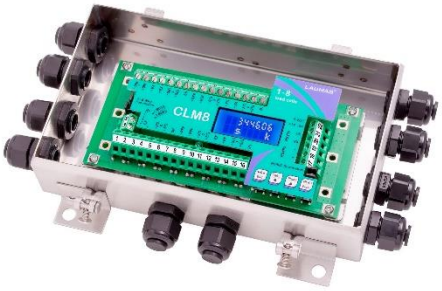
ENGLISH ENGLISH ENGLISH ENGLISH

Installation and User Manual

version 1.12

CLM8 – CLM16

INTELLIGENT JUNCTION BOX



SYMBOLS

Here are the symbols used in the manual to draw the reader's attention:

Caution! Risk of electric shock.

Caution! This operation must be performed by skilled personnel.

Pay particular attention to the following instructions.

Further information.

WARRANTY

24 months from the date of the delivery note. Warranty covers only failures of defective components (due to construction defects or defects in materials) and includes replacement or repair of the components and related labor costs.
Warranty is automatically forfeited in the event of:
- tampering, deletion, removal of the identification label and/or serial number of the product
- misuse, transformation, alteration, repair of products not carried out by Laumas personnel

Laumas provides a 1-year warranty from the date of the delivery note on defects in material or manufacture of the battery.

GUIDELINES FOR PROPER DISPOSAL

This symbol on the product or packaging indicates that:
- This is electrical/electronic equipment and cannot be disposed of as municipal solid waste, but must be delivered to a recycling center
- Improper use or disposal can pollute the environment or damage human health
- Non-compliance with these guidelines will be penalized in accordance with the regulations in force in the country of destination
- It is recommended to dispose of the packing and packaging as required by local regulations

TABLE OF CONTENTS

USER WARNINGS

RECOMMENDATIONS FOR THE PROPER USE OF WEIGHING INSTRUMENT

- Keep away from heat sources and direct sunlight
- Repair the instrument from rain (except special IP versions)
- Do not wash with water jets (except special IP versions)
- Do not dip in water
- Do not spill liquid on the instrument
- Do not use solvents to clean the instrument
- Do not install in areas subject to explosion hazard (except special Atex versions)

RECOMMENDATIONS FOR CORRECT INSTALLATION OF WEIGHING INSTRUMENTS

The terminals indicated on the instrument's wiring diagram to be connected to earth must have the same potential as the weighed structure (same earthing pit or earthing system). If you are unable to ensure this condition, connect with an earthing wire the terminals of the instrument (including the terminal –SUPPLY) to the weighed structure.

The cell cable must be individually led to its panel input and not share a conduit with other cables; connect it directly to the instrument terminal strip without breaking its route with support terminal strips.

Use "RC" filters on the instrument-driven solenoid valve and remote control switch coils.

Avoid inverters in the instrument panel; if inevitable, use special filters for the inverters and separate them with sheet metal partitions.

The panel installer must provide electric protections for the instruments (fuses, door lock switch etc.).

It is advisable to leave the equipment always switched on to prevent the formation of condensation.

MAXIMUM CABLE LENGTHS

- RS485: 1000 metres with AWG24, shielded and twisted cables
- RS232: 15 metres for baud rates up to 19200

RECOMMENDATIONS FOR CORRECT INSTALLATION OF THE LOAD CELLS

SIZING OF LOAD CELLS CAPACITY

For safety reasons, in case of static weighing, it is advisable to use the load cells at a maximum of 70-80% of its nominal capacity (assuming that the load is uniformly distributed over the entire weighed structure); depending on the handling mode of the load to weigh, consider to further reduce the % of load with respect to the nominal capacity (ex.: forklifts handling, bridge cranes, etc.).

In case of weighing with dynamic loads, the installer has to estimate the thrust speed, the acceleration, the frequency, etc.

INSTALLING LOAD CELLS

The load cells must be placed on rigid, stable in-line structures; it is important to use the mounting modules for load cells to compensate for misalignment of the support surfaces.

PROTECTION OF THE CELL CABLE

Use water-proof sheaths and joints in order to protect the cables of the cells.

MECHANICAL RESTRAINTS (pipes, etc.)

When pipes are present, we recommend the use of hoses and flexible couplings with open mouthpieces with rubber protection; in case of hard pipes, place the pipe support or anchor bracket as far as possible from the weighed structure (at a distance at least 40 times the diameter of the pipe).

WELDING

Avoid welding with the load cells already installed. If this cannot be avoided, place the welder ground clamp close to the required welding point to prevent sending current through the load cell body.

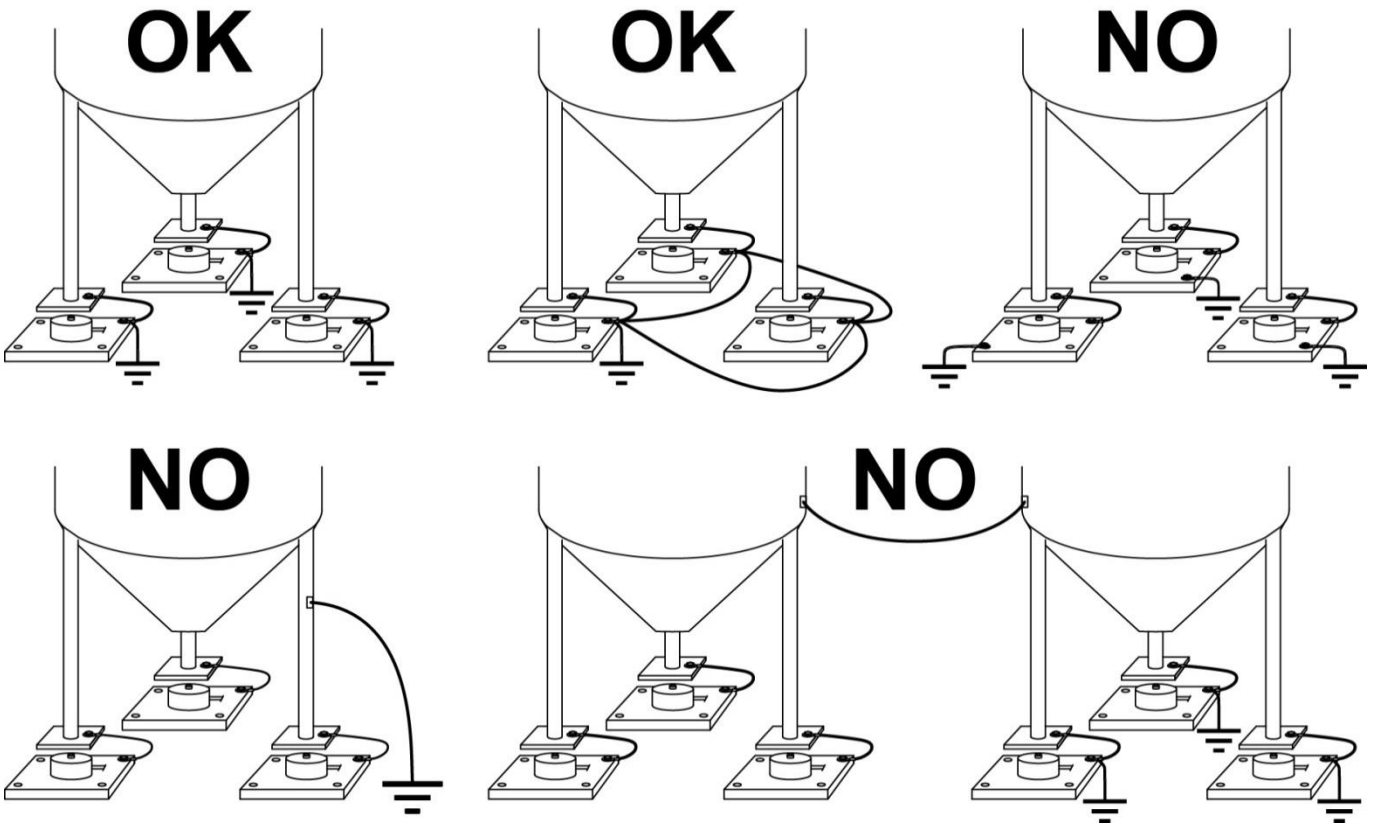
WINDY CONDITIONS - KNOCKS – VIBRATIONS

The use of weigh modules is strongly recommended for all load cells to compensate for misalignment of the support surfaces. The system designer must ensure that the plant is protected against lateral shifting and tipping relating to: shocks and vibration; windy conditions; seismic conditions in the installation setting; stability of the support structure.

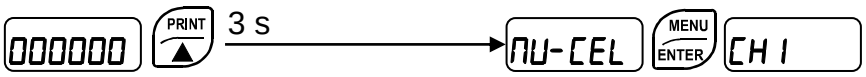
EARTHING THE WEIGHED STRUCTURE

By means of a copper wire with suitable cross-section, connect the cell upper support plate with the lower support plate, then connect all the lower plates to a single earthing system. Electrostatic charges accumulated because of the product rubbing against the pipes and the weighed container walls are discharged to the ground without going through or damaging the load cells. Failure to implement a proper earthing system might not affect the operation of the weighing system; this, however, does not rule out the possibility that the cells and connected instrument may become damaged in the future. It is forbidden to ensure earthing system continuity by using metal parts contained in the weighed structure.

FAILURE TO FOLLOW THE INSTALLATION RECOMMENDATIONS WILL BE CONSIDERED A MISUSE OF THE EQUIPMENT



LOAD CELL INPUT TEST (QUICK ACCESS)



From the weight display, press ▲ for 3 seconds: the response signal of each load cell is displayed (CH 1 ÷ CH 8), expressed in mV with four decimals.
Example: a load cell with 2.000 mV/V sensitivity provides a response signal between 0 and 10 mV.

LOAD CELL TESTING

Load cell resistance measurement (use a digital multimeter):

- Turn off the instrument.
- The value between the positive signal wire and the negative signal wire must be equal or similar to the one indicated in the load cell data sheet (output resistance).
- The value between the positive excitation wire and the negative excitation wire must be equal or similar to the one indicated in the load cell data sheet (input resistance).

Load cell voltage measurement (use a digital multimeter):

- Turn on the instrument.
- Take out the load cell to be tested from underneath the container, or alternatively, lift the container support.
- Make sure that the excitation of two wires of the load cell connected to the instrument (or amplifier) is 5 VDC ±3%.
- Measure the response signal between the positive and the negative signal wires by directly connecting them to the tester, and make sure that it is comprised between 0 and ±0.5 mV.
- Apply load to the cell and make sure that there is a signal increment.

IF ONE OF THE ABOVE CONDITIONS IS NOT MET, PLEASE CONTACT THE TECHNICAL ASSISTANCE SERVICE.

MAIN SPECIFICATIONS OF THE INSTRUMENT

Intelligent junction box with 6-wire load cells inputs suitable for assembly on back panel fitted Omega/DIN rail. Dimensions: 125x92x52 mm. Backlit alphanumeric LCD display, 38x16 mm viewing area, two-line by eight-digit (5 mm height). 4-key keypad.
Two serial ports (RS485 and RS232) for connection to: PC/PLC up to 32 instruments (max 99 with line repeaters) by ASCII Laumas or ModBus R.T.U. protocol, remote display, printer. Optional: integrated Ethernet TCP/IP output.

8 independent channels:automatic detection of connected load cells.
Digital equalization: load cell response uniformed via software.
Load distribution: indication of the weight percentage on each load cell.
Automatic diagnostics: load distribution check to detect any faults.
Events log: storage of the last 50 events: calibrations, zero-settings, errors, equalizations.

TECHNICAL SPECIFICATIONS

POWER SUPPLY and CONSUMPTION	12/24 VDC ±10%; 5 W
NO. OF LOAD CELLS IN PARALLEL and SUPPLY	max 16 (350 ohm); 5 VDC/240 mA
LINEARITY	< 0.01% F.S.
THERMAL DRIFT	< 0.0005% F.S./°C
A/D CONVERTER	8 channels, 24 bit (16000000 points), 4.8 kHz
DIVISIONS (with measurement range ±10 mV = sens. 2 mV/V)	±999999
MEASUREMENT RANGE	±39 mV
MAX SENSITIVITY OF USABLE LOAD CELLS	±7 mV/V
MAX CONVERSIONS PER SECOND	600 conversions/second
DISPLAY RANGE	±999999
NO. OF DECIMALS / DISPLAY INCREMENTS	0÷4 / x 1 x 2 x 5 x 10 x 20 x 50 x 100
DIGITAL FILTER / READINGS PER SECOND	21 levels / 5÷600 Hz
SERIAL PORTS	RS485, RS232
BAUD RATE	1200, 2400, 4800, 9600, 19200, 38400, 115200
HUMIDITY (non condensing)	85%
STORAGE TEMPERATURE	-30 °C +80 °C
WORKING TEMPERATURE	-20 °C +60 °C

c UL us	WORKING TEMPERATURE	-20 °C +60 °C
	Equipment to be powered by 12-24 VDC LPS or Class 2 power source.	

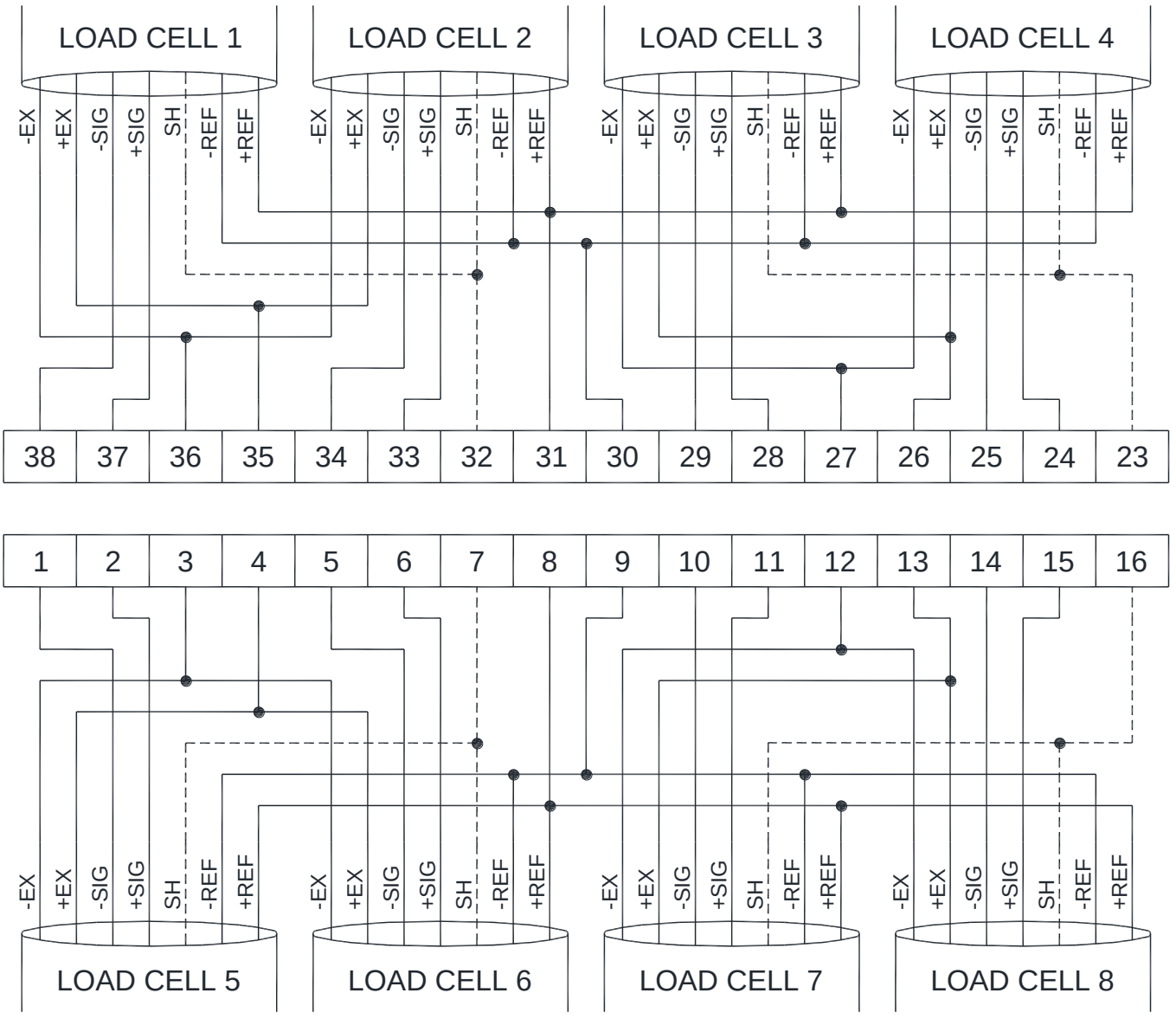
Available versions:
- naked, board only; 151x72x30 mm
- IP67 AISI 304 stainless steel box; 200x148x45 mm, 8+2 cable glands-plugs

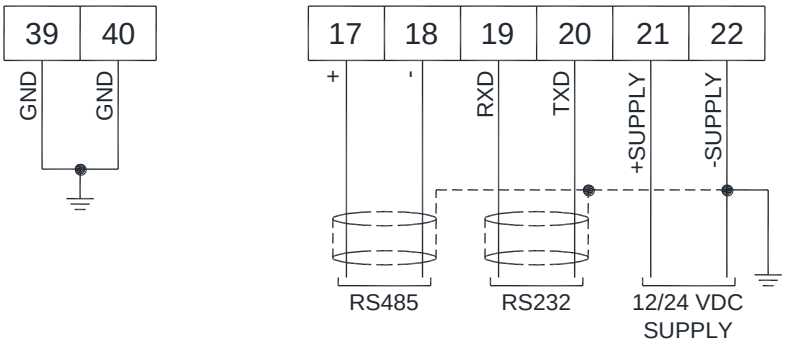
ELECTRICAL CONNECTIONS

BASIC INFORMATION

- Connect terminals 39 and 40 to the earthing system.
- It is possible to supply up to 16 350 ohm load cells.
- Connect terminal "–SUPPLY" to the RS485 common of the connected instruments in the event that these receive alternating current input or that they have an optically isolated RS485.
- In case of an RS485 network with several devices it is recommended to activate the 120 ohm termination resistance on the two devices located at the ends of the network, as described in the paragraph **RS485 SERIAL CONNECTION.**

WIRING DIAGRAM

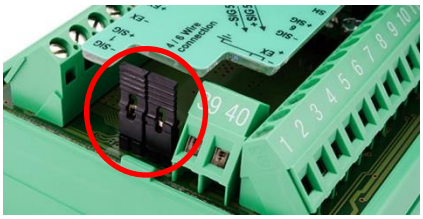




TERMINALS LEGEND

1	-LOAD CELL 5 SIGNAL	20	TX RS232
2	+LOAD CELL 5 SIGNAL	21	+SUPPLY (12/24 VDC)
3	-LOAD CELLS 5 and 6 EXCITATION (-EX)	22	-SUPPLY (12/24 VDC) RS232, RS485: SHIELD, GND
4	+LOAD CELLS 5 and 6 EXCITATION (+EX)	23	LOAD CELLS 3 and 4 SHIELD
5	-LOAD CELL 6 SIGNAL	24	+LOAD CELL 4 SIGNAL
6	+LOAD CELL 6 SIGNAL	25	-LOAD CELL 4 SIGNAL
7	LOAD CELLS 5 and 6 SHIELD	26	+LOAD CELLS 3 and 4 EXCITATION (+EX)
8	+LOAD CELLS 5, 6, 7, 8 REF/SENSE	27	-LOAD CELLS 3 and 4 EXCITATION (-EX)
9	-LOAD CELLS 5, 6, 7, 8 REF/SENSE	28	+LOAD CELL 3 SIGNAL
10	-LOAD CELL 7 SIGNAL	29	-LOAD CELL 3 SIGNAL
11	+LOAD CELL 7 SIGNAL	30	-LOAD CELLS 1, 2, 3, 4 REF/SENSE
12	-LOAD CELLS 7 and 8 EXCITATION (-EX)	31	+LOAD CELLS 1, 2, 3, 4 REF/SENSE
13	+LOAD CELLS 7 and 8 EXCITATION (+EX)	32	LOAD CELLS 1 and 2 SHIELD
14	-LOAD CELL 8 SIGNAL	33	+LOAD CELL 2 SIGNAL
15	+LOAD CELL 8 SIGNAL	34	-LOAD CELL 2 SIGNAL
16	LOAD CELLS 7 and 8 SHIELD	35	+LOAD CELLS 1 and 2 EXCITATION (+EX)
17	+RS485	36	-LOAD CELLS 1 and 2 EXCITATION (-EX)
18	-RS485	37	+LOAD CELL 1 SIGNAL
19	RX RS232	38	-LOAD CELL 1 SIGNAL

If all the load cells used are 4-wire, close the two jumpers as shown in picture.



In case of difficulty connecting all the reference wires of the installed load cells, simply connect those of the load cell located at the average distance from the instrument. The reference wires not used must be individually isolated.

INTRODUCTION TO THE USER MANUAL

This manual explains the operation of the instrument through the use of keyboard and display and/or the communication interface.
For example, **FILTER ON THE WEIGHT** section: the first part explains what the filter on the weight is and how to modify it via keyboard; the second part (`COMMUNICATION INTERFACE`) explains how to perform the same operation by using the communication interface commands.

For a better understanding of the contents, it is assumed the knowledge of the following topics:
- management of weight values via the communication interface (see section **DIVISION**);
- alarm identification (see section **ALARMS**);
- registers and data of the communication interface (see section **PARAMETERS OF THE COMMUNICATION INTERFACE**);

KEYS AND SYMBOLS FUNCTIONS

KEY	Short press	Long press (3 s)	Into menus
→0← ESC	Semi-automatic zero	Tare resetting	Cancel or return to previous menu
TARE ◀	Gross → Net	Net → Gross	Select figure to be modified or go to previous menu item.
PRINT ▲	Weight print	Gross weight: mV load cell test Net weight: temporarily display the gross weight	Modify selected figure or go to next menu item
MENU ENTER			Confirm or enter in submenu
MENU ENTER + →0← ESC	Setting general parameters (press MENU ENTER immediately followed by →0← ESC)		
MENU ENTER + TARE ◀	Setting preset tare (press MENU ENTER immediately followed by TARE ◀)		

SYMBOL	Function
n	net weight (semi-automatic tare or preset tare)
0	zero (deviation from zero not more than ±0.25 divisions)
s	stability
k	unit of measure: kg
g	unit of measure: g
1	not used
2	
3	

The symbols are activated in sequence within the menus to indicate that the display is not showing a weight.

PARAMETERS OF THE COMMUNICATION INTERFACE

The parameters listed in this section are used by the communication interface. To identify their position among the data exchanged by the instrument, see section **MODBUS-RTU PROTOCOL**.

GROSS WEIGHT (GW) – NET WEIGHT (NW)

The weight values are expressed as positive integer numbers, including decimal figures, but without decimal point. Read the Status Register to obtain information about sign and possible errors on the weight.

EXCHANGE REGISTERS (R1, W1)

These registers are used for instrument management operations. There is a read (R1) and a write (W1) exchange register.

STATUS REGISTER (SR1)

Bit 0	Load cell error	**Bit 8**	Net weight negative sign
Bit 1	AD converter malfunction	**Bit 9**	
Bit 2	Maximum weight exceeded by 9 divisions	**Bit 10**	Net display mode
Bit 3	Gross weight over 110% of full scale	**Bit 11**	Weight stability
Bit 4	Gross weight over 999999 or less than -999999	**Bit 12**	Weight within ±¼ of a division around ZERO
Bit 5	Net weight over 999999 or less than -999999	**Bit 13**	
Bit 6		**Bit 14**	
Bit 7	Gross weight negative sign	**Bit 15**	Load cells references not connected

ERROR CODE (ERC) – AUXILIARY ERROR CODE (AERC)
These registers allow you to read the error codes (see section **REMOTE ALARMS MANAGEMENT**).

EXECUTION CODE COMMAND (EXC) – AUXILIARY EXECUTION CODE COMMAND (AEXC)
These registers allow you to read the execution status of the commands sent to the CMDR (see section **COMMAND EXECUTION STATUS**).

COMMAND REGISTER (CMDR)
The commands are sent to the instrument through this register.

DIVISIONS AND UNITS OF MEASURE (DU)
This register contains the current setting of the divisions and of the units of measure (see sections **DIVISION** and **SETTING UNITS OF MEASURE**).

H byte	**L byte**
Unit of measure	Division

SAMPLE WEIGHT FOR INSTRUMENT CALIBRATION (CALW)
This register allows you to set the value of the sample weight (see section **REAL CALIBRATION (WITH SAMPLE WEIGHTS)**).

PRESET TARE (PT)
This register allows you to set the preset tare value (see section **PRESET TARE (SUBTRACTIVE TARE DEVICE)**).

COMMAND EXECUTION STATUS

EXC Execution code command	AEXC Auxiliary execution code command	Description
Command code sent to CMDR	0	Execution completed successfully
1	0	Running
-2	0	The limits allowed for the parameter have been exceeded
-3 (execution error)	1	Sample weight equal to zero
	2	Maximum number of calibration points reached
	3	Sample weight already used in the current calibration
	4	Number of active channels other than one: This filtering level cannot be selected
	5	No active channels
	6	Invalid function selected
	7	Equalization disabled
	8	Slow set, function not available
	9	The current load cell has already been equalized
	10	Preset tare equal to zero
	11	Semiautomatic tare active: preset tare not allowed
	12	Gross weight equal to zero
	14	Set value less than or equal to the Preset value
	15	Preset value greater than the Set value
	16	Incorrect requested configuration
	17	Invalid output index
	18	Invalid channel index
	19	Unstable weight
	20	Gross weight greater than the maximum capacity
	21	Semiautomatic tare active: semiautomatic zero not allowed
	22	Weight greater than the value of parameter 0 SEt
	31	Weight less than the minimum allowed value
	32	No load cell or axis is loaded
	33	Incorrect index of load cell or axis
-4	0	Qualified access required for parameter modification
-5	0	Command not available in the current configuration

- Read the execution code command in EXC
- Read the auxiliary execution code command in AEXC

Command execution codes are expressed through 4-byte numbers in which the two H byte represent EXC and the two L byte represent AEXC.

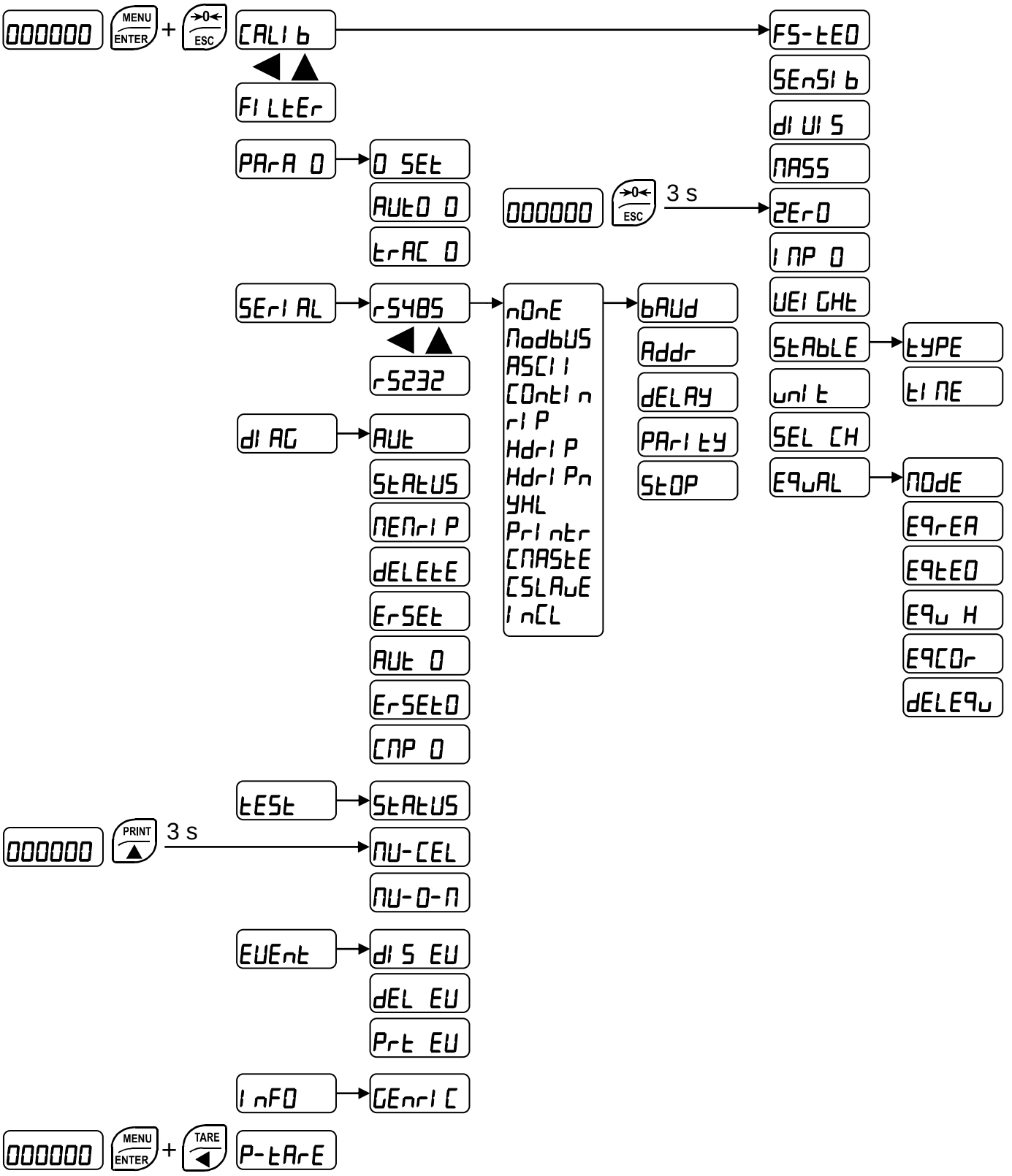
Example: content of R1 when prompted to enter a calibration point when all available points are already used

	H (2 byte)	**L (2 byte)**	**Total**
Hexadecimal	0xFFFD	0x0002	0xFFFD0002
Decimal	-3	2	-196606

MENU MAP

Into menus changes are applied right after pressing the ENTER key (no further confirmation is required).

SYSTEM PARAMETERS



INSTRUMENT COMMISSIONING

Upon switch-on, the display shows in sequence:
- 111111 → 999999 (ONLY in case of approved program);
- instrument model (e.g.: CLM8);
- SU followed by the software code (e.g.: SU 101);
- program type: BASE (base);
- r followed by the software version (e.g.: r 1.04.01);
- HU followed by the hardware code (e.g.: HU 660);
- serial number (e.g.: 1005 15);

Check that the display shows the weight and that when loading the load cells there is an increase in weight. If there is not check and verify the connections and correct positioning of the load cells.

- **If the instrument has already been theoretical CALIBRATED** (plant system identification tag present on the instrument and on the cover: load cell's rated data already entered):
  - If the system uses load cells with different sensitivity perform a real or theoretical equalization (see section **EQUALIZATION**).
  - Reset to zero (see section **TARE WEIGHT ZERO SETTING**).
  - Check the calibration with sample weights and correct the indicated weight if necessary (see section **REAL CALIBRATION (WITH SAMPLE WEIGHTS)**).

- **If the instrument HAS NOT BEEN CALIBRATED** (missing plant system identification tag) proceed with calibration:
  - If the system uses load cells with different sensitivity perform a real or theoretical equalization (see section **EQUALIZATION**).
  - If load cells data are unknown, follow the procedure in section **REAL CALIBRATION (WITH SAMPLE WEIGHTS)**.
  - Enter the rated data of load cells following the procedure given in section **THEORETICAL CALIBRATION**.
  - Reset to zero (see section **TARE WEIGHT ZERO SETTING**).
  - Check the calibration with sample weights and correct the indicated weight if necessary (see section **REAL CALIBRATION (WITH SAMPLE WEIGHTS)**).

- If you use serial communication, set the related parameters (see section **SERIAL COMMUNICATION SETTING**).

PROGRAMMING OF SYSTEM PARAMETERS

From the weight display, press simultaneously keys MENU and ESC to access the parameter setting.

MENU/ENTER: to enter a menu/confirm the data entry.
▲: to modify the displayed figure or menu item.
◀: to select a new figure or modify the displayed menu item.
ESC: to cancel and return to the previous menu.

THEORETICAL CALIBRATION

This function allows the load cell rated values to be set.

To perform the theoretical calibration, set in sequence the values of theoretical full scale, sensitivity and division.

- By modifying the theoretical full scale or the sensitivity, the real calibration is cancelled and the theoretical calibration only is considered valid.
- If the theoretical full scale and the recalculated full scale in real calibration (see section **REAL CALIBRATION (WITH SAMPLE WEIGHTS)**) are equal, this means that the calibration currently in use is theoretical; if they are different, the calibration in use is the real calibration based on sample weights.
- By modifying the theoretical full scale or the sensitivity, the system's parameters containing a weight value will be set to default values.

THEORETICAL FULL SCALE

000000 MENU/ENTER + →0← ESC CALIb MENU/ENTER FS-tEO

FS-tEO (default: dEMo): the **system full scale** is given by one cell capacity multiplied by the number of cells used. Example: 4 cells of 1000 kg → FULL SCALE = 1000 x 4 = 4000.
The instrument is supplied with a theoretical full scale value dEM0 corresponding to 10000.
To restore factory values, set 0 as full scale.

COMMUNICATION INTERFACE

WRITING

- Write the value in W1
- Send command 6501 to CMDR

READING

- Send command 6502 to CMDR
- Read the value in R1

SENSITIVITY

000000 MENU ENTER + ESC CALIb MENU ENTER FS-tEO ◀ ▲ SEnSIb

SEnSIb (default: 2.00000 mV/V): the **sensitivity** is a load cell rated parameter expressed in mV/V. Set the average sensitivity value indicated on the load cells. It's possible to set a value between 0.50000 and 7.00000 mV/V. Example: 4-cell system with sensitivity 2.00100, 2.00150, 2.00200, 2.00250; enter 2.00175, calculated as (2.00100 + 2.00150 + 2.00200 + 2.00250) / 4.

The sensitivity values used by the instrument are expressed as six-digit integer numbers. To write the sensitivity in the register, you must first multiply the value by 100000; to read the sensitivity, divide the value in the register by 100000.
Example: to set the sensitivity to 2.00175, write 200175.

WRITING

- Multiply the value by 100000
- Write the value in W1
- Send command 6503 to CMDR

READING

- Send command 6504 to CMDR
- Read the value in R1
- Divide the value by 100000

DIVISION

000000 MENU ENTER + ESC CALIb MENU ENTER FS-tEO ◀ ▲ dIVIS

dIVIS: the **division** is the minimum weight increment value which can be displayed. It is automatically calculated by the system according to the performed calibration, so that it is equal to 1/10000 of full scale. It can be changed and be variable between 0.0001 and 100 with x1 x2 x5 x10 increments.

DIVISIONS						
Index	**Division**	**Active decimals**		**Index**	**Division**	**Active decimals**
0	100	0		10	0.05	2
1	50	0		11	0.02	2
2	20	0		12	0.01	2
3	10	0		13	0.005	3
4	5	0		14	0.002	3
5	2	0		15	0.001	3
6	1	0		16	0.0005	4
7	0.5	1		17	0.0002	4
8	0.2	1		18	0.0001	4
9	0.1	1				

COMMUNICATION INTERFACE

WRITING

- Write the index* in W1
- Send command 6505 to CMDR

READING

- Read the index* in the least significant byte (L byte**)** of DU

*see table DIVISIONS

When a parameter is expressed in weight value, it is necessary to consider the number of divisions and active decimals set on the instrument: the value must be multiplied or divided by 10^n (n=active decimals, see table DIVISIONS) and rounded to the set divisions.

Examples: writing a value

Weight value to set	Division	Active decimals	Value to write in the register	Value rounded to the division
100	0.1	1	1000 given by $100x10^1$	100.0
12.00	0.05	2	1200 given by $12.00x10^2$	12.00
33	5	0	33 given by $33x10^0$	35
20.123	0.002	3	20123 given by $20.123x10^3$	20.122

Examples: reading a value

Weight value read by the instrument	Division	Active decimals	Corresponding weight value
1000	0.1	1	100.0 given by $1000/10^1$
1200	0.05	2	12.00 given by $1200/10^2$
35	5	0	35 given by $35/10^0$
20122	0.002	3	20.122 given by $20122/10^3$

MAXIMUM CAPACITY

000000 MENU ENTER + →0← ESC CALIb MENU ENTER FS-tEO ◀ ▲ MASS

MASS: maximum displayable weight (from 0 to full scale; default: 0). When the weight exceeds this value by 9 divisions, the display shows ------. To disable this function, set 0.

COMMUNICATION INTERFACE

WRITING

- Write the value in W1
- Send command 6511 to CMDR

READING

- Send command 6512 to CMDR
- Read the value in R1

TARE WEIGHT ZERO SETTING

000000 MENU ENTER + →0← ESC CALIb MENU ENTER FS-tEO ◀ ▲ 2Er0

This menu may also be accessed directly from the weight display, holding down the →0← key for 3 seconds.

Perform this procedure after having set the THEORETICAL CALIBRATION data.

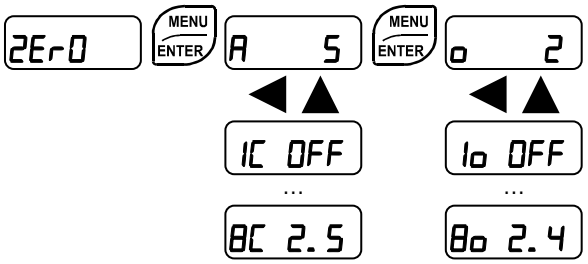
Use this function to set to zero the weight of the empty system after commissioning and then later on to compensate zero variations due to the presence of product residues.
Procedure:

- Confirm the message 2Er0 by pressing ENTER.
- The weight value to be set to zero is displayed. In this phase all of the symbols are flashing.
- Confirming once again, the weight is set to zero (the value is stored to the permanent memory).
- Press ▲ to display the value of the total weight reset by the instrument, given by the sum of all of the previous zero settings.

DIAGNOSTICS ON ZERO: if diagnostics on zero has been enabled, the instrument can display and store the load distributions on zero and the mV on active channels (see section **TEST**). If the stored weight is zero and all channels are OFF, it means that no zero-setting has yet been performed.

WARNING: diagnostics on zero is performed only if the load distribution has been stored at least once.

The tare weight zero-setting procedure is the following:

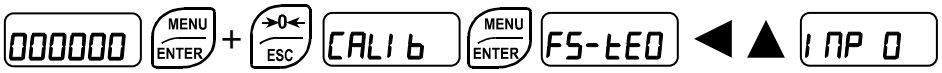


- Confirm the message 2Er0 by pressing ENTER.
- The current weight value, preceded by the letter A, is displayed.
- Press ◀ and ▲ to display in sequence the current load distribution on each channel (IC ÷ 8C); press ENTER to return to the previous display.
- By pressing ENTER the last weight set to zero, preceded by the letter o, is displayed.
- Press ◀ and ▲ to display in sequence the load distribution stored during the last zero-setting on each channel (Io ÷ 8o); press ENTER to return to the previous display.
- By pressing ENTER the weight value to be set to zero is displayed, in this phase all of the symbols are flashing.
- Confirming once again, the weight is set to zero (the value is stored to the permanent memory).
- Press ▲ to display the value of the total weight reset by the instrument, given by the sum of all of the previous zero settings.

COMMUNICATION INTERFACE

- Send command 100 to CMDR

ZERO VALUE MANUAL ENTRY



WARNING: perform this procedure only if it's not possible to reset the weighed structure tare, for example because it contains product that cannot be unloaded.
Set in this parameter the estimated zero value (from -99999 to +999999; default: 0).

COMMUNICATION INTERFACE

WRITING

- Write the value in W1
- Send command 6527 to CMDR

READING

- Send command 6528 to CMDR
- Read the value in R1

REAL CALIBRATION (WITH SAMPLE WEIGHTS)

000000 MENU ENTER + →0← ESC CALIb MENU ENTER FS-tEO ◀ ▲ UEIGHt

After having performed the THEORETICAL CALIBRATION, EQUALIZATION and TARE WEIGHT ZERO SETTING, this function allows correct calibration to be done using sample weights of known value and, if necessary, any deviations of the indicated value from the correct value to be corrected.

Load onto the weighing system a sample weight, which must be **at least 50%** of the maximum quantity to be weighed.
By confirming the message UEIGHt the flashing value of the weight currently on the system is displayed. In this phase all of the symbols are off. Adjust the value on display by using the arrow keys if necessary. After confirming, the new set weight will appear with all the symbols flashing. After an additional confirmation, the message UEIGHt will be restored and by repeatedly pressing the key ESC the weight will once again be displayed.

Example: for a system of maximum capacity 1000 kg and 1 kg division, two sample weights are available, one of 500 kg and the other one of 300 kg. Load both weights onto the system and correct the indicated weight to 800. Now remove the 300 kg weight, the system must show 500; remove the 500 kg weight too; the system must read zero. If this does not happen, it means that there is a mechanical problem affecting the system linearity.

WARNING: identify and correct any mechanical problems before repeating the procedure.

- If theoretical full scale and recalculated full scale in real calibration are equal, it means that the theoretical calibration is currently in use; otherwise, the real calibration based on sample weights is in use.
- If the correction made changes the previous full scale for more than 20%, all the parameters with settable weight values are reset to default values.

LINEARISATION OPTION ON MAX 8 POINTS:

It is possible to perform a linearisation of the weight repeating the above-described procedure up to a maximum of eight points, using eight different sample weights. The procedure ends by pressing the ESC button or after entering the eighth value; at this point it will no longer be possible to change the calibration value, but only to perform a new real calibration. To perform a new calibration, should return to the weight display and then re-entering into the calibration menu.
By pressing ▲ after having confirmed the sample weight that has been set, the full scale appears, recalculated according to the value of the maximum sample weight entered and making reference to the cell sensitivity set in the theoretical calibration (SEnSIb).

In order to correctly set a sample weight of negative value, it is necessary to consider the contents of CALW as a 32-bit signed number. If the development system does not handle signed numbers, enter the values in two's complement.
Example: to set the sample weight to -56 kg, enter the value indicated in the table into the register.

REGISTER	*DECIMAL VALUE*	*HEXADECIMAL VALUE*
CALW	-56	0xFFFFFFC8

When acquiring a single calibration point, the instrument replaces the existing calibration with the new one.

ACQUISITION OF A SINGLE CALIBRATION POINT

- Load onto the weighing system a sample weight equal to at least 50% of the maximum quantity to be weighed
- Write the loaded weight value in CALW
- Send command 101 to CMDR
- Read the outcome* of the operation in CALW

ACQUISITION OF MULTIPLE CALIBRATION POINTS

- Load onto the weighing system a sample weight
- Write the loaded weight value in CALW
- Send command 106 to CMDR
- Read the outcome* of the operation in CALW
- Repeat the procedure up to a maximum of 8 sample weights

* 0=OK

CANCELLATION OF THE REAL CALIBRATION

- Send command 104 to CMDR

000000 MENU ENTER + →0← ESC CALIb MENU ENTER FS-tEO ◀ ▲ StAbLE

tYPE: select how the weight is considered stable:

- MOdE0: the weight value must remain within the same division for a time greater than or equal to that specified in parameter tI ME;
- MOdE 1: the variation of the weight value must be less than or equal to a division for a time greater than or equal to that specified in parameter tI ME.

tI ME (from 0.1 to 3.0 s; default: 1.0 s): time needed to consider the weight stable.

COMMUNICATION INTERFACE

tYPE

WRITING

- Write the value* in W1
- Send command 6579 to CMDR

READING

- Send command 6580 to CMDR
- Read the value* in R1

*0=MOdE0; 1=MOdE 1

tI ME

The time required to consider the weight stable is expressed in tenths of a second.
Example: to set up tI ME to 2.2 seconds, write 22 in W1.

WRITING

- Write the value in W1
- Send command 6581 to CMDR

READING

- Send command 6582 to CMDR
- Read the value in R1

CONFIRMATION AND CHANGE OF ACTIVE CHANNELS

After performing the calibration and verifying that the system works properly, you can confirm the channels automatically detected by the instrument; in this way, in case of accidental interruption of the cable of one or more load cells, the instrument displays the *ErCEL 1* alarm.

000000 MENU/ENTER + →0← ESC CALI b MENU/ENTER FS-tEO ◀ ▲ SEL CH

AUtO (default): confirmation is requested (*SUrE?*),press ENTER to proceed or press ESC to cancel. The display shows the number of channels automatically detected by the instrument, press ENTER to confirm and save the current selection or press ESC to exit with no change.
MAnUAL confirmation is requested (*SUrE?*),press ENTER to proceed or press ESC to cancel. Press ◀ or ▲ to select the channel, confirm with ENTER and press ◀ or ▲ to activate (*On*) or deactivate it (*OFF*); press ESC to save the current selection and exit.

After editing, you must repeat equalization, zero setting and calibration using a sample weight.

COMMUNICATION INTERFACE

ACR (ACTIVE CHANNELS REGISTER)			
bit 0	channel 1	bit 8	channel 9
bit 1	channel 2	bit 9	channel 10
bit 2	channel 3	bit 10	channel 11
bit 3	channel 4	bit 11	channel 12
bit 4	channel 5	bit 12	channel 13
bit 5	channel 6	bit 13	channel 14
bit 6	channel 7	bit 14	channel 15
bit 7	channel 8	bit 15	channel 16

bit=1: active channel; bit=0: not active channel;

Example of configuration of the channels with 16-channel mode not enabled: the system works using channels 1 to 8. Channels 9 to 16 are not available.

	ACR CONTENT	CHANNELS CONFIGURATION
Hexadecimal	0x001B	channel 1, channel 2, channel 4, channel 5: active channel 3, channel 6, channel 7, channel 8: not active
Binary	0b0000000000011011	

MANUAL SETTING OF ACTIVE CHANNELS

WRITING	READING
• Write the ACR value in W1 • Send command 6575 to CMDR	• Send command 6576 to CMDR • Read the ACR value in R1

AUTOMATIC SETTING OF ACTIVE CHANNELS

- Send command 6094 to CMDR

EQUALIZATION

At the end of the equalization you must perform the **TARE WEIGHT ZERO SETTING** and, if necessary, the **REAL CALIBRATION**.

REAL EQUALIZATION MODE

000000 MENU ENTER + →0← ESC CALIb MENU ENTER FS-tEO ◀ ▲ EQuAL MENU ENTER nodE

CornEr: the load cells are considered individually (default).
AHI 5: the load cells are considered as pairs forming an axis; this method is useful for weighing systems in which it is not possible to put the sample weight on the single load cells.

COMMUNICATION INTERFACE

WRITING	READING
• Write the mode* in W1 • Send command 6741 to CMDR	• Send command 6742 to CMDR • Read the mode* in R1

*0=CornEr; 1=AHI 5

REAL EQUALIZATION

000000 (MENU ENTER) + (→0← ESC) CALIb (MENU ENTER) FS-tEO ◄ ▲ EQuAL (MENU ENTER) EQrEA

Use a sample weight equal to **at least 50%** of the single load cell capacity.

EQuAL0: unload the scale, wait for stability and confirm by pressing ENTER.
EQuAL 1: place the sample weight on load cell 1 or axis 1, wait for stability and confirm by pressing ENTER.
EQuAL2: place the sample weight on load cell 2 or axis 2, wait for stability and confirm by pressing ENTER.
Repeat the operation for each connected load cell, or axis defined in the weighing system.
If equalization is successfully completed, the display shows UALI d, confirm by pressing ENTER to exit; if an error occurs, the display shows FAI LEd, confirm by pressing ENTER and repeat the procedure.

COMMUNICATION INTERFACE

After selecting the real equalization type (see section **REAL EQUALIZATION MODE**), proceed as follows:

START OF REAL EQUALIZATION
- Send command 6700 to CMDR

ACQUISITION OF THE EQUALIZATION ZERO
- Unload the weighing system
- Wait for the weight to be stable
- Write 0 in W1
- Send command 6701 to CMDR

ACQUISITION OF EQUALIZATION POINTS
- Place the sample weight in correspondence with a load cell or of an axis
- Wait for the weight to be stable
- Write the index of the equalization point (from 1 to total active channels or total defined axes) in W1
- Send command 6701 to CMDR
- Repeat the procedure moving the sample weight in correspondence with the remaining load cells or axes

CONCLUSION OF THE REAL EQUALIZATION
- Send command 6702 to CMDR

THEORETICAL EQUALIZATION

000000 (MENU ENTER) + (→0← ESC) CALIb (MENU ENTER) FS-tEO ◀ ▲ EqUAL (MENU ENTER) EqtEO

SEnS 1 ÷ SEnS 16: set the sensitivity for each load cell, leaving it at 0 for non-active channels.

If 16 channels mode is not enabled, channels 9 to 16 are not available.

The sensitivity values used by the instrument are expressed as six-digit integer numbers. To write the sensitivity in the register, you must first multiply the value by 100000; to read the sensitivity, divide the value in the register by 100000.
Writing example: to set the sensitivity to 2.00175, write 200175.
Reading example: if the read value is 203170, the sensitivity is 2.03170.

WRITING OF SENSITIVITY VALUES

- Write the channel index in W1
- Send command 6703 to CMDR
- Multiply the load cell sensitivity value by 100000
- Write the value in W1 (write 0 if the channel is not connected to the load cell)
- Send command 6563 to CMDR
- Repeat the procedure for all available channels

READING OF SENSITIVITY VALUES

- Write the channel index in W1
- Send command 6564 to CMDR
- Read the value in R1
- Divide the value by 100000

CONCLUSION OF THEORETICAL EQUALIZATION

- Send command 6704 to CMDR

EQUALIZATION COEFFICIENTS

000000 MENU/ENTER + →0← ESC CALIb MENU/ENTER FS-tEO ◀ ▲ EQuAL MENU/ENTER EQu H

EQH 1 ÷ EQH 16: it displays the equalization coefficients calculated for each active channel.

If 16 channels mode is not enabled, channels 9 to 16 are not available.

COMMUNICATION INTERFACE

The equalization coefficients values used by the instrument are expressed as six-digit integer numbers. To write the equalization coefficient in the register, you must first multiply the value by 100000; to read the equalization coefficient, divide the value in the register by 100000.
Writing example: to set the coefficient to 1.20175, write 120175.
Reading example: if the read value is 183170, the coefficient is 1.83170.

WRITING AND READING COMMANDS

EQUALIZATION COEFFICIENT	WRITING	READING
Channel 1	6707	6708
Channel 2	6709	6710
Channel 3	6711	6712
Channel 4	6713	6714
Channel 5	6715	6716
Channel 6	6717	6718
Channel 7	6719	6720
Channel 8	6721	6722
Channel 9	6723	6724
Channel 10	6725	6726
Channel 11	6727	6728
Channel 12	6729	6730
Channel 13	6731	6732
Channel 14	6733	6734
Channel 15	6735	6736
Channel 16	6737	6738

WRITING

- Multiply the value by 100000
- Write the value in W1
- Send command* to CMDR

READING

- Send command* to CMDR
- Read the value in R1
- Divide the value by 100000

*see table WRITING AND READING COMMANDS

MANUAL COEFFICIENT CORRECTION

000000 MENU/ENTER + →0← ESC CALIb MENU/ENTER FS-tEO ◀ ▲ EquAL MENU/ENTER Eq cor

Use a sample weight equal to **at least 50%** of the single load cell capacity.

The channel whose equalization coefficient you want to correct must be active.

- Confirm the message Eq cor by pressing ENTER, the current weight is displayed;
- Place the sample weight on the load cell whose equalization coefficient you want to correct, wait for stability and confirm by pressing ENTER;
- The current equalization coefficient is displayed: enter a value in the range from 0.5 to 2, press ENTER to confirm or press ESC to cancel;
- The display will show the weight calculated using the new equalization coefficient, press ENTER to confirm and save or press ESC to return to the previous display.

Repeat the procedure for each equalization coefficient to be corrected.

COMMUNICATION INTERFACE

- Place the sample weight on the load cell whose equalization coefficient you want to correct
- Send command 6739 to CMDR
- Check the command execution status
- With no error conditions, send command 6740 to CMDR
- Read the index of the load cell on which the sample weight is placed in R1
- Read the value of the equalization coefficient (see section **EQUALIZATION COEFFICIENTS**)
- Write the new value of the equalization coefficient (see section **EQUALIZATION COEFFICIENTS**)
- Check the weight calculated using the new equalization coefficient
- Repeat the procedure for each equalization coefficient to be corrected

EQUALIZATION DELETION

000000 MENU/ENTER + →0← ESC CALIb MENU/ENTER FS-tEO ◀ ▲ EquAL MENU/ENTER dELEqu

Confirmation is requested (SUrE?), press ENTER to reset the equalization or press ESC to cancel the command.

COMMUNICATION INTERFACE

- Send command 6046 to CMDR

FILTER ON THE WEIGHT

000000 (MENU/ENTER) + (→0←/ESC) CALIb ◀ ▲ FILtEr

Setting this parameter allows a stable weight display to be obtained.
Two filter types are available:
- tYPE 0: Laumas standard filter (default);
- tYPE 1: moving average filter with fixed refresh frequency.

To increase the effect (weight more stable) increase the filter level (from 0 to 9, default 4).
Procedure:
- By confirming the FILtEr message, the currently programmed filter type is displayed.
- Select the desired filter type and confirm, the currently programmed filter level is displayed.
- Select the desired filter level and confirm, the weight is displayed and it will be possible to experimentally verify its stability.
- If stability is not satisfactory, repeat the procedure until an optimum result is achieved.

The filter enables to stabilise a weight as long as its variations are smaller than the corresponding "response time". It is necessary to set this filter according to the type of application and to the full scale value set.

FILTER ON THE WEIGHT					
LEVEL	Response time* [ms]		Display and serial port refresh frequency* [Hz]		
	tYPE 0	tYPE 1	tYPE 0	tYPE 1	
				1-4 active channels	5-8 active channels
0	12	100	300	100	50
1	150	330	100	100	50
2	260	500	50	100	50
3	425	700	25	100	50
4	850	1100	12.5	100	50
5	1700	1600	12.5	100	50
6	2500	2700	12.5	100	50
7	4000	3500	10	100	50
8	6000	5000	10	100	50
9	7000	6800	5	100	50
A	6	—	600	—	

*indicative values

The "A" filter can only be set if the instrument is connected to one load cell only.

COMMUNICATION INTERFACE

The type and level of the filter are set through a 4-byte number in which the two H byte indicate the type of filter and the two L byte indicate the level of the filter.

Example: set the filter on the weight as type 1 and level 5

	H (2 byte)	L (2 byte)	Total
Hexadecimal	0x0001	0x0005	0x00010005
Decimal	1	5	65541

WRITING

- Write the level* in the two L byte of W1
- Write the type* in the two H byte of W1
- Send command 6519 to CMDR

*see table FILTER ON THE WEIGHT

READING

- Send command 6520 to CMDR
- Read the level* in the two L byte of R1
- Read the type* in the two H byte of R1

ANTI PEAK

When the weight is stable, the anti peak filter removes any sudden disturbances with a maximum duration of 1 second. Confirm the filter on the weight with ENTER and select one of the following options:

- AntPOn: anti peak filter enabled (default);
- AntPOF: anti peak filter disabled.

COMMUNICATION INTERFACE

ENABLING WRITING

- Write the enabling status* in W1
- Send command 6541 to CMDR

*0=disabled; 1=enabled

ENABLING READING

- Send command 6542 to CMDR
- Read the enabling status* in R1

RESETTABLE WEIGHT SETTING FOR SMALL WEIGHT CHANGES

0 SEt (from 0 to full scale; default: 300; considered decimals: 300 – 30.0 – 3.00 – 0.300): this parameter indicates the maximum weight value resettable by external contact, keypad or serial protocol.

COMMUNICATION INTERFACE

ENABLING WRITING	ENABLING READING
• Write the value in W1 • Send command 6529 to CMDR	• Send command 6530 to CMDR • Read the value in R1

AUTOMATIC ZERO SETTING AT POWER-ON

AUtO 0 (from 0 to 10% of full scale; default: 0): if at switch-on the weight value is lower than the value set in this parameter, the weight is reset. To disable this function, set 0.

COMMUNICATION INTERFACE

WRITING	READING
• Write the value* in W1 • Send command 6521 to CMDR	• Send command 6522 to CMDR • Read the value* in R1

*0=function disabled

ZERO TRACKING

trAC 0 (from 1 to 5, default: nOnE): when the weight value is stable and, after a second, it deviates from zero by a figure in divisions smaller or equal to the figure in divisions set in this parameter, the weight is set to zero. To disable this function, set nOnE.

Example: if the parameter dI UI 5 is set to 5 and trAC 0 is set to 2, the weight will be automatically set to zero for variations smaller than or equal to 10 (dI UI 5 x trAC 0).

COMMUNICATION INTERFACE

WRITING	READING
• Write the value* in W1 • Send command 6531 to CMDR	• Send command 6532 to CMDR • Read the value* in R1

*0=function disabled

SETTING UNITS OF MEASURE

000000 (MENU/ENTER) + (→0←/ESC) CALIb (MENU/ENTER) FS-tEO ◀ ▲ unit

UNITS OF MEASURE		
Unit of measure index	**Visualisation**	**Description**
0	HI LOG	Kilograms
1	G	Grams
2	t	Tons
3	Lb	Pounds
4	nEUtOn	Newton
5	LI trE	Litres
6	bAr	Bar
7	AtN	Atmospheres
8	PI ECE	Pieces
9	nEU-N	Newton metres
10	HI LO-N	Kilogram metres
11	OtHEr	Other

If the print function is enabled, the symbol corresponding to the selected unit of measure will be printed after the measured value.

COMMUNICATION INTERFACE

WRITING

- Write the unit of measure index* in W1
- Send command 6523 to CMDR

*see table UNITS OF MEASURE

READING

- Read the index* in the most significant byte (H byte) of DU

SEMI-AUTOMATIC TARE (NET/GROSS)

THE SEMI-AUTOMATIC TARE OPERATION IS LOST UPON INSTRUMENT POWER-OFF.

To perform a net operation (SEMI-AUTOMATIC TARE) press the TARE key for less than 3 seconds. The instrument displays the net weight (just set to zero) and the NET symbol lights up. To display the gross weight again press TARE for 3 seconds.
This operation can be repeated many times by the operator to allow the loading of several products.

Example:
Put the box on the scale, the display shows the box weight; press TARE, the display shows the net weight to zero; introduce the product in the box, the display shows the product weight. This operation can be repeated several times.

While the net weight is displayed, keep ▲ pressed to display gross weight. When the key is released the net weight will be displayed again.

The semi-automatic tare operation is not allowed if the gross weight is zero (the display shows InZErO).

COMMUNICATION INTERFACE

ACTIVATION	DEACTIVATION
• Send command 7 to CMDR	• Send command 9 to CMDR

PRESET TARE (SUBTRACTIVE TARE DEVICE)

000000 MENU ENTER + TARE P-tArE

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

By default the instrument shows the last programmed preset tare value: to apply it press ▲ and then ENTER.
After setting the tare value, going back to the weight display, the display shows the net weight (subtracting the preset tare value) and the NET symbol lights up to show that a tare has been entered. To delete a preset tare and return to gross weight display hold down TARE for about 3 seconds. The preset tare value is set to zero. The NET symbol is turned off when the gross weight is displayed once again.

While the net weight is displayed, keep ▲ pressed to display the gross weight. When the key is released the net weight will be displayed again.

- **IF A SEMI-AUTOMATIC TARE (NET) IS ENTERED, IT IS NOT POSSIBLE TO ACCESS THE ENTER PRESET TARE FUNCTION.**
- **IF A PRESET TARE IS ENTERED, IT'S STILL POSSIBLE TO ACCESS THE SEMI-AUTOMATIC TARE (NET) FUNCTION. THE TWO DIFFERENT TYPES OF TARE ARE ADDED.**

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

COMMUNICATION INTERFACE

Example: set the preset tare to 69312

	H (2 byte)	L (2 byte)	Total
Hexadecimal	0x0001	0x0EC0	0x00010EC0
Decimal	1	3776	69312

WRITING

- Write the value in PT

READING

- Read the value in PT

ACTIVATION

- Send command 130 to CMDR

DEACTIVATION

- Send command 9 to CMDR

SEMI-AUTOMATIC ZERO (WEIGHT ZERO-SETTING FOR SMALL VARIATIONS)

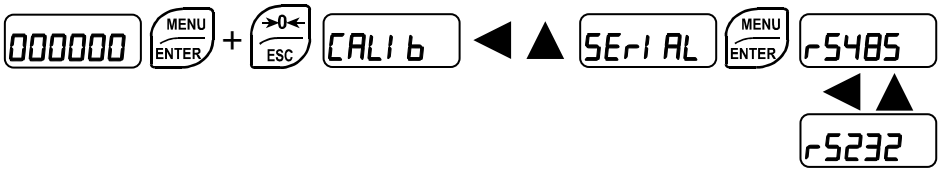
By pressing the →0← key for less than 3 seconds, the StorEP message is displayed for 3 seconds, by pressing ENTER the weight is set to zero.
This function is only allowed if the weight is lower than the 0 SEt value (see section **RESETTABLE WEIGHT SETTING FOR SMALL WEIGHT CHANGES**), otherwise the alarm E ----- appears and the weight is not set to zero.

The zero-setting is lost upon instrument power-off.

COMMUNICATION INTERFACE

- Send command 8 to CMDR

SERIAL COMMUNICATION SETTING



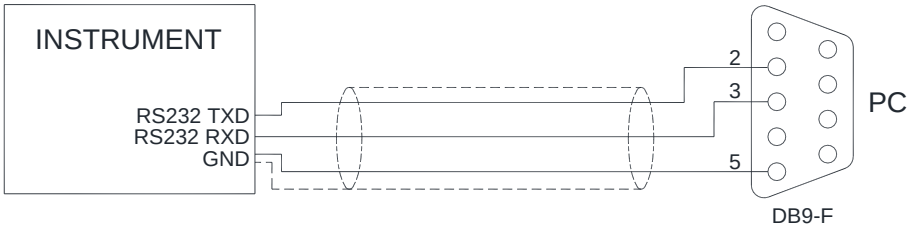
- nonE: it disables any type of communication (default).
- ModbUS: MODBUS-RTU protocol; possible addresses: from 1 to 99.
- ASCII : ASCII bidirectional protocol; possible addresses: from 1 to 99.
  - nOdU60
  - nOd td
- CONtI n: continuous weight transmission protocol, at the frequency set in HErtZ item (from 10 to 300).
  - nOd t (set: PAr I tY = nonE, StOP = 1).
  - nOd td (set: PAr I tY = nonE, StOP = 1).
- rI P: continuous weight transmission protocol to remote displays; the remote display shows the net weight or gross weight, according to its settings (set: bAUd = 9600, PAr I tY = nonE, StOP = 1) (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**).
- HdrI P: continuous weight transmission protocol to remote displays; the remote display shows the net weight or gross weight according to its settings (set: bAUd = 9600, PAr I tY = nonE, StOP = 1) (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**).
- HdrI Pn: continuous weight transmission protocol to remote displays (set: bAUd = 9600, PAr I tY = nonE, StOP = 1) (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**).
  When the remote display is set to gross weight:
  - if the instrument displays the gross weight, the remote display shows the gross weight.
  - if the instrument shows the net weight, the remote display shows the net weight alternated with the message nEt.

- YHL: continuous weight transmission protocol (see section **CONTINUOUS WEIGHT TRANSMISSION PROTOCOL**).
- PrInTr: printer.
- CMASTE: it configures the instrument as master (see section **16 CHANNELS MODE (CLM16)**).
- CSLAVE: it configures the instrument as slave (see section **16 CHANNELS MODE (CLM16)**).
- InCL: communication protocol with inclinometer (see Inclinometer manual).

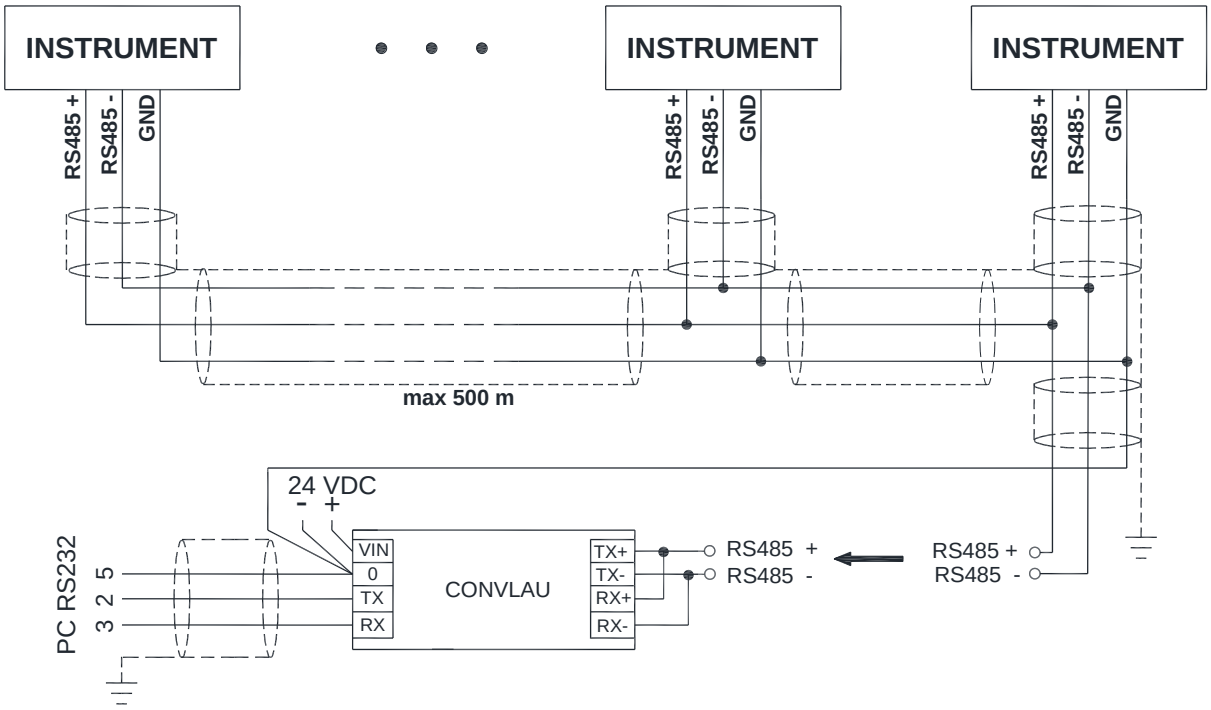
  - bAUd: transmission speed (1200, 2400, 4800, 9600, 19200, 38400, 115200; default: 9600).
  - Addr: instrument address (from 1 to 99; default: 1).
  - HErt2: maximum transmission frequency (10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 100 – 200 – 300; default: 10); to be set when the CONtIn transmission protocol is selected.
    Maximum setting frequency **(HErt2)**:
    - 20 Hz with minimum baud rate 2400 baud.
    - 40 Hz with minimum baud rate 4800 baud.
    - 80 Hz with minimum baud rate 9600 baud.
    - 100 Hz with minimum baud rate 19200 baud.
    - 200 Hz with minimum baud rate 38400 baud.
    - 300 Hz with minimum baud rate 38400 baud.
  - dELAY: delay in milliseconds which elapses before the instrument replies (from 0 to 200 ms; default: 0).

  - PArIty:
    - nOnE: no parity (default).
    - EUEn: even parity.
    - Odd: odd parity.
  - StOP: stop bit (1 – 2; default: 1).
  - St bIt: stability character (YES – nO; default: nO); to be set when the CONtIn transmission protocol is selected in nOd t mode (see section **CONTINUOUS FAST WEIGHT TRANSMISSION PROTOCOL**).
  - nCOPY: number of copies(1 – 9; default: 1).
  - EMPtY: number of blank lines between one printout and the next.
  - HEAdEr: printing of custom heading from PC (YES – nO; default: nO).
  - PrtMOd: connected printer type:
    - P 190
    - StAUP
    - StAUt

RS232 SERIAL COMMUNICATION



RS485 SERIAL COMMUNICATION



If the RS485 network exceeds 100 metres in length or baud-rate over 9600 are used, two terminating resistors are needed at the ends of the network: close the two jumpers "RS485 Termination" on the furthest instruments. Should there be different instruments or converters, refer to the specific manuals to determine whether it is necessary to connect the above-mentioned resistors.

DIRECT CONNECTION BETWEEN RS485 AND RS232 WITHOUT CONVERTER

Since a two-wire RS485 output may be used directly on the RS-232 input of a PC or remote display or printer, it is possible to implement instrument connection to an RS-232 port in the following manner:

INSTRUMENT		RS232
RS485 –	→	RXD
RS485 +	→	GND

This type of connection allows A SINGLE instrument to be used in a ONE WAY mode.

AUTOMATIC DIAGNOSTICS OF LOAD DISTRIBUTION

000000 (MENU ENTER) + (→0← ESC) CALIb ◀ ▲ dI AC

Only use this function in systems where load distribution can be repeated with each change of weight (for example: liquid weighing).

LOAD DIAGNOSTICS

The instrument, with stable weight, calculates and stores the load percentage on each channel. If under normal operation the load percentage error is higher than the value set in parameter ErSEt, the display shows the ErdI AC alarm alternated with the weight; the alarm remains active also upon instrument power-off, press ENTER to cancel.

- AUt (YES/nO; default: nO): it enables load diagnostics.
- StAtUS: it displays the current weight preceded by the letter A; press ENTER and then use ◀ and ▲ to display the load percentage on each active channel.

StAtUS (MENU ENTER) A 235 (MENU ENTER) 1C OFF … 8C 2.5

- MEMrI P: it displays stored load distributions (weight, load percentage on each channel, number distribution saved).

MEMrI P (MENU ENTER) o 235 (MENU ENTER) 1C OFF …
◀ ▲ o 516 … o 824 8C 2.4

  - Confirm the message MEMrI P by pressing ENTER.
  - The weight of the first stored load distribution, preceded by the letter o, is displayed; press ◀ and ▲ to display in sequence the stored weight values, in ascending order.
  - Press ENTER to display the related stored load distribution on each channel (1o ÷ 16o); press ENTER or ESC to return to the previous display.

- dELEtE: it deletes stored load distributions; confirmation is requested (SUrE?),press ENTER to proceed or press ESC to cancel.
- ErSEt (default: 5.0): difference between the current and stored percentage beyond which the ErdI AC alarm is triggered.

The threshold values used by the instrument are expressed as integer numbers with a decimal, therefore they must be multiplied by 10.
Example: to set the threshold percentage to 15% it is necessary to write 150.

ENABLING WRITING

- Write the enabling status* in W1
- Send command 6571 to CMDR

*0=disabled; 1=enabled

ENABLING READING

- Send command 6572 to CMDR
- Read the enabling status* in R1

THRESHOLD WRITING

- Multiply the threshold value by 10
- Write the value in W1
- Send command 6567 to CMDR

THRESHOLD READING

- Send command 6568 to CMDR
- Read the value in R1
- Divide the value by 10

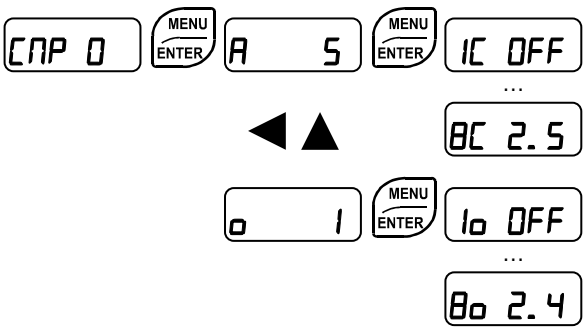
CANCELLATION OF THE STORED LOAD DISTRIBUTIONS

- Send command 6072 to CMDR

DIAGNOSTICS ON ZERO

When a zero-setting is performed from the *CALIb* menu, the instrument calculates the load percentage on each channel; diagnostics on zero is performed only if the load distribution has been stored at least once (see section **TARE WEIGHT ZERO SETTING**).
If with unloaded system the load percentage error is higher than the value set in parameter *ErSEtO*, the display shows the *ErdI AC* alarm alternated with the weight; the alarm remains active also upon instrument power-off, press ENTER to cancel.

- *AUt O* (*YES*/*nO*; default: *nO*): it enables diagnostics on zero.
- *ErSEtO* (default: 5.0): difference between the current and stored percentage beyond which the *ErdI AC* alarm is triggered.
- *CNP O*: it displays the current load distribution on zero and the one previously stored (weight, load percentage on each channel).



- Confirm the message *CNP O* by pressing ENTER.

- The current weight value, preceded by the letter **A**, is displayed; press ◀ and ▲ to display the stored value of the last weight set to zero, preceded by the letter **o**.
- Press ENTER to display the related load distribution on each channel: **1o ÷ 16o** (stored weight) or **1C ÷ 16C** (current weight); press ENTER or ESC to return to the previous display.

COMMUNICATION INTERFACE

TARE WEIGHT ZERO SETTING AND STORAGE OF THE LOAD DISTRIBUTION ON ZERO

- Send command 6122 to CMDR

The threshold values used by the instrument are expressed as integer numbers with a decimal, therefore they must be multiplied by 10.
Example: to set the threshold percentage to 15% it is necessary to write 150.

ENABLING WRITING

- Write the enabling status* in W1
- Send command 6573 to CMDR

*0=disabled; 1=enabled

ENABLING READING

- Send command 6574 to CMDR
- Read the enabling status* in R1

THRESHOLD WRITING

- Multiply the threshold value by 10
- Write the value in W1
- Send command 6569 to CMDR

THRESHOLD READING

- Send command 6570 to CMDR
- Read the value in R1
- Divide the value by 10

CONFIRMATION OF THE DIAGNOSTICS ERROR

To confirm **Erdl AC** via keyboard see section **ALARMS.**

COMMUNICATION INTERFACE

- Send command 6084 to CMDR

READING OF THE LOAD PERCENTAGES ON EACH CHANNEL

To read the load percentages from the display, see section **TEST**.

COMMUNICATION INTERFACE

The load percentage values used by the instrument are expressed as integer numbers with a decimal, so they must be divided by 10.
Example: a value of 152 corresponds to a load percentage of 15.2%.

When the function is enabled, the exchange registers contain the value of each channel:

Output Data from instrument (Reading)	Register
Load percentage on channel 1 or 9 [2 byte]	40053
Load percentage on channel 2 or 10 [2 byte]	40054
Load percentage on channel 3 or 11 [2 byte]	40055
Load percentage on channel 4 or 12 [2 byte]	40056
Load percentage on channel 5 or 13 [2 byte]	40057
Load percentage on channel 6 or 14 [2 byte]	40058
Load percentage on channel 7 or 15 [2 byte]	40059
Load percentage on channel 8 or 16 [2 byte]	40060

ENABLING

- Write the percentage type* in W1
- Send command 6808 to CMDR for channels 1 to 8
- Send command 6810 to CMDR for channels 9 to 16

DISABLING

- Send command 6809 to CMDR

* 0=% of load related to the gross weight
1=% of load related to the total weight (gross weight+zeroing component)

READING OF THE RESPONSE SIGNALS OF THE CELLS IN mV

COMMUNICATION INTERFACE

The response signals of the load cells in mV are expressed as integers with sign and two decimals, so they must be divided by 100.
Example: a value of 520 corresponds to a mV reading of 5.20 mV.

When the function is enabled, the exchange registers contain the value of each channel:

Output Data from instrument (Reading)	Register
Response signal in mV on channel 1 or 9 [2 byte]	40053
Response signal in mV on channel 2 or 10 [2 byte]	40054
Response signal in mV on channel 3 or 11 [2 byte]	40055
Response signal in mV on channel 4 or 12 [2 byte]	40056
Response signal in mV on channel 5 or 13 [2 byte]	40057
Response signal in mV on channel 6 or 14 [2 byte]	40058
Response signal in mV on channel 7 or 15 [2 byte]	40059
Response signal in mV on channel 8 or 16 [2 byte]	40060

ENABLING

- Send command 6902 to CMDR for channels 1 to 8
- Send command 6908 to CMDR for channels 9 to 16

DISABLING

- Send command 6903 to CMDR

TEST

000000 MENU/ENTER + →0← ESC CALIb ◀ ▲ tESt

- **Load distribution:**

  StAtUS: it displays the current weight preceded by the letter A; press ENTER and then use ◀ and ▲ to display the load percentage on each active channel.

- **Millivolt Test:**

  nU-CEL: it displays the response signal of each load cell (CH 1 ÷ CH 8) expressed in mV with three decimals.

- **Millivolt stored at zero setting (only if AUt 0 = YES):**

  nU-0-n: it displays the response signal of each load cell (CH 1 ÷ CH 8) expressed in mV with three decimals (see section **TARE WEIGHT ZERO SETTING**).

EVENTS LOG

000000 (MENU ENTER) + (→0← ESC) CALIb ◀ ▲ EUEnt

The instrument can store up to 50 events; the oldest records are overwritten.

- dIS EU: it displays the last 50 events stored, starting from the most recent one:
  - 2Er0: zero-setting from the calibration menu, press ENTER to display the value set to zero.
  - FtE0: theoretical calibration, press ENTER to display the full scale set.
  - FrEA: real calibration, press ENTER to display the sample weight used.
  - INP0: tare setting via the keypad, press ENTER to display the set value.
  - dI AG: load distribution error, press ENTER to display the weight value that triggered the alarm, press ENTER again to display in sequence the differences between the load percentages and the stored value.
  - ALL: weight alarm, press ENTER to display the alarm type.
  - dELr: load distribution deletion.
  - E9U: equalization.
  - CHn: modification or deletion of the manual selection of active channels.
- dEL EU: it deletes stored events; confirmation is requested (SUrE?),press ENTER to proceed or press ESC to cancel.
- Prt EU: it prints all events.

INFO MENU

000000 (MENU ENTER) + (→0← ESC) CALIb ◀ ▲ InF0

GEnrIC: the identification data of the instrument are displayed.

- InStrN: instrument model
- SU COd : software code
- PrOGrN: program type
- FU UEr: software version
- SEr nu: serial number

16 CHANNELS MODE (CLM16)

By connecting to each other two CLM8, respectively configured as master and slave, the result will be a 16 channels system.

CONNECTIONS AND CONFIGURATION

Connection via **RS485** port.

SIGNAL	MASTER	SLAVE
RS485 +	17	17
RS485 -	18	18
SHIELD	22	22

Connection via **RS232** port
(for connections less than 15 m).

SIGNAL	MASTER	SLAVE
TXD	20	19
RXD	19	20
SHIELD	22	22

Master instrument configuration

Configure, on the serial port used, the CMASTE protocol (see section **SERIAL COMMUNICATION SETTING**).

All the configurations and operations for all 16 channels are carried out by the master instrument.

Slave instrument configuration

Configure, on the serial port used, the CSLAVE protocol (see section **SERIAL COMMUNICATION SETTING**).

The instrument operates as a simple junction box: whilst in slave mode, the display shows the message SLAVE; the only operation allowed is the restore of the standard 8 channels mode, by disabling the CSLAVE protocol (see section **SERIAL COMMUNICATION SETTING**).

It's not possible to enable 16 channels mode on several serial ports; in case of conflict, the last serial set remains active.

USE WITH W SERIES INSTRUMENTS

WARNING: the weight indicator must be properly configured before operating in combination with the intelligent junction box (see section **DATA DELETION AND PROGRAM SELECTION** in W series instrument manual) and the approval status set on both instruments must be the same.

When the CLM8 is used in combination with a W series instrument, the load cells are connected to the junction box, which transmits the weight to the indicator; all the operations of calibration, zeroing, equalization and channel selection can be performed remotely through the indicator.

CONNECTION TO THE WEIGHT INDICATOR

Connection via **RS485** port.

SIGNAL	CLM8	Weight indicator
RS485 +	17	RS485 +
RS485 -	18	RS485 -
SHIELD	22	SHIELD

Connection via **RS232** port
(for connections less than 15 m).

SIGNAL	CLM8	Weight indicator
TXD	20	RXD
RXD	19	TXD
SHIELD	22	SHIELD

Weight indicator configuration

Configure, on the serial port used, the MASNUL protocol with the following parameters:

bAUd = 9600 PAr I tY = nOnE StOP = 1

The MASNUL item appears in the serial port configuration menu, on the W series instrument connected to the CLM8 (see section **ADDITIONAL MENU MAP**).
By default, the CML8 remote control is configured on RS485 port.

CLM8 intelligent junction box configuration

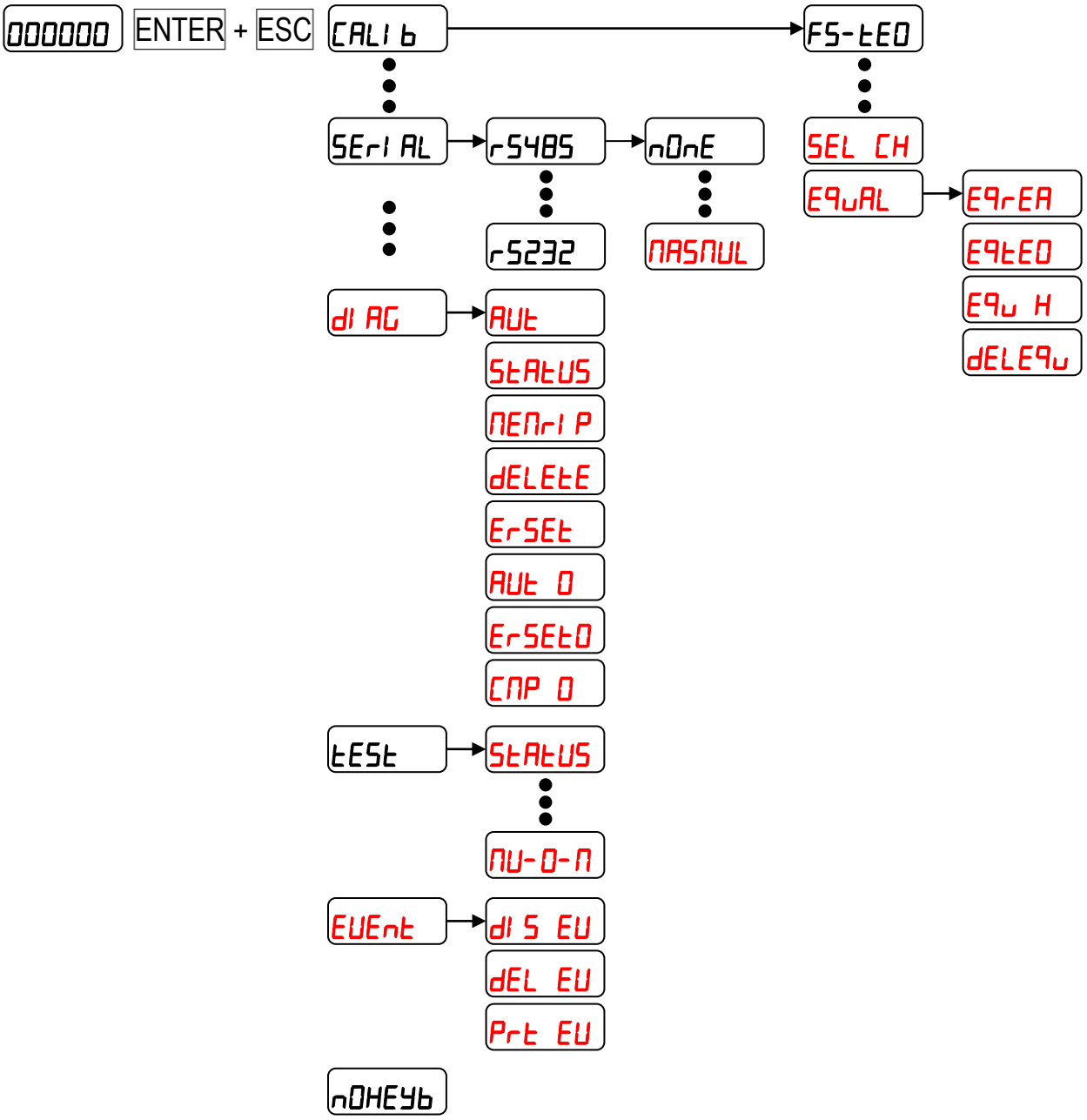
Configure, on the serial port used, the MODBUS protocol with the following parameters:

bAUd = 9600 PAr I tY = nOnE StOP = 1

ADDITIONAL MENU MAP

WARNING: the map shows only the additional menu items that are enabled on the W series instruments connected to the CLM8.

Into menus changes are applied right after pressing the ENTER key (no further confirmation is required).



CLM8 REMOTE CONTROL

The following functions of CLM8 can be performed remotely through the weight indicator and are added to those normally present:

- INSTRUMENT COMMISSIONING
- TARE WEIGHT ZERO SETTING
- CONFIRMATION AND CHANGE OF ACTIVE CHANNELS
- EQUALIZATION (CORnER mode only)
- FILTER ON THE WEIGHT
- ANTI-PEAK
- AUTOMATIC DIAGNOSTICS OF LOAD DISTRIBUTION
- LOAD DIAGNOSTICS
- DIAGNOSTICS ON ZERO
- TEST
- EVENTS LOG

WARNING: when using the weight indicator to manage the intelligent junction box, the weight indicator display replicates exactly what would be displayed on the CLM8 display.

If the configuration is performed on the CLM8, the W series instrument connected must be restarted to allow synchronization.

REMOTE KEYPAD LOCKING

000000 ENTER + ESC CALIb ◀ ▲ nOHEYb

YES: keypad locked.
nO: keypad unlocked.

ADDITIONAL ALARMS

WARNING: the list shows only the additional alarms that are enabled on the W series instruments connected to the CLM8.

Er CON: CLM8 is not responding, check connections and serial ports settings.
Er rES: CLM8 responds incorrectly, check connections and serial ports settings.
ErUArt: issues with the serial communication device.
SYnC: the instrument is synchronizing with CLM8, wait for the end of the operation.

ALARMS

nOCEL: no load cell detected, check the connections.

ErCEL: the load cell signal exceeds 39 mV; the conversion electronics (AD converter) is malfunctioning.

ErCELr: the load cell excitation is not connected or is incorrectly connected; the references are not connected or are incorrectly connected; the load cell is a 4-wire and there are no jumpers between EX- and REF- and between EX+ and REF+.

ErCEL 1: the load cell is not connected or is incorrectly connected (the number indicates the channel on which the error is detected).

Er OL: the weight display exceeds 110% of the full scale.

Er Ad: internal instrument converter failure; check load cell connections, if necessary contact technical assistance.

------: the weight exceeds the maximum capacity by 9 divisions.

Er OF: maximum displayable value exceeded (value higher than 999999 or lower than -999999).

t-----: weight too high: zero setting not possible.

MAH-PU: this message appears in the sample weight setting, in real calibration, after the eighth sample weight value has been entered.

Error: the value set for the parameter is beyond the permitted values; press ESC to quit the setting mode leaving the previous value unchanged. Examples: a number of decimals is selected for full scale which exceeds the instrument's display potential; value above the maximum setting value; the weight value set in sample weight verification does not match the detected mV increase.

bLOC: lock active on menu item, keypad or display.

nOdI SP: It's not possible to display properly the number because is greater than 999999 or less than -999999.

nO MI n: weight too low, the instrument returns to the previous screen.

tUI CE: the current load cell has already been equalized; press ENTER to go back to the previous step and move the sample weight on the next load cell.

LOAd: the sample weight was not loaded or is too light.

ErdI AC: the load percentage error is higher than the value set in parameters ErSEt or ErSEtO; press ENTER to cancel the alarm.

I n2ErO: gross weight equal to zero: the semi-automatic tare operation cannot be performed.

Er SLA: communication problems between master and slave; check connections and instruments settings.

bUS Er: issues with the fieldbus device.

ErrCHH: issues with data contained in external memory, contact technical assistance.

Serial protocol alarms:

	ErCEL	Er OL	Er Ad	------	Er OF	t------
MODE						
Bit LSB	76543210	76543210	76543210	76543210	76543210	The response to the zero command is a 'value not valid' error (error code 3)
Status Register MODBUS RTU	**xxxxxxx1**	**xxxx1xxx**	**xxxxxx1x**	**xxxxx1xx**	On gross: **xxx1xxxx** On net: **xx1xxxxx**	
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-N	**_ERCEL**	**_ER_OL**	**_ER_AD**	**######**	**_ER_OF**	**O__SET**
CONTIN	**_ERCEL**	**_ER_OL**	**_ER_AD**	**^^^^^^**	**_ER_OF**	**O__SET**
YHL	999999999	999999999	999999999	999999999	999999999	999999999

*** For RIP remote displays, if the message exceeds 5 digits the display reads ------.**

REMOTE ALARMS MANAGEMENT

The status of the instrument alarms is expressed through 4-byte numbers in which the two H byte represent ERC and the two L byte represent AERC.

ERC error code		AERC auxiliary error code		Cause of error
Decimal	Binary	Decimal	Binary	
Load cell error				
1	0b000000001	1	0b0000000000000001	ErCELr
		2	0b0000000000000010	ErCEL 1
		4	0b0000000000000100	ErCEL2
		8	0b0000000000001000	ErCEL3
		16	0b0000000000010000	ErCEL4
		32	0b0000000000100000	ErCEL5
		64	0b0000000001000000	ErCEL6
		128	0b0000000010000000	ErCEL7
		256	0b0000000100000000	ErCEL8
		512	0b0000001000000000	ErCEL9
		1024	0b0000010000000000	ErCE 10
		2048	0b0000100000000000	ErCE 11
		4096	0b0001000000000000	ErCE 12
		8192	0b0010000000000000	ErCE 13
		16384	0b0100000000000000	ErCE 14
		32768	0b1000000000000000	ErCE 15
		0	0b0000000000000000	ErCE 16
Instrument error				
4	0b000000100	1	0b000000001	------
		2	0b000000010	Er OL
		4	0b000000100	Er Ad
		16	0b000010000	Gross weight over the maximum displayable value
		32	0b000100000	Net weight over the maximum displayable value

ERC error code		AERC auxiliary error code		Cause of error
Decimal	Binary	Decimal	Binary	
Diagnostics error, if the load diagnostics is enabled (AUt=YES)				
8	0b00000100	1	0b0000000000000001	Load percentage on channel 1>ErSEt
		2	0b0000000000000010	Load percentage on channel 2>ErSEt
		4	0b0000000000000100	Load percentage on channel 3>ErSEt
		8	0b0000000000001000	Load percentage on channel 4>ErSEt
		16	0b0000000000010000	Load percentage on channel 5>ErSEt
		32	0b0000000000100000	Load percentage on channel 6>ErSEt
		64	0b0000000001000000	Load percentage on channel 7>ErSEt
		128	0b0000000010000000	Load percentage on channel 8>ErSEt
		256	0b0000000100000000	Load percentage on channel 9>ErSEt
		512	0b0000001000000000	Load percentage on channel 10>ErSEt
		1024	0b0000010000000000	Load percentage on channel 11>ErSEt
		2048	0b0000100000000000	Load percentage on channel 12>ErSEt
		4096	0b0001000000000000	Load percentage on channel 13>ErSEt
		8192	0b0010000000000000	Load percentage on channel 14>ErSEt
		16384	0b0100000000000000	Load percentage on channel 15>ErSEt
		32768	0b1000000000000000	Load percentage on channel 16>ErSEt

ERC error code		AERC auxiliary error code		Cause of error
Decimal	Binary	Decimal	Binary	
Diagnostics error, if the diagnostics on zero is enabled (AUt 0=YES)				
8	0b000001000	1	0b0000000000000001	Load percentage on channel 1>ErSEt0
		2	0b0000000000000010	Load percentage on channel 2>ErSEt0
		4	0b0000000000000100	Load percentage on channel 3>ErSEt0
		8	0b0000000000001000	Load percentage on channel 4>ErSEt0
		16	0b0000000000010000	Load percentage on channel 5>ErSEt0
		32	0b0000000000100000	Load percentage on channel 6>ErSEt0
		64	0b0000000001000000	Load percentage on channel 7>ErSEt0
		128	0b0000000010000000	Load percentage on channel 8>ErSEt0
		256	0b0000000100000000	Load percentage on channel 9>ErSEt0
		512	0b0000001000000000	Load percentage on channel 10>ErSEt0
		1024	0b0000010000000000	Load percentage on channel 11>ErSEt0
		2048	0b0000100000000000	Load percentage on channel 12>ErSEt0
		4096	0b0001000000000000	Load percentage on channel 13>ErSEt0
		8192	0b0010000000000000	Load percentage on channel 14>ErSEt0
		16384	0b0100000000000000	Load percentage on channel 15>ErSEt0
		32768	0b1000000000000000	Load percentage on channel 16>ErSEt0
Writing error				
16	0b000010000	1	0b000000001	The data to be saved is incorrect
Command error				
256	0b100000000	0	0b000000000	The received command does not exist

READING OF THE ALARMS STATUS

COMMUNICATION INTERFACE

- Send command 6800 to CMDR
- Read ERC in the two H byte of R1
- Read AERC in the two L byte of R1

PRINTING EXAMPLES

If the printer has been set (see section **SERIAL COMMUNICATION SETTINGS**), from the weight display press the PRINT key:

BASIC PRINTOUT

```
----------------------
CLM8   BASE     Addr:01

GROSS            878 kg
NET              589 kg
TARE             289 kg
```

LOAD DISTRIBUTION PRINT

Current distribution: press the PRINT key from the STATUS menu.
Current and stored distribution: from the CMP 0 and MEMRIP menus, keep pressed the PRINT key for more than 3 seconds while the weight is displayed.

CURRENT DISTRIBUTION

```
----------------------
CLM8   BASE     Addr:01
CURRENT        (STATUS)
GROSS           2014 kg
CH1:             23.5 %
CH2:             24.1 %
CH3:             15.5 %
CH4:             16.7 %
CH5:              9.0 %
CH6:             10.2 %
CH7:                ERR    (load cell connected but in error)
CH8:                OFF    (load cell not connected)
```

CURRENT AND STORED DISTRIBUTION

```
----------------------
CLM8   BASE     Addr:01
STORED         (MEMRIP)
GROSS           2014 kg
CH1:             23.5 %
CH2:             24.1 %
CH3:             15.5 %
CH4:             16.7 %
CH5:              9.0 %
CH6:             10.2 %
CH7:                ERR    (load cell connected but in error)
CH8:                OFF    (load cell not connected)
GROSS  OLD      2050 kg
CH1:             25.5 %
CH2:             22.1 %
CH3:             16.5 %
CH4:             16.7 %
CH5:              9.0 %
CH6:             10.2 %
CH7:                ERR    (load cell connected but in error)
CH8:                OFF    (load cell not connected)
```

CONTINUOUS FAST WEIGHT TRANSMISSION PROTOCOL

This protocol allows the continuous transmission of the weight at high update frequencies. Up to 300 strings per second are transmitted with a minimum transmission rate of 38400 baud.
Following communication modes availables (see section **SERIAL COMMUNICATION SETTINGS**):

- *MOd t*: communication compatible with TX RS485 instruments
- *MOd td*: communication compatible with TD RS485 instruments

If *MOd t* is set, the following string is transmitted to PC/PLC:

xxxxxxCRLF

where: **xxxxxx** ..... 6 characters of gross weight (48 ÷ 57 ASCII)
CR..... 1 character return to the start (13 ASCII)
LF..... 1 character on new line (10 ASCII)

In case of negative weight, the first character from the left of the weight characters takes on the value "-" (minus sign - ASCII 45).

If *St bIt = YES* (see section **SERIAL COMMUNICATION SETTING**), the following string is transmitted to PC/PLC:

yxxxxxxCRLF

where: **y** ..... 1 character of weight stability identification (S=weight stable, N=weight not stable)

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

If *MOd td* is set, the following string is transmitted to PC/PLC:

&TzzzzzzPzzzzzz\ckckCR

where: **&** ..... 1 initial string character (38 ASCII)
T ..... 1 character of gross weight identification
P ..... 1 character of gross weight identification
zzzzzz ..... 6 characters of gross weight (48 ÷ 57 ASCII)
**** ..... 1 character of separation (92 ASCII)
ckck ..... 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". "**ckck**" is the ASCII code of the two hexadecimal digits
CR..... 1 character of end string (13 ASCII)

In case of negative weight, the first character from the left of the weight characters takes on the value "-" (minus sign - ASCII 45).
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 section.

CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL

This protocol allows the continuous weight transmission to remote displays. The communication string is transmitted 10 times per second.
Following communication modes availables (see section **SERIAL COMMUNICATION SETTINGS**):

- *rIP*: communication with RIP5/20/60, RIP50SHA, RIPLED series remote displays; the remote display shows the net weight or gross weight, according to its settings (set: *bAUd* = *9600*, *PAr tY* = *nOnE*, *StOP* = *1*)
- *HdrI P*: communication with RIP6100, RIP6100N, RIP6100IP65, RIP675, RIP6125C series remote displays; the remote display shows the net weight or gross weight, according to its settings (set: *bAUd* = *9600*, *PAr tY* = *nOnE*, *StOP* = *1*)
- *HdrI Pn*: communication with RIP6100, RIP6100N, RIP6100IP65, RIP675, RIP6125C series remote displays (set: *bAUd* = *9600*, *PAr tY* = *nOnE*, *StOP* = *1*)

The instrument sends the following string to the remote display:

&NxxxxxxLyyyyyy\ckckCR

where: **&** ..... 1 initial string character (38 ASCII)
N ..... 1 character of net weight identification (78 ASCII)
xxxxxx ..... 6 characters of net weight or PEAK if present (48 ÷ 57 ASCII)
L ..... 1 character of gross weight identification (76 ASCII)
yyyyyy ..... 6 characters of gross weight (48 ÷ 57 ASCII)
\ ..... 1 character of separation (92 ASCII)
ckck ..... 2 ASCII checksum characters calculated considering the characters between "**&**" and "****" excluded. The checksum value is obtained from the calculation of XOR (OR exclusive) of the 8-bit ASCII codes of the characters considered. This obtains a character expressed in hexadecimals with two digits that can have the values from "0" to "9" and from "A" to "F". "**ckck**" is the ASCII code of the two hexadecimal digits
CR..... 1 character of end string (13 ASCII)

In case of negative weight, the first character from the left of the weight characters takes on the value "-" (minus sign - ASCII 45).
If *HdrI P* has been set, the decimal point at the position shown on the instrument's display can also be transmitted. In this case, if the value exceeds 5 digits, only the 5 most significant digits are transmitted, while if the value is negative, no more than the 4 most significant digits are transmitted. In both cases, however, the decimal point shifts consistently with the value to display.
If *HdrI Pn* has been set, in addition to what stated in *HdrI P* protocol, the instrument transmits the prompt *nEt* every 4 seconds in the gross weight field, if on the instrument, it has been carried out a net operation (see section **SEMI-AUTOMATIC TARE (NET/GROSS)**).
In case of weight value is under -99999, the minus sign "-" is sent alternated with the most significant figure.
In case of error or alarm, the 6 characters of the gross weight and net weight are substituted by the messages found in the table of the ALARMS section.

CONTINUOUS WEIGHT TRANSMISSION PROTOCOL

This protocol allows the continuous weight transmission. The communication string is transmitted 5 times per second:

- YHL: if a net operation has been performed (see section **SEMI-AUTOMATIC TARE (NET/GROSS)**) the net weight is transmitted, otherwise the gross weight is transmitted

The instrument sends the following string to the remote display:

=xxxxxxxxx

where: **=** .....1 initial string character (62 ASCII)

xxxxxxxxx ..9 characters of net or gross weight (48 ÷ 57 ASCII) with LITTLE ENDIAN sorting

In case of negative weight, the first character from the right of the weight characters takes on the value "-" (minus sign - ASCII 45); the decimal point can also be transmitted, in the position determined by the calibration of the instrumentation.

Example: in case of gross weight of -20.7 kg, the instrument sends:
=7.02000-

In case of error or alarm, the 9 characters of the gross and net weight are substituted by the message "999999999".

ASCII BIDIRECTIONAL PROTOCOL

The instrument replies to the requests sent from a PC/PLC.
It is possible to set a waiting time for the instrument before it transmits a response (see dELAY parameter in the **SERIAL COMMUNICATION SETTINGS** section).
Following communication modes availables (see section **SERIAL COMMUNICATION SETTINGS**):

- nOdU60: communication compatible with instruments series W60000, WL60 Base, WT60 Base, TLA600 Base
- nOd td: communication compatible with TD RS485 instruments

Captions:

$ ..... Beginning of a request string (36 ASCII)
& or **&&**..... Beginning of a response string (38 ASCII)
aa..... 2 characters of instrument address (48 ÷ 57 ASCII)
! ..... 1 character to indicate the correct reception (33 ASCII)
? ..... 1 character to indicate a reception error (63 ASCII)
..... 1 character to indicate an error in the command execution (23 ASCII)
ckck: ..... 2 ASCII characters of Check-Sum (for further information, see section **CHECK-SUM CALCULATION**)
CR..... 1 character for string end (13 ASCII)
**** ..... 1 character of separation (92 ASCII)

1. READING WEIGHT FROM PC

The PC transmits the following ASCII string: **$aajckckCR**

where: **j** = t ..... to read gross weight
j = n ..... to read net weight

Possible instrument responses:

- correct reception: **&aaxxxxxxj\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

where: **xxxxxx** ..... 6 characters of the required weight value

Notes: in case of negative weight, the first character from the left of the weight characters takes on the value "-" (minus sign - ASCII 45). In case of weight value is under -99999, the minus sign "-" is sent alternated with the most significant figure.

Error messages:
in case of an instrument alarm for exceeding 110% of the full scale or 9 divisions above the value of the parameter MASS, the instrument sends the string:
&aassO-Lst\ckck

in case of faulty connection of the load cells or of another alarm, the instrument sends:
&aassO-Fst\ckck

where: **s** ..... 1 separator character (32 ASCII – space)

Generally refer to the **ALARMS** section.

2. SEMI-AUTOMATIC ZERO (WEIGHT ZERO-SETTING FOR SMALL VARIATIONS)

The PC transmits the following ASCII string: **$aaZEROckckCR**

Possible instrument responses:
- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**
- the current weight is over the maximum value resettable: **&aa#CR**

3. COMMUTATION OF GROSS WEIGHT TO NET WEIGHT

The PC transmits the following ASCII string: **$aaNETckckCR**

Possible instrument responses:
- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

4. COMMUTATION OF NET WEIGHT TO GROSS WEIGHT

The PC transmits the following ASCII string: **$aaGROSSckckCR**

Possible instrument responses:
- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

5. READING OF DECIMALS AND DIVISION NUMBER

The PC transmits the following ASCII string: **$aaDckckCR**

Possible instrument responses:

- correct reception: **&aaxy\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

where: **x** ..... number of decimals
y = 3 ..... for division value = 1
y = 4 ..... for division value = 2
y = 5 ..... for division value = 5
y = 6 ..... for division value = 10
y = 7 ..... for division value = 20
y = 8 ..... for division value = 50
y = 9 ..... for division value = 100

6. TARE ZERO-SETTING

The PC transmits the following ASCII string: **$aazckckCR**

where: **z** ..... command of weight zero-setting (122 ASCII)

Possible instrument responses:

- correct reception: **&aaxxxxxxt\ckckCR**
- incorrect reception: **&&aa?\ckckCR**
- the gross weight is not displayed on the instrument: **&aa#CR**

where: **xxxxxx** ..... 6 characters to indicate the required weight value
t ..... character to indicate the weight (116 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 (“000000”).

The calibration values are stored permanently in the EEPROM memory and the number of allowed writings is limited (about 100000).

7. REAL CALIBRATION (WITH SAMPLE WEIGHT)

After the tare zero-setting, this function allow the operator to check the calibration obtained by using sample weights and correct automatically any change between the displayed value and the correct one.

Load onto the weighing system a sample weight, which must be at least 50% of the Full Scale, or make so that that the instrument measures a corresponding mV signal.

The PC transmits the following ASCII string: **$aasxxxxxxckckCR**

where **: s** ..... calibration command (115 ASCII)
xxxxxx ..... 6 characters to indicate the value of sample weight (negative values are not allowed).

Possible instrument responses:
- correct reception: **&aaxxxxxxt\ckckCR**
- incorrect reception or full scale equal to zero: **&&aa?\ckckCR**

where: **t** ..... character of gross weight identification (116 ASCII)
xxxxxx ..... 6 characters to indicate the value of current weight

In case of correct reception, the read value has to be equal to the sample weight.

Example: calibration of the instrument no. 1 with a sample weight of 20000 kg:
query: **$01s02000070(Cr)**
response: **&01020000t\77(Cr)**
In case of correct calibration, the read value has to be “020000”.

8. KEYPAD LOCK (BLOCK THE ACCESS TO THE INSTRUMENT)

The PC transmits the following ASCII string: **$aaKEYckckCR**

Possible instrument responses:
- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

9. KEYPAD UNLOCK

The PC transmits the following ASCII string: **$aaFREckckCR**

Possible instrument responses:
- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

10. DISPLAY AND KEYPAD LOCK

The PC transmits the following ASCII string: **$aaKDISckckCR**

Possible instrument responses:

- correct reception: **&&aa!\ckckCR**
- incorrect reception: **&&aa?\ckckCR**

11. CHECK-SUM CALCULATION

The two ASCII characters (**ckck**) are the representation of a hexadecimal digit in ASCII characters. The check digit is calculated by executing the operation of XOR (exclusive OR) of 8-bit ASCII codes of only the string underlined.

The procedure to perform the calculation of check-sum is the following:

- Consider only the string characters highlighted with underlining
- Calculate the exclusive OR (XOR) of 8-bit ASCII codes of 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 digit (that is, numbers from 0 to 9 or letters from A to F). In this case the hexadecimal code is 0x75.
- 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**.**

To select the MODBUS-RTU communication see **SERIAL COMMUNICATION SETTINGS** section.

Check if the *master* MODBUS-RTU in use (or the development tool) requires the disclosure of registers based on 40001 or 0. In the first case the registers numbering corresponds to the one in the table; in the second case the register must be determined as the value in the table minus 40001. E.g.: the register 40028 shall be reported as 27 (= 40028-40001).

Certain data, when specifically indicated, will be written directly in the EEPROM type memory. This memory has a limited number of writing operations (100000), 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.

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
- Settable parity bit
- Settable stop bit

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 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 present in the **SERIAL COMMUNICATION SETTING** section, 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 Modicon PI_MBUS_300.

In general queries and answers toward and from one slave instrument are composed as follows:

FUNCTION 3: Read holding registers (READ PROGRAMMABLE REGISTERS)

QUERY

Address	Function	1st register address	No. registers	2 byte
A	0x03	0x0000	0x0002	CRC

Tot. byte = 8

RESPONSE

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

Tot. byte = 3+2*No. registers+2

where: No. registers. number of Modbus registers to write beginning from the address no. 1
No. byte..... number of bytes of the following data

FUNCTION 16: Preset multiple registers (WRITE MULTIPLE REGISTERS)

QUERY

Address	Function	1st reg. add.	No. reg.	No. bytes	Val.reg.1	Val.reg.2	2 byte
A	0x10	0x0000	0x0002	0x04	0x0000	0x0000	CRC

Tot. byte = 7+2*No. registers+2

RESPONSE

Address	Function	1st reg. address	No. reg.	2 byte
A	0x10	0x0000	0x0002	CRC

Tot. byte = 8

where: No. registers. number of Modbus registers to read beginning from the address no. 1
No. byte..... number of bytes of the following data
Val.reg.1..... Contents of the register beginning from the first

The response contains the number of registers modified beginning from the address no. 1.

MANAGING BROADCAST REQUESTS

The instrument is able to manage the broadcast requests sent by the *master* MODBUS RTU, identified by value 0 in the Address field:

- record read request: the instrument takes no action and transmits no response
- record write request: the instrument performs the request and transmits no response

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 + 0x80		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 AVAILABLE 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 ..... high half of the DOUBLE WORD containing the number
L..... low half of the DOUBLE WORD containing the number

Register	Description	SIGLA	Saving in EEPROM	Access
40001	Firmware Version	-	-	R
40002	Instrument type	-	-	R
40003	Year of manufacture	-	-	R
40004	Serial Number	-	-	R
40005	Program type	-	-	R

40006	COMMAND REGISTER	CMDR	NO	R/W
40007	STATUS REGISTER	SR1	-	R
40008	GROSS WEIGHT H	GW	-	R
40009	GROSS WEIGHT L		-	R
40010	NET WEIGHT H	NW	-	R
40011	NET WEIGHT L		-	R
40014	Divisions and Units of measure	DU	-	R
40051	REGISTER 1	R1/W1*	NO	R/W
40052	REGISTER 2			R/W
40053	REGISTER 3			R/W
40054	REGISTER 4			R/W
40055	REGISTER 5			R/W
40056	REGISTER 6			R/W
40057	REGISTER 7			R/W
40058	REGISTER 8			R/W
40059	REGISTER 9			R/W
40060	REGISTER 10			R/W
40061	REGISTER 11			R/W
40062	REGISTER 12	AEXC		R/W
40063	REGISTER 13			R/W
40064	REGISTER 14	EXC		R/W
40065	Sample weight for instrument calibration H	CALW	Use with command 101 of the Command Register	R/W
40066	Sample weight for instrument calibration L			R/W
40073	Preset Tare H	PT	Use with command 130 of the Command Register	R/W
40074	Preset Tare L			R/W

*) in this document, reference is made to R1 for access to the register in reading and W1 for access to the register in writing.

COMMUNICATION EXAMPLES

The numerical data below are expressed in hexadecimal notation with prefix h.

EXAMPLE 1
Command for multiple writing of registers (hexadecimal command 16, h10):
Assuming that we wish to write the value 0 to the register 40017 and the value 2000 to the register 40018, the string to generate must be:

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

The instrument will respond with the 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 H	**h00**	Number of registers H	**h00**
Number of registers L	**h02**	Number of registers L	**h02**
Byte Count	**h04**	CRC16 L	**h40**
Datum 1 H	**h00**	CRC16 H	**h0D**
Datum 1 L	**h00**		
Datum 2 H	**h07**		
Datum 2 L	**hD0**		
CRC16 L	**hF1**		
CRC16 H	**h0F**		

EXAMPLE 2
Multiple commands reading for registers (hexadecimal command 3, h03):
Assuming that we wish to read the two gross weight values (in the example 4000) and net weight values (in the example 3000), reading from address 40008 to address 40011 must be performed by sending the following string:

h01 h03 h00 h07 h00 h04 hF5 hC8

The instrument will respond with the string:

h01 h03 h00 h07 h00 h00 h0F hA0 h00 h00 h0B hB8 h37 h11

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	**h00**
Address of the first register L	**h07**	Address of the first register L	**h07**
Number of registers H	**h00**	Datum 1 H	**h00**
Number of registers L	**h04**	Datum 1 L	**h00**
CRC16 L	**hF5**	Datum 2 H	**h0F**
CRC16 H	**hC8**	Datum 2 L	**hA0**
		Datum 3 H	**h00**
		Datum 3 L	**h00**
		Datum 4 H	**h0B**
		Datum 4 L	**hB8**
		CRC16 L	**h37**
		CRC16 H	**h11**

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

ETHERNET TCP/IP PROTOCOL

TECHNICAL SPECIFICATIONS

Port	RJ45 10Base-T or 100Base-TX (auto-detect)

Link LED indications	off ..... Ethernet link not established amber ..... 10 Mb/s green ..... 100 Mb/s
Activity LED indications	off ..... Ethernet activity not detected amber ..... Half Duplex green ..... Full Duplex

The instrument features an ethernet TCP/IP port that allows to exchange the weight and the main parameters in an ethernet network, for example with a PC.

INSTRUMENT SETUP

ENTER + ESC → EtHnEt

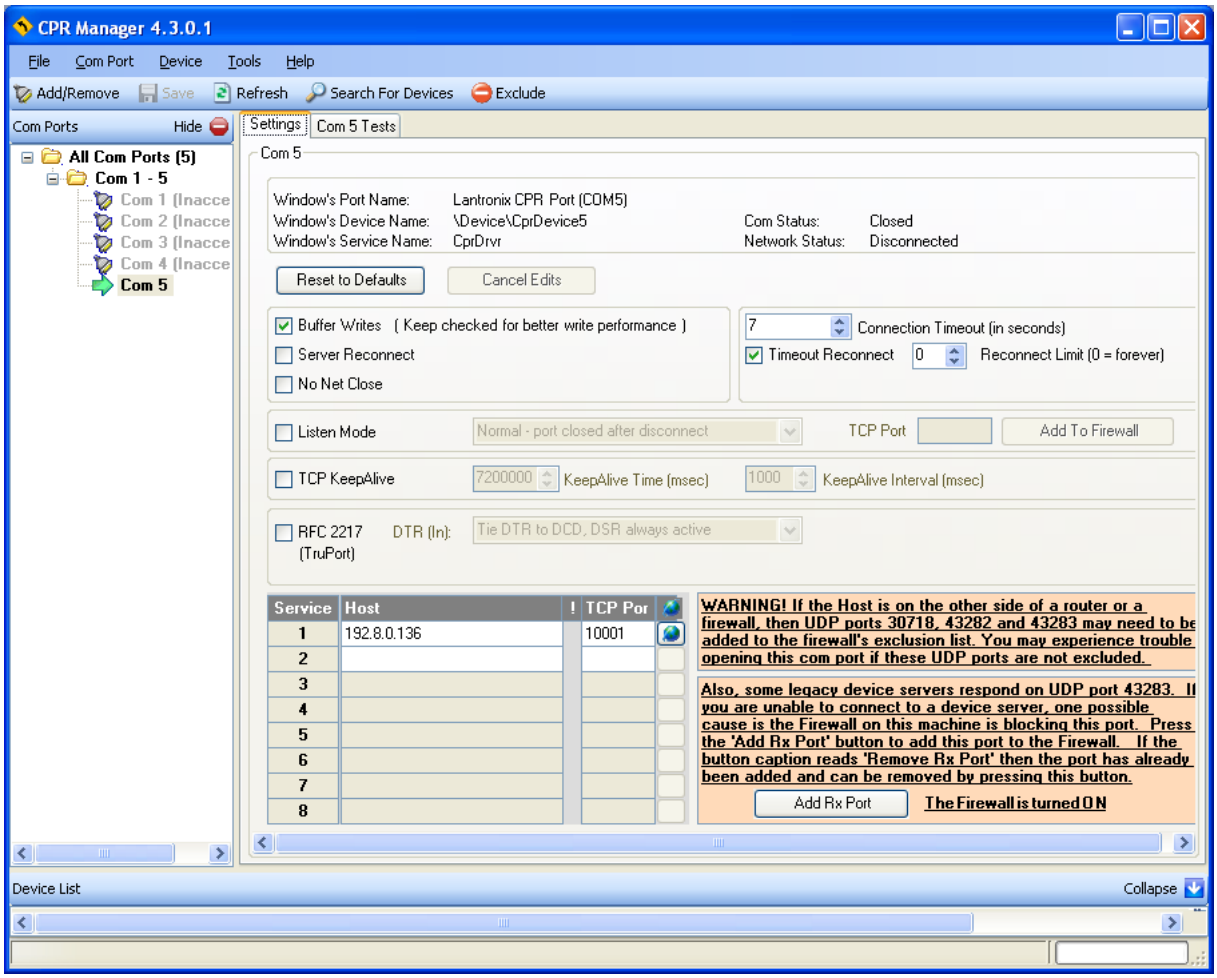
- IPAddr (default: 192.8.0.141): set instrument IP address.
- SUbnEt (default: 255.255.255.0): set instrument Subnet Mask.
- GAtUAY (default: 192.8.0.111): set Gateway address of Ethernet network.
- nOdE: select communication protocol.
  - nOnE: it disables any type of communication (default).
  - ModbUS: MODBUS-RTU protocol; possible addresses: from 1 to 99.
  - ASCII : ASCII bidirectional protocol; possible addresses: from 1 to 99.
    - nOdU60
    - nOd td
  - COntI n: continuous weight transmission protocol, at the frequency set in HErt2 item (from 10 to 200).
    - nOd t
    - nOd td
  - rIP: continuous weight transmission protocol to remote displays; the remote display shows the net weight or gross weight according to its settings (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**).
  - HdrIP: continuous weight transmission protocol to remote displays; the remote display shows the net weight or gross weight according to its settings (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**).

- HdrI Pn: continuous weight transmission protocol to remote displays (see section **CONTINUOUS WEIGHT TRANSMISSION TO REMOTE DISPLAYS PROTOCOL**), when the remote display is set to gross weight:
  - if the instrument displays the gross weight, the remote display shows the gross weight.
  - if the instrument shows the net weight, the remote display shows the net weight alternated with the message nEt.
- YHL: continuous weight transmission protocol (see section **CONTINUOUS WEIGHT TRANSMISSION PROTOCOL**)
- UEbSru: see section **WEBSITE**.

  - Addr: instrument address (from 1 to 99; default: 1).
  - HErt2: maximum transmission frequency (10 – 20 – 30 – 40 – 50 – 60 – 70 – 80 – 100 – 200; default: 10); to be set when the CONtI n transmission protocol is selected.
  - dELAY: delay in milliseconds which elapses before the instrument replies (from 0 to 200 ms; default: 0).

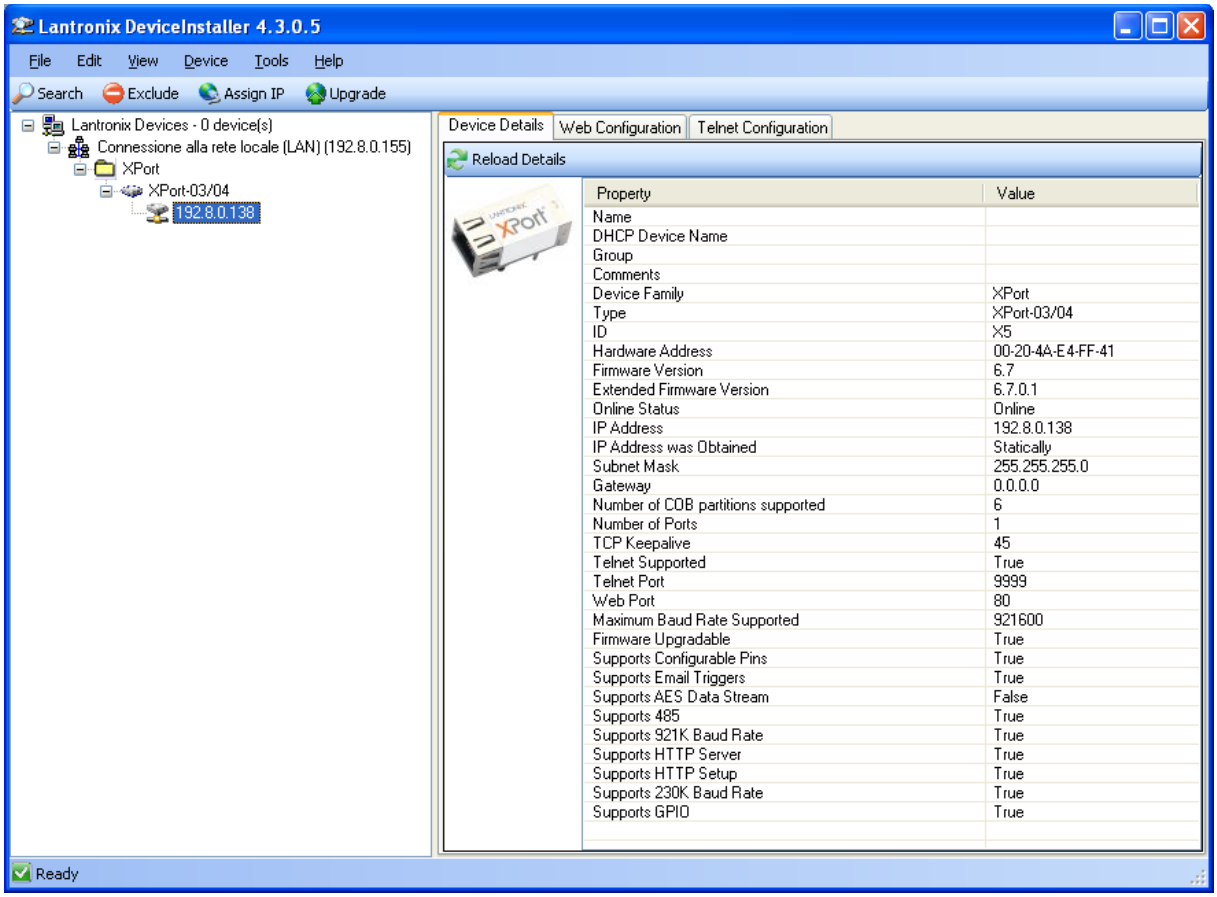
In order to apply the changes, turn the instrument off, wait for 10 seconds and turn it back on.

A PC can be connected, by a virtual serial port, to the instrument via ethernet TCP/IP.
To install the virtual COM port, use the CPR Manager included in the supply: run file *CPR.exe* on CD, add a serial port, set an IP address (host) and a TCP port (10001), then save.

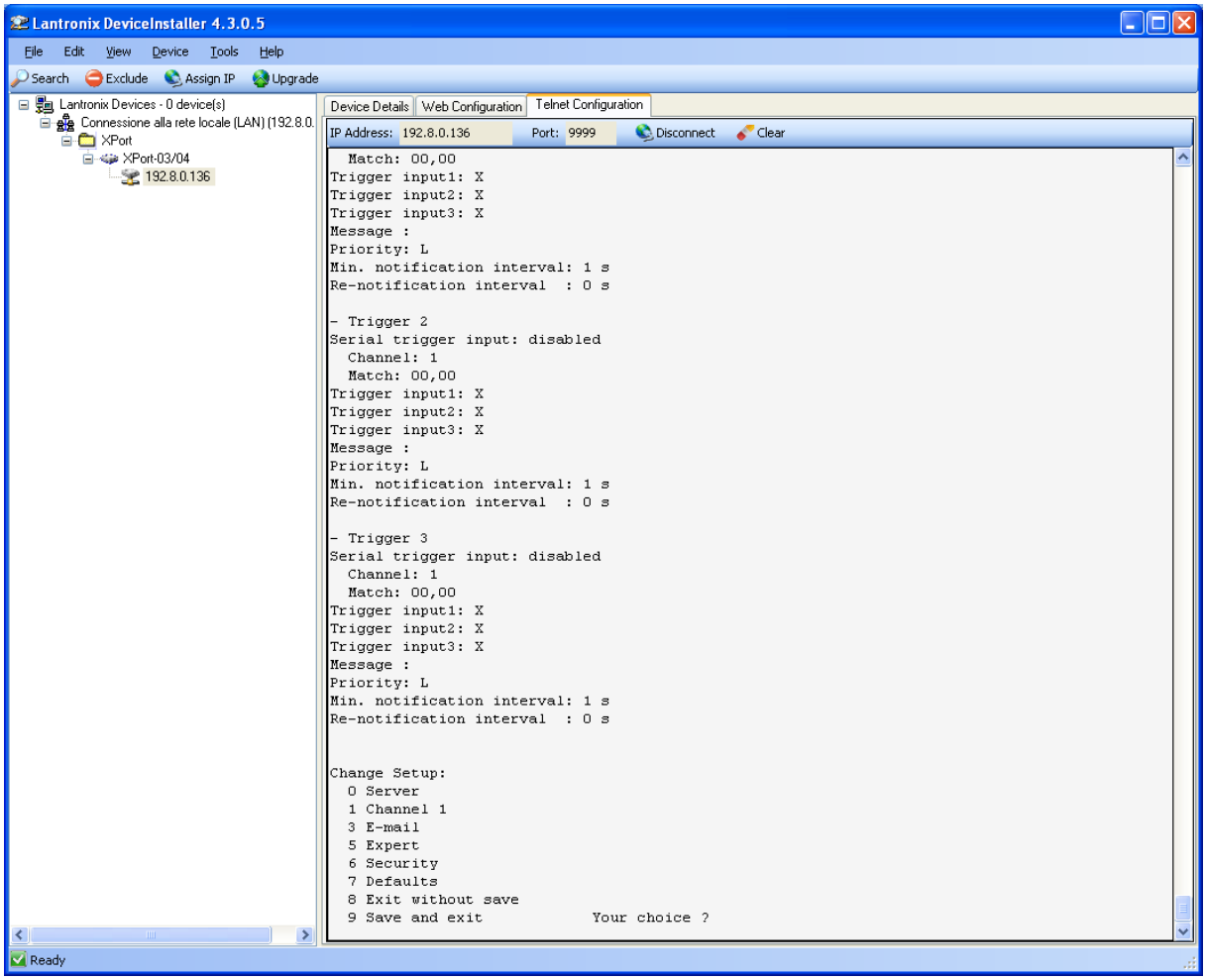


Use the just created virtual COM port to communicate with the instrument, using the protocol selected on it.
Alternatively connect to the instrument using a socket (e.g.: Winsock) on port 10001.

To verify the ethernet configuration of the instrument, you can install the application Lantronix DeviceInstaller on a PC with Microsoft Windows operating system (run file *DevInst.exe* on CD). Connect PC and instrument via LAN (point-to-point or through hub/switch), run the application and click on Search:

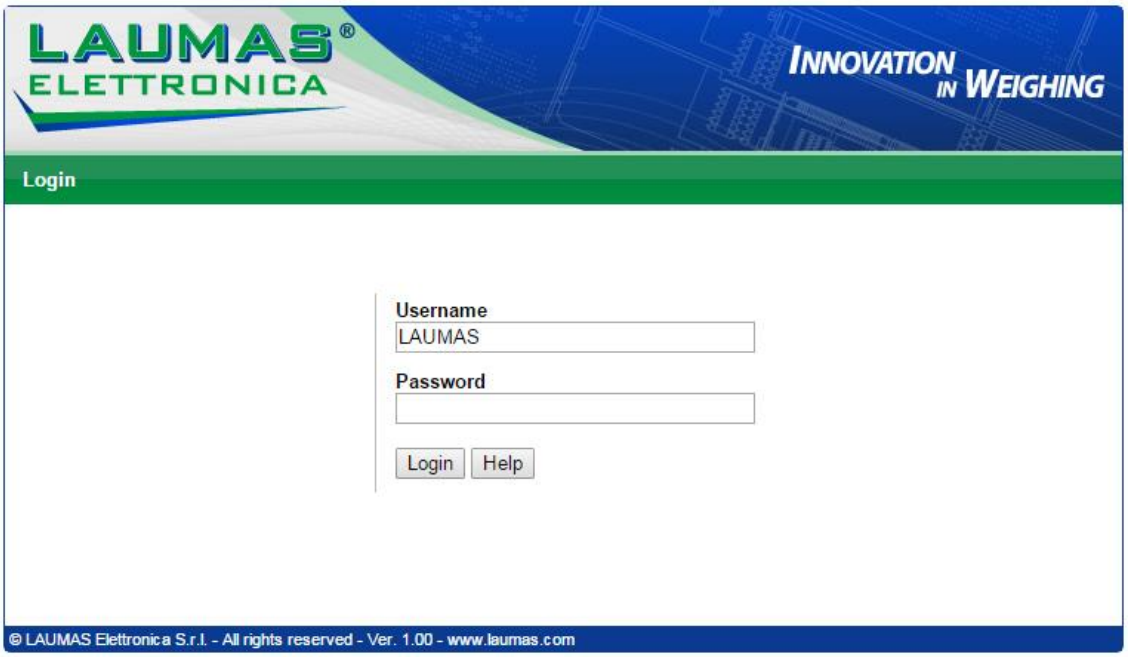


Select the found device and click on Telnet Configuration tab; click on Connect, and then press Enter on keyboard.

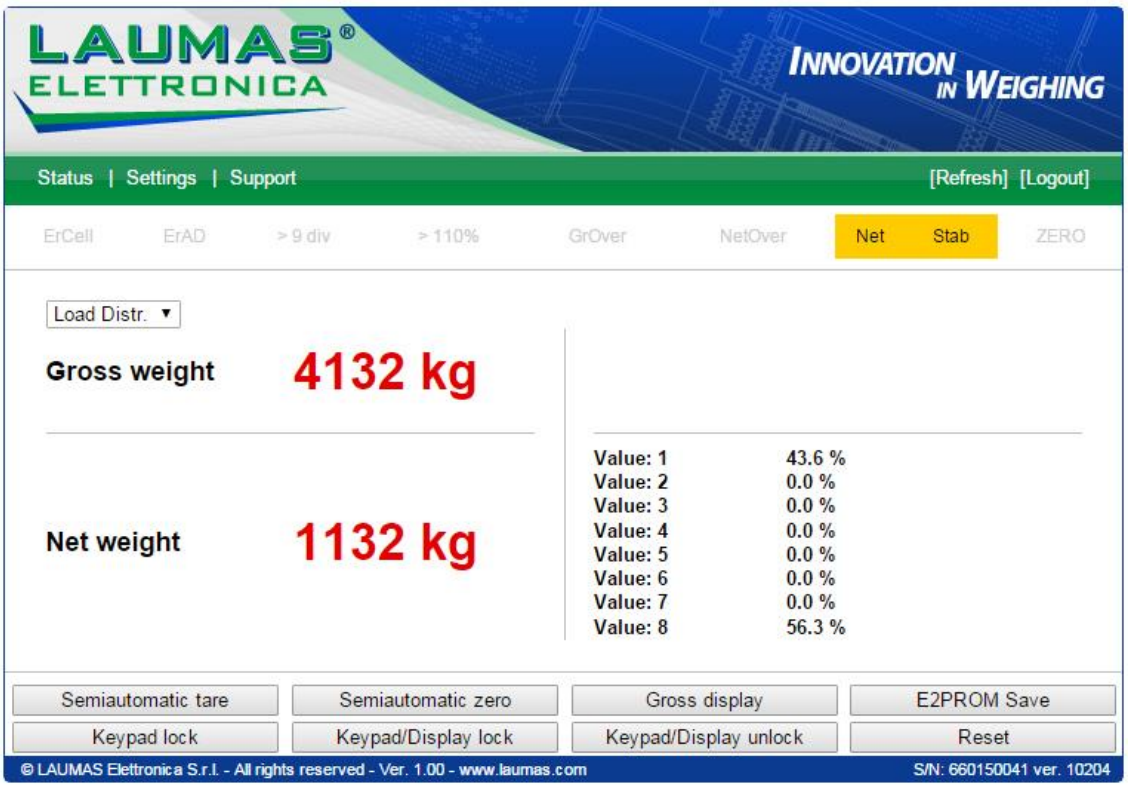


Press 0 to change server settings: change only the 4 fields of IP address and confirm the other parameters by pressing Enter. Set a static IP address.

Set WEbSrU operation mode (into EtHnEt menu) and restart the instrument to apply changes.
Open your web browser and point to the instrument address to be monitored; it will open the following page:



Enter the "LAUMAS" user name and the password supplied with the instrument in respective fields, then press Login to enter the status page:



In case of incorrect parameter setting, the "INSTRUMENT DATA READING ERROR" message is displayed.

The instrument status page shows the gross and net weight read and allows you to send the main commands (Tare, Zero setting, E2PROM saving, etc.); it also shows instrument status, including possible anomalies:

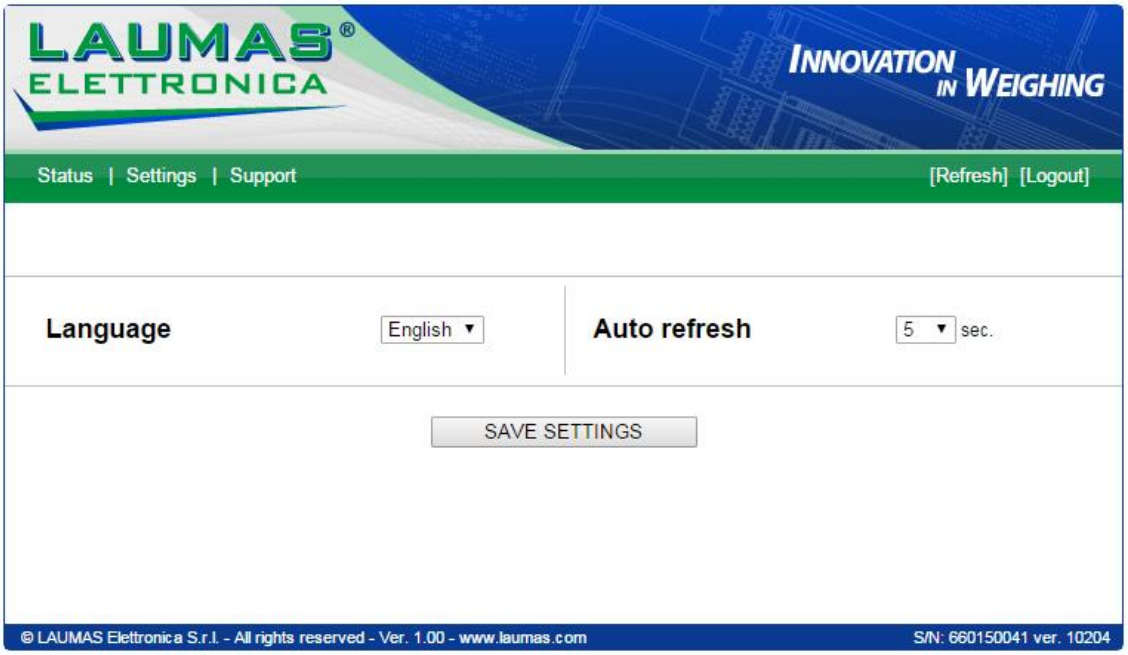
ErCell: ..... load cell error
ErAD:..... instrument converter error
>9div: ..... weight exceeds maximum weight by 9 divisions
>110% ..... weight exceeds 110% of full scale
GrOver..... gross weight over 999999
NetOver..... net weight over 999999
Net ..... instrument shows the net weight
Stab..... weight is stable
ZERO ..... weight is zero

Number of decimals and unit of measure are read by the instrument.

The screen to be displayed is selected through the drop down menu:

Load Distr.: .. percentage load distribution
mV:..... current response signal of each load cell expressed in mV
mV zero:..... response signal of each load cell, stored during zero setting, expressed in mV
Points: ..... current response signal of each load cell expressed in converter points

Click on Settings to enter the instrument configuration page:



In the configuration page you can set language and page refresh time: by pressing SAVE SETTINGS data are saved on the instrument and will be used for subsequent accesses.

READING DIVISIONS WITH SIGN OF EACH WEIGHTING CHANNEL

COMMUNICATION INTERFACE

When this operating mode is enabled, the output data from the instrument transmits the points of each connected load cell, in low (16 bit) or high (24 bit) resolution.

Input signal on single channel	Low resolution	High resolution
0 mV	0	0
10 mV	8000	2000000
-10 mV	-8000	-2000000

Only the points of each connected load cell are transmitted, without any filter applied; the calculation of the weight value and the zeroing and calibration operations are carried out by the customer.

Mode: 8x divisions LowRes (ch 1-8)

ENABLING

- Send command 24 to CMDR

DISABLING

- Send command 27 to CMDR

Output Data from instrument (Reading)	Register
Channel 1 reading divisions – Low Res [2 byte]	40051
Channel 2 reading divisions – Low Res [2 byte]	40052
Channel 3 reading divisions – Low Res [2 byte]	40053
Channel 4 reading divisions – Low Res [2 byte]	40054
Channel 5 reading divisions – Low Res [2 byte]	40055
Channel 6 reading divisions – Low Res [2 byte]	40056
Channel 7 reading divisions – Low Res [2 byte]	40057
Channel 8 reading divisions – Low Res [2 byte]	40058

Mode: 8x divisions LowRes (ch 9-16)

ENABLING	DISABLING
• Send command 32 to CMDR	• Send command 27 to CMDR

Output Data from instrument (Reading)	Register
Channel 9 reading divisions – Low Res [2 byte]	40051
Channel 10 reading divisions – Low Res [2 byte]	40052
Channel 11 reading divisions – Low Res [2 byte]	40053
Channel 12 reading divisions – Low Res [2 byte]	40054
Channel 13 reading divisions – Low Res [2 byte]	40055
Channel 14 reading divisions – Low Res [2 byte]	40056
Channel 15 reading divisions – Low Res [2 byte]	40057
Channel 16 reading divisions – Low Res [2 byte]	40058

Mode: 4x divisions HiRes (ch 1-4)

ENABLING	DISABLING
• Send command 25 to CMDR	• Send command 27 to CMDR

Output Data from instrument (Reading)	Registers
Channel 1 reading divisions – High Res [4 byte]	40051-40052
Channel 2 reading divisions – High Res [4 byte]	40053-40054
Channel 3 reading divisions – High Res [4 byte]	40055-40056
Channel 4 reading divisions – High Res [4 byte]	40057-40058

Mode: 4x divisions HiRes (ch 5-8)

ENABLING	DISABLING
• Send command 26 to CMDR	• Send command 27 to CMDR

Output Data from instrument (Reading)	Registers
Channel 5 reading divisions – High Res [4 byte]	40051-40052
Channel 6 reading divisions – High Res [4 byte]	40053-40054
Channel 7 reading divisions – High Res [4 byte]	40055-40056
Channel 8 reading divisions – High Res [4 byte]	40057-40058

Mode: 4x divisions HiRes (ch 9-12)

ENABLING	DISABLING
• Send command 33 to CMDR	• Send command 27 to CMDR

Output Data from instrument (Reading)	Registers
Channel 9 reading divisions – High Res [4 byte]	40051-40052
Channel 10 reading divisions – High Res [4 byte]	40053-40054
Channel 11 reading divisions – High Res [4 byte]	40055-40056
Channel 12 reading divisions – High Res [4 byte]	40057-40058

Mode: 4x divisions HiRes (ch 13-16)

ENABLING	DISABLING
• Send command 34 to CMDR	• Send command 27 to CMDR

Output Data from instrument (Reading)	Registers
Channel 13 reading divisions – High Res [4 byte]	40051-40052
Channel 14 reading divisions – High Res [4 byte]	40053-40054
Channel 15 reading divisions – High Res [4 byte]	40055-40056
Channel 16 reading divisions – High Res [4 byte]	40057-40058

EXAMPLE OF USE OF CONVERTER POINTS

When the instrument is connected to a system, it can be used to read the weight directly from the protocol or, alternatively, the weight can be calculated by the PC or PLC system to which the instrument is connected. In the latter case, the calibration can be performed as follows: if the transmitter sends e.g. 6500 divisions (converter points) when the tank is empty, and after putting a sample weight of 10000 kg it sends 49833 divisions, in order to find out the weight you will simply need to subtract from the divisions read those relative to the empty tank and then divide the result by a constant given by the following calculation:

(49833-6500)/10000=4,333

so, if the PC or PLC receives 40000 divisions, the weight will be given by:

(40000-6500)/4,333=7731 kg

RESERVED FOR THE INSTALLER

MENU LOCKING

Through this procedure, it's possible to block the access to any menu on the instrument.
Select the menu that you wish to lock:

000000 MENU/ENTER CALIb press ESC and ◀ simultaneously for 3 seconds, the display shows C.ALIb (the left point on the text indicates that this menu item is now locked). If the operator tries to enter this menu, the access is denied and the display shows bLOC.

MENU UNLOCKING

000000 MENU/ENTER C.ALIb press ENTER and ▲ simultaneously for 3 seconds, the display shows CALIb (the left point on the text is off to indicate that this menu item is unlocked).

TEMPORARY MENU UNLOCKING

000000 MENU/ENTER C.ALIb press ▲ and ◀ simultaneously for 3 seconds: it is now possible to enter and modify all menus including those which are locked. By returning to weight display, the menu lock is restored.

DATA DELETION AND PROGRAM SELECTION

WARNING: operations must only be performed after contacting technical assistance.
After each operation the display shows dOnE, press ENTER to continue.
By pressing ESC the procedure is cancelled and no changes are made.

Upon instrument power-on hold down the ESC key until the display shows PrOG, then proceed as follows:

- Constants restore (does not erase the calibration): confirm PrOG, use arrow keys to select PASSU, set code 6935 and confirm
- Program selection: confirm PrOG and use the arrow keys to select the desired program
  - bASE: basic program

- Set the approval status

  - nOtLEG: not approved program
  - LEGAL: approved program, single interval*
  - LEGMI : approved program, multi-interval*
  - LEGMr: approved program, multiple range*

  ***)** Contact technical assistance to request the proper manual and the correct procedures for approval, indicating mandatory hardware code and serial number (see section **INSTRUMENT COMMISSIONING**).

- Set the active regulation on the instrument (only if nOtLEG have not been set), see the standards observed in the regions listed in the **TECHNICAL SPECIFICATIONS** section

  - OI ML: approved program according to OIML
  - I nMEtr: approved program according to INMETRO

When the CLM8 is used in combination with a W series instrument, the approval status set on both devices must be the same.

By confirming, the instrument is restored to default and data is erased.

If you do not have a specific manual for the newly set program, you can request it to technical assistance.

KEYPAD OR DISPLAY LOCKING

Press ESC immediately followed by ▲ hold them down for about 5 seconds (this operation is also possible via the MODBUS and ASCII protocols):

- FrEE: no lock.
- HEY: keypad lock: if active, when a key is pressed the message bLOC is displayed for 3 seconds.
- dI SP: keypad and display lock: if active, the kaypad is locked and the display shows the instrument model (weight is not displayed); by pressing a key the display shows bLOC for 3 seconds.

COMMUNICATION INTERFACE

KEYPAD LOCKING

- Send command 21 to CMDR

KEYPAD AND DISPLAY LOCKING

- Send command 23 to CMDR

KEYPAD AND DISPLAY UNLOCK

- Send command 22 to CMDR

DECLARATION OF CONFORMITY - EU

LAUMAS
Innovation in Weighing

SISTEMI DI PESATURA INDUSTRIALE - CELLE DI CARICO - BILANCE

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SISTEMA QUALITÀ CERTIFICATO UNI EN ISO 9001 - SISTEMA GESTIONE AMBIENTALE ISO 14001 - MODULO D: GARANZIA DELLA QUALITÀ DEL PROCESSO DI PRODUZIONE

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: CLM8

Mark Applied	EU Directive	Standards
CE	**2014/35/EU** Low Voltage Directive	*Not Applicable (N/A)* for VDC type EN 61010-1:2010+A1:2019 for 230/115 VAC type
CE	**2014/30/EU** EMC Directive	EN 55011:2016+A1+A11:2020 EN 61000-6-2:2019 EN 61000-6-4:2019 EN 61000-4-2:2009 EN 61000-4-3:2006+A2:2010 EN 61000-4-4:2012 EN 61000-4-5:2014+A1:2017 EN 61000-4-6:2014
CE M (only if "M" mark is applied)	**2014/31/EU** NAWI Directive	EN 45501:2015 OIML R76-1:2006

Montechiarugolo (PR), 22/10/2025

LAUMAS Elettronica s.r.l.
M. Consonni
(*Legal Representative*)

DECLARATION OF CONFORMITY - UKCA

LAUMAS
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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.
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RUS	Заявление о соответствии	Мы заявляем, что продукт, к которому относится данная декларация, соответствует перечисленным ниже нормам.

Models: CLM8

Mark Applied	UK legislation	Standards
UKCA	**Electrical Equipment (Safety) Regulations 2016**	*Not Applicable (N/A)* for VDC type BS EN 61010-1:2010+A1:2019 for 230/115 VAC type
UKCA	**Electromagnetic Compatibility Regulations 2016**	BS EN 55011:2016+A1+A11:2020 BS EN 61000-6-2:2019 BS EN 61000-6-4:2019 BS EN 61000-4-2:2009 BS EN 61000-4-3:2006+A2:2010 BS EN 61000-4-4:2012 BS EN 61000-4-5:2014+A1:2017 BS EN 61000-4-6:2014
UKCA M (only if "M" mark is applied)	**Non-automatic Weighing Instruments Regulations 2016**	BS EN 45501:2015

Montechiarugolo (PR), 22/10/2025

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M. Consonni
(*Legal Representative*)

On our website www.laumas.com there are videos on the guidelines for correct installation of weighing systems and video tutorials on configuring our transmitters and weight indicators.

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