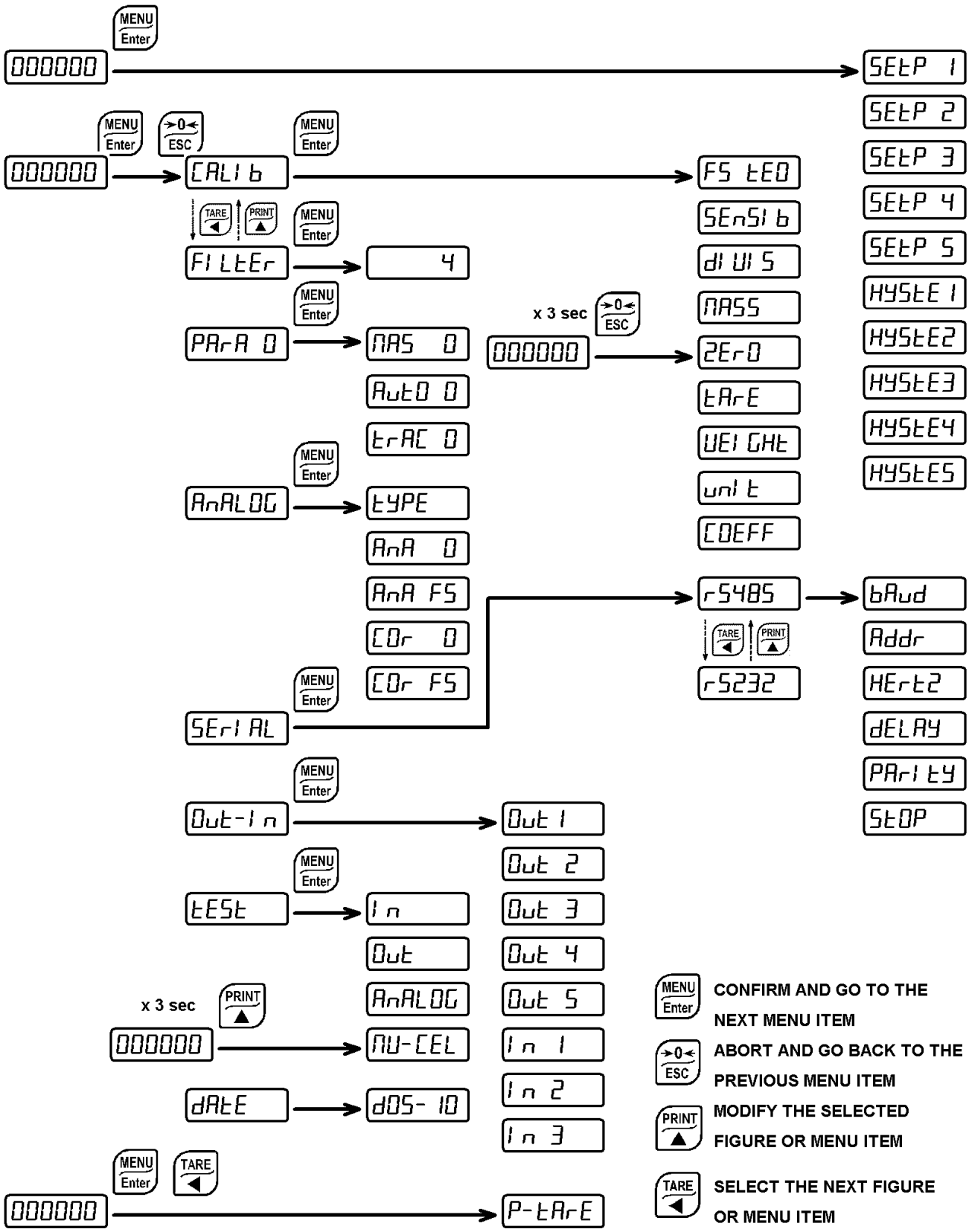
- It is possible to connect up to eight 350Ohm load cells or sixteen 750 ohm load cells in parallel.

CELL INPUT FAST ACCESS TEST

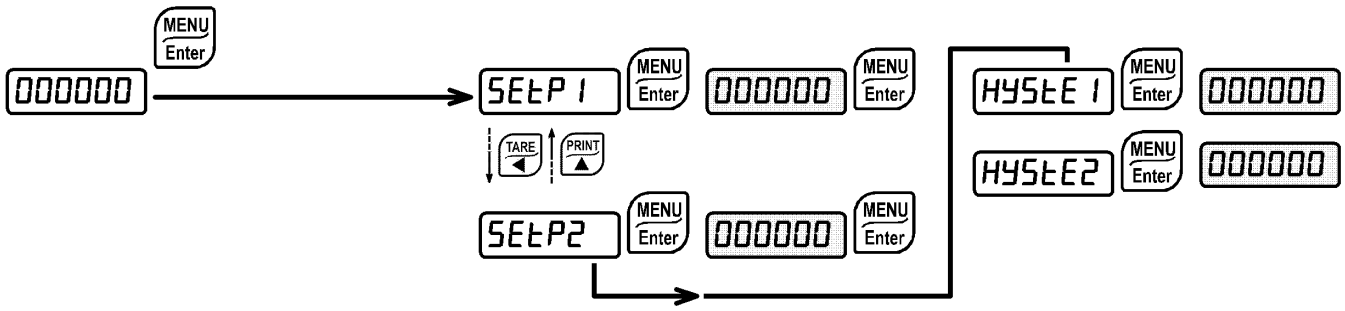
From the visualisation of the weight, push PRINT for 3 seconds; the signal response of the load cells is visualised, expressed in mV with four decimals.

INSTRUMENT PROGRAMMING

When one enters into the menu programming, all of the functions remain active, except the reading of the inputs (analogue, serial, settings...), the changes made in the menu have immediate effect.



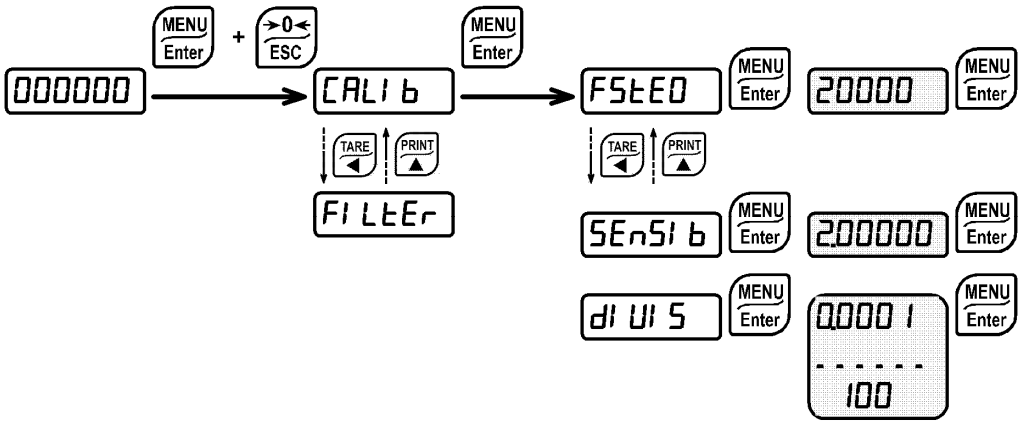
SET POINTS



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.
These values are set to zero if a new calibration is performed or the weight decimals are changed.

- SEt-P **(Setpoint)**: value of the weight, which when exceeded causes the commutation of the contact (from 0 to max full scale; default 0).
- HYStE **(Hysteresis)**: value to be subtracted from the setpoint to obtain commutation of the contact for decreasing weight. For example with a setpoint at 100 and a hysteresis at 10 the commutation comes about at 90 for decreasing weight (from 0 to max full scale, default 0).

THEORETIC CALIBRATION



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.
The instrument is supplied with a theoretical full scale "dEnO " corresponding to 10000.

To perform the theoretical calibration set the following parameters in sequence:

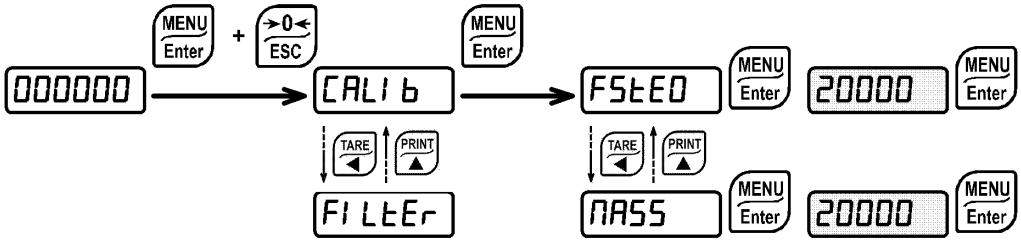
- FS-tEo**:** The **Full Scale System** is given by the load limit of one cell multiplied by the number of cells used. Example of the calculation of the system full scale: 4 cells of 1000kg FULL SCALE = 1000 X 4 = 4000.

Each time that this value is changed real calibration performed with the sample weight is cancelled. To visualise "dEnO" and **cancel the theoretical and real calibrations,** set 0 as the full scale.

- SEnSI b: The **sensitivity** is a rating plate parameter for the load cells and is expressed in mV/V. Set the average sensitivity value indicated on the load cells (from 0.50000 to 8.00000 mV/V). The default value is 2.00000 mV/V
- dI UI S: The **division** (resolution) is the minimum value of weight increase that may be visualised. It is calculated automatically by the system based upon the calibration performed, in such a manner as to correspond to 1/10000 of the full scale. It is possible to modify this value and it may vary from 0.0001 to 100 with increments x1, x2, x5, x10.

ATTENTION:
- Modifying only either the full scale or only the sensitivity the real calibration is nullified and the theoretical is the one considered.
- If the theoretic full scale and the recalculated full scale in the real calibration are equal, the current valid calibration is the theoretic one; if they are different, the valid one is the real one with sample weight.
- Modifying the theoretic full scale or the recalculated full scale or the divisions all the system's parameter containing a weight value will be set at default values (set, hysteresis, maximum, zero, and analogue full scale, etc.).

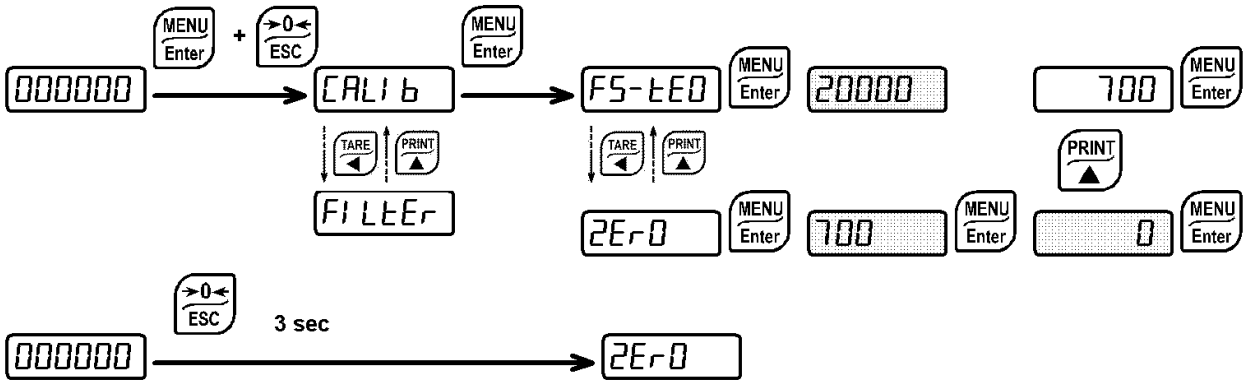
MAXIMUM WEIGHT



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

MASS: Maximum weight that may be visualised. When the weight exceeds this value by 9 divisions, '-------' appears. Setting 0 the check is disabled. Default value: 0 (from 0 to max full scale)

ZERO SETTING THE WEIGHT



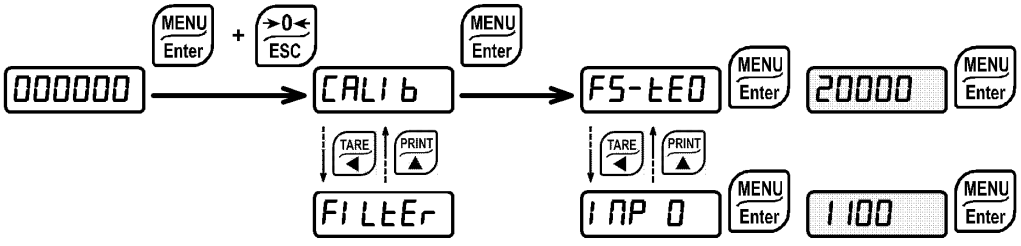
This menu may also be accessed directly from the visualisation of the weight holding down the → 0 ← ESC button for 3 seconds.

Perform this procedure after having set the theoretical calibration data.

Utilise this function to zero set the weight of the empty plant system after commissioning and then later to compensate zero variations due to presence of product residues.
As seen in the diagram,

- Confirm the message 2Ero (Zero).
- The weight value that is to be zeroed out appears. In this phase all of the LEDs flash.
- Confirming, zeroes out (the value is memorised in the eprom).
- Pushing PRINT the value of the total weight zeroed out by the instrument appears, determined by the sum of all of the zero set procedures previously performed.

SETTING THE ZERO VALUE

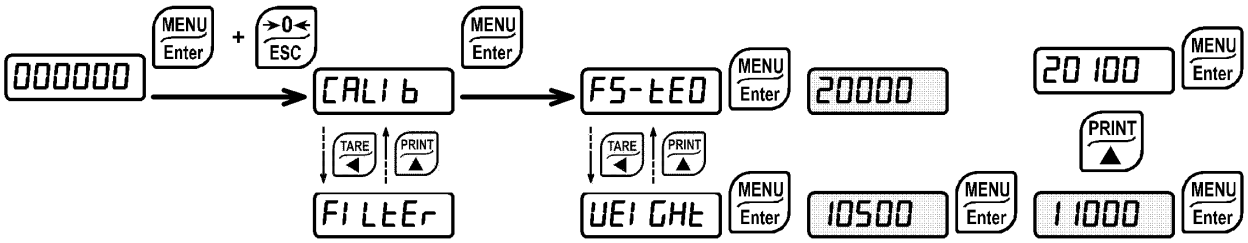


The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

Set this parameter to the estimated zero value if it is not possible to zero set the weight because the weighed structure contains some product that can not be unloaded.
(form 0 to max 999999; default 0)

REAL CALIBRATION (VERIFICATION OF THE WEIGHT INDICATED)

POSSIBILITY OF LINEARIZATION ON 5 POINTS



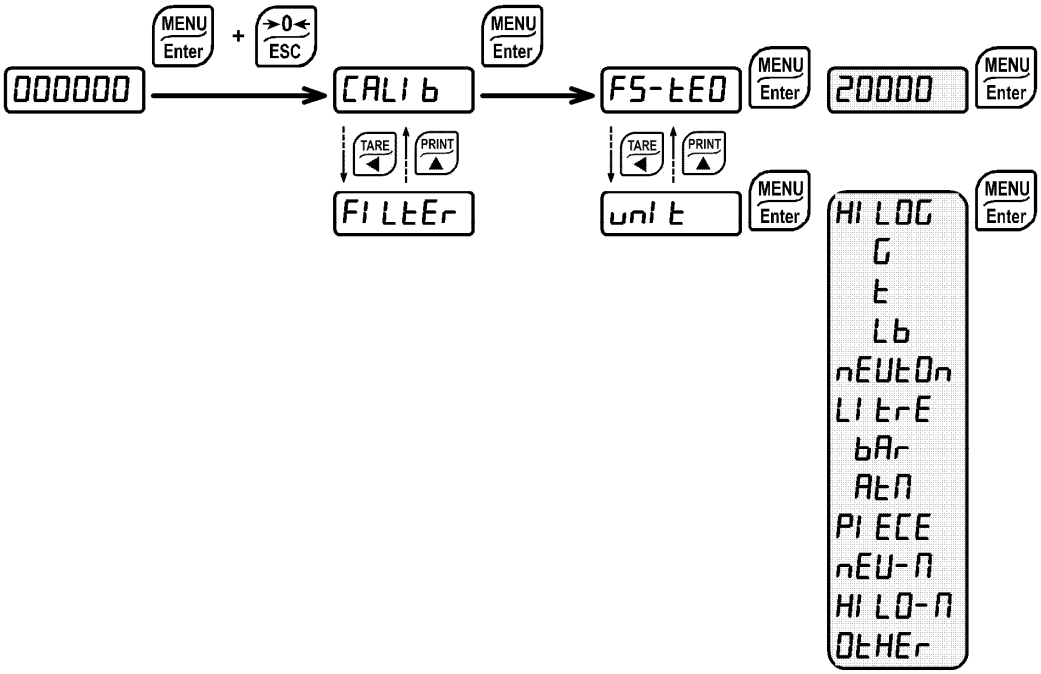
After having performed the **WEIGHT ZERO SET** procedure, it is possible to load a sample weight onto the weighing system, equal to the maximum quantity that is to be weighed or **at least the 50%** of it.

- Confirming the message UEI GHt the flashing weight value currently on the system appears. In this phase all of the LEDs are off. Proceed, if necessary with the correction of the value visualised. Confirming, the new weight set will appear with all of the LEDs flashing.
- After an additional confirmation, the message, UEI GHt returns and the operation with a new sample weight may be repeated. **In fact, it is possible to perform a linearization of the weight repeating the procedure up to a maximum of five times, using five different weight samples;** after the fifth time, entering into the menu, the message MAX-Pu will appear and then returns to UEI GHt. At this point it is no longer possible to change or add a single calibration value, but only to perform a new calibration (cancelling the previous one) returning to the visualisation of the weight and then returning to the calibration menu.
- Pushing PRINT after having confirmed the sample weight that was set, the full scale appears recalculated on the value of the maximum sample weight entered, keeping as reference the cell sensitivity set in the theoretical calibration (SEnSI b).

ATTENTION:

- If the theoretic full scale and the recalculated full scale in the real calibration are equal, the current valid calibration is the theoretic one; if they are different, the valid one is the real one with sample weight.
- All the parameters containing a user-modifiable weight value will be set at default values if the performed correction modifies in a significant way the system full scale; the variation has to be more than 5% of the 'old' full scale value (set, hysteresis, maximum, zero, and analogue full scale, etc).

SETTING UNITS OF MEASURE



HI LOG: kilograms
G: grams
t: tons
Lb: pounds *
nEUtOn: newton *
LI trE: litres *
bAr: bar *
AtN: atmospheres *
PI ECE: pieces *
nEU-n: newton metres *
HI LO-n: kilogram metres *
OtHEr: generic units of measure not included in the list *

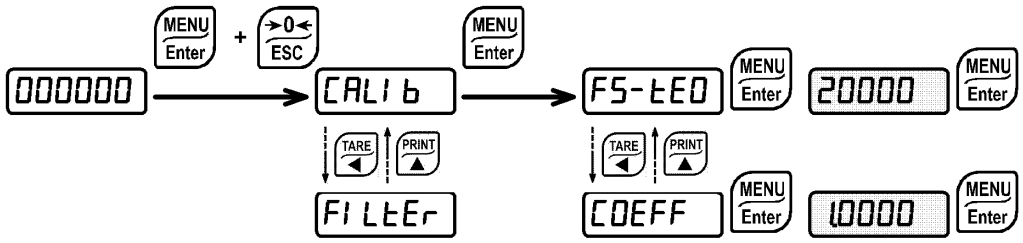
In the instruments equipped with a print, the symbol relative to the unit of measure selected will be printed after the value measured.

ATTENZIONE: for the following units of measure marked with an * it is necessary to also set the display coefficient (parameter COEFF, see the dedicate paragraph).
If you wish to use COEFF set in unI t the measurement unit you want when COEFF is active (COEFF input closed), not the measurement unit used to calibrate the instrument.

VISUALISATION COEFFICIENT

Through the setting of a coefficient COEFF the visualisation on the display will be modified based upon this value.

ATTENTION: all of the other settings (setpoints, hysteresis, calibrations...) will remain expressed in weight values. In the event that these are needed in a new unit of measure, as full scale in the calibration phase the value of the new unit of measure must be set (in this case in the data entry field COEFF is to be set at 1).



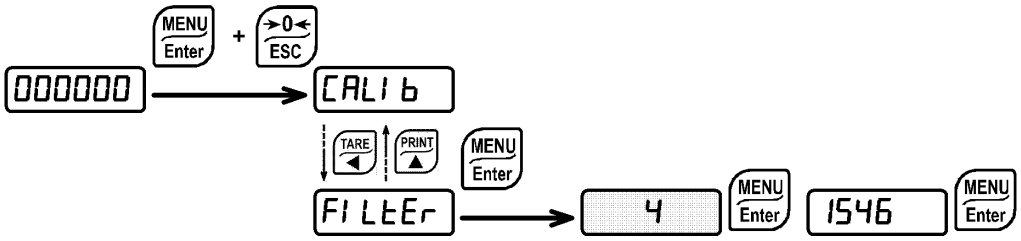
In setting this value the LEDs light up in sequence to indicate that a setting is being displayed.

COEFF assumes a different meaning according to the value set in UNITS (see paragraph on **SETTING UNITS OF MEASURE**), that is, of the chosen units of measure.
(max value 99.9999; default 1.0000)

If the unit of measure chosen is:
Lb: pounds, the value set in COEFF will be multiplied by the weight value currently visualised
nEUton: Newton, the value set in COEFF will be multiplied by the weight value currently visualised
LItrE : litres, in COEFF set the specific weight in kg/l; it is assumed that the system is calibrated in kg
bAr : Bar, the value set in COEFF will be multiplied by the weight value currently visualised
AtM : atmosphere, the value set in COEFF will be multiplied by the weight value currently visualised
PIECE : pieces, in coEFF. set the weight of one piece
nEU-M : Newton metres, the value set in COEFF will be multiplied by the weight value currently visualised
HILO-M : kilogram metres, the value set in COEFF will be multiplied by the weight value currently visualised
OtHEr : other generic units of measure not included in the list, the value set in COEFF will be multiplied by the weight value currently visualised

If one of the inputs is set in the COEFF modality (see paragraph **CONFIGURATION OF OUTPUTS AND INPUTS**) with input closed the modified value will be visualised based on the COEFF; coefficient; with input open it returns to a normal visualisation of the weight.

FILTER ON THE WEIGHT



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

The setting of this parameter allows a stable visualisation of the weight to be had.
As seen in the diagram:

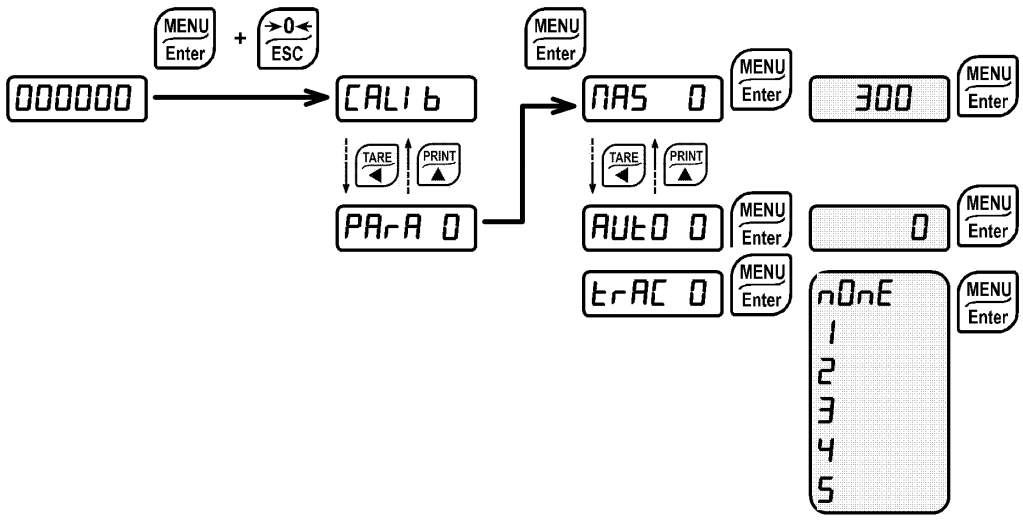
- Confirming the message, FILtEr. the flashing filter value currently on the scale appears.
- Changing the value and confirming the weight will appear, and it is possible to experimentally verify its stability. In this phase the LEDs flash to indicate that visualisation of the weight is not occurring.
- If the stability is not satisfactory, confirming brings back the message, FILt and the filter may again be modified until achieving an optimum result.

To increase the effect, (more stable weight), increase the value (from 0 to 9; default 4).

The filter is able to make stable a weight which variances are lower than the concerning “Response Time”. It is necessary to set this filter in function of the type of use and in relation with the value of the full scale set.

FILTER VALUE	Response time [ms]	Display and serial port refresh frequency [Hz]
0	60	300
1	150	100
2	260	50
3	425	25
4 (default)	850	12.5
5	1700	12.5
6	2500	12.5
7	4000	10
8	6000	10
9	7000	5

ZERO PARAMETERS



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

WEIGHT SETTING THAT MAY BE ZERO SET BY EXTERNAL CONTACT

nAS 0 : This parameter indicates the maximum weight value that may be zeroed out by external contact. The default value is 300 considering the decimals: 300 – 30.0 – 3.00 – 0.300 (from 0 to max full scale).

AUTOMATIC ZERO UPON SWITCHING ON

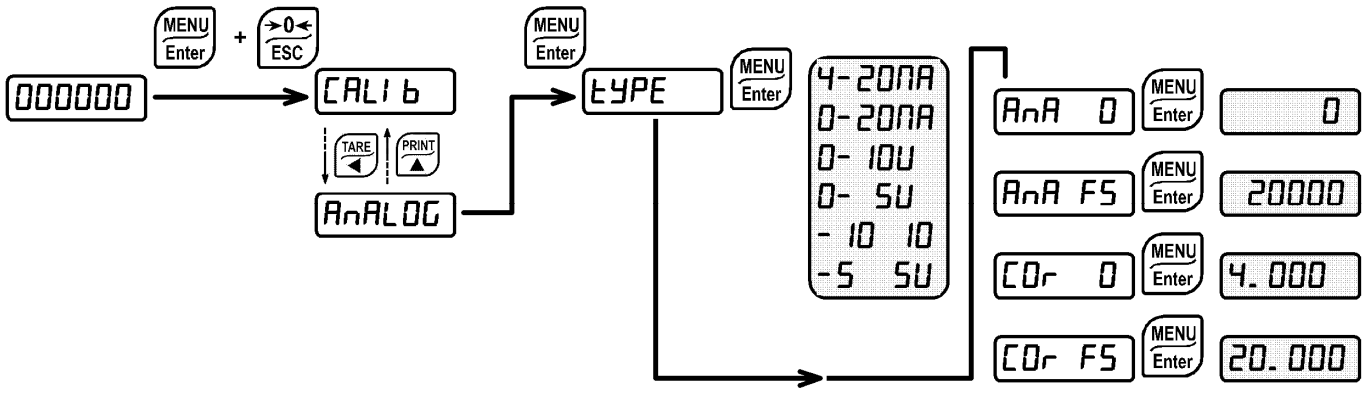
AUtO 0 : If upon switching on the instrument the value of the weight read is below the value set in the parameter AUtO 0 and does not exceed the value of nAS 0 the weight read will be zeroed out (max value that may be set is 20% of the full scale). To disable this function, set this parameter to 0 (default 0).

ZERO TRACKING

trAC 0 : When the weight value is stable, if after a second it differs from zero by a number of divisions smaller or equal to the number of divisions set in this parameter the weight is set to zero. (possible values: from 1 to 5; to disable the function select nOnE. Default nOnE).

Example: if dI UI 5 is 5 and trAc 0 is 2 the weight will be automatically set to zero for variations smaller or equal to 10.

ANALOGUE OUTPUT (ONLY FOR W100ANA AND JOLLYW100ANA)



The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

- Analogue type of output (*tYPE*): the possible analogue outputs are: 4..20mA, 0..20mA, 0..10V, 0..5V, -10..10V, -5..5V. (default 4-20mA)
  ATTENTION: for the -10..10V and -5..5V outputs it is necessary solder closed the SW1 on analog board:
- *AnA 0*: is the weight value for which there will be a minimal analogue output signal (which are only positive) or the weight value for which the analogue output is 0V (for negative or positive signals, -10..10V and -5..5V) default 0.
- *AnA FS* Full scale analogue output: is the weight value for which there is the maximum analogue output value and must correspond to that set in the PLC program. (default: equal to the calibration full scale)
- *COr 0* Correction of the analogue output to zero: allows the modification of the analogue output permitting that the 0 is indicated to the PLC. On the last figure on the left the '-' sign can be set.
- *COr FS* Correction of the analogue output to full scale : allows the modification of the analogue output permitting that the value set in the parameter *AnA FS* is indicated to the PLC.

Minimum and maximum values that may be set for the correction of zero and full scale:

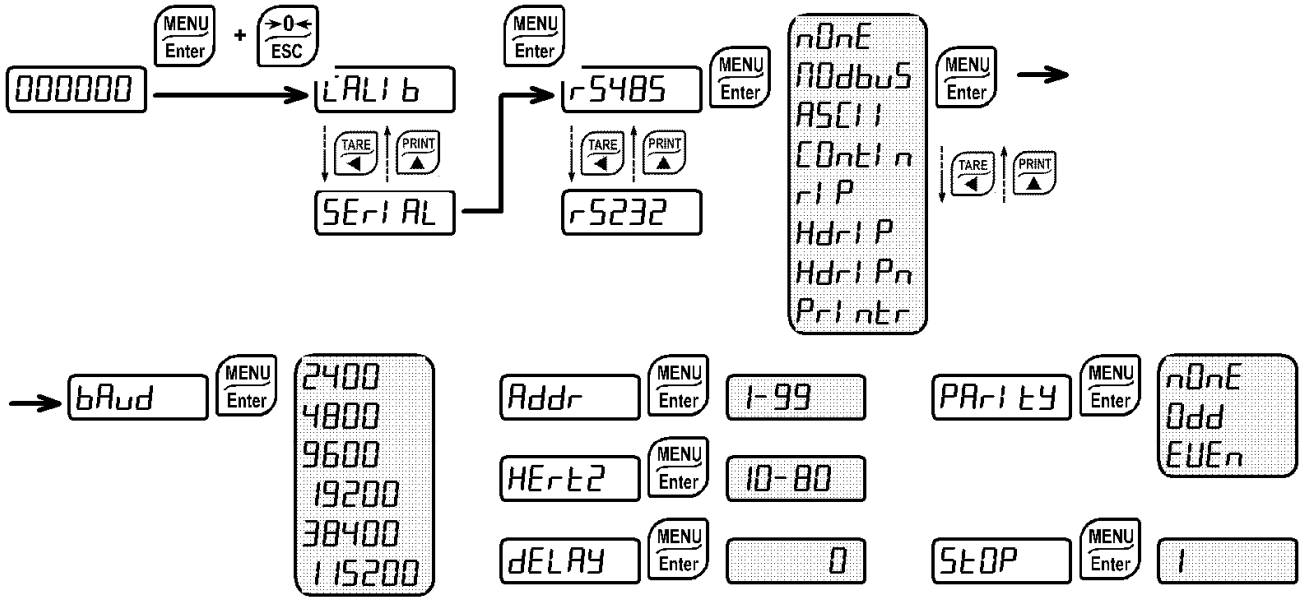
ANALOGUE TYPE OF OUTPUT	Minimum	Maximum
0 -10V	-0.150	10.200
0-5V	-0.150	5.500
-10 +10V	-10.300	10.200
-5 +5V	-5.500	5.500
0-20mA	-0.200	22.000
4-20mA	-0.200	22.000

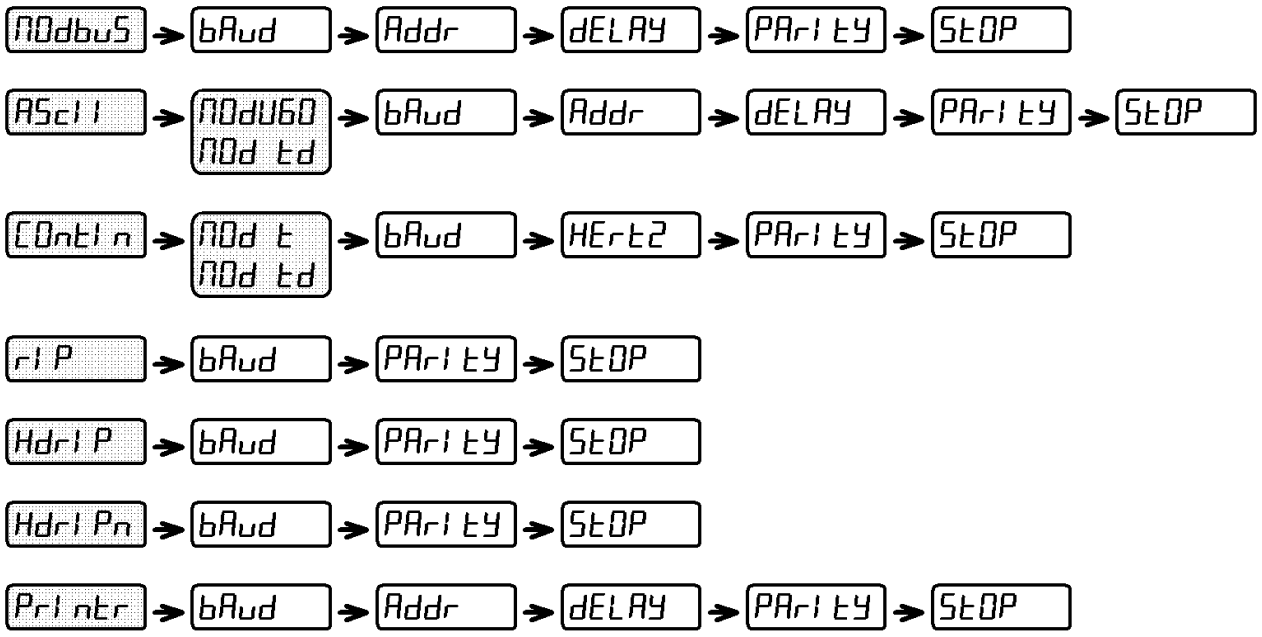
PLEASE NOTE: the analogue output may also be used in the inverse manner, that is, the weight set that corresponds to the analogue zero (*AnA 0*), may be greater than the weight set for the analogue full scale, (*AnA FS*). The analogue output will increase toward full scale while the weight decreases; the analogue output will decrease while the weight increases.

Example:

AnA 0= 10000 AnA FS= 0 analogue output 0 - 10 V
Weight = 10000 analogue output = 0 V
Weight = 5000 analogue output = 5 V
Weight = 0 analogue output = 10 V

SERIAL COMMUNICATIONS SETTINGS





According to the protocol chosen (modbus, ascii...) only the necessary settings will be visualised in sequence (see above diagram).

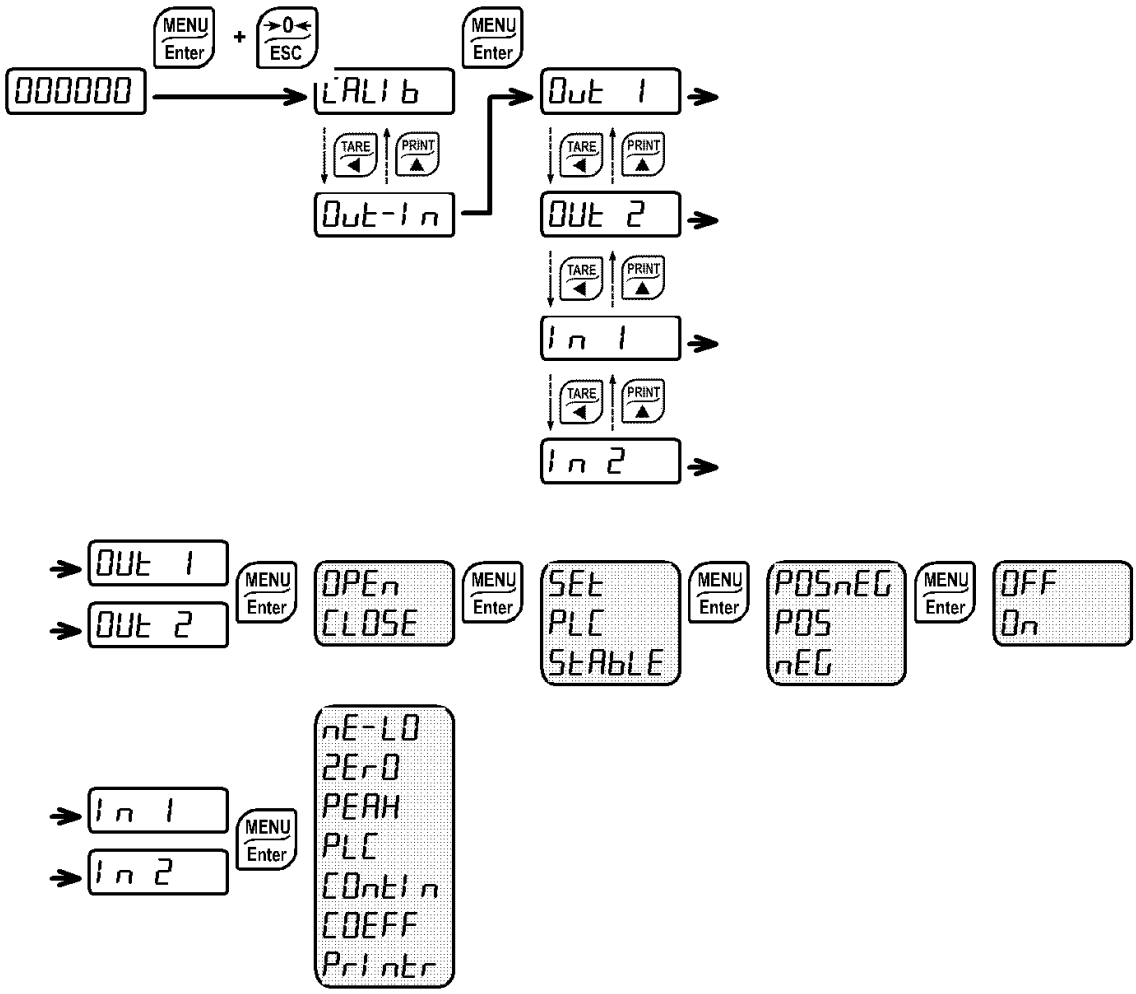
The LEDs light up in sequence and indicate that a setting is being visualised and not the weight.

- The parameter **r5485:** allows the selection of the type of communication
  - ModbUS :enables communications with MODBUS-RTU protocol with address from 1 to 99.

- ASCII : enables communications with the ASCII protocol (interrogation mode). Possible addresses from 1 to 99.
  - MODUB0 : (see paragraphs on the protocols) communication identical to W60000.
  - MOd td: (see protocols paragraph) communication compatible with the TDRS485
- Print: sends to the printer date and time, address and instrument type, gross weight, net weight, the weight of peak if present, by pressing the PRINT key or closing the input set as Print.
- Contin : transmits the weight value in a continuous manner (see protocol 'fast continuous transmission'), with frequency selected under the item HErtz (from 10 to 80).
  Maximum frequency that may be set:
  - 20Hz with 2400 baud minimum baud rate.
  - 40Hz with 4800 baud minimum baud rate.
  - 80Hz with 9600 baud minimum baud rate.
  - MOd t : (see paragraphs on the protocols) communication identical to TXRS485.
  - MOd td: (see paragraphs on the protocols) communication compatible with the TDRS485
- rIP: enables one way communication with RIP series repeaters; net or gross weight is displayed on the repeater depending on how the repeater is set. (set for RIP series repeaters compatibility bAUd=9600, PArIty=nonE, StOP= 1).
- HdrIP: enables one way communication with HDRIP series repeaters; net or gross weight is displayed on the repeater depending on how the repeater is set. (set for RIP series repeaters compatibility bAUd=9600, PArIty=nonE, StOP= 1).
- HdrIPn: enables one way communication with HDRIP series repeaters.
  The repeater is set to gross weight:
  - If the W100 shows the gross weight the repeater shows the gross weight
  - If the W100 shows the net weight the repeater shows the net weight alternated with 'nEt' (set for RIP series repeaters compatibility bAUd=9600, PArIty=nonE, StOP= 1).
- nonE : disables any type of communication (default).

- bAUd: Allows the selection of the transmission speed. Possible values: 2400, 4800, 9600, 19200, 38400, 115200
- Addr: allows the setting of the communication address from 1 to 99..
- HErtz: maximum transmission frequency, to be set when the transmission protocol is selected 'Contin' (10-20-30-40-50-60-70-80) .
- dELAY: allows the delay value to be set in milliseconds that the instrument allows to pass before transmitting the response (from 0 to 200 msec).
- PArIty :
  - nonE : null parity.
  - EUEn : even parity.
  - Odd : odd parity..
- StOP : stop bit 1 or 2.

CONFIGURATION OF OUTPUTS AND INPUTS



Possible output operation modes:

- **OPEn (normally open)**: the relay is not charged and the contact is open when the weight is less than the setpoint value established; it closes when the weight is greater than or equal to the setpoint value established.
- **CLOSE (normally closed)**: the relay is charged and the contact is closed when the weight is less than the setpoint value established; it opens when the weight is greater than or equal to the setpoint value established.
- **SEt:** the contact commutes with the weight value, based on the setpoints (see paragraph **SET-POINTS**).
- **PLC:** the contact does not commute based on the weight but is managed by the remote protocol commands.
- **StAbLE:** the commutation of the relay comes about when the weight is stable.

If the operational modality **SEt** is selected the following options are also active:

- **POSnEG :** the commutation of the relay comes about by either the positive or negative weight value.
- **POS**: the commutation of the relay comes about only by a positive weight value..
- **nEG:** the commutation of the relay comes about only by a negative weight value.

Confirming with MENU Enter you can set the operating mode when the set-point is '0':

- **OFF:** the commutation of the relay does not come about if the set point value is '0'.
- **On:**
  - Setpoint = '0' and **MODES=POSNEG**,the commutation of the relay comes about when the weight is at '0'. The relay commutes again when the weight is not at zero taking the hysteresis into account (for both positive and negative weight)
  - Setpoint = '0' and **MODES=POS**, the commutation of the relay comes about when the weight is greater than or equal to '0'. The relay commutes again for values less than '0' and taking the hysteresis into account.
  - Setpoint = '0' and **MODES=NEG,** the commutation of the relay comes about when the weight is less than or equal to '0'. The relay commutes again for values above '0' and taking the hysteresis into account..

The outputs are set by default as it follows: OPEN / SET / POSNEG / OFF.

Possible input operation modes:

- **NE-LO** : close the NET/GROSS input for a second maximum or push the TARE button, the display will be taken to zero (SEMI-AUTOMATIC TARE) and NET led will light up.
  To return to visualising the gross weight and turning off the corresponding LED keep the NET/GROSS input closed or push TARE for 3 seconds.
  The net function is not allowed if the gross weight is zero.
- **ZERO:** closing the input for a second maximum the weight is set to zero only if the weight is less than the quantity set under the heading **MAS 0**.
- **PEAK:** Keeping the input closed the maximum weight value achieved remains visualised. Opening the contact the current weight is visualised.
- **PLC:** closing the input no operation is performed, the input status may however be read remotely by way of the communications protocol.
- **CONTI n :** closing the input for a second maximum the weight is transmitted over the serial connection with the fast transmission protocol just one time. (**only if CONTI n is set under the heading SERIAL)**
- **COEFF :** when the input is closed the weight is visualised based on the coefficient set (see setting units of measure and coefficients), otherwise the weight will be visualised.
- **PRINTR:** when the input is closed the data is sent for printing if the PRINTR parameter has been set in the communications protocol of one of the two serial ports.

By default: input 1 = ZERO input 2 = NE-LO input 3 = PEAK

NET WEIGHT/GROSS WEIGHT

To manually batch several products with the weighing system the operator before batching the next product closes the NET/GROSS input for a second maximum or presses the 

; the displayed weight is set to zero (SEMIAUTOMATIC TARE) and the NET led lights up. This operation can be done many times to allow batching many products.

To come back to the gross weight and turn off the NET led keep the 

key pressed for 3 seconds or keep the NET/GROSS input closed for 3 seconds.

WARNING: when the net weight is displayed (NET led on to indicate that a tare device is active) the gross weight can be temporarily visualised keeping the 

key pressed: the NET led turns off and the gross weight is displayed. As soon as the 

key is released the net weight is visualised again (NET led on).
The net function is not allowed if the gross weight is zero.

SEMIAUTOMATIC ZERO

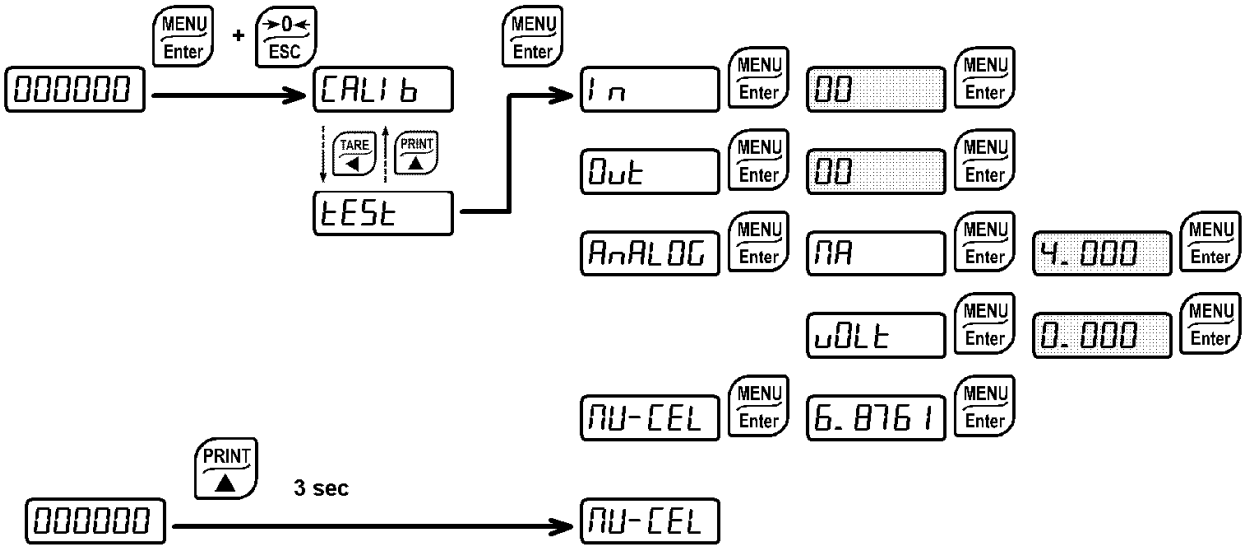
Closing the input for a second maximum the weight is set to zero; the zero set value is memorised in RAM. Therefore the zero setting will be lost upon shutting down the instrument. The function is active only if the weight is less than the quantity set under the heading nAS 0 (see paragraph **SETTING WEIGHT THAT MAY BE ZERO SET BY EXTERNAL CONTACT**).

PEAK

Closing the input the maximum weight value achieved remains visualised. Opening the contact the current weight is visualised.

Warning: If this input is to be used for the visualisation of a sudden variation peak, set the weight filter at 0.

TEST



- Test Inputs:

  In : Verify that for each open input '0', '1' is visualised at input closed..
- Test Outputs:

  Out: Setting '0' verify that the corresponding output opens. Setting '1' verify that the corresponding output closes..
- Test Analogue Output:

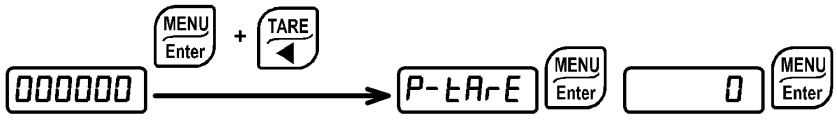
  AnAL: This allows the analogue signal to be varied between the minimum and the maximum value beginning from the minimum. (ONLY FOR W100ANA AND JOLLYW100ANA).

  nA : test current output..

  uOLt : test voltage output.
- Test millivolts:

  nU-CEL : test millivolts (visualises the load cell response signal in mV with four decimals).

PRESET TARE (SUBTRACTIVE TARE DEVICE)



It is possible to manually insert a preset tare value to be subtracted from the display value provided that the P-tArE ≤ MASS condition is verified.

After setting the tare value, coming back to the weight visualisation, the display shows the net weight (subtracting the preset tare value) and the NET led lights up to show that a tare device is active.

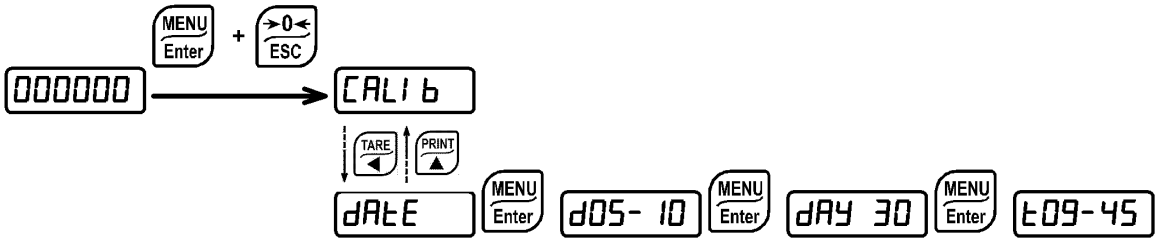
To cancel the preset tare and come back to the gross weight keep the TARE key pressed for 3 seconds or keep the NET/GROSS input (if present) closed for 3 seconds. The preset tare value is lost. The NET LED turns off upon return to the display of the gross weight.

WARNING: when the net weight is displayed (NET led on to indicate that a tare device is active) the gross weight can be temporarily visualised keeping the PRINT key pressed: the NET led turns off and the gross weight is displayed. As soon as the PRINT key is released the net weight is visualised again (NET led on)

- **IF A SEMI-AUTOMATIC TARE (net) IS INSERTED IT WILL NOT BE POSSIBLE TO ACCESS THE INSERT PRESET TARE FUNCTION.**
- **WHEN A PRESET TARE IS ACTIVE, YOU CAN ACCESS THE INSERT SEMIAUTOMATIC TARE (net) FUNCTION. THE TWO DIFFERENT TYPES OF TARES WILL BE ADDED TOGETHER.**

ALL THE SEMI-AUTOMATIC TARE (net) AND PRESET TARE FUNCTIONS WILL BE LOST WHEN THE INSTRUMENT IS TURNED OFF.

DATE AND TIME SETTING



Selecting the DATE item in the main menu, one enters the date and time display menu.

Pressing MENU Enter repeatedly scrolls in sequence :

d: current month - year

dAY: day of the month

t: hour-minutes (the central flashing dash indicates that the internal clock is operational)

Pressing the PRINT button the number that is to be modified flashes; pressing the PRINT button again the number increases; with the TARE button one may change the other group of figures; with the MENU Enter button one confirms and goes on to display the next menu.

ALARMS

ErCEL : appears if the cell is not connected or is connected in an incorrect manner or when the cell signal exceeds 39 mV or the conversion electronics (AD converter) is malfunctioning..
Er OL : appears when the weight visualisation exceeds 110% of the full scale.
Er Ad : internal instrument converter failure; check load cell connections (if necessary contact assistance service).
------ : this message appears when the weight exceeds the maximum weight by 9 divisions (parameter MASS).
Er OF : if the maximum indicative possibility of the instrument has been exceeded (weight greater than 999999 or less than -99999). In case of weight less than -99999, the display shows a minus sign ("-") alternated with the most significant digit.
MAS 0 : appears when there is the attempt to zero set a weight value from an external contact or from serial greater than the set value in the parameter MAS 0.
MAX-PU : this message appears in the sample weight setting, in the real calibration, after the fifth sample weight value has been entered..
Error :in setting the menu parameters this message is displayed when the value set is beyond the permitted values. Pushing →0← ESC exits the setting and keeps the old value saved in memory. (Examples: if a number of decimals are selected that, referred to the full scale, exceed the possibility of visualisation of the instrument, if the value is above the maximum that may be set, if the weight value set in the sample weight verification is not congruent with the mV increase detected, if the analogue output detection correction goes beyond the maximum permitted values).

bLOC : the password is entered on the menu heading or keyboard lock is active or display lock is active.
nOdI SP : you are trying to modify a weight value over 999999 that cannot be displayed; however you can change the value.

Serial protocol alarms:

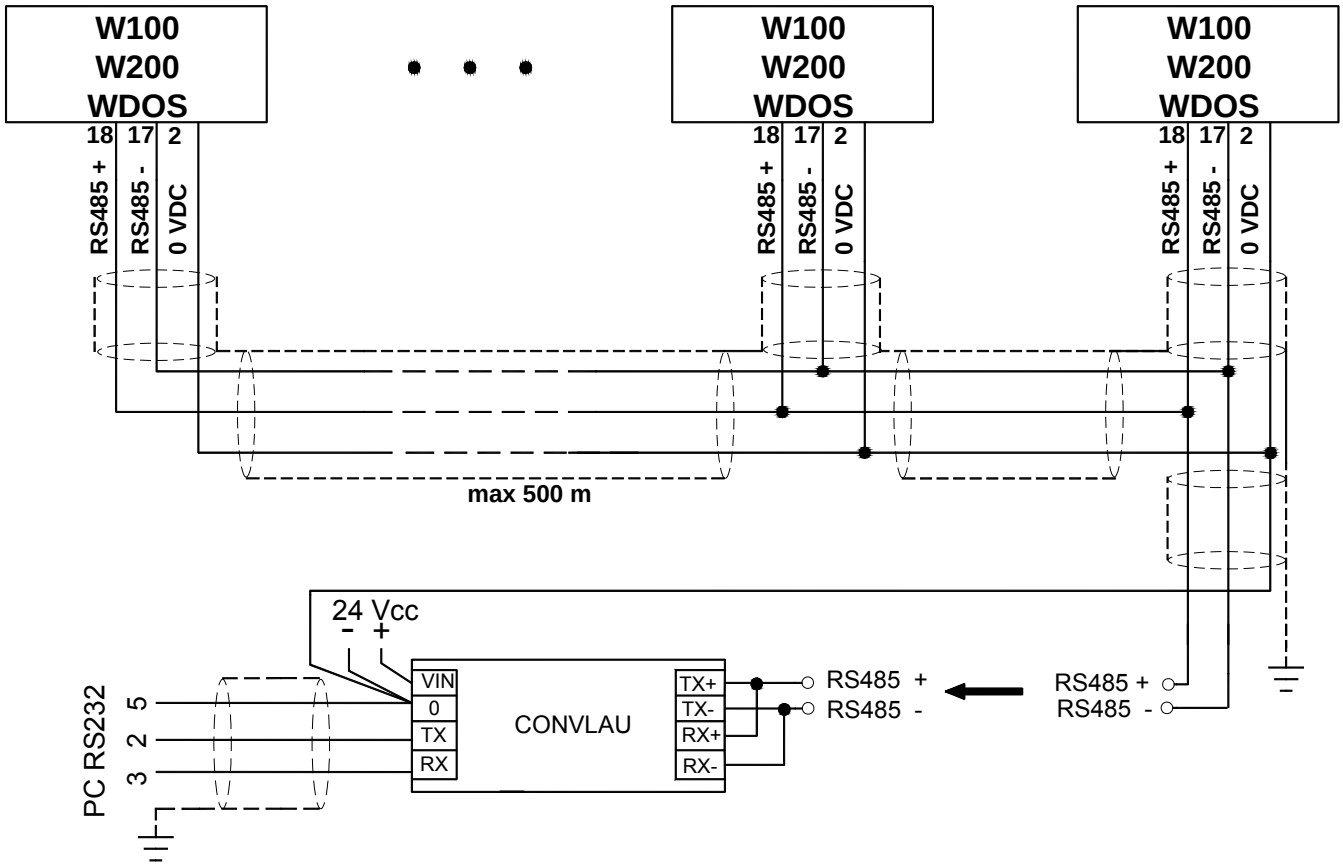
	ErCEL	Er OL	Er Ad	------	Er OF	MAS 0
MODALITY'						
Bit LSB	76543210	76543210	76543210	76543210	76543210	
Status Register MODBUS RTU	**xxxxxxx1**	**xxxx1xxx**	**xxxxxx1x**	**xxxxx1xx**	On gross: **xxx1xxxx** On net: **xx1xxxxx**	At zero command, responds with error 'invalid value' (error code 3)
ASCII	**__O-F_**	**__O-L_**	**__O-F_**	**__O-L_**	**__O-F_**	**&aa#CR**
RIP *	**__O-F_**	**__O-L_**	**__O-F_**	**__O-L_**	**__O-F_**	**__O-F_**
HDRIP	**_ERCEL**	**_ER_OL**	**_ER_AD**	######	**_ER_OF**	**_MAS_0**
CONTIN	**_ERCEL**	**_ER_OL**	**_ER_AD**	^^^^^^	**_ER_OF**	**_MAS_0**

*** For RIP repeaters, if the message exceeds 5 numbers the display visualises '------' .**

In case of alarm the relays open, the analogue outputs go to the lowest possible value according to the following table:

RANGE	0/20 mA	4/20 mA	0/5 V	0/10 V	-10/10 V	-5/5 V
Output Value	-0.2 mA	3.5 mA	-0.5 V	-0.5 V	0 V	0 V

RS485 COMMUNICATION



ATTENTION: In a connection similar to that shown in the diagram, if the RS485 network exceeds 100 metres in length, two terminating resistors are needed at the ends of the same. Two 120 Ohm resistors are to be connected, between the "+" and "-" terminals of the line both on the converter terminal board and on that of the instrument that is the furthest away on the network. If there were to be different instruments or converters, refer to the specific manuals to verify the necessity of connecting the above-mentioned resistors or not.

DIRECT CONNECTION BETWEEN RS485 AND RS232 WITHOUT CONVERTER

In virtue of the fact that a two-wire RS-485 output may be used directly on an RS-232 PC or repeater input, it is possible to realise the connection of the instrument to an RS-232 port in the following manner:

INSTRUMENT		PC o Printer
RS 485 -	→	RXD
RS 485 +	→	GND

This type of connection allows the utilisation of ONE SINGLE instrument in a MONO-DIRECTIONAL modality otherwise you can use it to connect a printer.

CONTINUOUS FAST TRANSMISSION PROTOCOL' AND 'FROM EXTERNAL CONTACT'

This protocol allows the automatic reception of the weight by way of a serial connection at high update frequencies. Up to 80 strings per second are transmitted (with a minimum transmission rate of 9600 baud)

If the *MOdE* parameter is set, the following string is transmitted:

xxxxxx CR LF

dove:

x x x x x x = 6 ASCII characters for gross weight (48 ÷ 57 ASCII).
CR = 1 c. return to the start (13 ASCII)
LF = 1 c. on new line (10 ASCII)

The first character from the left takes on the value « - » (minus sign - ASCII 45) in case of negative weight.

In case of error or alarm, the 6 characters of the weight are substituted by the messages found in the table of the ALARMS paragraph in this manual.

If the *MOdEd* parameter is set, the following string is transmitted:

& TzzzzzzPzzzzzz \ ckck CR

where:

& = 1 c. of string start (38 ASCII)
T = a reference character of gross weight
P = a reference character of gross weight
zzzzzz = 6 ASCII characters for gross weight (48 ÷ 57 ASCII)
\ = 1 c. of separation (92 ASCII)
ck ck = 2 ASCII control characters or calculated considering the characters included between & and \ excluded. The control value is obtained executing the XOR operation (or exclusive) for the 8 bit ASCII codes of the characters considered. Therefore, a character expressed in hexadecimal is obtained with 2 numbers that may assume values from "0" to "9" and from "A" to "F". "ck ck" is the ASCII code of the two hexadecimal digits.
CR = 1 c. of end string (13 ASCII)

The first character from the left of the weight characters takes on the value « - » (minus sign - ASCII 45) in case of negative weight.

In case of error or alarm, the 6 characters of the gross weight are substituted by the messages found in the table of the ALARMS paragraph in this manual.

PROTOCOL FOR CONTINUOUS TRANSMISSION ON 'RIP' AND 'HDRIP REPEATERS

This protocol is for communicating with RIP and HDRIP large number repeaters. The communication string is transmitted 10 times per second and is formatted as follows:

& NxxxxxxLyyyyyy \ ckck CR

where:

& = 1 c. string start (38 ASCII)
N = a net reference character (78 ASCII)
x x x x x x = 6 ASCII characters for net or PEAK weight if present (48 ÷ 57 ASCII).
L = a reference character for gross weight (76 ASCII)
y y y y y y = 6 ASCII characters for gross weight (48 ÷ 57 ASCII)
\ = 1 c. of separation (92 ASCII)
ck ck = 2 ASCII control characters or calculated considering the characters included between & and \ excluded. The control value is obtained executing the XOR operation (or exclusive) for the 8 bit ASCII codes of the characters considered. Therefore, a character expressed in hexadecimal is obtained with 2 numbers that may assume values from "0" to "9" and from "A" to "F". "ck ck" is the ASCII code of the two hexadecimal digits.
CR = 1 c. of end string (13 ASCII)

The first character from the left of the weight characters takes on the value « - » (minus sign - ASCII 45) in case of negative weight. If the protocol for *HdrIP*, has been set, the decimal point in the position in which it is visualised on the display of the instrument may be transmitted. In this case if the value exceeds 5 numbers, only the 5 most significant numbers are transmitted, if the value is negative, at most the 4 most significant numbers will be transmitted with the sign. In the two cases in any case, the decimal point shifts coherently with the value to be visualised.

In case of weight less than -99999, the display shows a minus sign ("-") alternated with the most significant digit.

In case of error or alarm, the 6 characters of the gross weight are substituted by the messages found in the table of the ALARMS paragraph in this manual.

ASCII INTERROGATION PROTOCOL

The communication initiative is always on the part of the PC. It is possible top set the delay time that the instrument will wait before transmitting the response (see "DELAY" parameter).

1. SETTING SETPOINTS FROM THE PC:

The PC must transmit the following string: **$aaxxxxxxyckckCR**

where:

$ = 1 initial string character (36 ASCII)

aa = instrument address
xxxxxx = 6 set-point characters
y = A (setpoint 1)
y = B (setpoint 2)
ck ck = 2 ASCII check-sum characters (2 ASCII control characters calculated considering the characters included between $ and ckck excluded. The control value is obtained executing the XOR operation (or exclusive) for the 8 bit ASCII codes of the characters considered. Therefore, a character expressed in hexadecimal is obtained with 2 numbers that may assume values from "0" to "9" and from "A" to "F". < ck ck > is the ASCII code of the two hexadecimal digits).
CR = 1 end string character

In case of correction the instrument responds with the following string:: **&&aa!\ckckCR**

where :
& & = 2 c. of initial string (38 ASCII)
a a = 2 c. for address (instrument number)
! = 1 c. of ok reception (33 ASCII)
\ = 1 c. of separation (92 ASCII)
ck ck = 2 c. for check-sum
CR = 1 c. for end string (13 ASCII)

while in the case of faulty reception it responds**:** **&&aa?\ckckCR**

where :
? = 1 c. For reception error (63 ASCII)

2. SETPOINT MEMORISATION and HYSTERESIS ON E2prom MEMORY:

The setpoints and the hysteresis values relative to the two setpoints programmed from the PC are memorised in RAM volatile memory and lost upon shutting down of the instrument. To save them permanently in the e2prom memory send the following command:

The PC must transmit**:** **$aaMEMckckCR**

In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**

In the case of faulty reception it responds: **&&aa?\ckckCR**

If a value greater than the full scale value is sent, the instrument responds: **&aa#CR**

3. READING WEIGHT, THE SET-POINT AND THE PEAK (IF PRESENT) FROM THE PC:

The PC must transmit**:** **$aajckckCR**

where:

j = a to read setpoint 1
j = b to read setpoint 2
j = t to read gross weight
j = n to read net weight

j = p to read gross weight peak if the ASCII parameter is set as MODBUS or else to read gross weight if the ASCII parameter is set on MOD bd **(to have the points set the FS_bEO equal to 50000):**

In case of correct reception the instrument responds: **&aaxxxxxxj\ckckCR**

The first character from the left takes on the value « - » (minus sign - ASCII 45) in case of negative weight..

In case of a request for a not configured Peak, it responds: **&aa#CR**

In case of weight less than -99999, the display shows a minus sign ("-") alternated with the most significant digit.

Error messages:

In the case that the instrument goes into alarm for exceeding 110% of the full scale or of 9 divisions above the value of the MASS, parameter, the instrument sends the string:

&aassO-Lst\ckck

In case of faulty connection of the load cells or other alarm, the instrument sends the following string::

&aassO-Fst\ckck

where :

s = 1 c. separator (32 ASCII – space-).

In general refer to the ALARMS table in this manual.

4. WEIGHT ZERO SETTING FROM THE PC:

The PC must transmit: **$aaZEROckckCR**

In the case of the request for the zero setting of a value beyond the maximum value that may be zeroed out, it responds: **&aa#CR**

In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**

In the case of faulty reception it responds: **&&aa?\ckckCR**

ATTENTION: The zero setting will not be maintained after the shutting down of the instrument.

5. COMMUTATION OF GROSS WEIGHT TO NET WEIGHT:

The PC must transmit: **$aaNETckckCR**
In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**
In the case of faulty reception it responds: **&&aa?\ckckCR**

6. COMMUTATION OF NET WEIGHT TO GROSS WEIGHT::

The PC must transmit**:** **$aaGROSSckckCR**
In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**
In the case of faulty reception it responds: **&&aa?\ckckCR**

7. READING OF DECIMALS AND DIVISION NUMBERS:

The PC must transmit: **$aaDckckCR**
In case of correct reception the instrument responds: **&aaxy\ckckCR**
where:

x = number of decimals;
y = value of division;
a a = instrument address

The y field can have the following values:

'3' for division value = 1;
'4' for division value = 2;
'5' for division value = 5;
'6' for division value = 10;
'7' for division value = 20;
'8' for division value = 50;
'9' for division value = 100;

In the case of faulty reception it responds: **&&aa?\ckckCR**

8. CALIBRATION COMMANDS (CORRECT THE DISPLAYED WEIGHT WITH A SAMPLE WEIGHT)

8a) WEIGHT ZEROING:

WARNING: This command is not the same as the command WEIGHT ZERO SETTING FROM THE PC seen at point 4.

The PC transmit the following ASCII string containing the zeroing command:

$ a a z ck ck CR

If the instrument is not in gross weight mode, the answer is: &aa#CR

In case of correct reception the instrument responds with the string:

& a a x x x x x x t \ ck ck CR

where :

$ = c. of initial string (36 ASCII)
& = c. of initial string (38 ASCII)
aa = 2 c. for instrument address
z = weight zeroing command (122 ASCII)
xxxxxx = 6 c. with the zeroed weight value
t = weight command value (116 ASCII)
\ = separation character (92 ASCII)
ck ck = 2 c. for check sum
CR = c. for string end – carriage return (13 ASCII)

Example: zeroing the weight of the instrument with address 2:

For the calibration you have to make sure that the system is unloaded or that the instrument measures a signal equal to the mV in the same situation:

query: **$02z78(Cr)** response**: &02000000t\76(Cr)**

If the zeroing works correctly the instrument sends the zeroed weight value (in this example "000000").

If the weight has to be often zeroed, please notice that the calibration values are stored in a EEPROM memory in the instrument and the number of allowed writing cycles is limited (about 100000). It is advised to perform the zeroing operation by storing the zero value in the PLC or PC system connected to the instrument.

8b) CALIBRATION WITH SAMPLE WEIGHT:

The PC sends the following ASCII string containing the full-scale calibration command.

$ a a s x x x x x x ck ck CR

In case of correct reception the instrument responds with the string:

& a a x x x x x x t \ ck ck CR

In case of incorrect reception or if the full scale value is zero it responds with the string:

&&aa?\ckckCR

where :

$ = c. of initial string (36 ASCII)
& = c. of initial string (38 ASCII)
aa = 2 c. for instrument address
s = command of full scale calibration (115 ASCII)
t = command of weight identification (116 ASCII)
xxxxxx = 6 c. of weight value (FULL SCALE)
\ = separation character (92 ASCII)
ck ck = 2 c. of check sum
CR = c. for string end – carriage return (13 ASCII)

Example of full scale calibration of the instrument with address1 with a sample weight of 20000 units:

For the calibration you have to put in the bin an equivalent sample weight or make so that that the instrument measures a corresponding mV signal.

query: **$01s02000070(Cr)** response: **&01020000t\77(Cr)**

In case of correct full-scale calibration the read value has to be 20000 (in the string “020000”).

Perform this operation in gross weight visualization or it twill not be executed.

Perform the calibration with a number of read points, excluded the points at zero, equal to the maximum quantity that is to be weighed or at least the 50% of it. In this way every weight unit will correspond to at least one converter point.

In the example the calibration must be executed at 22000 points at least.

9. KEYBOARD LOCK:

The PC transmits: **$aaFREckckCR**

In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**

In case of incorrect reception the answer is: **&&aa?\ckckCR**

10. KEYBOARD LOCK:

The PC transmits**:** **$aaKEYckckCR**

In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**

In case of incorrect reception the answer is: **&&aa?\ckckCR**

11. DISPLAY AND KEYBOARD LOCK:

The PC transmits**:** **$aaKDISckckCR**

In case of correct reception the instrument responds with the string: **&&aa!\ckckCR**

In case of incorrect reception the answer is : **&&aa?\ckckCR**

CHECK-SUM CALCULATION

The check-sum is made up of 2 ASCII characters obtained following this procedure:
- Consider only the string characters highlighted with underlining.
- Calculate THE EXCLUSIVE OR (XOR) of the ASCII codes for the characters:

Example:

character	decimal ascii code	hexadecimal ascii. code	binary ascii code
0	48	30	00110000
1	49	31	00110001
t	116	74	01110100
XOR =	117	75	01110101

- The result of the XOR operation expressed in hexadecimal notation is made up of 2 hexadecimal numbers (that is, numbers from 0 to 9 or letters from A to F).
- The checksum is made up of the 2 characters that represent the result of the operation and XOR in hexadecimal notation (in our example the character " 7 " and the character " 5 ").

MODBUS-RTU PROTOCOL

The MODBUS-RTU protocol allows the management of the reading and writing of the following registries according to the specifications found on the reference document for this **Modicon PI-MBUS-300** standard**.**

Certain data, when specifically indicated, will be written directly in the E2PROM type memory. This memory has a limited number of writing operations (100,000), therefore it is necessary to pay particular attention to not execute useless operations on said locations. The instrument in any case makes sure that no writing occurs if the value to be memorised is equal to the value in memory**.**

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The numerical data found below are expressed in decimal notation; if the prefix 0x is entered the notation will be hexadecimal.

MODBUS-RTU DATA FORMAT

The data received and transmitted by way of the MODBUS-RTU protocol have the following characteristics::

- 1 start bit
- 8 bit of data, *least significant bit* sent first
- parity bit selectable
- stop bit selectable

FUNCTIONS SUPPORTED IN MODBUS

Among the commands available in the MODBUS-RTU protocol, only the following are utilised for management of communication with the instruments; other commands could be incorrectly interpreted and generate errors or blocks of the system:

FUNCTIONS	DESCRIPTION
03 (0x03)	READ HOLDING REGISTER (READ PROGRAMMABLE REGISTERS)
16 (0x10)	PRESET MULTIPLE REGISTERS (WRITE MULTIPLE DI REGISTERS)

Interrogation frequency is linked to the communication speed set (the instrument stands by for at least 3 bytes before starting calculations an eventual response to the interrogation query). The DELAY parameter in the settings menu for the serial connections, allows the instrument to respond with a further delay and this directly influences the number of interrogations possible in the unit of time.

For additional information on this protocol refer to the general technical specifications PI_MBUS_300. The functions supported relative to the MODBUS standard are the READ HOLDING REGISTER and the PRESET MULTIPLE REGISTERS.

In general the query and the response toward and from one slave instrument are composed as follows:

FUNCTION 3: Read holding registers (READ PROGRAMMABLE REGISTERS)

QUERY

Address	Function	Add. 1st register	No. registers	2 byte	Tot.bytes
A	0x03	0x0000	0x0002	CRC	8

ANSWER

Address	Function	No. bytes	1st register	2nd register	2 byte	Tot.bytes
A	0x03	0x04	0x0064	0x00C8	CRC	3+2*No. register+2

FUNCTION 16: Preset multiple registers (WRITE MULTIPLE DI REGISTERS)

QUERY

Address	Function	Ind. 1st reg.	No. reg.	N° bytes	Val.reg. 1	Val.reg. 2	2 byte	Tot.bytes
A	0x10	0x0000	0x0002	0x04	0x0000	0x0000	CRC	7+2*No.registers +2

ANSWER

Address	Function	Ind. 1st reg.	No. reg.	2 byte	Tot.bytes
A	0x10	0x0000	0x0002	CRC	8

No. REGS: Number of registers to write beginning from the address.
N° BYTES: Number of bytes transmitted as a value of the registers (2 bytes per register)
VAL. REG.: Contents of the register beginning from the first.
The answer contains the register identification modified after the command has been executed.

COMMUNICATION ERROR MANAGEMENT:

The communication strings are controlled by way of the CRC (Cyclical Redundancy Check).
In case of communication error the slave will not respond with any string. The master must consider a time-out for reception of the answer. If it does not receive an answer it deduces that there has been a communication error.

In the case of the string received correctly but not executable, the slave responds with an EXCEPTIONAL RESPONSE. The "FUNCTION" field is transmitted with the MSB at 1

EXCEPTIONAL RESPONSE

Address	Function	Code	2 byte
A	Funct + 80h		CRC

CODE	DESCRIPTION
1	ILLEGAL FUNCTION (The function is not valid or is not supported)
2	ILLEGAL DATA ADDRESS (The specified data address is not available)
3	ILLEGAL DATA VALUE (The data received has an invalid value)

LIST OF USEABLE REGISTERS

The MODBUS-RTU protocol implemented on this instrument can manage a maximum of 32 registers read and written in a single query or response.

R = the register may only be read.
W = the register may only be written.
R/W = the register may be both read and written.
H = top side of the DOUBLE WORD of the number.
L = bottom side of the DOUBLE WORD of the number.

REGISTER	*DESCRIPTION*	*Saving in E2PROM*	*ACCESS*
40001	Firmware Version	**-**	**R**
40002	Instrumento type	**-**	**R**
40003	Year of Manufacture	**-**	**R**
40004	Serial Number	**-**	**R**
40005	Active Program	**-**	**R**
40006	**COMMAND REGISTER**	**NO**	**W**
40007	**STATUS REGISTER**	**-**	**R**
40008	GROSS WEIGHT H	**-**	**R**
40009	GROSS WEIGHT L	**-**	**R**
40010	PESO NETTO H	**-**	**R**
40011	NET WEIGHT L	**-**	**R**
40012	PEAK WEIGHT H	**-**	**R**
40013	PEAK WEIGHT L	**-**	**R**
40014	Divisions and Units of measure	**-**	**R**
40015	Coefficient H		**R**
40016	Coefficient L		**R**
40017	Digital INPUT	**-**	**R**
40018	RELAYS	**NO**	**R/W**
40019	**SETP 1 H**	**Only after command '99' of the COMMAND REGISTER**	**R/W**
40020	**SETP 1 L**		**R/W**
40021	**SETP 2 H**		**R/W**
40022	**SETP 2 L**		**R/W**
40023	**SETP 3 H**		**R/W**
40024	**SETP 3 L**		**R/W**
40025	**SETP 4 H**		**R/W**
40026	**SETP 4 L**		**R/W**
40027	**SETP 5 H**		**R/W**
40028	**SETP 5 L**		**R/W**
40039	**HYSTERESIS 1 H**		**R/W**
40040	**HYSTERESIS 1 L**		**R/W**
40041	**HYSTERESIS 2 H**		**R/W**
40042	**HYSTERESIS 2 L**		**R/W**

40043	**HYSTERESIS 3 H**		**R/W**
40044	**HYSTERESIS 3 L**		**R/W**
40045	**HYSTERESIS 4 H**		**R/W**
40046	**HYSTERESIS 4 L**		**R/W**
40047	**HYSTERESIS 5 H**		**R/W**
40048	**HYSTERESIS 5 L**		**R/W**
40065	H Sample weight for instrument calibration	**Use with command '101' of COMMAND REGISTER**	**R/W**
40066	L Sample weight for instrument calibration		**R/W**
40067	H Weight value with ZERO analog output	**Only after command '99' of the COMMAND REGISTER**	**R/W**
40068	L Weight value with ZERO analog output		**R/W**
40069	H Weight value with Full-Scale analog output		**R/W**
40070	L Weight value with Full-Scale analog output		**R/W**

ATTENTION: At the moment of their writing the setpoints, the hysteresis values, zero analog values and full-scale analog values are saved in RAM (they are lost upon shut down). To save them permanently in the e2prom so that they remain upon re-start, it is necessary to send the command '99' to the Command Register.

CALIBRATION COMMANDS (CORRECT THE DISPLAYED WEIGHT WITH A SAMPLE WEIGHT)

As in ASCII protocol you can modify the instrument calibration via Modbus. To execute the procedure you have to unload the system and set to zero the displayed weight with command **'100'** of the **Command Register**. Then you have to put a load onto the system and write its weight in the registers **40065-40066**; then send the command **'101'** of the Command Register to store the sample weight value. If the operation works correctly, the two registers containing the sample weight are set to zero.

Perform this operation in gross weight visualization or it twill not be executed.

Perform the calibration with a number of read points, excluded the points at zero, equal to the maximum quantity that is to be weighed or at least the 50% of it. In this way every weight unit will correspond to at least one converter point.

In the same manner it is possible to perform the calibration of the analogue output full scale writing the corresponding weight in the registers "*H Weight value with Full Scale analogue output*" and "*L Weight value with Full Scale analogue output*" or set the weight value to zero in the registers "*H Weight value with Full Scale analogue*" and "*L Weight value Full Scale analogue output*".

REGISTER STATUS

Bit 0	Cell Error
Bit 1	AD Converter Malfunction
Bit 2	Maximum weight exceeded by 9 divisions
Bit 3	Gross weight greater than 110% of full scale
Bit 4	Gross weight beyond 999999 or less than -99999
Bit 5	Net weight beyond 999999 or less than -99999
Bit 6	
Bit 7	Gross Weight Negative Sign
Bit 8	Net Weight Negative Sign
Bit 9	Peak Weight Negative Sign
Bit 10	Visualisation in Net
Bit 11	Weight stability
Bit 12	Weight within +/-¼ of division around ZERO
Bit 13	
Bit 14	
Bit 15	

COMMAND REGISTER

0	No command	**16**	Reserved
1		**17**	Reserved
2		**18**	Reserved
3		**19**	
4		**20**	
5		**21**	Keyboard lock
6		**22**	Keyboard and display unlock
7	NET visualisation	**23**	Keyboard and display lock
8	SEMIAUTOMATIC zero	**24**	
9	GROSS visualisation	**99**	Save data in E2PROM
10	Reserved	**100**	Zero for calibration
11	Reserved	**101**	Store sample weight value for full-scale calibration
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved	**9999**	Reset (reserved)

INPUT REGISTER (read only)

Bit 0	Input 1 Status
Bit 1	Input 2 Status
Bit 2	Input 3 Status
Bit 3	
Bit 4	
Bit 5	
Bit 6	
Bit 7	
Bit 8	
Bit 9	
Bit 10	
Bit 11	
Bit 12	
Bit 13	
Bit 14	
Bit 15	

OUTPUT REGISTER (read and write)

Bit 0	RELAY 1 Status
Bit 1	RELAY 2 Status
Bit 2	RELAY 3 Status
Bit 3	RELAY 4 Status
Bit 4	RELAY 5 Status
Bit 5	
Bit 6	
Bit 7	
Bit 8	
Bit 9	
Bit 10	
Bit 11	
Bit 12	
Bit 13	
Bit 14	
Bit 15	

The status of the relays may be read at any moment but may be set only if the function has bee selected in the PLC output settings, otherwise, the relays will be managed according to the current weight status with respect to the relative setpoints.

DIVISIONS REGISTRY and UNITS OF MEASURE

This register contains the current setting of the divisions (DIVIS parameter) and of the unit of measure (UNIT parameter):

H Byte	L Byte
UNIT'	DIVIS

Utilise this register together with the Coefficient registers to calculate the value visualised by the instrument.

Less significant byte (L Byte)

VALUE DIVIS	DIVISOR	DECIMALS
0	100	0
1	50	0
2	20	0
3	10	0
4	5	0
5	2	0
6	1	0
7	0.5	1
8	0.2	1
9	0.1	1
10	0.05	2
11	0.02	2
12	0.01	2
13	0.005	3
14	0.002	3
15	0.001	3
16	0.0005	4
17	0.0002	4
18	0.0001	4

More significant Byte (H Byte)

VALUE UNITS	Units of measure	Utilisation of the Coefficient with the different units of measure settings compared to the gross weight detected
0	Kilograms	Does not intervene
1	Grams	Does not intervene
2	Tons	Does not intervene
3	Pounds	Does not intervene
4	Newton	Multiplies
5	Litres	Divides
6	Bar	Multiplies
7	Atmospheres	Multiplies
8	Pieces	Divides
9	Newton Metres	Multiplies
10	Kilogram Metres	Moltiplica
11	Other	Multiplies

COMMUNICATION EXAMPLES

EXAMPLE 1

Command for multiple writing to registers (command 16, 10 hexadecimal):

Suppose that 40017 is to be written to the register, the value 0 is the value 2000 on the 40018 register, the string to be generated must be the following:

h01 h10 h00 h10 h00 h02 h04 h00 h00 h07 hD0 hF1 h0F

The instrument will respond with the following string:

h01 h10 h00 h10 h00 h02 h40 h0D

Query field name:	Hex	Response field name:	Hex
Instrument Address	H01	Instrument Address	H01
Function	H10	Function	H10
Address of the first register H	H00	Address of the first register H	H00
Address of the first register L	H10	Address of the first register L	H10
Number of registers to send H	H00	Number of registers H	H00
Number of registers to send L	H02	Number of registers L	H02
Byte Count	H04	CRC16 H	H40
Datum 1 H	H00	CRC16 L	H0D
Datum 1 L	H00		
Datum 2 H	H07		
Datum 2 L	HD0		
CRC16 H	HF1		
CRC16 L	H0F		

EXAMPLE 2

Command for multiple writing to registers (command 16, 10 hexadecimal):
Suppose that the two setpoint values are to be written on the instrument respectively at 2000 and 3000, then it is necessary to send the following string:

h01 h10 h00 h10 h00 h04 h08 h00 h00 h07 hD0 h00 h00 h0B hB8 hB0 hA2

The instrument will respond with the following string:

h01 h10 h00 h10 h00 h04 hC0 h0F

Query field name:	Hex	Response field name:	Hex
Instrument Address	H01	Instrument Address	H01
Function	H10	Function	H10
Address of the first register H	H00	Address of the first register H	H00
Address of the first register L	H10	Address of the first register L	H10
Number of registers H	H00	Number of registers H	H00
Number of registers L	H04	Number of registers L	H04
Byte Count	H08	CRC16 H	HC0
Datum 1 H	H00	CRC16 L	H0F
Datum 1 L	H00		
Datum 2 H	H07		
Datum 2 L	HD0		
Datum 3 H	H00		
Datum 3 L	H00		
Datum 4 H	H0B		
Datum 4 L	HB8		
CRC16 H	HB0		
CRC16 L	HA2		

EXAMPLE 3

Command for multiple reading of registers (command 3, 03 hexadecimal):

Suppose that two gross weight values are to be read (in the example 4000) and net weight (in the example 3000), it is necessary to read from the address 40008 to the address 40011 sending the following string:

h1 h3 h0 h7 h0 h4 hF5 hC8

The instrument will respond with the following string:

h1 h3 h8 h0 h0 hF hA0 h0 h0 hB hB8 h12 h73

Query field name:	Hex	Response field name:	Hex
Instrument Address	H01	Instrument Address	H01
Function	H03	Function	H03
Address of the first register H	H00	Address of the first register H	H08
Address of the first register L	H07	Address of the first register L	H00
Number of registers H	H00	Datum 1 H	H00
Number of registers L	H04	Datum 1 L	H00
CRC16 H	HF5	Datum 2 H	H0F
CRC16 L	HC8	Datum 2 L	HA0
		Datum 3 H	H00

		Datum 3 L	**H00**
		Datum 4 H	**H0B**
		Datum 4 L	**HB0**
		CRC16 H	**H12**
		CRC16 L	**H73**

For additional examples and on the generation of the correct control characters (CRC16) refer to the **Modicon PI-MBUS-300** manual**.**

RESERVED FOR THE INSTALLER

With this function you can disable the access to single functions

LOCK MENU

Select the menu you want to lock:

000000 (MENU Enter) SEt-P1 Push (→0← ESC) (TARE ◀) at the same time for 3 seconds and there will appear:

SEt-P1 The point to the left on the message signifies that the blockage of this menu item is active; you can now release the keys. If the operator tries to enter into this menu, there will appear:

bLOC and entry is not permitted. This procedure allows to protect any menu item.

UNLOCK MENU

000000 (MENU Enter) SEt-P1 Push (MENU Enter) (TARE ◀) at the same time for 3 seconds and there will appear:

SEt-P1 The point on the left is switched off and the lock is removed from the menu.

TEMPORARY UNLOCK OF MENUS

000000 (MENU Enter) SEtP 1 Push (PRINT ▲) (TARE ◀) at the same time for 3 seconds: now it is permitted to enter into and modify all menus including those which are locked. Returning to the visualisation of the weight, the locks are recovered.

PROGRAM SELECTION AND DATA DELETION

ATTENTION: This operation is to be executed after having contacted technical service assistance.

Upon turn on of the instrument hold down the (→0← ESC) button until there appears:

PrOG (MENU Enter) Std (MENU Enter)

(TARE ◀) (PRINT ▲)

rEuEr (MENU Enter)

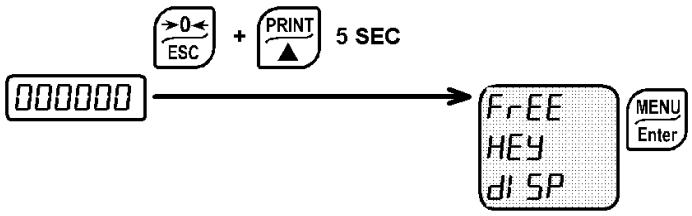
Std : standard operation.

rEuEr: to be utilised when on a loaded weighing system there corresponds a situation of unloaded cells and vice versa (the weight increases while in reality on the system it is decreasing).

Confirming the program visualised, the system variables are set with default values.

If the [→0← ESC] is pushed one exits without modifying the program and without executing the deletion of the variables set.

KEYBOARD OR DISPLAY LOCK



Keyboard lock and weight visualisation lock:

- **FrEE:** no lock.
- **HEY:** keyboard lock; when active when you press a key the display shows '**bLOC**' for 3 seconds.
- **di SP:** keyboard and display lock: the keyboard is locked and the display shows the instrument model (weight is not visualised). When you press a key the display shows '**bLOC**' for 3 seconds.

To enter the menu to lock and unlock the keyboard or the display press [→0← ESC] first and then [PRINT], keep them pressed for about 5 seconds.

You can perform this operation via Modbus and ASCII protocol too.

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Dichiarazione di conformità CE

EC-Konformitätserklärung
EC- Déclaration de conformité
EC-Dichiarazione di conformità
EC- Declaração de conformidade
EC-Deklaracja zgodności

EC-Declaration of -Conformity
EC-Declaración de Conformidad
EC-Conformiteitverklaring
EC- Prohlášení o shode
EC-Заявление о соответствии

I	Dichiarazione di conformità	Dichiariamo che il prodotto al quale la presente dichiarazione si riferisce è conforme alle norme di seguito citate.
GB	Declaration of conformity	We hereby declare that the product to which this declaration refers conforms with the following standards.
E	Declaración de conformidad	Manifestamos en la presente que el producto al que se refiere esta declaración está de acuerdo con las siguientes normas
D	Konformitäts-erklärung	Wir erklären hiermit, dass das Produkt, auf das sich diese Erklärung bezieht, mit den nachstehenden Normen übereinstimmt.
F	Déclaration de conformité	Nous déclarons avec cela responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.
CZ	Prohlášení o shode	Tímto prohlašujeme, že výrobek, kterého se toto prohlášení týká, je v souladu s níže uvedenými normami.
NL	Conformiteit-verklaring	Wij verklaren hiermede dat het product, waarop deze verklaring betrekking heeft, met de hierna vermelde normen overeenstemt.
P	Declaração de conformidade	Declaramos por meio da presente que o produto no qual se refere esta declaração, corresponde às normas seguintes.
PL	Deklaracja zgodności	Niniejszym oświadczamy, że produkt, którego niniejsze oświadczenie dotyczy, jest zgodny z poniższymi normami.
RUS	Заявление о соответствии	Мы заявляем, что продукт, к которому относится данная декларация, соответствует перечисленным ниже нормам.

Models: W100,W100ANA,JollyW100,JollyW100ANA, W100ANA4-20mA, W100ANA0-20mA, W100ANA0-10V, W100ANA0-5V, W100ANA+/-5V, W100ANA+/-10V

Mark Applied	EU Directive	Standards
CE	**2006/95/EC** Low Voltage Directive	*Not Applicable (N/A)*
CE	**2004/108/EC** EMC Directive	EN 55022 EN 61000-6-2 (2002) EN 61000-6-4 (2001) EN 61000-4-2/3/6/8
CE M (only if "M" mark is applied)	**2009/23/EC** NAWI Directive	EN 45501 OIML R-76-1 (2006)

Basilicanova (PR), 21/06/2011

LAUMAS Elettronica s.r.l.
M. Consonni
(Responsabile Qualità)