

TECHNICAL MANUAL



MCT 1302 Touch screen indicator with RS232 serial, analog and Fieldbus output

Software version PWI503



Pavone Sistemi
pesatura elettronica industriale

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PRECAUTIONS

READ this manual BEFORE operating or servicing the instrument.

FOLLOW these instructions carefully.

KEEP this manual for future use.



WARNING

The purpose of this manual is to provide the operator with explanatory text and figures, the requirements and basic criteria for the installation and correct use of the instrument.

The installation, maintenance and repair should only be carried out by specialised personnel who have read and understood this manual. "Specialised personnel" means personnel who, because of their training and professional experience have been expressly authorised by the plant Safety Officer to carry out the installation.

Power the instrument with a voltage whose value is within the limits specified in the specifications.

The user is responsible for ensuring that the installation complies with the provisions in force.

Any attempt to dismantle or modify the instrument which is not expressly authorised will invalidate the warranty and will relieve Pavone Sistemi from all liability.

Installation and maintenance of this instrument must be entrusted to qualified personnel only.

Be careful when performing inspections, tests and adjustments with the instrument on.

Perform the electrical connections with the instrument unplugged from the mains

Failure to observe these precautions may be dangerous.

DO NOT allow untrained personnel to work, clean, inspect, repair or alter this instrument.

INTRODUCTION

The MCT 1302 is a touch screen indicator to be combined with the load cells to detect the weight in every situation.

The module is easy to install and must be mounted on a 35 mm DIN rail or OMEGA bar. The weight, the status of the instrument, the setting parameters and any errors are all clearly shown on the display.

The 4 capacitive keys below the display permit easy use of these functions: ZERO-SETTING, TARE, GROSS/NET switching, setting of the weight set-points, configuration, and both theoretical and real calibration.

The MCT 1302 uses the RS232 serial port with ASCII protocols, in order to be connected to a PC, PLC and remote units with a maximum distance of 15m, above which you must use the serial port RS422/RS485 which also allows connection with the MODBUS RTU protocol up 32 addressable instruments.

Availability of the most widespread fieldbuses, as an alternative to port RS485, also makes it possible to interface the transmitter with any supervision device currently offered by the market.

There is also a USB 2.0 port for easy interfacing with the PC via a utility software which can be provided with it.

They are always 2 programmable weight set-points and control of the maximum weight value reached (peak).

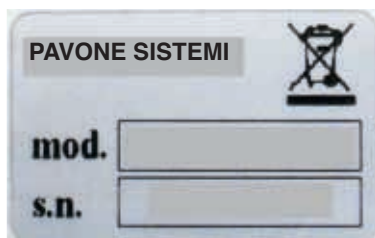
In addition you can have the analog output in current or voltage even with a FIELDBUS.

Available versions:

- **MCT 1302:** weight transmitter with RS232 serial output, USB, RS485 and peak function. Supported protocols are Modbus RTU, continuous, slave and on demand. Two programmable set points, 2 inputs and Peak function.
- **MCT 1302/A:** version with the analog output.
- **MCT 1302/PROFINET:** weight transmitter with RS232 serial output, USB and PROFINET.
- **MCT 1302/ETHERNET IP:** weight transmitter with serial output RS232 and ETHERNET IP.
- **MCT 1302/ETHERCAT:** weight transmitter with serial output RS232 and ETHERCAT.

IDENTIFICATION PLATE OF THE INSTRUMENT

Always cite this data when requesting information or instructions concerning the instrument, as well as the program number and version that are shown on the cover of the manual and on the display when the instrument is switched on.



WARNINGS

The following procedures must be entrusted to qualified personnel.

All connections must be made with the instrument turned off.

TECHNICAL FEATURES

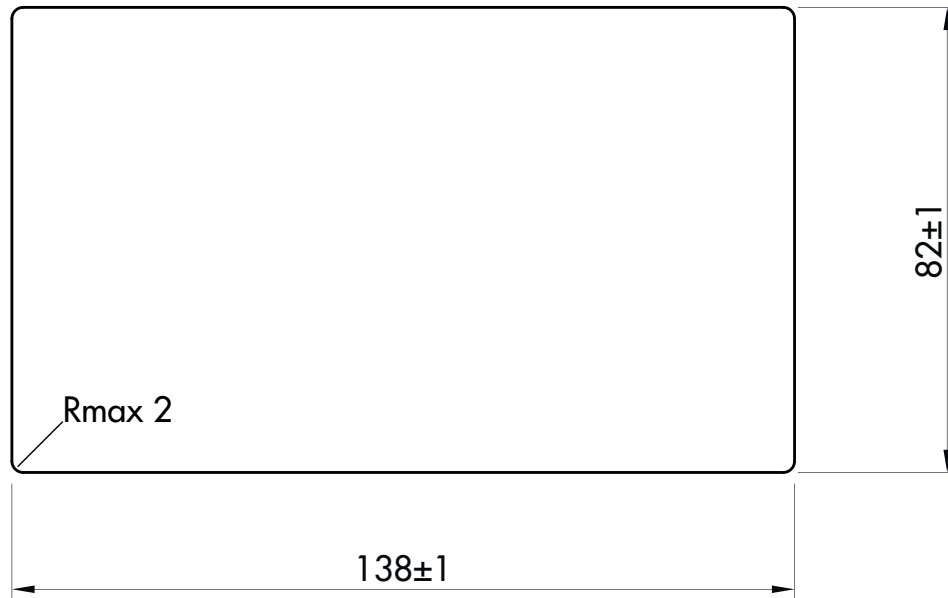
Power supply	12 ÷ 24 Vdc ± 15 %
Max. absorption	5 W
Isolation	Class II
Installation category	Cat. II
Operating temperature	-10°C ÷ +50°C (max humidity 85% without condensate)
Storage temperature	-20°C ÷ +70°C
Weight display	6 digit 7-segment red LEDs (h 14 mm)
Led	4 3mm indicator LEDs
Keyboard	4 capacitive keys
Overall dimensions	106 mm x 63 mm x 110 mm (l x h x d)
Assembly	On support for DIN profile or OMEGA bar
Container material	Self-extinguishing Noryl (UL 94 V1)
Connections	Removable terminal boards pitch 5.08.
Load cells power supply	5 Vcc/120 mA (max 8 cells x 350Ω in parallel) short-circuit protected
Input sensitivity	0.02 µV min.
Linearity	< 0.01% of full scale
Temperature drift	< 0.001% of full scale / °C
Internal resolution	24 bit
Displayed weight resolution	Up to 999,999 divisions on useful capacity
Measuring range	From -4 mV/V to +4 mV/V
Weight acquisition frequency	12 Hz - 1000 Hz
Digital filter	Selectable 0,5 ÷ 50 Hz (up to 1000 Hz in manual)
Weight decimal number	from 0 to 4 decimal digits
Zero calibration and full scale	Automatic (theoretical) or executable from the keyboard.
Logic outputs	2 optoinsulated (free contact) max 24Vdc / 100 mA ea.
Logic inputs	2 optoinsulated 24 Vdc PNP (external power supply)
Serial port (n° 2)	RS232C and RS422/485
Maximum cable length	15m (RS232C) and 1000m (RS422 and RS485)
Serial protocols	ASCII, Modbus RTU
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 selectable
USB port device:	complies with USB 2.0; up to 12 Mbps speed
Analogue output (optional)	optoinsulated 16 Bit Voltage: 0÷5/10 V (R min 10 K Ohm), Current: 0/4÷20 mA (R max 300 Ohm)
Analogue output calibration	From keyboard
Linearity	< 0,02% FS
Thermal drift	0,001% FS / °C
Microcontroller:	ARM Cortex M0+ to 32 bit, 256KB Flash reprogrammable on-board by USB.
Data storage	64 Kbytes expandable up to 1024 Kbytes
Fieldbus (alternative to RS485)	PROFINET, ETHERNET IP, EtherCAT,
Regulatory Compliance	EN61000-6-2, EN61000-6-3 , EN61010-1

INSTALLATION

GENERAL DATA

The MCT 1302 is a compact panel mount instrument made in aluminum.

Install the instrument in a panel cutout having dimensions of 138 x 82 and secure it using the 4 bracket.



The MCT 1302 should not be immersed in water, subjected to jets of water, and cleaned or washed with solvents.

Do not expose to heat or direct sunlight.

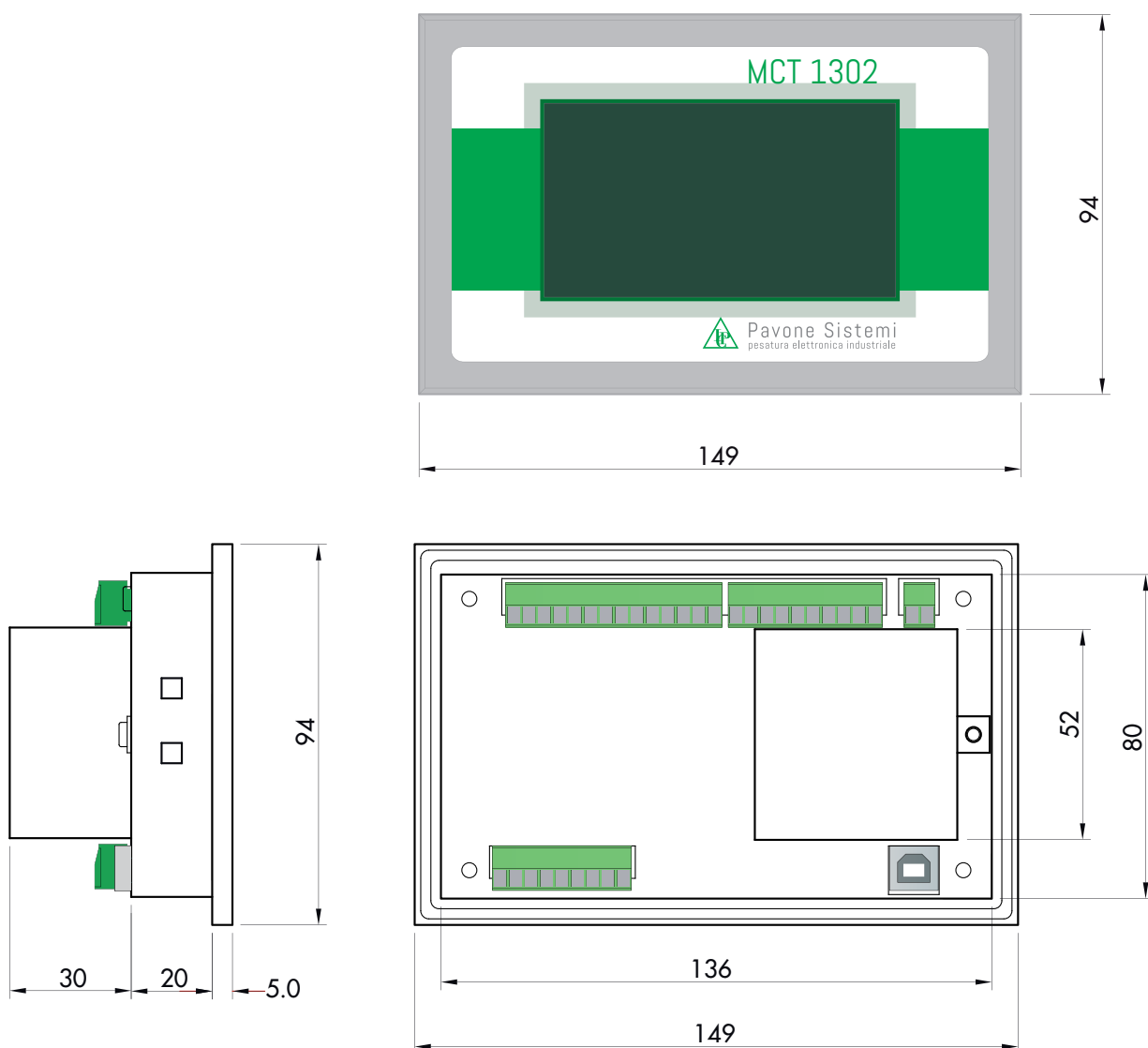
Do not install the instrument near power equipment (motors, inverters, contactors, etc.) or any other equipment that does not comply with CE standards for electromagnetic compatibility.

The connection cable for the load cells must have a maximum length of 140m/mm².

The RS232 serial line must have a maximum length of 15 meters (standard EIA RS-232-C).

The recommendations given for connecting the individual devices must be adhered to.

OVERALL DIMENSIONS



ELECTRICAL INSTALLATION

The MCT 1302 uses removable screw terminal boards with a pitch of 3.81 mm, for electrical connection. The load cell cable must be shielded and channelled away from power cables to prevent electromagnetic interference.

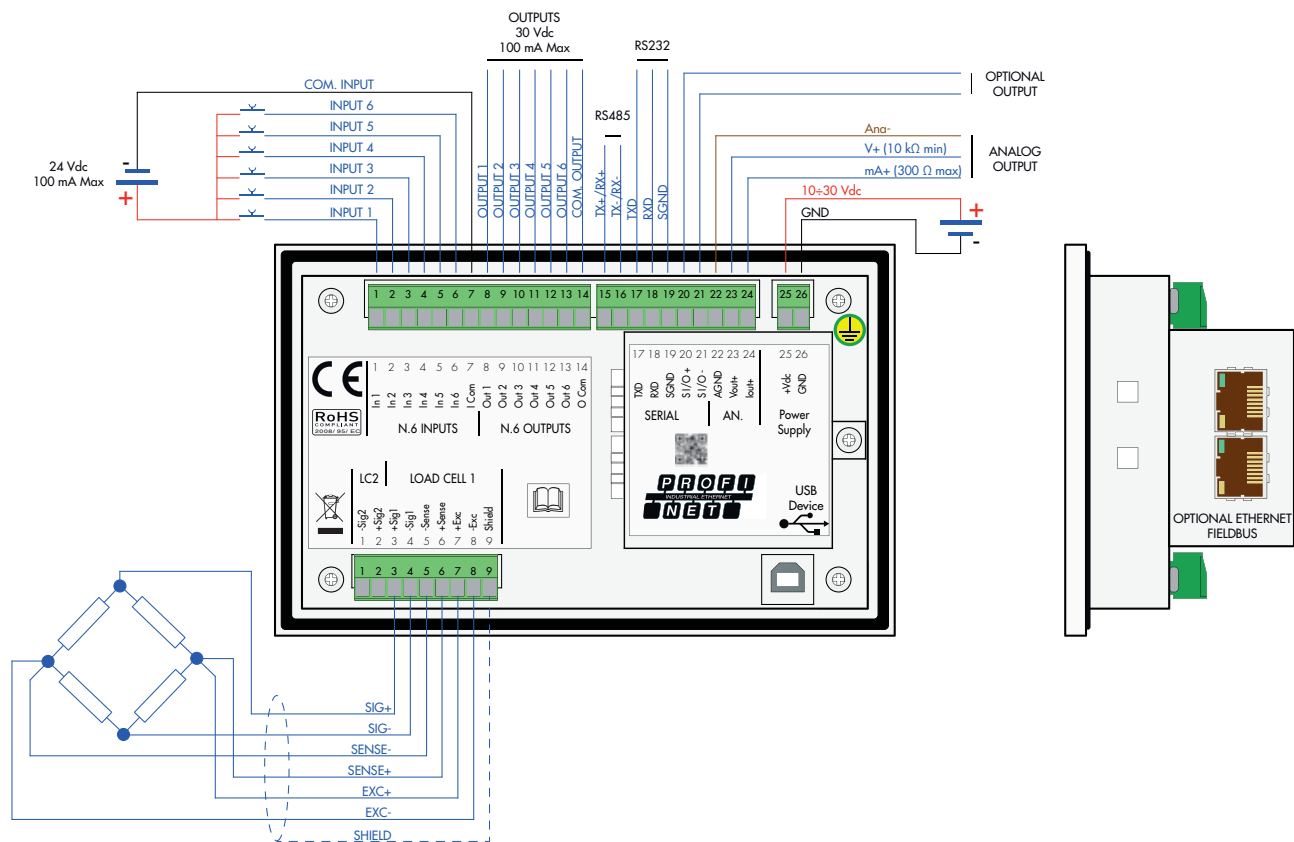


A switch or circuit-breaker shall be included in the building installation.

The switch shall be in close proximity to the equipment and within easy reach of the operator

The switch shall be marked as the disconnecting device for the equipment.

The equipment switch or circuit-breaker employed as disconnecting device shall comply with relevant requirements of IEC 60947-1 and IEC 60947-3



WARNING

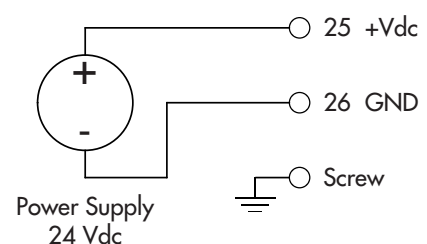
Make sure to switch off the instrument before making electrical connections

POWER SUPPLY OF THE INSTRUMENT

The instrument is powered via terminals 25 and 26. The power cord must be channelled separately from the other cables.

The electrical zero (terminal 26) is connected to the metal case. Connect terminal 26 to ground via the screw close to the supply terminals, as well as to the GND of the power supply.

Power supply voltage: 10÷30 Vdc, max 5W



LOAD CELL(S) CONNECTIONS

The cable of the cell(s) must be channelled separately, and not with other cables.

Any extension of the connection cable must be screened carefully, respecting the color code and using the type of cable supplied by the manufacturer. The extension connections must be made by welding, or through support terminal or via the junction box supplied separately.

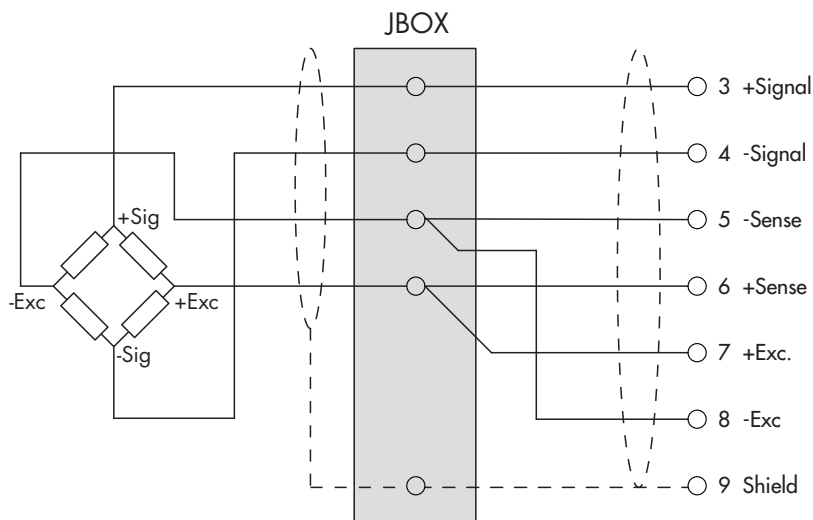
A maximum of 8 load cells of 350 ohm can be connected to the instrument in parallel. The supply voltage of the cells is 5 Vdc and has temporary short circuit protection.

The measuring range of the instrument permits the use of load cells with a sensitivity of up to 3.9 mV/V.

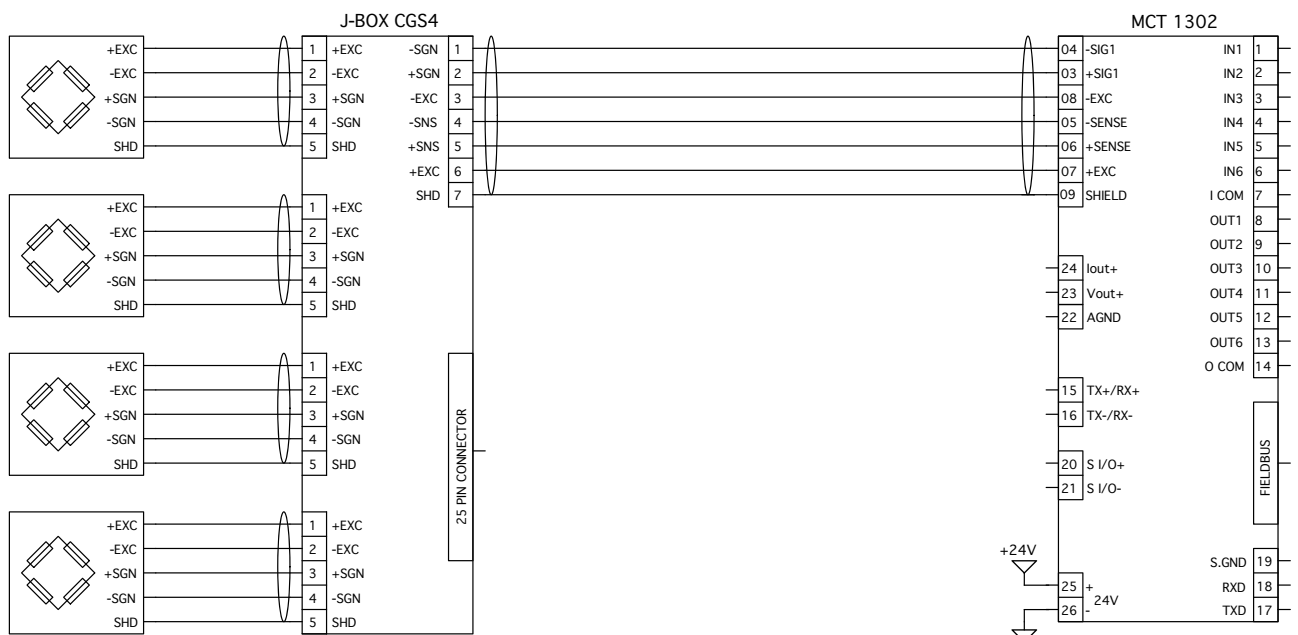
The cable of the load cells must be connected to terminals 3÷9.

In the case of a 4-wire load cell cable, jumper the terminals 5 to 8 and 6 to 7.

Connect the load cell cable shield to terminal 9.



In the case of two or more load cells, use special junctionboxes (CEM4/C or CSG4/C). The connection of these is shown below.



LOGIC INPUTS

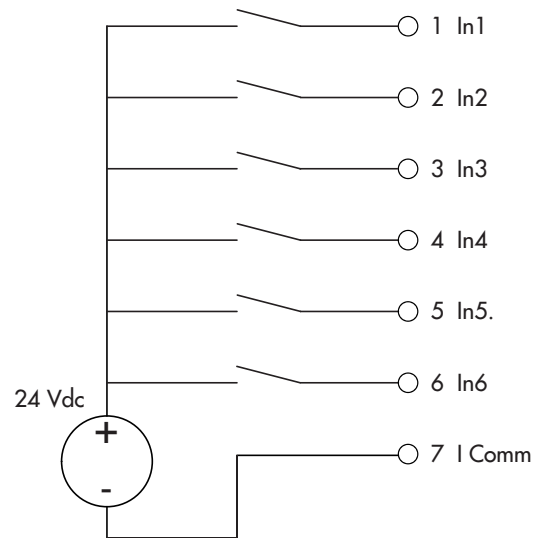
The logic inputs are opto-isolated.



The cable connected to the logic input should not be channelled with the power cables.

Minimise the length of the connecting cables.

To activate a digital input it must be connected to the positive power supply of 24Vdc while the common is connected to the negative thereof. The function of the inputs is carried out in the relevant Setup menu.



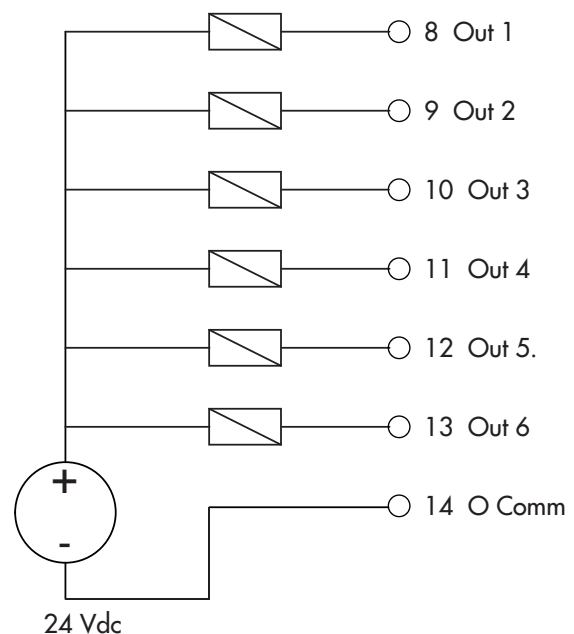
LOGIC OUTPUTS

The six logic output are dry contact (photo relay) with a common terminal. The contact rating of each contact is 30 Vdc, 100 mA max. The output connection cable does not have to be channelled with power cables. The connection should be as short as possible.



The environment where the equipment is installed can normally be subject to strong magnetic fields and electrical disturbances caused by the machinery present, therefore it is advisable to adopt the normal precautions in order to prevent them affecting the typical signals of an electronic precision apparatus. (filters on the remote control switches, diodes on the 24 VDC relays, etc.)

Below is the connection of the outputs



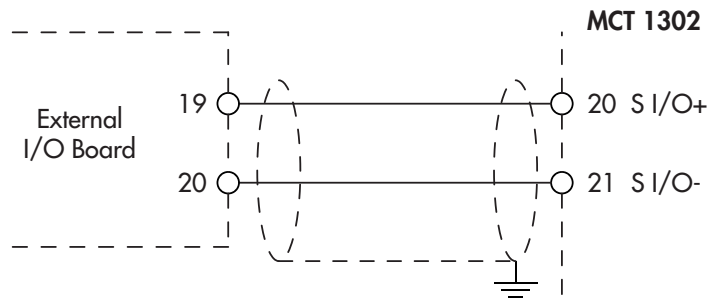
CONNECTION WITH ADDITIONAL INPUT/OUTPUT BOARD

In applications where it is necessary to have additional Inputs/Outputs, you can connect the optional cards, using the dedicated serial connection.

To make the connection, use a shielded cable, making sure to connect the shield to the ground at only one end. In the case in which the cable has a number of conductors exceeding those used, connect to the screen the free conductors.



The serial connection cable must have a maximum length of 100 meters. The cable must not be channeled with other cables, but should possibly follow their own path.



SERIAL COMMUNICATION

RS232

The serial connection cable must have a maximum length of 15 meters (EIA RS-232-C), beyond which you should take the RS485 interface which is fitted to the instrument.

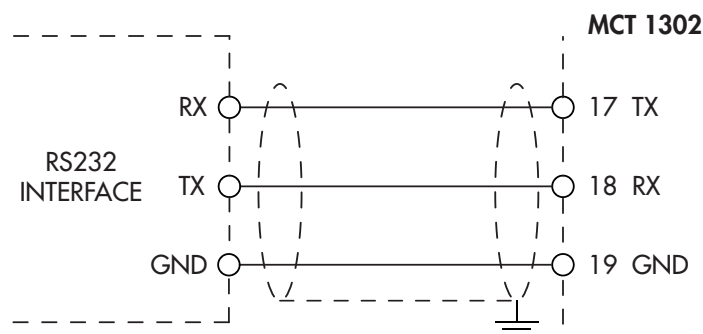


The cable must not be channeled with other cables (eg. Outputs connected to remote switches or power cables), but should possibly follow their own path.

The PC used for the connection must comply with standard EN 60950.

The RS232 serial port is normally used for PC connection, printer and repeaters.

To make the serial connection, use a suitable shielded cable, making sure to ground the screen to one of the two ends.



RS485

Via RS485 serial interface you can make serial connections over long distances (up to 1000 mt.).

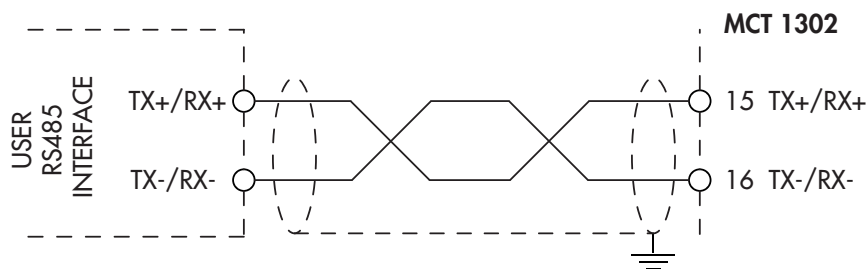
The RS485 serial connection is made of 2-wire, and allows you to connect up to 32 devices to a single MASTER unit (personal computer, PLC etc.) via a shielded twisted pair cable, taking care to connect the screen to ground only at one point of the two ends.

The cable must not be channeled with other cables (eg. Outputs connected to remote switches or power cables), but should possibly follow their own path.



The PC used for the connection must comply with standard EN 60950.

NOTE: If this a fieldbus RS485 is not available.



ANALOG OUTPUT (OPTIONAL)

The instrument provides an analogue output in current or voltage.

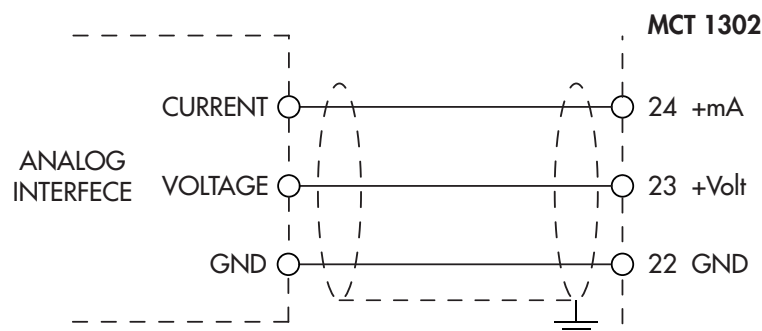
Analogue output in voltage: range from 0 to 10 Volt or from 0 to 5 Volt, minimum load 10K Ω .

Analogue output in current: range from 0 to 20 mA or from 4 to 20 mA. Maximum load is 300 Ω .

To make the connection, use a suitable shielded cable, making sure to connect the shield to the ground in one of the two ends.

Analog transmission can be sensitive to electromagnetic interference, it is therefore recommended that the cables are as short as possible and that they follow their own path.

Caution: do not connect the analogue output to active devices.



USB DEVICE (SPECIFICATION 2.0 COMPLIANT; FULL-SPEED 12 MBPS)

Use this communication port to directly interface a PC via a USB port.

Use a standard USB cable for the connection.

To connect the instrument via the USB device, you must install a driver on the PC which is suitable for the operating system used. For installation please follow the specific instructions.

FIELDBUS CONNECTIONS

As an alternative to the RS485 serial port some of the most common fieldbuses are available. You can use a single fieldbus which must be specified when ordering.

ETHERNET CONNECTION

On the lower left part of the instrument there is a RJ45 connector for Ethernet.

Features:

Transmission speed 10 Mbps

TCP Ethernet protocols, Modbus/TCP, UDP, IP, ICMP, ARP

TCP server communication mode

LED indicators (2) Presence of Ethernet and communication/diagnostics line

Buffer size 256 bytes

Connection Time-out Min 30 seconds - Max 90 seconds

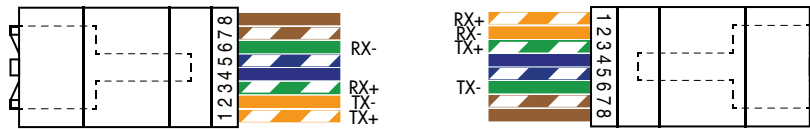
Link Time-out (cable disconnected) 30 seconds

PIN	DESCRIPTION
1	TX+
2	TX-
3	RX+
4	
5	
6	RX-
7	
8	

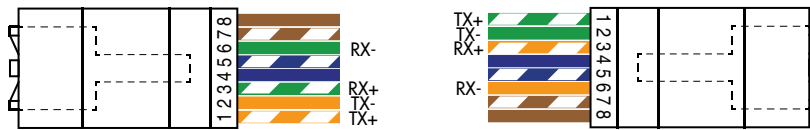
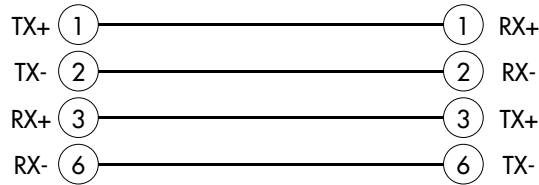
To connect to the MASTER, use a standard twisted pair Ethernet cable with RJ45 connector.

The RJ45 Ethernet connection cable has a variable maximum length, depending on the type of cable. A common Cat5 shielded cable can have a maximum length of about 180 m.

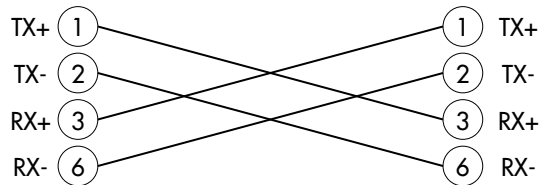
- You can connect the Ethernet communication port directly to the PC, without having to go through other network devices (routers, switches, hubs, LAN-bridge or the like), but must be used special RJ45 cables, called "crossover".
- Normally cables are the "direct" type and allow connection to network devices such as routers or hubs, but not direct connection to two PCs (even if there are currently network cards with auto-sensing technology, which recognize the type of cable and the type of connection, allowing direct PC-PC connections as well as using non cross-over cables).
- On next page are diagrams of the two types of cables mentioned and their connection diagram.



DIRECT ETHERNET CABLE



CROSSOVER ETHERNET CABLE



ETHERNET / IP CONNECTION

Ethernet / IP is a real-time industrial protocol which is based on the Ethernet network.

There are 2 RJ45 connectors to allow multiple devices to be connected to the same network.

Refer to the previous page for connection notes and warnings.

Specifications:

10 and 100 Mbit operation, Full and Half Duplex

Modbus-TCP server

Up to 128 bytes of I/O fieldbus in every direction.

PROFINET CONNECTION

There are 2 RJ45 connectors to allow multiple devices to be connected to the same network.

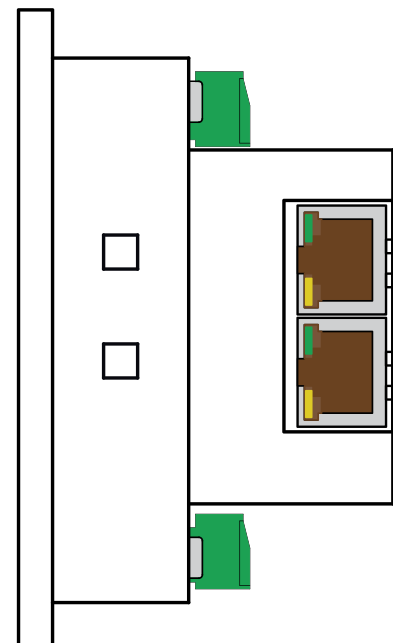
Refer to the previous page for connection notes and warnings.

Features:

PROFINET IO Real Time (RT) communications

Modbus-TCP server

Up to 128 bytes of I/O fieldbus in every direction.



ETHERCAT CONNECTION

EtherCAT is a real-time industrial protocol which is based on the Ethernet network.

Two RJ45 connectors are necessary.

Refer to the previous page for connection notes and warnings.

MAC ADDRESS IN INSTRUMENTS WITH INDUSTRIAL FIELDBUS ETHERNET.

Instruments which install Hilscher modules with Industrial Ethernet Protocol (Profinet, EthernetIP, EtherCAT, etc.) have a label under the connectors, as shown.

This label shows the MAC address of the module (red box), the identification number of the module (blue box) and a QR code that contains the MAC address. The latter can be read using a smartphone app for reading QR codes (eg. on Google Play store, "QR Code Reader").

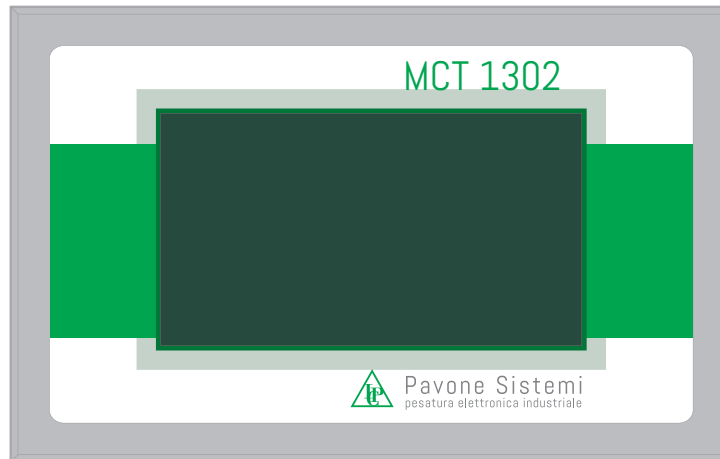


FRONT PANEL OF THE INSTRUMENT

The MCT 1302 is an instrument dedicated to industrial weighing with A touch screen monitor.

In the operation mode the display shows all the information needed for a complete system control.

The set-up parameters are easily accessed and modified through the use of the function keys, which from time to time appear on the display, used to select, edit, confirm and save the new settings.



DISPLAY

In the operation mode the display shows all the information needed for a complete system control. According to various programming procedures, the display is used for programming the parameters to be entered into memory, or messages indicating the type of operation in progress and are therefore assist the operator in the management and programming of the instrument.

TURNING ON THE INSTRUMENT

Once switched on, the display temporarily shown an introductory screen, in which are indicated the firmware code and the version number. After a few seconds it shows a main screen from which you can access all of the instrument operation.

CONTROLLO SOGLIE

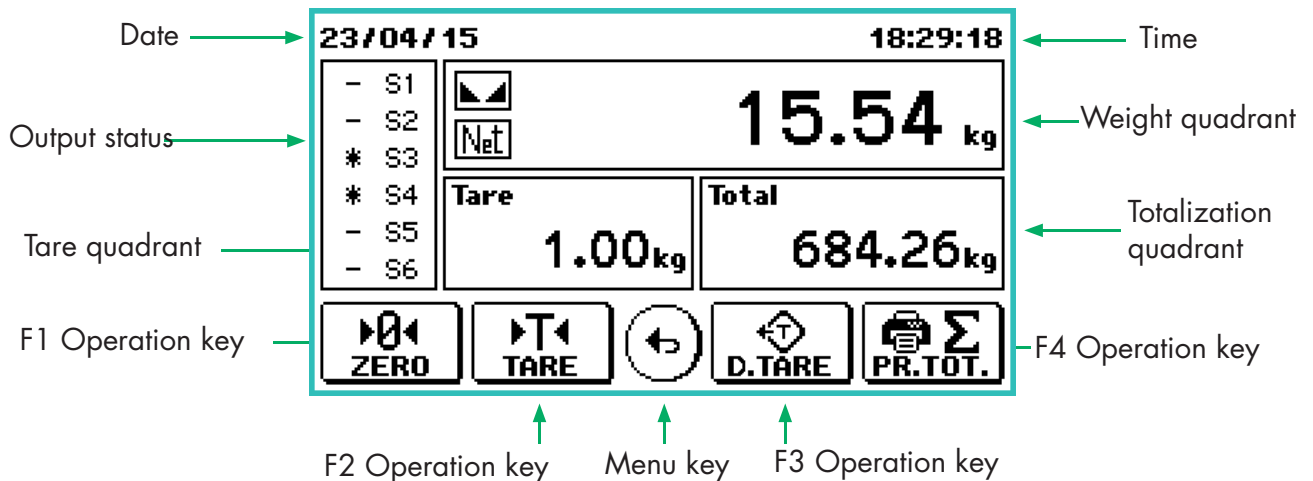
PW1503 Rev.0.9

MAIN SCREEN

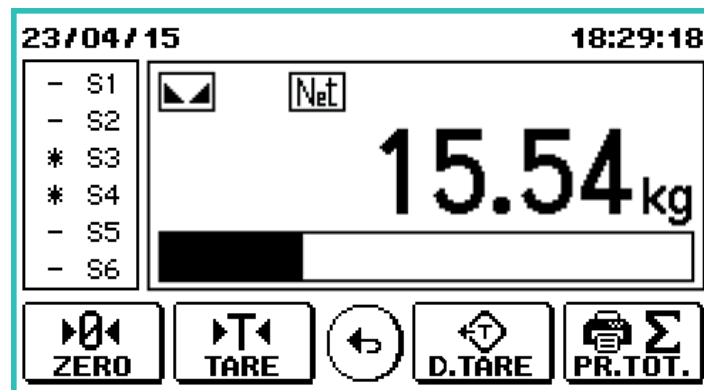
From this screenshot you can access of all the operating and programming instrument, following the specified commands.

The display mode of the main screen can be selected through the appropriate parameter in the "Operating Mode" menu:

- Main screen "standard", in which all quadrants are displayed (weight, outputs, tare and total).



- Main Screen "only weight", in which appears only the quadrant of the output status "and the quadrant of the weight. In this case, the weight value is displayed with a larger size than the standard display. Also in the weight quadrant it's displays a bar graph, which represents the gross weight in relation to full scale value.



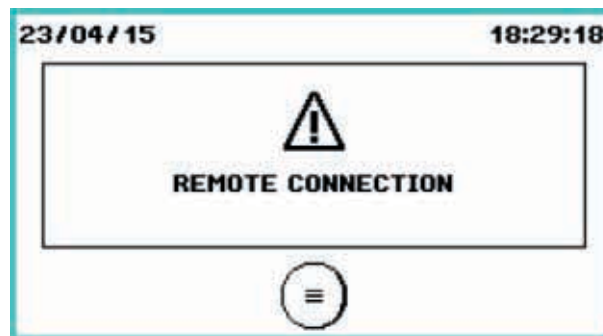
The functions of the operation keys (F1, F2, F3 and F4) are programmable through the appropriate parameters in the "Operation Mode" menu.

OPERATION KEYS	
	Access to the parameter programming menu
Net  Min 15.54 kg	Press in the weight display quadrant to switch the weight display between net, gross or peak.
TARE 1.00 kg	Press in the Tare display quadrant to access in the manual tare function. This function is only available when it is not already entered a tare value with relative operational key.
TOTAL 684.26 kg	Press in the total display quadrant to perform the delete function of the totalized weight; before performing the function a confirmation message is displayed.
- S1 - S2 * S3 * S4 - S5 - S6	Press this area of the display to access the setpoints setup menu. In the "Operation Mode" menu, you can set the password for access to this menu.
	Semiautomatic zero command.
	Tare command.
	Delete Tare command.
	Peak reset.
	Command of totalization weight; this operation can only be performed in case of a weight change exceeding 20 divisions (delta weight). This command does not include the ticket printing.
	Weight print command; this command does not include the totalization of weight.
	Print and weight totalisation; this operation can only be performed in case of a weight change exceeding 20 divisions (delta weight).
	Saving command of the weighing values (log) on optional memory. In the case of "continuous" log mode, you must press this button again to finish saving.

INFO DISPLAY

INDICATIONS AND WEIGHT MESSAGES ERROR		
Net  Min 	NO-CAL kg	Weight calibration not performed; flashing message, alternate to the weight display detected.
Net  Min 	----- kg	Displayed indication at power on, while waiting the necessary conditions for the automatic zero of the weight; in case of automatic zeroing disabled this message is not displayed.
Net  Min 	~~~~~ kg	Overload. The load applied to the load cells exceeds by over 9 divisions the maximum capacity of the weighing system or when the weight is over 999999.
Net  Min 	O-L kg	Signal that the load cells are absent or outside of the measuring range mV/V.
Net  Min 	NO-COM kg	Fieldbus network disconnected.
Net  Min 	E-FBUS kg	Fieldbus interface absent or not working

While communicating with PC software "Optimation" for remote setup of the instrument, the following screenshot appears.



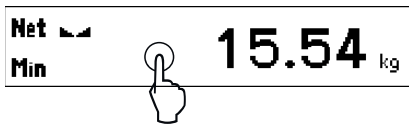
In the case of METRIC operation to enable the connection with PC software "Optimation," you must log on with the password (see access to the setup menu).

STATUS WEIGHT INDICATIONS	
Net	Net weight displayed.
Peak	Peack weight displayed.
Min	Minimum weight, gross weight on the balance is less than 20 divisions.
	Stable weight.
	multirange indication (weight on 1 st range).
	multirange indication (weight on 2 nd range).
	multirange indication (weight on 3 rd range).

OUTPUT STATUS INDICATIONS	
- S1	Non active output (NO contact).
* S1	Active output (NC contact).

OPERATING FUNCTION

GROSS WEIGHT / NET WEIGHT / PEACK DISPLAY



Press the of the weight quadrant, on the main screen of the instrument to switch the weight displayed. Each time you press the weight displayed changes between the following values:

- Gross - The displays shown the gross weight.
- Net - The displays shown the net weight.
- Peak - The displays shown the peak value calculated (selection only available if the peak function enabling, through a special parameter in the setup menu).

ZERO SETTING



The reset command of the gross weight is used to correct for small zero shifts of the weighing system during normal operation.

The reset command of the gross weight is not executed if occurs even one of the following conditions:

- Unstable weight (the weight does not stabilize within 3 seconds from the zero command).
- Gross weight greater (in positive or negative) than the number of divisions set in the "0 BAND" parameter, when the auto-zero set-point is not programmed. f this parameter is set to 0, the zero setting function is disabled

The zero setting operation is retained in memory after the instrument is turned off.

AUTOTARE

Press TARE key to perform command.



The tare command is not executed if occurs even one of the following conditions:

- Unstable weight (the weight does not stabilize within 3 seconds from the autotare command).
- Gross weight equal to or greater than the maximum capacity of the weighing system.

The tare value is stored at instrument switching off.

DELETE TARE



This operation deletes the value of the previously entered Tare.

MANUAL TARE



Press in the Tare display quadrant to access in the manual tare function. This function is only available when it is not already entered a tare value with relative operational key.

The tare value is stored at instrument switching off.

PEAK RESET

This operation is performed to reset the peak value.



STORING AND TOTALISATION OF THE WEIGHT

The weighted control can be performed manually from the touch screen, by external input, or by serial or fieldbus line.

The command determines the totalization of the net, sending or printing on serial data based on the communication port settings. The net weight is also stored in a readable memory records on request by fieldbus.

In METRIC operation, if configured alibi memory, the transaction is recorded.

The conditions to carry out the weighing are:

- Stable weight (or stabilized within 3 seconds from control)
- The last execution of totalization, the weight has undergone a change of at least 20 divisions (delta weight).
- gross weight equal to or greater than the minimum weight (minimum of 20 divisions) and less than the maximum flow rate.
- net weight not null.
- If METRIC operation, the net weight and gross weight must be positive.

NOTE: To get the automatic weighing running you can keep closing the external input command.

Two different keys are available to perform the totalization of the weighted function:

- Totalization key (performs the totalization of weight, does not provide for receipt printing).
- Print and totalization key (performs the totalization of weight, even if the printer protocol is selected the following receipt is printed):



12/11/2015	10:30
OPERATOR CODE	1
GROSS WEIGHT	211.5 kg
TARE	2.5 kg
NET WEIGHT	209.0 kg

The operator code is printed only if you set the parameter in the "Operation Mode" menu.

The totalized value is stored in memory at switch off.

DELETE TOTAL

Press on the quadrant of the totalized value on the touch screen, to access the delete function; Press on the quadrant of the totalized value in the instrument screen, to access the delete function; before performing the function a confirmation screen will be displayed.



If the printer protocol is selected, is printed the illustrated receipt (facsimile).

12/11/2015	10:30
TOTALE	
NET WEI HGHT	209.0 kg

PRINT



This operation allows you to print the weighing (if the printer protocol is selected, it prints the receipt shown). This operation is always executable; the conditions necessary to executing the totalisation of weight are not checked.

12/11/2015	10:30
OPERATOR CODE	1
GROSS WEIGHT	211.5 kg
TARE	2.5 kg
NET WEIGHT	209.0 kg

WEIGHING DATA LOG



This operation allows you to save on memory option the weighing values (log). In case of "continuous" log mode, you must press this key again to finish saving.

USE OF THE PEAK FUNCTION

The peak value can be showed and used even in the following functions.

FUNCTION	DESCRIPTION
LOGIC OUTPUT	The SETPOINT can be configured to have as a reference the peak value (see the configuration procedure of the logic outputs operation).
SERIAL PORTS	he peak value can be transmitted through protocols Continuous, Automatic, On Demand, and Modbus Slave.
ANALOG OUTPUT	The analogue output can be related to the peak value (see analogue output configuration procedure).

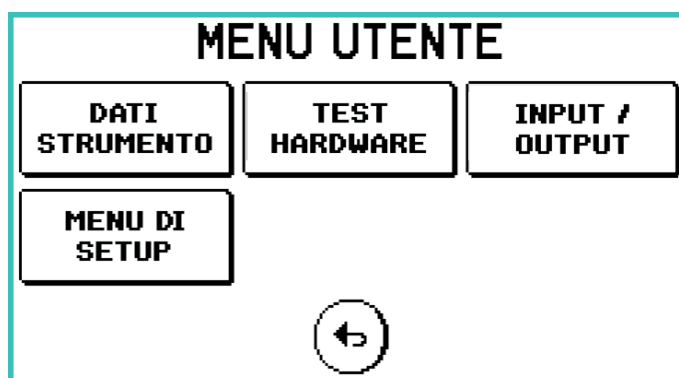
The peak value is calculated at the same frequency acquisition of the weight, and refers to the net or gross weight, depending on the selection in the "Enable Peak" parameter in the "OPERATION MODE" menu.

MENU STRUCTURE

The menu screens are divided into two types: menu of commands and parameters menu, according to the context and structure of the data programming menu.

By pressing on the button that contains the description you enter the sub-menu.

Each screen can display up to 6 parameters; the display of other parameters will be through the page buttons that will appear automatically.



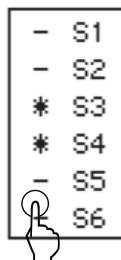
By pressing on the key that contains the description of the parameters, you can enter to the setting parameter.



OPERATION KEY	
 PRECEDENTE	F1 operation key; switches to the previous menu page (this button only appears if the menu has more than 6 items, is never displayed on the first page).
SUCCESSIVO 	F2 operation key; switches to the next menu page (this button only appears if the expected more than 6 menu items, is never shown on the last page).
	The exit menu key (displays the top-level menu or the base screen.

SETPOINT MENU

To access the setpoints setup menu you have to press in the status of the outputs on the home screen. In the "Operation Mode" menu, you can set the password for access to this menu.

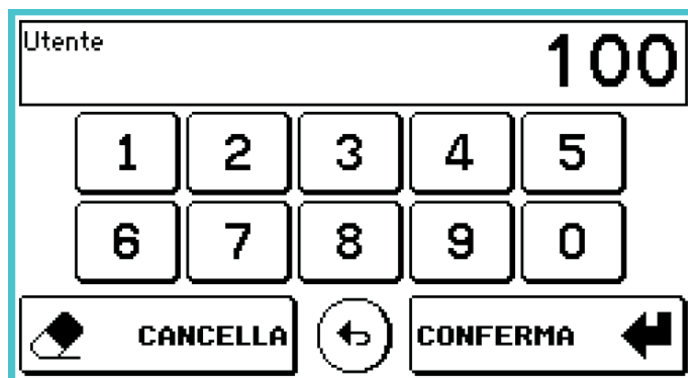


SETPOINT PROGRAM (PARAMETERS)						
MESSAGE	DESCRIPTION	TYPE	UNIT	DEFAULT	RANGE	FIELDBUS ADDRESS
Setpoint n.1	The instrument checks 6 programmable weight setpoints, and enables the respective logic outputs depending on the selections made during the set up, however, editable. For each set point you can define: • If it is compared with the gross, net weight or with the peak value or if the output takes "IN PROCESS" function. • If the setpoint check is done with weight values positive or negative or absolute value. • If the relative output is activated with weight below the setpoint, or with weight equal to or greater than the programmed setpoint. It is also possible to program a hysteresis value for each setpoint. In case of exceeding of the system full scale or weight undetectable, all outputs will be disabled (open contact)	Numerical setting	Weight meas. unit	0	0÷Capacity	201(MSW) - 202(LSW)
Setpoint n.2		Numerical setting	Weight meas. unit	0	0÷Capacity	203(MSW) - 204(LSW)
Setpoint n.3		Numerical setting	Weight meas. unit	0	0÷Capacity	205(MSW) - 206(LSW)
Setpoint n.4		Numerical setting	Weight meas. unit	0	0÷Capacity	207(MSW) - 208(LSW)
Setpoint n.5		Numerical setting	Weight meas. unit	0	0÷Capacity	209(MSW) - 210(LSW)
Setpoint n.6		Numerical setting	Weight meas. unit	0	0÷Capacity	211(MSW) - 212(LSW)

USER MENU ACCESS

In case of Legal for trade functioning, the programming of weighing parameters and weight calibration settings are allowed only to authorized persons by law, through password-protected access.

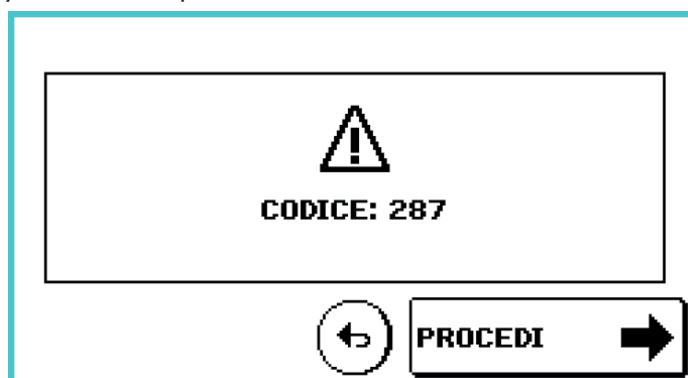
Entering into user menu, message appears asking the operator's identification code:



The screen displays a text field labeled "Utente" with the value "100" entered. Below the field is a numeric keypad with buttons 1 through 0. At the bottom, there are three buttons: a "CANCELLA" button with a delete icon, a circular button with a left arrow, and a "CONFERMA" button with a right arrow.

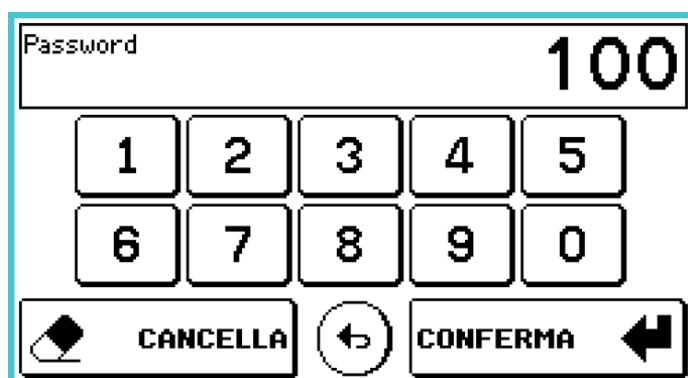
Enter identification operator's code, corresponding to the table password' number provided with instrument, and confirm with CONFERMA key.

If you confirm the 0000 value, access to the menu parameters will be limited (you can not access to the programming of weighing parameters and weight calibration settings). Otherwise you will see a 3-digit number randomly determined. Locate on the table the corresponding 4-digit password, and press the PROCEED key to enter the password.



The screen displays a warning icon (a triangle with an exclamation mark) and the text "CODICE: 287". Below this, there are two buttons: a circular button with a left arrow and a "PROCEDI" button with a right arrow.

Type the password found in the table and confirm with the ENTER key. If the entered value does not match it will return to the previous screen, otherwise you will access the full menu (also with the metrological parameters).



The screen displays a text field labeled "Password" with the value "100" entered. Below the field is a numeric keypad with buttons 1 through 0. At the bottom, there are three buttons: a "CANCELLA" button with a delete icon, a circular button with a left arrow, and a "CONFERMA" button with a right arrow.

USER MENU

USER MENU (COMMANDS)	
MESSAGE	DESCRIPTION
INSTRUMENT DATA	Summary page of the configuration parameters and identification parameters of the firmware (program code and software version number).
HARDWARE TEST	Menu of test procedures for operation of the instrument hardware.
INPUT / OUTPUT	Configuration Menu of the functions of the inputs and outputs.
SETUP MENU	Menu of the programmable parameters that determine the startup of the instrument.

INSTRUMENT DATA DISPLAY

The summary page of informations of the instrument is divided into 4 sections:

FIRMWARE PW1503 Rev.0.00	PARAMETRI F.S.: 5000.0 kg Calib: OFF Vin: 0.50
CONNESSIONI Address:1 FieldBus:Rs485	OPZIONI Analogica:0-10 V Memoria: NO Memoria

⏮

- **FIRMWARE:** Indication of installed Firmware code, in case of assistance is important to communicate these data.
- **PARAMETERS:** Indication of the the full scale set, the state of the internal jumper to enable the metrology calibration, and the value of the instrument's supply voltage.
- **CONNESSIONI:** Indication of the Fieldbus type configured, and Fieldbus address set.
- **OPZIONI:** Indication of the type of analog output configured, the presence of additional memory (No, Alibi Memory).



In the case of PROFINET fieldbus, this screen shows the IP address programmed by PLC; This field is only updated at the instrument power on. After an IP address change by PLC must be switched off and on the instrument to display the correct value.

HARDWARE TEST MENU

HARDWARE TEST (COMMANDS)	
MESSAGGE	DESCRIPTION
CELLE DI CARICO	Weight display with 10x resolution, the signal acquired by the instrument in mV / V and the percentage of the full scale of the weighing system..
MEMORIE	Functioning test of the optional memory (not shown in case of any memory).
INPUT / OUTPUT	Viewing the status of the digital inputs, and manual setting state of the digital outputs.
PORTE COMUNICAZ.	Test of the configured active communication ports. The test consists in the re-transmission of the string received from its serial line (echo test); also displays the number of strings and the number of characters received in the last communication.
OUTPUT ANALOGICA	Analog Output function test, with manual setting to predetermined percentages (not in case of the absence of analog output).

INPUT/OUTPUT MENU

INPUT/OUTPUT (COMMANDS)	
MESSAGE	DESCRIPTION
OUTPUT 1	Menu of the logic output parameters.
[...]	
OUTPUT 6	
INPUT 1	Menu of the logic input parameters.
[...]	
INPUT 6	

OUTPUT N (PARAMETRI)						
Message	Description	Type	Unit	Default	Range	Fieldbus address
Source.	Selection of the weight value used to control its setpoint. The threshold can be compared with the net weight, gross weight, or with the peak. In this last case the setpoint is compared with the last acquired peak value, even when the peak function is not active.	Selection		0	[0] Net [1] Gross [2] Peak	1411 (1) 1421 (2) 1431 (3) 1441 (4) 1451 (5) 1461 (6)
Contact level	Selection of contact level type.	Selection		0	[0] N. Open [1] N. Close	1412 (1) 1422 (2) 1432 (3) 1442 (4) 1452 (5) 1462 (6)
Polarity	The related setpoint can be compared only with positive weights, only with negative weights, or both with positive and negative values.	Selection		0	[0] Positive [1] Negative [2] Bidirectional	1413 (1) 1423 (2) 1433 (3) 1443 (4) 1453 (5) 1463 (6)
Stability	Its output can be activated even when the weight is in motion or just after the weight is stable.	Selection		0	[0] Normal [1] Stable	1414 (1) 1424 (2) 1434 (3) 1444 (4) 1454 (5) 1464 (6)
Hysteresis	Hysteresis value of the setpoint.	Numerical setting	Weight measurement unit	2	0÷Load cells capacity	1415 (1) 1425 (2) 1435 (3) 1445 (4) 1455 (5) 1465 (6)

INPUT N (PARAMETERS)						
Message	Description	Type	Unit	Default	Range	Fieldbus address
Function	Function assigned to respective input. (*)	Selection		0	[0] Zero [1] Tare [2] Del.Tare [3] Del. Peak [4] On Demand [5] Weigh [6] Data Log	1401 (1) 1402 (2) 1403 (3) 1404 (4) 1405 (5) 1406 (6)

(*) Each logic input can be associated with one of the following functions:

- **Zero:** Perform Zero calibration.
- **Tara:** Performs Autotare.
- **Canc. Tara:** Delete Tare.
- **Peak:** Delete Peak.
- **On Demand:** Data transmission on serial port.
- **Weight:** Execution weight command.
- **Log Dati:** Saving command of the weighing values on optional alibi memory (log).

ENTERING THE SETUP MENU

In case of METRIC operation, programming of weighing parameters and calibration weight, are allowed only to authorized personnel via password-protected access.

Entering into the setup menu are then prompted the operator's identification code: value from 100 to 109.

Enter the operator ID and confirm with the ENTER key. If you enter 0000, access to the menu parameters will be limited (you can not access to the programming of weighing parameters and weight calibration settings). Otherwise you will see a 3-digit number randomly determined. Locate on the table the corresponding 4-digit password, and press the CONTINUE key to enter the password..

Type the password obtained from the table and press the CONFIRM key. If the value does not match, it returns to the user code setting screen, otherwise you will access the full menu (also with the metrological parameters).

SETUP MENU

MESSAGE	DESCRIPTION
CALIBRATION	Program menu of the parameters relating to the weight calibration. In this menu it is also possible, by appropriate selection, perform the dead weight calibration or table calibration. (*)
ANALOG OUTPUT	Program menu of the parameters related to the analog output. In this menu, you can also perform analog output adjustment function. This menu only appears if analog output board is installed..
COMM. PORTS	Programming menu of parameters relative to the serial communication ports.
LEGAL PARAMETERS	Program menu of weighing metrological parameters. (*)
FILTER	Weight filter value programming menu. The filter value can be selected from 9 predetermined values, or they can be manually configured the individual parameters that determine the behavior of the filter (output rate, average number, etc.).
FUNCTION MODE.	Program menu of the parameters relating to the functional characteristics of the instrument (standby, password, language, etc.).
DATE AND TIME	Time and date setting.
DISPLAY CONTRAST	Function of the display contrast adjustment.
METROL. ACCESS	Display of the last 5 access of authorized personnel (**)
ALIBI MEMORY	Alibi memory consultation (**)

(*) These sub-menu item appears only in case of FREE use setting, or by password in case of METRIC functioning.

(**) These items are displayed only in case of METRIC functioning.

All the parameters that can be set are described in the following pages. At the end of each parameter description, where present, the fieldbus address corresponding to the parameter is shown. If the parameter is the selectable type, the value to be entered in the register for the desired selection is shown between "[]".

CALIBRATION MENU



Access to this menu is only allowed when operating in FREE mode or when operating in METRIC with access using the password of authorised personnel.

MEASUREMENT UNIT

Measurement unit of the weight value; it is displayed on the main screen and in all the weight parameter settings.

Values that can be selected:

[0] kg, [1] g [2] t [3]

lb, [4] N, [5] kN

Default: kg

DIVISION VALUE [1101÷1102]

Value of a single division, expressed in kg. The ratio between the capacity of the system and the division value represents the resolution of the system (number of divisions).

Following the change of the division value, if the maximum capacity is not changed, calibration of the weight is corrected automatically.

Values that can be selected:

0.0001 - 0.0002 - 0.0005

0.001 - 0.002 - 0.005

0.01 - 0.02 - 0.05

0.1 - 0.2 - 0.5

1 - 2 - 5

10 - 20 - 50

Default: 1

(*) L'impostazione dei valori di divisione tramite fieldbus avviene in maniera differente rispetto a quella effettuata da strumento. Fare riferimento agli indirizzi 1101 e 1102 della tabella dei registri MODBUS.

CAPACITY OF THE LOAD CELLS [1103-1104]

It defines the value corresponding to the sum of the rated capacity values of the load cells expressed in Measurement unit. In the case of systems with only one load cell and "N" fixed supports, enter the capacity value of the cell for the total number of supports. This figure represents the full scale value of the weighing system. Following the change of the parameter value, the theoretical weight value is recalculated.

Values: from 1 to 999999

Default: 0

SENSITIVITY OF THE LOAD CELLS [1105]

Set the value corresponding to the average sensitivity of the loadcells, in mV / V. The instrument accepts values between 0.0 and 4 mV/V. If no value is programmed, 2mV/V is set by default.

Following the change of the sensitivity value, the theoretical weight value is recalculated.

Values: from 0.0001 to 4.0000 mV/V

Default: 2.0000

CAPACITY OF THE WEIGHING SYSTEM [1301-1302]

Programming the useful capacity (net) of the weighing system.

Values: from 0 to 999999

Default: 0

FIXED TARE OF WEIGHING SYSTEM [1106-1107]

Programming the fixed tare value of the weighing system

Values: from 0 to 999999

Default: 00000

SELECTING THE CALIBRATION TYPE

Selecting the calibration type. On confirmation one of the following procedures is started.

DEAD WEIGHT TYPE CALIBRATION [501÷503]

Zero Calibration and Full Scale up to 5 linearisation points using dead weights.

TABLE TYPE CALIBRATION [1151÷1172]

Allows you to manually program up to 5 calibration points. The values corresponding to those resulting from the linearisation procedure with sample weights. In this way you can copy the calibration values made with dead weights.

MULTIRANGE 1 [1112-1113]

Value of the first range value for multirange application (program 0 to disable control).

Values: from 0 to 999999

Default: 0

MULTIRANGE 2 [1114-1115]

Value of the second range value for multirange application (program 0 to disable control).

Values: from 0 to 999999

Default: 0

PARAMETERS DISPLAYED ONLY DURING METRIC OPERATION

CALIBRATION LOCATION GRAVITY [1108-1109]

Programming of the force of gravity of the location where the calibration takes place.

Values: from 9.77000 to 9.84000

Default: 0

GRAVITY OF LOCATION OF USE [1110-1111]

Programming of the force of gravity of the location where the instrument will be used.

Values: from 9.77000 to 9.840000

Default: 0

CONFIGURATION/CALIBRATION EXAMPLE

Set the parameters listed above to perform theoretical calibration of the Full Scale of the MCT 1302. This procedure must be completed with calibration of the zero-point as described later on. The procedure ensures good precision of the system (maximum error <1% FS) when there are no mechanical problems.

When you change the division value selection, calibration of the full-scale is automatically recalculated. Selections incompatible with the calibration parameters or with the calibration value saved in the memory are not accepted.

A tank must be weighed, of an unladen weight of 750 Kg and capacity 1000 litres, containing a product with specific weight 1.3 Kg/dm³ the weight of which needs to be read with a display resolution 0.2 Kg.

Before proceeding with configuration it is required to ensure the load cells are connected correctly to the unit and the tank is empty, the parameters may then be set.

Use:

3 load cells 1000 Kg capacity

Sensitivity respectively 2.0015, 2.0008 and 1.9998 mV/V (average value = 2.0007 mV/V)

Set the following figures in configuration parameters:

Measurement unit = kg

Division value = 0.2

L.C: Capacity = 3000

L.C. Sensitivity = 2.0007

Full Scale = 1500

Dead Weight = 0

Ensure the value read in parameter Signal in the menu TEST corresponds to the tare weight of the system according to the following proportion:

$$3000:2.0007=750:X$$

Where X is the value of the signal expressed in mV/V corresponding to the theoretical value of the empty tank weight- The value should be about 0.5 mV/V

At this stage one may proceed with calibration described in the following paragraph or exit the configuration menu saving the data entered.

The instrument should indicate the value corresponding to the unladen tank weight (e.g. 756.8).

It is possible to enter the configuration menu again and enter the value of the weight read in parameter Dead Weight and enter 756.8

Exit the configuration menu again after saving the data.

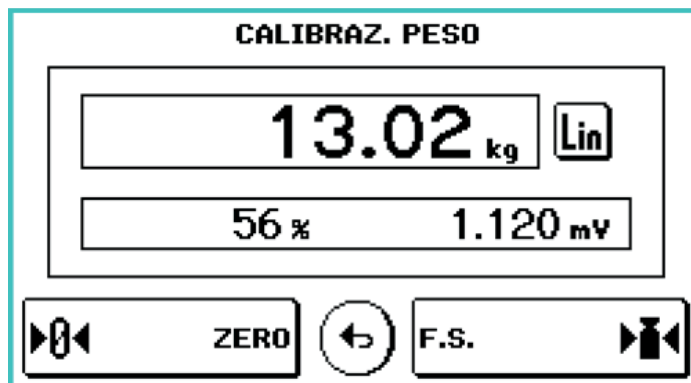
For greater precision arrange sample weights or pre-weighed material on a certified scale and proceed with calibration as described in the following paragraph.

CALIBRATION OF SAMPLE WEIGHTS

The calibration procedure described below should be carried out using sample weights and/or a sample product pre-weighed on a weighing system.

Before proceeding with calibration of the full scale, always perform zero calibration.

WARNING: Switching off the instrument without exiting the set-up menu cancels any changes made during the programming process.



N.B. If linearity errors are shown after calibration, verify that the weighed structure is completely free of mechanical constraints.

OPERATION KEYS	DESCRIPTION
 ZERO	Zero Calibration: Perform this operation with the scale unloaded (including the fixed tare), and when the weight is stable. The weight displayed is reset. This operation can be repeated at will.
F.S. 	Calibration of the full scale: Before calibration, put the sample weight on the scale and wait for stabilisation; the display shows a weight value. With a touchscreen display Type the corresponding weight value. If the set value is higher than the resolution offered by the instrument, the weight is not accepted and an error message appears on the display for a few seconds. This procedure can be repeated.
	Sample weights linearisation : Up to 5 linearisation points are possible on positive scale. The progression of linearisation points (ex "LIN 1") is displayed alternately to the current weight. Press the key F.S. to set the value of the sample weight on the scale. To end the procedure, press the LIN key again. You can set a number of points less than 5.
	Exit key from the calibration function

TABLE CALIBRATION

Allows you to manually program up to five calibration points, in addition to zero. The values corresponding to those resulting from the linearisation procedure with sample weights. This way you can view the values automatically determined with this procedure or modify and program them in accordance with predetermined values.

CALIBRAZ. TABELLA		
Segnale Zero mV/V 0.0461	Valore Peso P1 kg 1.000	Segnale P1 mV/V 0.3823
Valore Peso P2 kg 2.000	Segnale P2 mV/V 0.7348	Valore Peso P3 kg 3.000
SUCCESSIVO		

TABLE CALIBRATION		
MESSAGGE	DESCRIPTION	UNIT
Zero signal	Signal value corresponding to the zero scale	mV/V
Weight point 1	Weight value corresponding to the 1st calibration point	Weight measurement unit
Signal point 1	Signal value corresponding to the 1st calibration point	mV/V
Weight point 2	Weight value corresponding to the 2nd calibration point	Weight measurement unit
Signal point 2	Signal value in corresponding to the 2nd calibration point	mV/V
Weight point 3	Weight value corresponding to the 3rd calibration point	Weight measurement unit
Signal point 3	Signal value corresponding to the 3rd calibration point	mV/V
Weight point 4	Weight point 4 Weight value corresponding to the 4th calibration point	Weight measurement unit
Signal point 4	Signal point 4 Signal value corresponding to the 4th calibration point	mV/V
Weight point 5	Weight point 5 Weight value corresponding to the 5th calibration point	Weight measurement unit
Signal point 5	Signal point 5 Signal value corresponding to the 5th calibration point	mV/V

The programmed to zero are not considered. The calibration data sheet is automatically cancelled when a new theoretical calibration is carried out or with sample weights.

After the execution of the zero signal acquisition function, the signals in the table are recalculated. At each signal value is added to an offset obtained from the difference between the new zero signal acquired and the old zero-signal value.

ANALOG OUTPUT (OPTIONAL)

ANALOG OUTPUT RANGE [1506]

Select the analogue output range.

Selectable values:

$0 \div 10$ Vdc [0]

$0 \div 5$ Vdc [1]

$4 \div 20$ mA [2]

$0 \div 20$ mA [3]

Default: $0 \div 10$ Vdc

ANALOG OUTPUT OPERATION MODE [1505]

Selection of the value to be associated to the analogue output, corresponding to the net weight, gross weight or peak value.

Selectable value:

NET [0]

GROSS [1]

PEAK [2]

Default: NET

ANALOG OUTPUT ZERO VALUE [1501-1502]

Analog output offset. If set, the zero value of the analog output corresponding to the weight value set for this parameter.

Analogue value to be subtracted referred to the full scale of the analogue output.

FULL SCALE [1503-1504]

It is the weight corresponding to the analog output full scale.

Value settable from 0 to Capacity

Default: Capacity

ZERO OFFSET REGULATION [1507]

Measure the analogue output value with a multimeter to perform the zero (0) calibration.

Use the keys + and - to regulate the analogue output. Press and hold the key for rapid change.

Press SAVE key to store value.

FULL SCALE OFFSET REGULATION [1508]

Measure the analogue output value with a multimeter to perform the full scale (FS) calibration.

Use the keys + and - to regulate the analogue output. Hold the key for a quick change.

Press SAVE key to store value.

NOTE. The analog output is calibrated on factory for each selectable range. This procedure is available to the user for adjustment, for each selectable range. In the case of a full reset of the setup memory (PC Configurator), they are restored values to the factory calibration.

SERIAL OUTPUT PARAMETERS

This menu makes it possible to configure the COM1, COM2 and COM3 serial ports and the communication parameters. The instrument has two independent serial ports:

COM1 always with interface RS232 ; COM2 can be fitted with either of the following interfaces: RS485, ETHERCAT, ETHERNET, ETHERNET IP, PROFINET.

COM3 always with interface RS485: it is normally used for connecting external I/O modules.

COM1 (RS232)

TX VALUE

Selecting the value transmitted on output RS 232.

Values that can be selected:

NET, GROSS, PEAK

Default: NET

PROTOCOL

It defines how to use the RS232 serial port:

Values that can be selected:

NONE: *Serial communication OFF*

CONTINUE: *Continuous transmission of the weight string. It can be used, for example, to drive a weight repeater. See details in the relevant section.*

ON DEMAND: *When the Operator presses the relative button on the front or uses Input 2, a weight string is sent. The command is accepted if the weight is stable. Between two consecutive transmissions, variation of the weight must be at least equal to 20 divisions.*

AUTO: *A weight string is sent automatically when the weight stabilises at a value above the minimum weight (20 divisions).*

SLAVE: *ASCII protocol. See details in the relevant section.*

PRINT: *When the operator presses the key on the front or by Input, a weight string is transferred. The command is accepted if the weight is stable. Between two successive transmissions, the weight must have a variation of at least 20 divisions.*

Default: NONE

BAUD RATE

Defines the baud rate of serial port RS232.

The value must be set at the same value as PC/PLC or remote display.

Values that can be selected:

1200

2400

4800

9600

19200

38400

57600

115200

Default: 9600

FORMAT:

Type of frame. For the SLAVE protocol you cannot select 7-bit data format (E-7-1 e O-7-1):

Values that can be selected:

n-8-1

n-8-2

E-7-2

E-8-1

o-7-2

o-8-1

Default: n-8-1

COM 2 PARAMETERS WHEN PRESENT RS485

OUTPUT MODE

Selecting the value transmitted on output RS 485.

Values that can be selected:

NET, GROSS, PEAK

Default: NET

PROTOCOL

It defines how to use the RS485 serial port:

Values that can be selected:

NONE: Serial communication OFF

CONTINUE: Continuous transmission of the weight string. It can be used, for example, to drive a weight repeater. See details in the relevant section.

ON DEMAND: When the operator presses the relevant front key or via Input 2, a weight string is transmitted. The command is accepted if the weight is stable. Between two subsequent transmissions the weight must undergo a variation of 20 divisions.

AUTO: VA weight string is sent automatically when the weight stabilises at a value above the minimum weight (20 divisions).

SLAVE: ASCII protocol. See details in the relevant section.

MODBUS: MODBUS RTU Protocol See details in the relevant section.

Default: NONE

BAUD RATE

Defines the baud rate of serial port RS485.

The value must be set at the same value as PC/PLC or remote display.

Values that can be selected:

1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Default: 9600

FORMATO FRAME:

Type of frame. For the SLAVE or MODBUS protocol you cannot select 7-bit data format (E-7-1 and O-7-1):

Values that can be selected:

n-8-1, n-8-2, E-7-2, E-8-1, o-7-2, o-8-1

Default: n-8-1

ADDRESS:

Communication address of the serial port:

Values from 1 to 32

Default: 1

COM 2 PARAMETERS WHEN PROFINET / ETHERCAT IS PRESENT

FIELD BUS ENABLING

Enabling PROFINET / ETHERCAT fieldbus, if OFF error messages concerning FIELD BUS communication are never displayed:

Values that can be selected:

OFF

ON

Default: OFF

INPUT AREA DIMENSION

Input area dimension for fieldbus (value expressed in Bytes).

Values that can be selected:

32, 64, 96, 128

Default: 128

OUTPUT AREA DIMENSION

Output area dimension for fieldbus (value expressed in Bytes).

Values that can be selected:

32, 64, 96, 128

Default: 128

In case of PROFINET fieldbus, the XML configuration file "GSDML-V2.3-HILSCHER-NIC 50-RE PNS 32-20160122.xml" is provided. The size of the input and output areas set in the PLC (possible selections: 32, 64, 96 or 128 bytes) must correspond to the size of the input and output areas selected in the instrument (parameters "INP.REG." and "OUT.REG.").

The instruments are supplied with the parameter "Profinet Name" not configured and IP address set at 0.0.0.0.

In case of ETHERCAT fieldbus: the devices will be connected with ring type (according to EtherCAT specification), refer to the installation manual for the use of INPUT and OUTPUT ports.

4 different XML configuration files are provided:

"Hilscher NIC 50-RE V2.2 ECS Byte.xml 32" (32 bytes Input Area, 32 bytes of Output area).

"Hilscher NIC 50-RE V2.2 ECS 64 Byte.xml" (64 bytes Input Area, 64 bytes of Output area).

"Hilscher NIC 50-RE V2.2 ECS Byte.xml 96" (96 bytes Input Area, 96 bytes of Output area).

"Hilscher NIC 50-RE V2.2 ECS 128 Byte.xml" (128 bytes Input Area, 128 bytes of Output area).

In the PLC must be imported the file that matches the size of the input and output areas selected in the instrument (for example, if the instrument is set to InP.rEG.=128 and oUt.rEG.=128, the PLC has to be imported file "Hilscher NIC 50-RE V2.2 ECS 128 Byte.xml"). It could be import multiple files with different size, but in this case you can not run the automatic search function and configuration of the devices on the network.

PARAMETERS COM 2 WHEN ETHERNET IP IS PRESENT

ENABLE FIELDBUS

Enabling ETHERNET IP fieldbus, if OFF error messages concerning Fieldbus communication are never displayed:

Values that can be selected:

OFF

ON

Default: OFF

IP ADDRESS

ETHERNET IP protocol address

Values from 0.0.0.0 to 255.255.255.255

Default: 0.0.0.0

SUBNET MASK

ETHERNET IP protocol Subnet Mask.

Values from 0.0.0.0 to 255.255.255.255

Default: 0.0.0.0

INPUT AREA

Input area dimension for fieldbus (value expressed in Bytes).

Values that can be selected:

32, 64, 96, 128

Default: 128

OUTPUT AREA

Output area dimension for fieldbus (value expressed in Bytes).

Values that can be selected:

32, 64, 96, 128

Default: 128

In the case of IP ETHERNET fieldbus, the EDS configuration file "HILSCHER NIC 50-RE EIS V1.1.EDS" is provided. The size of the input and output areas set in the PLC (possible selections: 32, 64, 96 or 128 bytes) must correspond to the size of the input and output areas selected in the instrument (parameters "INP.REG." and "OUT .REG.").

COM 2 PARAMETERS WHEN ETHERNET IS PRESENT

OUTPUT MODE

Selecting the value transmitted on ETHERNET output.

Values that can be selected:

NET, GROSS, PEAK

Default: NET

PROTOCOL

It defines how to use the ETHERNET serial port:

Values that can be selected:

NONE: *Serial communication OFF*

CONTINUE: *Continuous transmission of the weight string. It can be used, for example, to drive a weight repeater. See details in the relevant section.*

ON DEMAND: *When the operator presses the relevant front key or via Input 2, a weight string is transmitted. The command is accepted if the weight is stable. Between two subsequent transmissions the weight must undergo a variation of 20 divisions.*

AUTO: *VA weight string is sent automatically when the weight stabilises at a value above the minimum weight (20 divisions).*

SLAVE: *ASCII protocol. See details in the relevant section.*

MODBUS/TCP: *MODBUS TCP Protocol See details in the relevant section.*

Default: NONE

IP ADDRESS

ETHERNET protocol IP address

Values from 0.0.0.0 to 255.255.255.255

Default: 192.168.0.201

SUBNET MASK

ETHERNET protocol Subnet Mask.

Values from 0.0.0.0 to 255.255.255.255

Default: 255.255.255.0

GATEWAY

ETHERNET protocol gateway.

Values from 0.0.0.0 to 255.255.255.255

Default: 192.168.0.1

PORT

Communication port for ETHERNET protocol.

Values from 1 to 65535

Default: 1800

COM3

NUMBER OF MODULE

Select the number of I/O module connected.

Values that can be selected:

0÷4

Default: 0

BAUD RATE

Defines the baud rate of serial port RS485.

The value must be set at the same value of the I/O modules.

Values that can be selected:

1200

2400

4800

9600

19200

38400

57600

115200

Default: 9600

LEGAL PARAMETERS

Access to this menu is only allowed when operating in FREE mode or when operating in METRIC with access using the password of authorised personnel. The parameters in this menu permit adjustment of the times for acquisition and updating of the display and manual or automatic resetting by the instrument.

USE

Selecting the operation of the instrument. In case of a change from FREE operation to METRIC operation, to confirm the setting authentication is required through the password of authorised personnel.

Value	Variation
Free	Free operation. [0]
Trade	METRIC instrument operation. [1]
Default: Free	

STABILITY OF WEIGHT [1303]

This parameter defines the number of divisions needed to consider the weight stable. A high number of divisions allows the transmitter to quickly detect stability of the weight, which is needed when executing tare and print commands.

Value
0÷4
Default: 2

AUTOZERO WHEN SWITCHING ON [1304-1305]

This parameter defines the value of maximum weight that can be reset when the instrument is switched on. This operation corresponds to zero calibration of the system and is executed only if the weight is stable and below the set value.

Value: from 0 to Capacity.
Default: 0

ZERO TRACKING [1306]

This function allows you to perform temporary zero calibration compensating for the temperature drift of the weight. Switching off the transmitter automatically restores the previous zero calibration. The maximum weight that can be reset by this parameter is 2% of the capacity of the system. To disable this function, set the value 0.

Value	Variation
0	Control excluded
1	0.5 div/sec
2	1 div/sec
3	2 div/sec
4	3 div/sec
Default: 0	

ZERO BAND [1307-1308]

This parameter defines the number of divisions that can be reset by touchscreen or the associated Input.

Values: from 0 to 200.
Default: 100

FILTER - SETTING FILTER PARAMETERS

FILTER VALUE [1201]

This parameter is for adjusting the refresh rate of the display and the serial and analogue outputs.

Set high filter value to increase the refresh rate of the display.

Set low filter values to decrease the refresh rate of the display.

Factor (Hz)	Settling Time (mS)	ADC Freq (Hz)	N readings	Monotony Time (mS)	Oscillation time (mS)	Oscillation range (div)
MANUAL [0]		Selectable	Settable	Settable	Settable	Settable
50 [1]	20	250	5	20	4000	10
25 [2]	40	100	5	40	3000	12
10 [3]	100	50	5	80	2500	16
5 [4]	200	50	10	100	2000	20
2 [5]	500	50	25	250	1500	25
1,25 [6]	800	12,5	10	300	1500	25
1 [7]	1000	12,5	12	400	1500	25
0,7 [8]	1500	12,5	19	500	1200	30
0,5 [9]	2000	12,5	25	600	1000	30

Default: 2 Hz

The following parameters are visible and therefore can be set, only if the parameter selection is **MANUAL**.

OUTPUT RATE [1202]

With this parameter you regulate the acquisition frequency of the weight

Values that can be selected:

12,5 [0]

50 [1]

100 [2]

250 [3]

AVERAGE NR [1203]

With this parameter you set the number of readings that the filter will use to stabilise the average value.

Values: from 0 to 50.

MONOTONY TIME [1204]

Evaluation time in the event of signal changes (in mS)

Values: from 0 to 999.

FLUCTUATION TIME [1205]

Time used by the filter to recognise repetitive oscillations of the signal (in mS).

Values: from 0 to 999.

FLUCTUATION RANGE [1206]

Signal amplitude expressed in divisions, used to recognise repetitive oscillations of the signal.

Values: from 0 to 99.

Default: value is function of Filter value set.

FUNCTION MODE

STAND BY TIME [1001]

Idle time beyond which the instrument automatically assumes a low brightness status and keypad lock.
0 = deactivated function.

Values: from 0 to 999.

Default: 0

SETUP PASSWORD [1003]

If programmed, to access the programming menu you must enter the password. In the event of subsequent accesses it is no longer necessary to type the password until the stand-by intervenes or the instrument is powered off.

Values from 0 to 9999.

Default: 0000 (no Password)

SETPOINT PASSWORD [1009]

If programmed, to access the SETUP menu you must enter the password. In the event of subsequent accesses it is no longer necessary to type the password until the stand-by intervenes or the instrument is powered off.

Values from 0 to 9999.

Default: 0000 (no Password)

ENABLE PEAK [1004]

Allows the peak function to be available or not and refers it to the net or gross weight. If the application does not provide this feature you can disable it.

Values that can be selected:

NO PEAK [0]

NET [1]

GROSS [2]

Default: NO PEAK

LANGUAGE [1008]

Choice of operator interface language.

Values that can be selected:

ITALIANO [0]

ENGLISH [1]

ALTRO [2]

Default: ITALIANO

BASE SCREEN [1012]

Choice of the based screen.

Values that can be selected:

Standard [0]

Weig. Only [1]

Default: Standard

F1 KEY [1013]

Selection of the function associated with the F1 operation key.

Values that can be selected:

[0] Blocked

[1] Zero

[2] Tare

[3] Del Tare

[4] Del Peak

[5] Total

[6] Print

[7] Print Total

[8] Data log

Default: Zero

F2 KEY [1014]

Selection of the function associated with the F2 operation key.

Values that can be selected:

[0] Blocked

[1] Zero

[2] Tare

[3] Del Tare

[4] Del Peak

[5] Total

[6] Print

[7] Print Total

[8] Data log

Default: Zero

F3 KEY [1015]

Selection of the function associated with the F3 operation key.

Values that can be selected:

[0] Blocked

[1] Zero

[2] Tare

[3] Del Tare

[4] Del Peak

[5] Total

[6] Print

[7] Print Total

[8] Data log

Default: Zero

F4 KEY [1016]

Selection of the function associated with the F4 operation key.

Values that can be selected:

[0] Blocked

[1] Zero

[2] Tare

[3] Del Tare

[4] Del Peak

[5] Total

[6] Print

[7] Print Total

[8] Data log

Default: Zero

SETPOINTS KEY [1017]

Blocked function of setpoints quadrant.

Values that can be selected:

[0] Blocked

[1] Active

Default: Active

WEIGHT KEY [1018]

Blocked function of weight quadrant.

Values that can be selected:

[0] Blocked

[1] Active

Default: Active

TARE KEY [1019]

Blocked function of tare quadrant.

Values that can be selected:

[0] Blocked

[1] Active

Default: Active

TOTAL KEY [1020]

Blocked function of total quadrant.

Values that can be selected:

[0] Blocked

[1] Active

Default: Active

OPERATOR CODE [1010 - 1011]

If programmed it is shown in the receipt printing.

Values: from 0 to 999999.

Default: 0

The following parameters are visible only in case of Free operation and optional alibi memory installed.

DATALOGGER [1005]

Allows you to save the weight and I/O status in the optional memory in Excel format. The logging can be a single measurement or a continuous series of measurements from the start of storage (max 1000 measurements). The memory can contain a maximum of 60000 records, after which the oldest records are overwritten.

Selectable setting:

NONE [0]

SINGLE [1]

CONTIN. [2]

Default: NONE

TRIGGER DATALOGGER [1006]

If the datalogger is enabled, select whether storage is done manually (by button or input), or on activation of output 1 or 2. To start storing by key, press and hold the LOG Key. Storage can be interrupted at any time by pressing again the LOG key.

Selectable setting:

MANUAL [0]

OUT1 [1]

OUT2 [2]

OUT3 [3]

OUT4 [4]

OUT5 [5]

OUT6 [6]

Default: MANUAL

DATALOGGER FREQUENCY [1007]

If the datalogger is enabled, select the storage frequency of data (datalogger). The maximum frequency corresponds to that of weight acquisition (maximum frequency 250 Hz).

Selectable setting:

10 MIN. [0]

5 MIN. [1]

1 MIN. [2]

10 SEC. [3]

5 SEC. [4]

2 SEC. [5]

1 HZ [6]

5 HZ [7]

10 HZ [8]

HIGH [9]

Default: 10 MIN.

DOWNLOAD LOG

Log download function, the records are transmitted through the USB key of the instrument. At the end of the transmission you are prompted to delete the log. Follow instruction shown on OPTIMATION utility software manual.

LOG DELETION

Log delete function.

NOTE: In the download function of the log the records are transmitted in the following format (starting from the oldest record):

<Date>; <Time>; <Gross>; <Net>; <Peak>; <Inputs>; <Outputs> CR LF

Where:

Date: field consists of eight ASCII characters with the value of the recording time in the format "hh:mm:ss".

Time: field consists of eight ASCII characters with the value of the recording time in the format "dd/mm/yy".

Gross Net Peak: fields consisting of 8 ASCII characters with the weight value justified to the right (without insignificant zeroes, with decimal points and negative signs).

Inputs: six ASCII characters, "0" (30h, input disabled) or "1" (31h, input enabled). Which indicate the status of input from 1 to 6.

Outputs: six ASCII characters, "0" (30h, output disabled) or "1" (31h, output enabled). Which indicate the status of output from 1 to 6.

ACCESS VIEWING

This menu only appears in case of METRIC functioning.

ACCESS 1

On display it is shown the user code used to access, see password table, the sequence number and the date and time you access.

ACCESS 2

Viewing of ACCESS 2 data's.

ACCESS 3

Viewing of ACCESS 3 data's.

ACCESS 4

Viewing of ACCESS 4 data's.

ACCESS 5

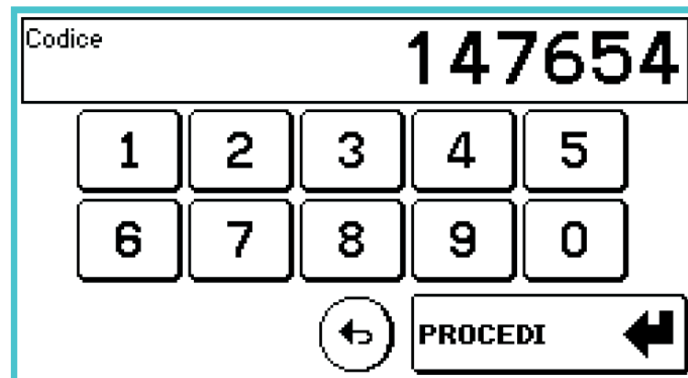
Viewing of ACCESS 5 data's.

*Whene access is made through calibration jumper, it is displayed identification code 0000.
The access 1 indicates the most recent.*

ALIBI MEMORY

Check of the weight saved in the alibi memory.

Set the code for the weighing to control.



The keypad interface for the Alibi Memory function. It features a display area at the top showing the label "Codice" and the entered code "147654". Below the display is a numeric keypad with buttons for digits 1 through 0. At the bottom, there is a circular button with a left arrow and a rectangular button labeled "PROCEDI" with a right arrow.

You will see its weight saved in the alibi memory.

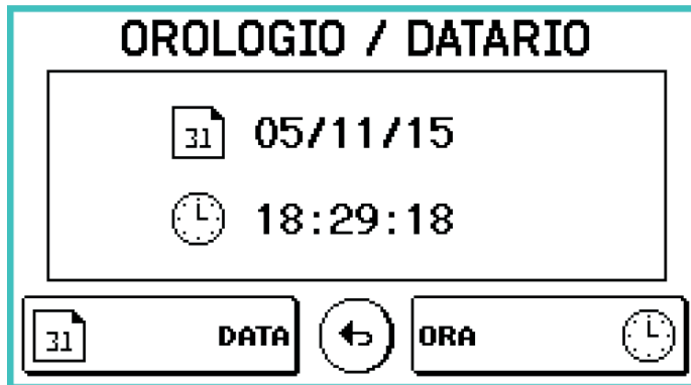


The weight display screen showing the result of the weighing. It features a central display area with a small icon of a scale and the text "PESO NETTO: 134.5 kg". Below the display is a circular button with a left arrow.

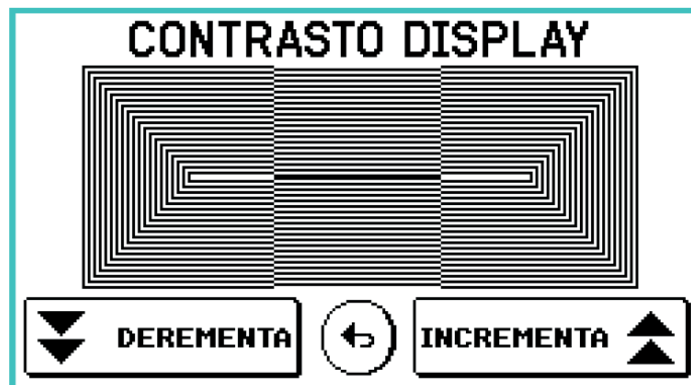


If the entered code does not match any value in memory, will be shown a message instead of the weight value.

TIME AND DATE MENU



DISPLAY CONTRAST



UPLOAD / DOWNLOAD FUNCTION



The TESTER 1008 must be connected to the serial COM1 (RS232) of the instrument.

This feature allows you to download or upload the setup configuration and calibration data stored in the instrument.

- **Download function:** The instrument setup parameters are stored in a file.
- **Upload function:** the instrument is configured with the setup parameters read from a file.

To use these functions it is necessary to activate the procedure ("receive" files or "transmit file") in 1008 TESTER instrument.

SERIAL COMMUNICATION PROTOCOLS

CONTINUOUS, AUTOMATIC AND MANUAL ASCII PROTOCOLS

The continuous transmission is carried out at the refresh rate of the weight, consistent with the serial transmission baud rate. In case of communication on the ethernet port, the continuous transmission frequency is limited to 12.5 Hz.

In case of FREE mode, the string is transmitted with Continuous, On Demand and Automatic protocols:

STX	<status>	<weight>	ETX	<chksum>	EOT
-----	----------	----------	-----	----------	-----

In case of METRIC mode, the string is transmitted with On Demand protocols:

STX	<status>	<weight>	Weighing ID	ETX	<chksum>	EOT
-----	----------	----------	-------------	-----	----------	-----

Where:

STX (start of text) = 0x02h

ETX (end of text) = 0x03h

EOT (end of transmission) = 0x04.

<status> = character encoded as per the following table (bit = 1 if condition TRUE):

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Tare Entered	Zero band	Stable weight	Centre zero

<weight> = field consisting of 8 ASCII characters with the weight value justified to the right (without insignificant zeroes, with decimal points and negative signs).

The weight value transmitted may be the net weight, the gross weight or the peak value, depending on the transmitted data selected (parameter MODE) in the configuration menu of the serial communication ports (see related paragraph).

In conditions of overweight the field assumes the value: "^^^^^^^^".

In conditions of underweight greater than 99999, the field assumes the value: " _ _ _ _ _ _ _ _".

In conditions of weight reading error the field assumes the value: " O-L ".

<weighing ID> = field consisting of seven ASCII characters with the identifier code of the weight justified to the right (without insignificant zeros).

<chksum> = checksum of the string data. It is calculated by performing the exclusive OR (XOR) of all the characters between STX (or from <Addr>) and ETX, with the exclusion of the latter two; the result of the XOR is broken up into 2 characters considering the upper 4 bits (first character) and the lower 4 bits (second character) separately; the 2 characters obtained are then ASCII encoded;

(example: XOR = 5Dh; <csum> = "5Dh" i.e. 35h and 44h).

In the case of automatic and manual communication protocols, between 2 successive transmissions the weight must have a variation of at least 20 divisions.

SLAVE TRANSMISSION PROTOCOL

LIST OF THE CONTROLS AVAILABLE:

1. Request for the net and gross weight and current peak.
2. Execution weighing command
3. Autotare command
4. Zero command
5. Peak reset command
6. Programming setpoints
7. Requesting the programmed setpoints.
8. Logic output activation
9. Request Input status
10. Command of setpoints storage in permanent memory.
11. Switches display from gross weight to net weight.
12. Switches display from net weight to gross weight.
13. Command of tare delete.
14. Requesting the net weight.
15. Requesting the gross weight

The unit connected to the instrument (typically a personal computer) acts as a MASTER and is the only unit that can start a process of communication.

The process of communication must be made by the transmission of a string by the MASTER, followed by a reply from the SLAVE concerned.

CONTROLS FORMAT DESCRIPTION:

The double quotes enclose constant characters (observe upper and lower case); the < and > symbols contain variable numeric fields. The <addr> is the instrument identification. In case of communication on the RS485 port, is obtained by adding 80h to the instrument's address value (for example with address 3 <addr> = 80h + 03h = 83h). In case of communication on the RS232 port, the <addr> must always be equal to 81h, or, in case of communication on the Ethernet port, the <addr> must always be equal to FFh

1.REQUEST FOR THE NET AND GROSS WEIGHT AND CURRENT PEAK

Master: <Addr> "N" EOT

MCT 1302: "N" <Addr> <status> <net> <gross> <peak> ETX <chksum> EOT

2 EXECUTION WEIGHIN COMMAND

Master: <Addr> "P" EOT

MCT 1302: <Addr> "P" <status> <weight> <ID weight> ETX <chksum> EOT
or <Addr> NAK EOT

This command is only available in case of METRIC operation. Since the last executed weigh, the weight has undergone a change of at least 20 divisions (delta weight), if the weight is in motion the command can't be executed

3 AUTO-TARE COMMAND

Master: <Addr> "A" EOT

MCT 1302: <Addr> "A" ACK EOT or <Addr> NAK EOT

4. SEMI-AUTOMATIC ZERO COMMAND

Master: <Addr> "Z" EOT

MCT 1302: <Addr> "Z" ACK EOT or <Addr> NAK EOT

5. PEAK VALUE RESET COMMAND

Master: <Addr> "X" EOT

MCT 1302: <Addr> "X" ACK EOT or <Addr> NAK EOT

6. PROGRAMMING SET-POINTS

Master: <Addr> "S" <index> <setpoint> ETX <csum> EOT

MCT 1302: <Addr> "S" ACK EOT or <Addr> NAK EOT

7. REQUESTING PROGRAMMED SET-POINTS

Master: <Addr> "R" EOT

MCT 1302: <Addr> "R" <index> <setpoint> ETX <csum> EOT or <Addr> NAK EOT

8. ACTIVATION OF LOGIC OUTPUTS.

Master: <Addr> "U" <outputs> EOT

MCT 1302: <Addr> "U" ACK EOT or <Addr> NAK EOT

To use this feature all the setpoint values should be programmed to 0.

9. STATUS REQUEST OF LOGIC INPUTS

Master: <Addr> "I" EOT

MCT 1302: <Addr> "I" <inputs> ETX <csum> EOT or <Addr> NAK EOT

10. COMMAND FOR STORING SET-POINTS IN THE PERMANENT MEMORY.

Master: <Addr> "E" EOT

MCT 1302: <Addr> "E" ACK EOT or <Addr> NAK EOT

In the case of a communication error or a command that is not recognised, MCT 1302 responds with the following string:

MCT 1302: <Addr> NAK EOT

11. COMMAND FOR DISPLAYING FROM GROSS TO NET

Master: <Addr> "CN" EOT

MCT 1302: <Addr> "C" ACK EOT or <Addr> NAK EOT

12. COMMAND FOR DISPLAYING FROM NET TO GROSS

Master: <Addr> "CL" EOT

MCT 1302: <Addr> "C" ACK EOT or <Addr> NAK EOT

13. COMMAND OF TARE DELETE

Master: <Addr> "DT" EOT

MCT 1302: <Addr> "D" ACK EOT or <Addr> NAK EOT

14. NET WEIGHT REQUEST (used for program PW1508)

Master: <Addr> "W" "N" EOT

MCT 1302: <Addr> "W" <rip status> <net> ETX <csum> EOT or <Addr> NAK EOT

15. GROSS WEIGHT REQUEST (used for program PW1508)

Master: <Addr> "W" "G" EOT

MCT 1302: <Addr> "W" <rip status> <gross> ETX <csum> EOT or <Addr> NAK EOT

Where:

<index>: single ASCII character corresponding to setpoint number (from '1' to '6').

<setpoint>: formatted as weight field.

<outputs> and <inputs>: two ASCII character encoded as per the following table (bit = 1 if input/output enabled).

1° character

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	0	1	1	Input 4 Output 4	Input 3 Output 3	Input 2 Output 2	Input 1 Output 1

2° character

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	0	1	1	0	0	Input 6 Output 6	Input 5 Output 5

<rip status>: c haracter encoded as per the following table (bit = 1 in case of true condition).

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	0	1	1	Weight displayed 0 = net 1 = gross	Zero band	Stable weight	Center of zero

MODBUS RTU PROTOCOL

The addresses set out in the tables follow the standard routing specified in the reference guide of Modicom PI-MBUS-300 an extract of which is provided below to help the user communicate with the instrument.

"All data addresses in Modbus messages are referenced to zero. The first occurrence of a data item is addressed as item number zero. For example:

The coil known as 'coil 1' in a programmable controller is addressed as coil 0000 in the data address field of a Modbus message.

Coil 127 decimal is addressed as coil 007E hex (126 decimal).

Holding register 40001 is addressed as register 0000 in the data address field of the message. The function code field already specifies a 'holding register' operation. Therefore the '4XXXX' reference is implicit."

To confirm a new value entered in E2prom, run the MAKE – BACKUP function. If this function is not performed, by switching off, the MCT 1302, the value before the change will be restored.

Unless otherwise specified, the numerical values (such as addresses, codes and data) are expressed as decimal values.

The MODBUS RTU protocol is available only on COM2 RS485.

HANDLING OF COMMUNICATION ERRORS

The CRC (Cyclic Redundancy Check) is carried out to check the communication strings. In the case of a communication error, the slave does not respond with a string. The master must consider a timeout for receipt of the response. If it does not receive a response, a communication error has occurred

HANDLING OF RECEIVED DATA ERRORS

In the case of a string that has been received correctly but cannot be executed, the slave responds with an EXCEPTIONRESPONSE as indicated in the table below.

CODE	DESCRIPTION
1	ILLEGAL FUNCTION (The function is not valid or not supported)
2	ILLEGAL DATA ADDRESS (The address of the specified data is not available)
3	ILLEGAL DATA VALUE (The values of the received data are invalid)

FUNCTIONS SUPPORTED:

FUNCTION	DESCRIPTION
01	READ COIL STATUS (Reading the status of the logic outputs)
02	READ INPUT STATUS (Reading the status of the logic inputs)
03	READ HOLDING REGISTERS (Reading the programmable registers)
04	READ INPUT REGISTERS (Reading the "read only" registers")
05	FORCE SINGLE COIL (Writing the status of each output)
06	PRESET SINGLE REGISTER (Writing a programmable register)
15	FORCE MULTIPLE COILS (Multiple writing of outputs)
16	PRESET MULTIPLE REGISTERS (Multiple writing of registers)
Funct + 80h	EXCEPTION RESPONSE

LIST OF THE MODBUS PROTOCOL HOLDING REGISTERS

The instrument parameters that can be read or programmed via the communication interfaces available on the instrument, depending on the hardware configuration, are listed in the following table.

R type registers are readable while W type are writeable.

In case of Modbus TCP protocol, the address of the instrument (the "Unit Identifier" field) must always be FFh.

If a fieldbus is used (different from the Modbus), only the R or R/W registers will be in the input area and only the W or R/W registers will be in the output area.

The registers are 16 bit in size.

Address	Holding Register	R/W	Notes
0001	Status Register	R	See relevant table.
0002	Gross weight (MSB)	R	INT value. - Most significant word
0003	Gross weight (LSB)	R	INT. value - Less significant word
0004	Net weight (MSB)	R	INT. value - Most significant word
0005	Net weight (LSB)	R	INT. value - Less significant word
0006	Peak (MSB)	R	INT. value - Most significant word
0007	Peak (LSB)	R	INT. value - Less significant word
0008	Digital Inputs	R	See relevant table
0009	Digital Outputs	R	See relevant table
0010	Load cell signal	R	INT value
0011	Tare (MSW)	R/W	INT value. - Most significant word
0012	Tare (LSW)	R/W	INT. value - Less significant word
0101	Weighted net weight (MSW)	R/W	INT value. - Most significant word
0102	Weighted net weight (LSW)	R/W	INT. value - Less significant word
0103	Weighted code (MSW)	R	INT value. - Most significant word
0104	Weighted code (LSW)	R	INT. value - Less significant word
0105	Net weight total (MSW)	R/W	INT value. - Most significant word
0106	Net weight total (LSW)	R/W	INT. value - Less significant word
0201	Set-Point 1 (MSB)	R/W	INT. value - Most significant word
0202	Set-Point 1 (LSB)	R/W	INT. value - Less significant word
0203	Set-Point 2 (MSB)	R/W	INT. value - Most significant word
0204	Set-Point 2 (LSB)	R/W	INT. value - Less significant word
0205	Set-Point 3 (MSW)	R/W	INT value. - Most significant word
0206	Set-Point 3 (LSW)	R/W	INT. value - Less significant word
0207	Set-Point 4 (MSW)	R/W	INT value. - Most significant word
0208	Set-Point 4 (LSW)	R/W	INT. value - Less significant word
0209	Set-Point 5 (MSW)	R/W	INT value. - Most significant word
0210	Set-Point 5 (LSW)	R/W	INT. value - Less significant word
0211	Set-Point 6 (MSW)	R/W	INT value. - Most significant word
0212	Set-Point 6 (LSW)	R/W	INT. value - Less significant word
0501	Data Register (MSB)	W	INT. value - Most significant word (See relevant table)
0502	Data Register (LSB)	W	INT. value - Least significant word (See relevant table)
0503	Command Register	W	See relevant table.
1001	Stand-by function	R/W	INT. value
1002	Spare	R	

1003	Password function	R/W	INT. value
1004	Peak function	R/W	See correspondence on page 49
1005	Data-Logger function	R/W	See correspondence on page 52
1006	Data-Logger Trigger	R/W	See correspondence on page 52
1007	Data-Logger function	R/W	See correspondence on page 52
1008	Lingua	R/W	See correspondence on page 49
1009	Password Setpoint function	R/W	INT. value
1010	Operator code print (MSW)	R/W	INT value. - Most significant word
1011	Operator code print (LSW)	R/W	INT. value - Less significant word
1012	Base screen selection	R/W	INT. value
1013	F1 function key	R/W	INT. value
1014	F2 function key	R/W	INT. value
1015	F3 function key	R/W	INT. value
1016	F4 function key	R/W	INT. value
1017	Setpoint key blocked	R/W	INT. value
1018	Weight key blocked	R/W	INT. value
1019	Tare key blocked	R/W	INT. value
1020	Total key blocked	R/W	INT. value
1101	Weight division value (*)	R/W	See relevant table.
1102	Decimals (*)	R/W	
1103	Capacity of load cells (MSB) (*)	R/W	INT. value - Most significant word
1104	Capacity of load cells (LSB) (*)	R/W	INT. value - Less significant word
1105	Sensitivity of load cells (*)	R/W	INT. value
1106	Fixed Tare (MSB) (*)	R/W	INT. value - Most significant word
1107	Fixed Tare (LSB) (*)	R/W	INT. value - Less significant word
1108	Gravity Calibration (MSB) (*)	R/W	INT. value - Most significant word
1109	Gravity Calibration (LSB) (*)	R/W	INT. value - Less significant word
1110	Gravity zone of use (MSB) (*)	R/W	INT. value - Most significant word
1111	Gravity zone of use (LSB) (*)	R/W	INT. value - Less significant word
1112	Multirange 1 (MSW) (*)	R/W	INT. value - Most significant word
1113	Multirange 1 (LSW) (*)	R/W	INT. value - Less significant word
1114	Multirange 2 (MSW) (*)	R/W	INT. value - Most significant word
1115	Multirange 2 (LSW) (*)	R/W	INT. value - Less significant word
1151	Cal. table Zero signal (MSB) (*)	R/W	INT. value - Most significant word
1152	Cal. table Zero signal (LSB) (*)	R/W	INT. value - Less significant word
1153	Cal. table P1 signal (MSB) (*)	R/W	INT. value - Most significant word
1154	Cal. table P1 signal (LSB) (*)	R/W	INT. value - Less significant word
1155	Cal. table P2 signal (MSB) (*)	R/W	INT. value - Most significant word
1156	Cal. table P2 signal (LSB) (*)	R/W	INT. value - Less significant word
1157	Cal. table P3 signal (MSB) (*)	R/W	INT. value - Most significant word
1158	Cal. table P3 signal (LSB) (*)	R/W	INT. value - Less significant word
1159	Cal. table P4 signal (MSB) (*)	R/W	INT. value - Most significant word
1160	Cal. table P4 signal (LSB) (*)	R/W	INT. value - Less significant word
1161	Cal. table P5 signal (MSB) (*)	R/W	INT. value - Most significant word
1162	Cal. table P5 signal (LSB) (*)	R/W	INT. value - Less significant word
1163	Cal. table P1 value (MSB) (*)	R/W	INT. value - Most significant word
1164	Cal. table P1 value (LSB) (*)	R/W	INT. value - Less significant word

1165	Cal. table P2 value (MSB) (*)	R/W	INT. value - Most significant word
1166	Cal. table P2 value (LSB) (*)	R/W	INT. value - Less significant word
1167	Cal. table P3 value (MSB) (*)	R/W	INT. value - Most significant word
1168	Cal. table P3 value (LSB) (*)	R/W	INT. value - Less significant word
1169	Cal. table P4 value (MSB) (*)	R/W	INT. value - Most significant word
1170	Cal. table P4 value (LSB) (*)	R/W	INT. value - Less significant word
1171	Cal. table P5 value (MSB) (*)	R/W	INT. value - Most significant word
1172	Cal. table P5 value (LSB) (*)	R/W	INT. value - Less significant word
1201	Filter factor	R/W	See correspondence on page 46
1202	Output rate ADC	R/W	See correspondence on page 46
1203	Number of readings on average	R/W	INT. value
1204	Monotony Time	R/W	INT. value
1205	Oscillations Time	R/W	INT. value
1206	Oscillations Range	R/W	INT. value
1301	Full Scale (MSB) (*)	R/W	INT. value - Most significant word
1302	Full Scale (LSB) (*)	R/W	INT. value - Less significant word
1303	Weight stability (*)	R/W	See correspondence on page 46
1304	Auto zero when switching on (MSB) (*)	R/W	INT. value - Most significant word
1305	Auto zero when switching on (LSB) (*)	R/W	INT. value - Less significant word
1306	Zero tracking (*)	R/W	See correspondence on page 47
1307	Zero Band Divisions (MSB) (*)	R/W	INT. value - Most significant word
1308	Zero Band Divisions (LSB) (*)	R/W	INT. value - Less significant word
1401	Input 1 function	R/W	See correspondence on Input/Output menu
1402	Input 2 function	R/W	See correspondence on Input/Output menu
1403	Input 3 function	R/W	See correspondence on Input/Output menu
1404	Input 4 function	R/W	See correspondence on Input/Output menu
1405	Input 5 function	R/W	See correspondence on Input/Output menu
1406	Input 6 function	R/W	See correspondence on Input/Output menu
1411	Output mode 1 — Function	R/W	See correspondence on page 30
1412	Output mode 1 — Logic	R/W	See correspondence on page 30
1413	Output mode 1 — Polarity	R/W	See correspondence on page 30
1414	Output mode 1 — Stability	R/W	See correspondence on page 30
1415	Hysteresis output 1	R/W	Valore INT.
1421	Output mode 2 — Function	R/W	See correspondence on page 30
1422	Output mode 2 — Logic	R/W	See correspondence on page 30
1423	Output mode 2 — Polarity	R/W	See correspondence on page 30
1424	Output mode 2 — Stability	R/W	See correspondence on page 30
1425	Hysteresis output 2	R/W	INT. value
1431	Output mode 3 — Function	R/W	See correspondence on page 30
1432	Output mode 3 — Logic	R/W	See correspondence on page 30
1433	Output mode 3 — Polarity	R/W	See correspondence on page 30
1434	Output mode 3 — Stability	R/W	See correspondence on page 30
1435	Hysteresis output 3	R/W	Valore INT.
1441	Output mode 4 — Function	R/W	See correspondence on page 30
1442	Output mode 4 — Logic	R/W	See correspondence on page 30
1443	Output mode 4 — Polarity	R/W	See correspondence on page 30
1444	Output mode 4 — Stability	R/W	See correspondence on page 30

1445	Hysteresis output 4	R/W	INT. value
1451	Output mode 5 — Function	R/W	See correspondence on page 30
1452	Output mode 5 — Logic	R/W	See correspondence on page 30
1453	Output mode 5 — Polarity	R/W	See correspondence on page 30
1454	Output mode 5 — Stability	R/W	See correspondence on page 30
1455	Hysteresis output 5	R/W	Valore INT.
1461	Output mode 6 — F unction	R/W	See correspondence on page 30
1462	Output mode 6 — Logic	R/W	See correspondence on page 30
1463	Output mode 6 — Polarity	R/W	See correspondence on page 30
1464	Output mode 6 — Stability	R/W	See correspondence on page 30
1455	Hysteresis output 6	R/W	INT. value
1501	Analogue Tare (MSB)	R/W	INT. value - Most significant word
1502	Analogue Tare (LSB)	R/W	INT. value - Less significant word
1503	Analogue Full Scale (MSB)	R/W	INT. value - Most significant word
1504	Analogue Full Scale (LSB)	R/W	INT. value - Less significant word
1505	Analogue Output Mode	R/W	See correspondence on page 35
1506	Analogue Output Range	R/W	See correspondence on page 35
1507	Regulation of analogue zero	R/W	INT. value Analogue output zero points, to end the regulation procedure it is necessary to send the data storage command to the permanent memory in the Command Register.
1508	Regulation of analogue full scale	R/W	INT. value Analogue output full scale points, to end the regulation procedure it is necessary to send the data storage command to the permanent memory in the command register.
2000	Monitor register	W	The programmed value is automatically copied in the Monitor Register R (2100).
2100	Monitor register	R	

(*) These registers can only be modified in FREE mode or if in METRIC mode with a calibration bridge enabled.

TABLE A - REGISTER STATUS CODING

BIT	15	14	13	12	11	10	9	8
Description	Setup (***)	Weight difference	0	0	Shown Peak	0= Shown Net 1= Shown Gross	Run Backup	0

BIT	7	6	5	4	3	2	1	0
Description	Not calibrated	Weight error	Over-load	Under-load	Tare entered	Zero band	Stable weight	Zero centre

TABLE B - INPUTS/OUTPUTS CODING

BIT	15÷6	5	4	3	2	1	0
Description	Not used	In 6 - Out 6 Active	In 5 - Out 5 Active	In 4 - Out 4 Active	In 3 - Out 3 Active	In 2 - Out 2 Active	In 1 - Out 1 Active

ATTENZIONE: the bits from 15 to 6 are not managed and are always equal to 0.

TABLE C - DECIMALS AND DIVISION VALUE CODING

ADDRESS	DESCRIPTION	ACCEPTED VALUES
1101	Division value	1 - 2 - 5 - 10 - 20 - 50
1102	Number of decimals	0 - 1 - 2 - 3 - 4

TABLE D - DATA REGISTER / COMMAND REGISTER CODING

REGISTER VALUE	COMMAND REGISTER FUNCTION	FUNCTION DATA REGISTER
0x0001	Semiautomatic zero	
0x0002	Auto-tare	
0x0003	Peak Reset	
0x0004	Zero calibration (**)	
0x0005	Full scale calibration (**)	Sample weight value in MSB and LSB
0x0006	Analogue Test	Value between 0 and 100 at intervals of 10 in LSB
0x0007	Saving the data in the permanent memory	
0x000A	Run command.	
0x000B	Change from gross to net	
0x000C	Change from net to gross	
0x000D	Acquisition of the zero signal (calibration table)	
0x000E	Delete tare command.	
0x000F	Weight command.	
0x7FFF	Enabling Output Data Area (*)	

(*) The instrument parameters managed in the Fieldbus Output Data Area are not changed until this command is sent. When the instrument is switched on the Output Data area is completely reset, the master fieldbus must read the parameter values from the Input Data Area and copy them in the relevant registers of the Output Data Area, then it must send the enable command in the Command Register. Otherwise all parameters managed in the Output Data area would be reset when switched on.

(**) Function only available in FREE mode or if in METRIC mode with a calibration jumper enabled.

(***) The instrument is undergoing configuration (TRUE flag during access to the SETUP menu of the instrument or during connection with PC "Optimation" software).

EXAMPLES

ZERO CALIBRATION

In condition of stable and unloaded scale write hexadecimal value 0004 in Command Register (0503).

To permanently store in the memory the new Zero value, write hexadecimal value 0007 in Command Register (0503).

FULL SCALE CALIBRATION

Put a sample weight on the scale, i.e 1256 kg.

Write in Data Register (0501 and 0502) the hex value of the sample weight: 04E8.

Write to the Command Register (0503), the hexadecimal value 0005.

You can write at the same time the Command Register and Data Register using the multiple registers function.

To permanently store in the memory the new value, write hexadecimal value 0007 in Command Register (0503).

INSTRUMENT RESPONSE TIMES

The instrument, to satisfy most requests, uses a variable time in accordance with the programming of the instrument parameters and the type of request as per table:

Update frequency of measurements	12,5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Analogue output update frequency	12,5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Fieldbus memory area reading and update update frequency.	250 Hz	250 Hz	250 Hz	250 Hz	250 Hz
Update frequency of logic outputs.	12,5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Status and weight acquisition cycle from Modbus RTU (*)	$f_{max} = \frac{1}{\left(\left(\frac{(nchar + 8) * 10}{baud} \right) + 0,004 \right)}$				
Status and weight acquisition cycle from ASCII protocol (*)	$f_{max} = \frac{1}{\left(\left(\frac{(nchar + 8) * 10}{baud} \right) + 0,004 \right)}$				

(*) nchar = sum of characters which make up the request string of the master (Query) and the response string of the MCT 1302 (Response).

Example of status request, net weight and gross weight (5 registers) at baud rate = 115,2 kbit/sec:

$$1 / (((8 + 15 + 8) * 10) / 115200) + 0,004 = 149 \text{ Hz}$$

Exceptions are:

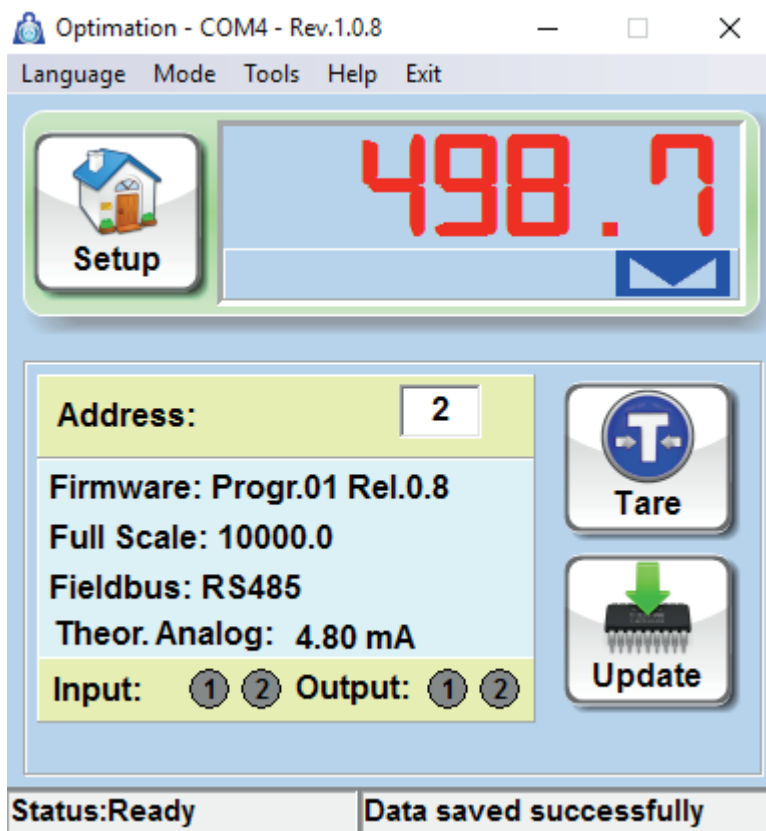
- the Backup E2prom command (max time = 350mSec.)
- writing of the registers of Cells capacity, Cells sensitivity, Net weight, System tare, Filter (max time = 550mSec).

THE USE OF SERIAL APPLICATIONS VIA THE USB PORT

The PC software OPTIMATION allows you to connect the instrument via the USB port for:

- total configuration of all the setup parameters;
- testing of the different hardware sections;
- consultation of the instrument documentation
- updating of instrument firmware
- storage over time of the weight values acquired by the instrument using the Datalogger function;
- saving and loading of the configuration parameters of the instrument on file.

On the dedicated manual are indicated all operational procedures.



FIELDBUS PROTOCOL

INPUT DATA AREA

The following table lists the registers of the input area (produced from the instrument and read by the master), common to all PROFINET, ETHERCAT, ETHERNET / IP fieldbuses. The registers are 16 bit in size. The input area is updated at a fixed frequency of 250 Hz. The size of the output area configured in the master fieldbus must match the size configured in the instrument.

Byte	Register address	INPUT AREA REGISTER	Notes
1-2	0	Status Register	See relevant table.
3-4	1	Gross weight (MSB)	INT. value - Most significant word
5-6	2	Gross weight (LSB)	INT. value - Less significant word
7-8	3	Net weight (MSB)	INT. value - Most significant word
9-10	4	Net weight (LSB)	INT. value - Less significant word
11-12	5	Peak (MSB)	INT. value - Most significant word
13-14	6	Peak (LSB)	INT. value - Less significant word
15-16	7	Digital Inputs	See relevant table.
17-18	8	Digital Outputs	
19-20	9	Load cell signal	INT. value
21-22	10	Tare (MSW)	INT. value - Most significant word
23-24	11	Tare (LSW)	INT. value - Less significant word
25-26	12	Monitor register	This value corresponds to the same register in the output area.
27-28	13	Net weight weighing (MSB)	INT. value - Most significant word
29-30	14	Net weight weighing (LSB)	INT. value - Less significant word
31-32	15	Code weighing (MSB)	INT. value - Most significant word
33-34	16	Code weighing (LSB)	INT. value - Less significant word
35-36	17	Total net weight (MSB)	INT. value - Most significant word
37-38	18	Total net weight (LSB)	INT. value - Less significant word
39-40	19	Set-Point 1 (MSB)	INT. value - Most significant word
41-42	20	Set-Point 1 (LSB)	INT. value - Less significant word
43-44	21	Set-Point 2 (MSB)	INT. value - Most significant word
45-46	22	Set-Point 2 (LSB)	INT. value - Less significant word
47-48	23	Set-Point 3 (MSB)	INT. value - Most significant word
49-50	24	Set-Point 3 (LSB)	INT. value - Less significant word
51-52	25	Set-Point 4 (MSB)	INT. value - Most significant word
53-54	26	Set-Point 4 (LSB)	INT. value - Less significant word
55-56	27	Set-Point 5 (MSB)	INT. value - Most significant word
57-58	28	Set-Point 5 (LSB)	INT. value - Less significant word
59-60	29	Set-Point 6 (MSB)	INT. value - Most significant word
61-62	30	Set-Point 6 (LSB)	INT. value - Less significant word
63-64	31	Analog tare (MSB)	INT. value - Most significant word
65-66	32	Analog tare (LSB)	INT. value - Less significant word
67-68	33	Analog Full Scale (MSB)	INT. value - Most significant word
69-70	34	Analog Full Scale (LSB)	INT. value - Less significant word
71-72	35	Analog output mode	See correspondance on SETUP MENU: ANALOG OUTPUT
73-74	36	Analog output range	See correspondance on SETUP MENU: ANALOG OUTPUT

READING EXAMPLE

To read the gross weight on the MCT1302 it is needed to read the addresses from 3 to 6 of the Input Area.

To read the net weight is needed to read the addresses from 7 to 10 of the Input Area.

When the display shows the gross weight value of 12351 in the corresponding bytes there will be:

	Byte 3	Byte 4	Byte 5	Byte 6
Hex	00	00	30	3F

OUTPUT DATA AREA

The following table lists the registers of the output area (written by the master and acquired by the instrument), common to all PROFINET, ETHERCAT, ETHERNET / IP Fieldbuses.

The registers are 16 bit in size. The registers written by the master in the output area, are read by the instrument at a fixed frequency of 250 Hz.

The size of the output area configured in the master fieldbus must match the size configured in the instrument.

Byte	Register address	OUTPUT AREA REGISTER	Note
1-2	0	Command Register	See relevant table.
3-4	1	Data Register (MSB)	INT. value - Most significant word (See Table)
5-6	2	Data Register (LSB)	INT. value - Least significant word (See Table)
7-8	3	Monitor register	This value corresponds to the same register in the output area.
9-10	4	Set-Point 1 (MSB)	INT. value - Most significant word
11-12	5	Set-Point 1 (LSB)	INT. value - Less significant word
13-14	6	Set-Point 2 (MSB)	INT. value - Most significant word
15-16	7	Set-Point 2 (LSB)	INT. value - Less significant word
17-18	8	Total Net weight (MSB)	INT. value - Most significant word
19-20	9	Total Net weight (LSB)	INT. value - Less significant word
21-22	10	Set-Point 1 (MSW)	INT. value - Most significant word
23-24	11	Set-Point 1 (LSW)	INT. value - Less significant word
25-26	12	Set-Point 2 (MSW)	INT. value - Most significant word
27-28	13	Set-Point 2 (LSW)	INT. value - Less significant word
29-30	14	Set-Point 3 (MSW)	INT. value - Most significant word
31-32	15	Set-Point 3 (LSW)	INT. value - Less significant word
33-34	16	Set-Point 4 (MSW)	INT. value - Most significant word
35-36	17	Set-Point 4 (LSW)	INT. value - Less significant word
37-38	18	Set-Point 5 (MSW)	INT. value - Most significant word
39-40	19	Set-Point 5 (LSW)	INT. value - Less significant word
41-42	20	Set-Point 6 (MSW)	INT. value - Most significant word
43-44	21	Set-Point 6 (LSW)	INT. value - Less significant word
45-46	22	Analogue Fixed Tare (MSB)	INT. value - Most significant word
47-48	23	Analogue Fixed Tare (LSB)	INT. value - Less significant word
49-50	24	Analogue Full Scale (MSB)	INT. value - Most significant word
51-52	25	Analogue Full Scale (LSB)	INT. value - Less significant word
53-54	26	Analogue Output Mode	See correspondence on page 35
55-56	27	Analogue Output Range	See correspondence on page 35

WRITING EXAMPLES

To write the set-up parameters following the example:

In the bytes 1-2 (Command Register) write value Hex 7FFF. This value opens the writing area of the MCT 1302.

Example: to enter the Set-Point 1 and Set-Point 2 values to 120 and 9740.

Set-Point 1	Byte 21	Byte 22
Hex	00	78
Dec	29965	

Set-Point 2	Byte 23	Byte 24
Hex	26	0C
Dec	13	

Save the data by writing the value Hex 7 in Command Register.

N.B. The MCT 1302 does not accept writing of the same values already written.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The display shows the O-L message	The weight cannot be detected because the cell is not available or has been connected incorrectly.	Check the connections of the cells.
The hyphen is shown in the top display.	The acquired weight cannot be shown because it exceeds the available five digits or is greater than the capacity of the cells.	
The underscore is shown on the lower display.	The acquired weight cannot be shown because it is negative and exceeds -9999.	
The number of decimal places is wrong.	Incorrect division value selected.	Select the correct division value in the main menu.
The serial communication does not work properly.	Installation has been completed properly. Selection of operation of the serial interface is incorrect.	Check the connections as described in the installation manual. Select the settings as appropriate.
The semi-automatic zero-setting function does not work.	The gross weight exceeds the action limit of semi-automatic zero-setting. The weight doesn't stabilise.	To re-establish the zero, calibrate the weight. Wait for the weight to stabilise or adjust the weight filter parameter.
The semi-automatic tare function does not work.	The gross weight is negative or exceeds the maximum capacity. The weight doesn't stabilise.	Check the gross weight. Wait for the weight to stabilise or adjust the weight filter parameter.

EU DECLARATION OF CONFORMITY (DOC)

We

Pavone Sistemi S.r.l.
Via Tiberio Bianchi, 11/13/15
20863 Concorezzo, MB

declare that the DoC issued under our sole responsibility and belongs to the following product:

Apparatus model/Product: **MCT1302**
Type: Weighing instrument

The object of the declaration described above used as indicated in the installation manual and use, is in conformity with the relevant Union harmonisation legislation:

Directive **EMC 2014/30/EU** Electromagnetic Compatibility

The following harmonized standards and technical specification have been applied:

EN 61000-6-2:2005
EN 61000-6-3:2007 + A1 2011

Directive **LVD 2014/35/EU** Low Voltage Directive

The following harmonized standards and technical specification have been applied:

EN 61010-1:2011

Signed for end on behalf of:
Concorezzo: 16/01/2017

Di Reda Donato - Manager





Pavone Sistemi
pesatura elettronica industriale

Certifications:



Via Tiberio Bianchi, 11/13/15 - 20863 Concorezzo (MB) ITALIA - Telephone: 039 9162656 (6 lines) - Fax: 039 9162675

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