TECHNICAL MANUAL

MCT 1302 Touch screen batching version with RS232 serial, analog and Fieldbus

Software version PW1507

Pavone Sistemi
pesatura elettronica industriale

TABLE OF CONTENTS

PRECAUTIONS

READ THIS MANUAL BEFORE using or servicing the instrument.

FOLLOW these instructions carefully.

KEEP this manual for future use.

CAUTION

The purpose of this manual is to make the operator aware of the texts and explanatory figures, the basic requirements and criteria for the installation and correct use of the instrument.

Installation, maintenance and repair must carried be out only by specialized personnel who must have read and understood this manual. "Specialized personnel" means personnel who, due to training and professional experience, have been expressly authorized by the System Safety Manager to perform the installation.

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

It is the user's responsibility to ensure that the installation complies with the applicable regulations.

Any attempt to disassemble or modify the instrument not expressly authorized will invalidate the warranty and relieve Pavone Sistemi of any responsibility.

The installation and maintenance of this instrument should only be permitted by qualified personnel.

Pay attention when checking, testing, and adjusting with the instrument turned on.

Make the electrical connections in the absence of the power supply voltage.

Failure to observe these precautions may result in danger.

DO NOT ALLOW untrained personnel to work, clean, inspect, repair or tamper with this instrument.

INTRODUCTION

The MCT 1302 is a touch screen weight indicator and batcher to be combined with load cells to meet the industrial applications.

The instrument is installed in a frame in a slot having a drilling template of 138 x 53 mm and is secured by means of the 2 tensioning screws supplied.

The MCT 1302 uses the RS232 serial port with ASCII protocols, to be connected to the PC, PLC and remote units with a maximum distance of 15m beyond which it is necessary to use the RS422/RS485 serial output that allows the connection also with MODBUS RTU protocol up to 32 addressable instruments.

The availability of the most popular field buses, as an alternative to the RS485 port, also allows interfacing the instrument with any supervision device currently offered by the market.

A USB 2.0 port is also available and facilitates interfacing with PCs using AN Utility Software available in the kit.

6 digital inputs and 6 digital outputs configurable by Set-up are always available.

It is also possible to have the analog output in voltage or current even in the presence of the FIELDBUS.

Available versions:

- **MCT 1302:** weight indicator with RS232 serial output, USB, RS485. The supported protocols are continuous Modbus RTU.

- **MCT 1302/A:** version with analog output.

- **MCT 1302/PROFINET:** weight indicator with RS232, USB and PROFINET serial output.

- **MCT 1302/ETHERNET IP:** weight indicator with RS232, USB and ETHERNET IP serial output.

- **MCT 1302/ETHERCAT:** weight indicator with RS232, USB and ETHERCAT serial output.

- **MCT 1302/PROFIBUS:** weight indicator with RS232, USB and PROFIBUS serial output.

The analog output can also be present with the FIELDBUS option

IDENTIFICATION PLATE OF THE INSTRUMENT

It is important to communicate this data, in case of request for information or indications concerning the instrument, together with the program and version number, shown on the cover of the manual and displayed when the instrument is switched on.
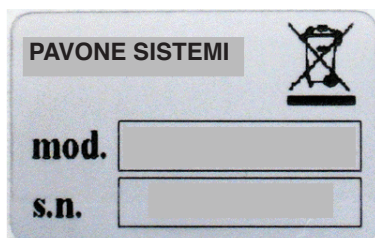
WARNINGS

The procedures listed below must be performed by specialized personnel.

All connections must be made when the instrument is switched off.

TECHNICAL FEATURES

Power supply	18÷30 Vdc
Max. absorption	5 W
Isolation	Class II
Installation category	Cat. II
Working temperature	-10°C ÷ +50°C (Max. humidity 85% without condensation)
Storage temperature	-20°C ÷ +70°C
Display	Graphic 240x128 pixel LCD
Keyboard	4 wire resistive touch screen
Overall dimensions	150 x 95 x 26 mm (l x h x w) including terminal blocks 150 x 95 x 56 mm (l x h x w) with FIELDBUS option
Drilling template:	138 x 82 mm
Assembly	Panel Mount
Case material	Aluminum
Connections	Removable screw terminal blocks, 3.81 pitch.
Load cell power supply	5 Vdc/120 mA (max. 8 cells of 350Ω in parallel) protected against short circuit
Input sensitivity	0.02 µV min.
Linearity	< 0.01% of the full scale
Temperature drift	< 0.001% of the full scale / C°
Internal resolution	24 bits
Displayed weight resolution	Up to 999,999 divisions on the payload
Measuring range	From -3.9 mV/V to +3.9 mV/V
Weight acquisition frequency	12 Hz - 1000 Hz
Digital filter	Selectable 0,1 ÷ 250 Hz
Weight decimal number	from 0 to 4 decimal places
Zero and Full Scale Calibration	
Automatic (theoretical) or executable from the keyboard.	
Logic outputs	6 opto-insulated (dry contact) max 24Vdc / 100 mA each
Logic inputs	6 opto-insulated at 24 Vdc PNP (external power supply)
Serial port (#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:	compliant with USB 2.0; speed up to 12 Mbps
Analog output (optional)	16-bit opto-insulated Voltage: 0 ÷ 5/10 V (R min10 K Ohm), Current: 0/4 ÷ 20 mA (R max 300 Ohm)
Analog output calibration	From the keyboard
Linearity <0.02% FS	
Thermal drift	0.001% FS/°C
Microcontroller:	ARM Cortex M0 + 32 bit, 256KB Flash reprogrammable on-board from USB.
Data memory	64 Kbytes expandable up to 1024 Kbytes
Fieldbus (as an alternative to RS485)	PROFINET, ETHERNET IP, ETHERCAT, PROFIBUS
Compliance with Standards	EN61000-6-2, EN61000-6-3, EN61010-1, EN45501

INSTALLATION

GENERAL INFORMATION

The MCT 1302 is a compact panel mounting instrument made of aluminum.

The instrument is installed in a panel in a slot with a drilling template of 138 x 82 mm and is secured by means of the 2 tensioning screws supplied.

Rmax 2

82±1

138±1
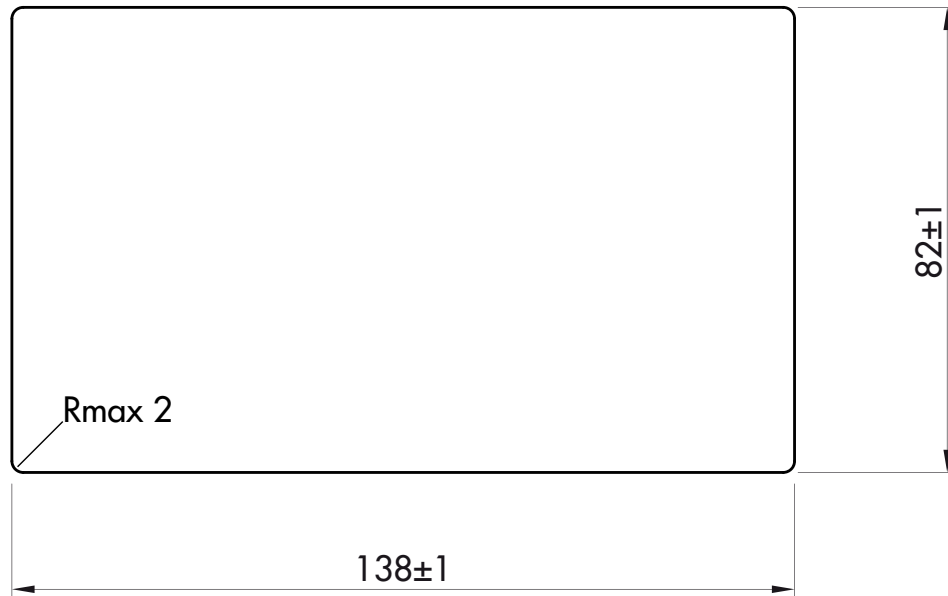
The MCT 1302 must not be immersed in water, subjected to jets of water and cleaned or washed with solvents.

Do not expose to heat or direct sunlight.

Do not install the instrument near power equipment (motors, inverters, contactors, etc.) or near devices that do not comply with CE regulations for electromagnetic compatibility.

The connection cable for the load cells must have a maximum length of 140 m/mm^2.

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

The warnings given on the connection of the individual peripheral devices must be observed.

OVERALL DIMENSIONS
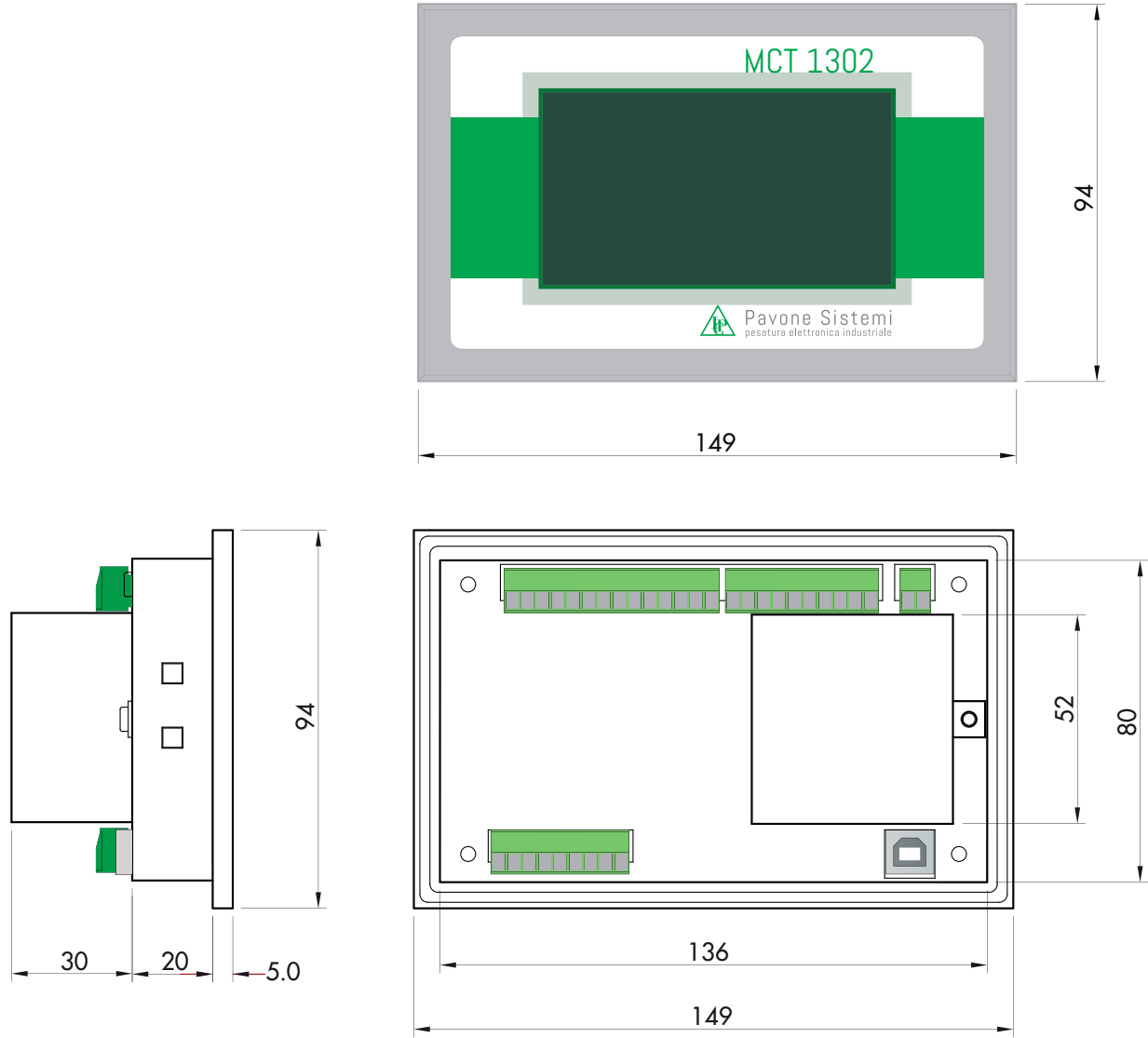
ELECTRICAL INSTALLATION

The MCT 1302 instrument uses for the electrical connection of the 3.81 mm removable screw terminal blocks. The load cell cable must be shielded and channeled away from power cables to avoid electromagnetic interference.

⚠ The field wiring of the instrument must be suitable for the environment in which it will be used and must comply with all national regulations.
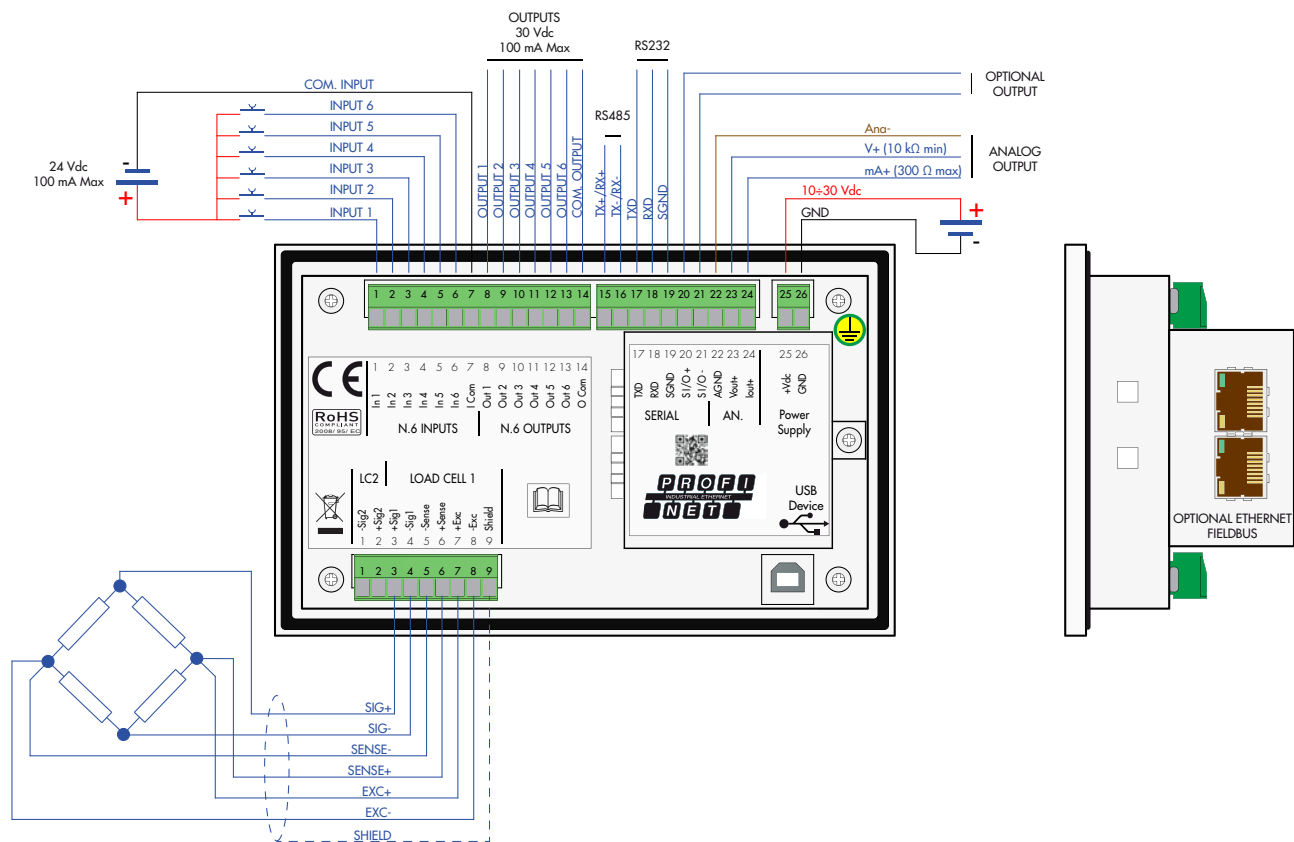
A switch or disconnector must be included in the electrical system.

The switch must be close to the instrument and easily reachable by the operator.

The switch must be marked as a device to stop the machine.

The switch or circuit breaker used as a disconnecting device must comply with the applicable requirements of IEC 60947-1 and IEC 60947-3.

WARNING

Disconnect the power supply to the instrument before making electrical connections.

POWER SUPPLY OF THE INSTRUMENT

The instrument is powered through terminals 25 and 26. The power cable must be routed separately from other cables.

The electric zero (terminal 26) is connected to the metal case. Connect the terminal 26, in addition to the GND of the power supply, also on the ground using the screw near the power terminals.

Supply voltage: 18÷30 Vdc, max 5W
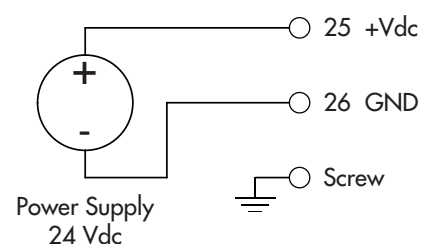
LOAD CELL CONNECTION

The load cell cable must not be routed with other cables, but must follow its own path.

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

Up to a maximum of 8 350 ohm load cells in parallel can be connected to the instrument. The supply voltage of the load cells is 5 Vdc and is protected by a temporary short circuit.

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

The load cell cable must be connected to terminals 3 to 9. In the case of a 4-wire cell cable, jumper the terminals 5 to 8 and 6 to 7.

Connect the load cell cable shield to terminal 9.
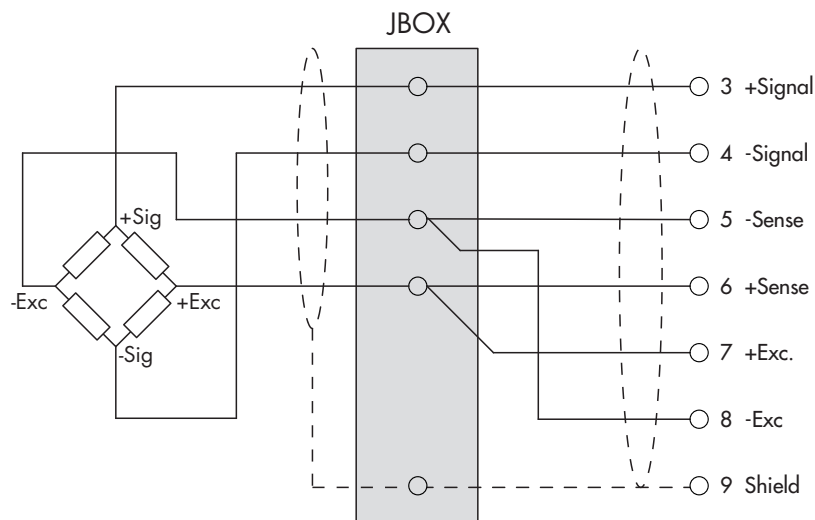
In case of use of two or more load cells, use appropriate junction boxes (CEM4/C or CSG4/C) of which the connection is shown below.

LOGIC INPUTS

The logic inputs are insulated from the instrument through optocouplers.

⚠️ The connection cables of the logic inputs must not be channeled with power cables.

Use a shorter connection cable as possible.

To activate a logic input, it must be brought to the positive of a 24Vdc power supply while the common item must be connected to its negative. The function of the inputs is established in the relevant Setup menu.
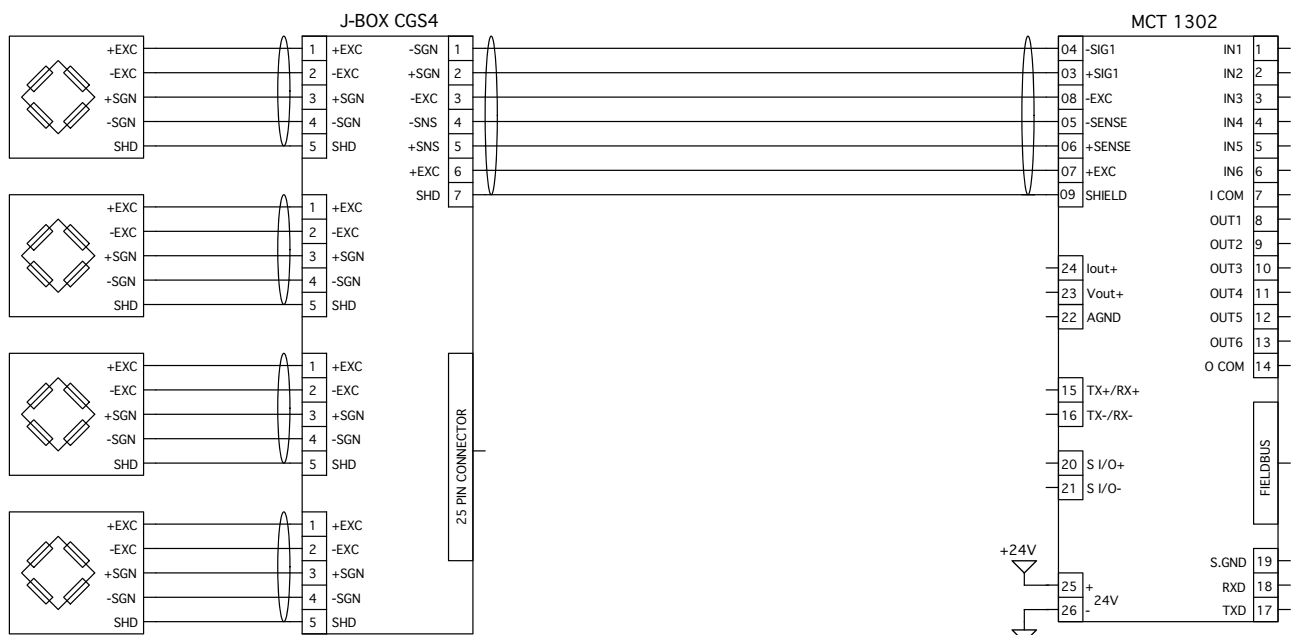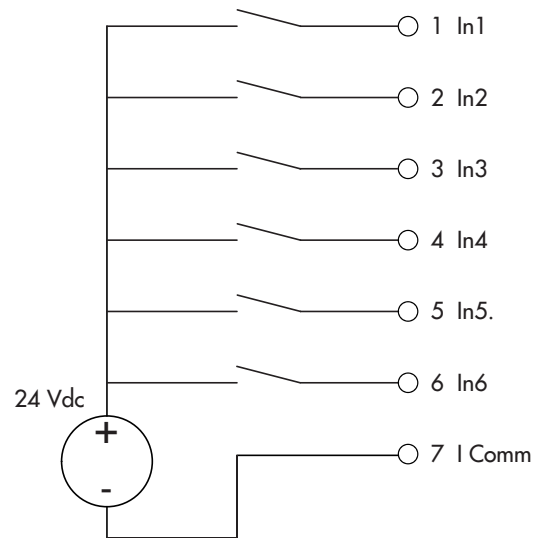

LOGIC OUTPUTS

The 6 logic outputs are of the Photorelay (dry contact) type with a common item. The capacity of each contact is 100 mA / 30Vdc. By enabling the output, the contact closes (NA contact).

⚠️ The environment where the equipment is installed can normally be subject to strong magnetic fields and electrical noise caused by the machinery present, so it is advisable to implement the usual precautions in order to avoid that these affect the typical signals of a precision electronic equipment. (filters on contactor, diodes on 24 Vdc relays, etc.)

The connection of the outputs is shown below
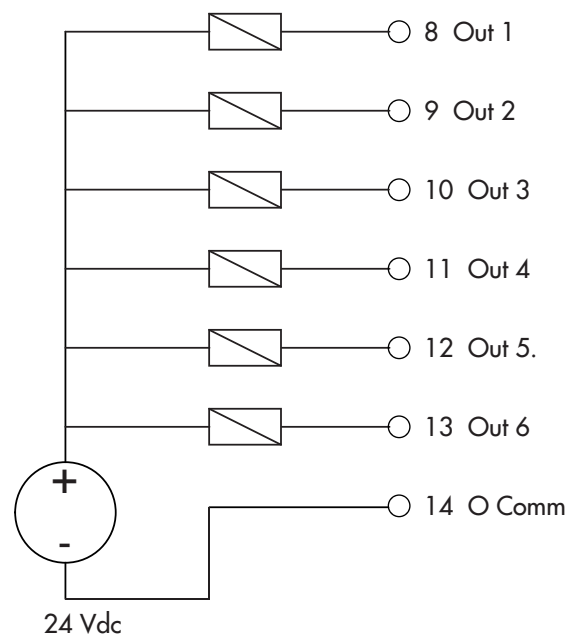
CONNECTION WITH ADDITIONAL INPUTS/OUTPUTS BOARD

In applications where additional inputs/outputs are required, optional I/O boards can be connected using the dedicated serial connection.

To make the connection, use a shielded cable, taking care to connect the screen to ground at only one of the two ends. If the cable has more conductors than those used, connect the free wires to the screen.

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

```
                                        MCT 1302

External      19  ⚬─────────────────⚬  20  S I/O+
I/O Board
              20  ⚬─────────────────⚬  21  S I/O-
```
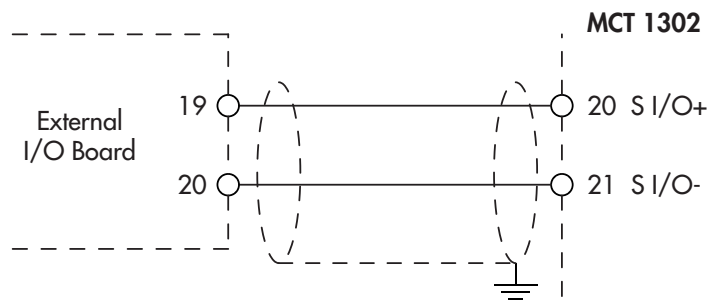
SERIAL RS232

COMMUNICATION

The serial connection cable must have a maximum length of 15 meters (EIA RS-232-C standards), beyond which it is necessary to adopt the RS485 interface with which the instrument is equipped.

⚠️ The cable must not be channeled with other cables (i.e. outputs connected to contactors or power cables), but must possibly follow its own path.

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

The RS232 serial port is normally used for PC, printer and repeater connections.

To make the serial connection, use a suitable shielded cable, taking care to connect the screen to ground at only one of the two ends.

```
                                        MCT 1302

              RX  ⚬─────────────────⚬  17  TX
RS232
INTERFACE     TX  ⚬─────────────────⚬  18  RX

              GND ⚬─────────────────⚬  19  GND
```

RS485

Through serial RS485 interface, it is possible to make serial connections for long distances (up to 1000 m).

The RS485 serial connection is of the 2-wire type, and allows to connect up to 32 instruments to a single MASTER unit (personal computer, PLC, etc.) using a twisted and shielded cable, taking care to connect the screen to the ground at only one of the two ends.
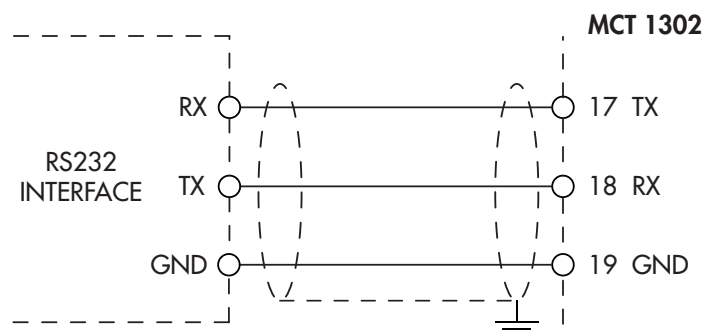
The cable must not be channeled with other cables (i.e. outputs connected to contactors or power cables), but must possibly follow its own path.

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

NOTE: If there is a fieldbus, the RS485 is not available.
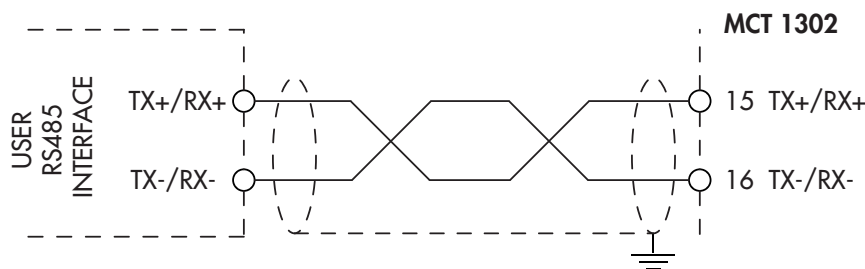
ANALOG OUTPUT (OPTIONAL)

The instrument provides an opto-insulated analog output in current and/or voltage.

Features:

- Analog voltage output: range from 0 to 10 Volt or from 0 to 5 Volt, minimum load 10KΩ

- Analog current output: range from 0 to 20 mA or from 4 to 20 mA. The maximum load is 300Ω.

To make the connection, use a shielded cable, taking care to connect the screen to ground at only one of the two ends.

The analog sending can be sensitive to electromagnetic disturbances, it is therefore recommended that the cables are as short as possible and that they follow their own path.

Warning: do not connect the analog output to active devices.
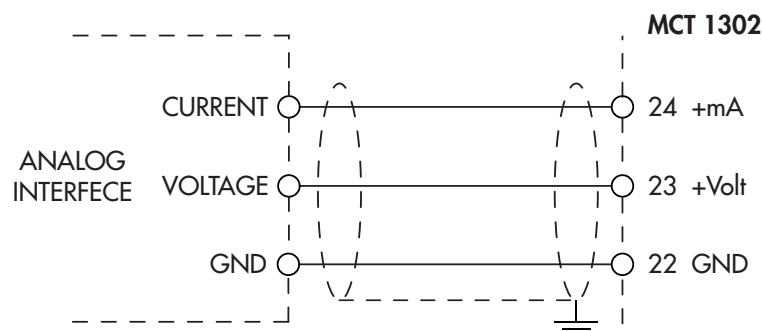
USB DEVICE (SPECIFICATION 2.0 COMPLIANT, FULL-SPEED 12 MBPS)

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 port, the appropriate driver for the operating system used must be installed on the PC. For the installation, follow the specific instructions.

FIELDBUS CONNECTIONS

As an alternative to the RS485 serial port, some of the most popular fieldbuses are available. Only one fieldbus can be used, which must be specified when ordering.

ETHERNET CONNECTION

In the lower left part of the instrument there is an RJ45 connector for Ethernet network.

Features:

10 Mbps transmission speed

Network compatible with 10/100/1000 Base-T networks

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

TCP server communication mode

Indicator LEDs (2) Ethernet line presence and communication/diagnostics

Buffer size 256 bytes

Connection Timeout Min. 30 seconds - Max. 90 seconds

Link Timeout (cable disconnected) 30 seconds

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

To connect to the MASTER, use an Ethernet twisted pair cable with the relevant RJ45 connector.

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

• It is possible to connect the ethernet communication port directly to the PC, without switching from other network devices (routers, switches, hubs, lan-bridges or other), but special RJ45 cables, called "crossovers", must be used.

Usually the cables are "direct", and allow the connection to network devices such as routers or hubs, but not to directly connect two PCs (although currently there are network cards with auto-sensing technology, which recognize the type of cable and the type of connection, allowing direct PC-PC connections even using non-crossover cables).

• The following page shows the diagrams of the two types of cables mentioned above and the related connection diagram.
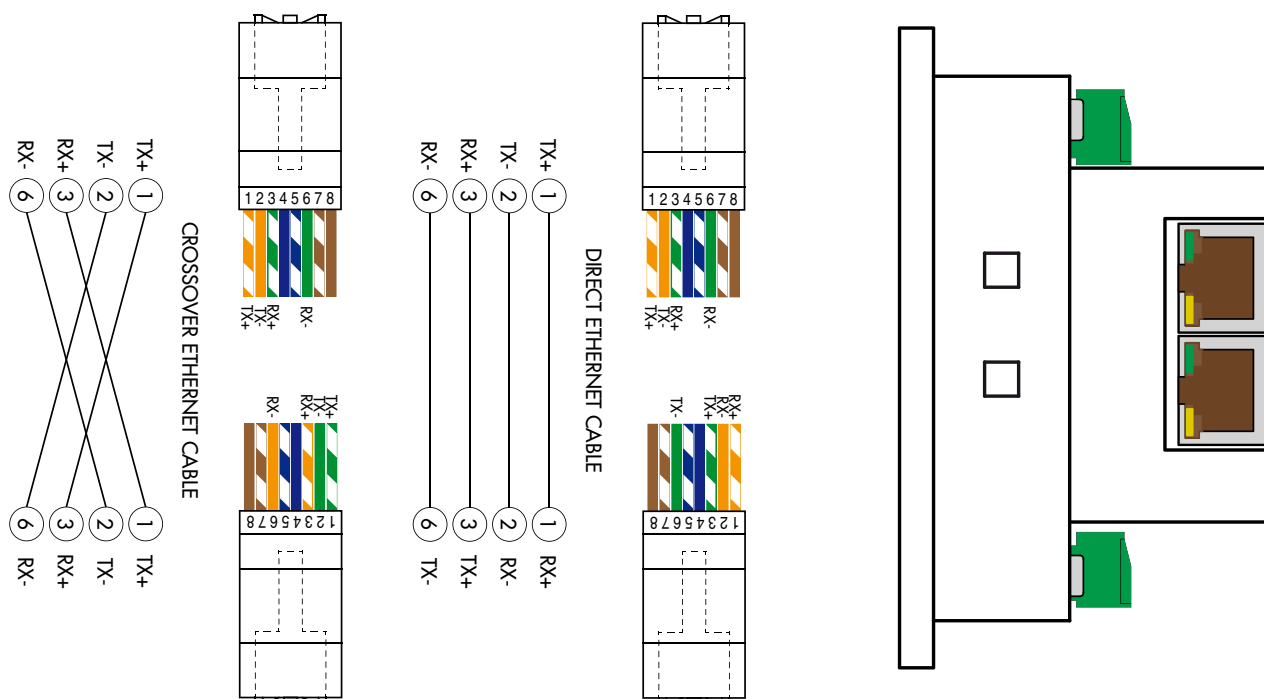
ETHERNET/IP CONNECTION

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

There are 2 RJ45 connectors to allow the connection of several instruments under the same network.

Refer to the description above for connection notes and warnings.

Features:

10 and 100 Mbit operations, Full and Half Duplex

Modbus-TCP server

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

PROFINET CONNECTION

There are 2 RJ45 connectors to allow the connection of several instruments under 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 fieldbus I/O in every direction.

ETHERCAT CONNECTION

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

The EtherCAT protocol requires that the RJ45 connectors have the function of IN and OUT.

By putting several MCT1302 instruments in series, the MASTER will be connected to the IN connector of the first MCT1302 whose OUT connector will connect to the IN connector of the next, etc.

Refer to the previous page for connection notes and warnings.

## MAC ADDRESS IN THE INSTRUMENTS WITH ETHERNET INDUSTRIAL FIELDBUS.

The instruments that mount Hilscher modules with Industrial Ethernet protocol (Profinet, EthernetIP, Ethercat, etc.) have a label under the connectors, as shown below.

This label shows the MAC Address of the module (red box), an identification number of the module (blue box) and a QR code that contains the MAC Address. The latter can be read with a smartphone using a QR reading app i.e., on the Google Play Store, "QR Code Reader").

PROFIBUS CONNECTION

Pin	Signal	Description
3	B line	+RxD/+TxD, level RS485
4	RTS	Request to send
5	GND	Ground (insulated)
6	+ 5V Bus Output	+5V end (insulated)
8	A line	-RxD/-TxD, level RS485
Housing	Cable shield	Internally connected to the protective ground according to Profibus specifications
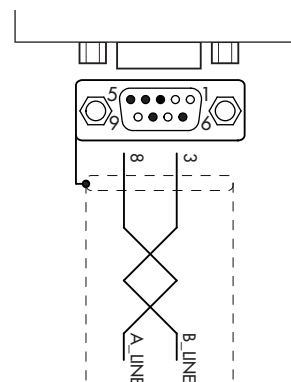
To connect to the Profibus MASTER, use a standard Profibus cable. The typical impedance of the cable should be between 100 and 130 Ohm (f > 100 kHz). The cable capacity (measured between conductor and conductor) should be less than 60 pF/meter and the minimum conductor cross-section should not be less than 0.22 mm^2.

In a Profibus-DP network, both type A and type B cables can be used, depending on the required performance. The following table summarizes the characteristics of the cable to be used:

Feature	Type A cable	Type B cable
Impedance	135 to 165 ohm (f = 3÷20 MHz)	100 to 300 ohm (f >100 kHz)
Capacity	< 30 pF/m	< 60 pF/m
Resistor	< 110 ohm/km	-
Conductor section	> 0.34 mm^2	> 0.22 mm^2

The following table shows the maximum length of the line with type A cable and with type B cable according to the different communication speeds required:

Baudrate (kbit/s)	9.6	19.2	187.5	500	1500	3000	6000	12000
Length (m) of the type A cable	1200	1200	1000	400	200	100	100	100
Length (m) of the type B cable	1200	1200	600	200	-	-	-	-

For reliable operation of the fieldbus, a line terminator should be used at both ends.
In case of multiple MCT 1302 instruments, use the line end only on an instrument.

For the setup of the board, the GSD file (hms_1810.gsd) is available and must be installed in the master.

FRONT PANEL OF THE INSTRUMENT

The MCT 1302 is a touch screen instrument dedicated to batching applications.

The main operating characteristics are:

- Programmable recipes, standard - 100 recipes of 20 steps. With Alibi memory option - 1000 recipes with 20 steps.

- 50 programmable activities.

- Management of 38 configurable outputs (6 internal outputs to the instrument plus 8 outputs for each connected I/O module; maximum 4 modules that can be connected to the instrument). Depending on the type of activity, up to 2 outputs can be selected.

- Double-speed batching control, tolerance control of the dosed weight and lack of product.

- Automatic repetition of the batching cycles.

- Management of the batched totals by activity and recipe.

The setup parameters are easily accessible and modifiable through the use of the function keys that from time to time appear on the display used to select, edit, confirm and save the new settings.
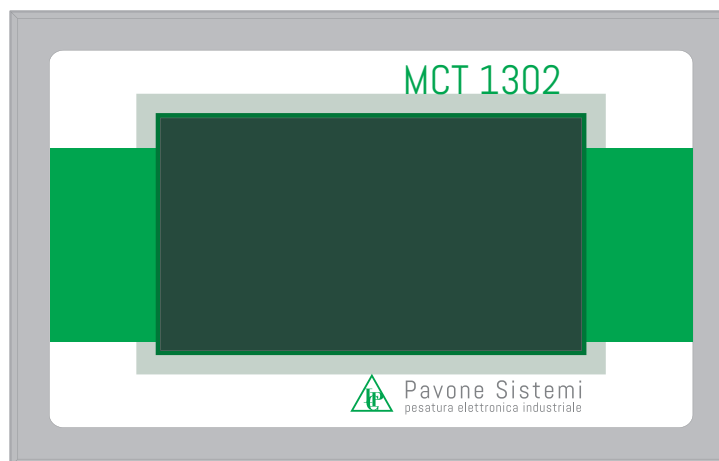
DISPLAY

In the operating mode the display shows all the information necessary for a complete control of the system. According to the various programming procedures, the display is used for programming the parameters to be entered in the memory, i.e. messages indicating the type of operation being carried out and therefore helping the operator in the management and programming of the instrument.

POWER UP OF THE INSTRUMENT

When switched on, the display temporarily shows an introductory mask, which shows the firmware code and the version number. After a few seconds, the main screen is displayed, from which all the instrument operations can be accessed.

MCT 1302 - DOSAGGIO

PW1507 Rev. 0.8
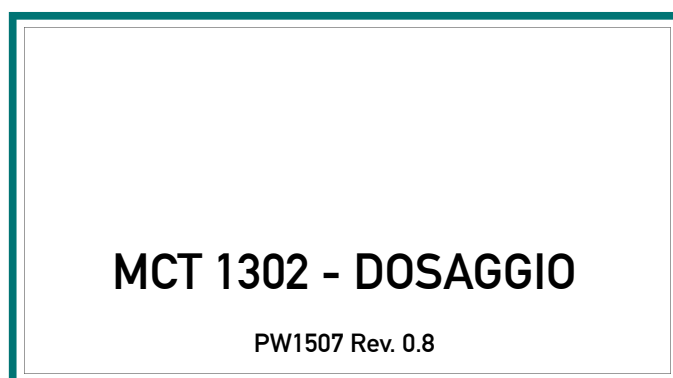
MAIN SCREEN

From this screen it is possible to access all the operational and programming functions of the instrument, following the indicated commands.

The functions of the operation keys (F1, F2, F3 and F4) can be programmed using the appropriate parameters in the "Operating Mode" menu.
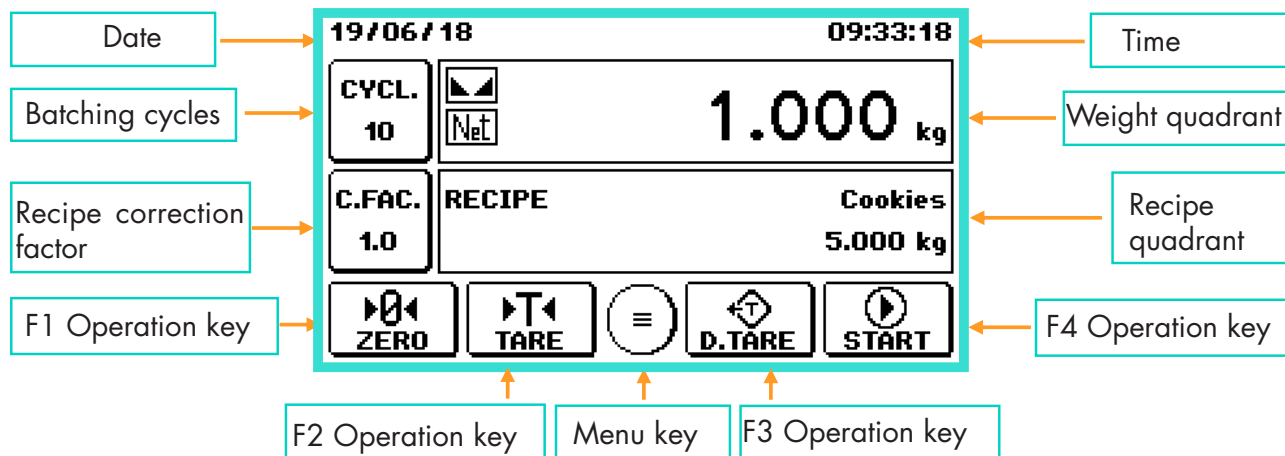
OPERATION KEYS

(≡)	Access to the parameter programming menu.
Net ◢◣ Min **1.000** kg	Press in the weight display dial to switch the weight display (net, gross).
RECIPE Cookies 5.000 kg	Access to the recipe selection screen.
CYCL. 10	Press in the setting screen for the number of batching cycles.
C.FAC. 1.0	Access to the recipe correction factor setting screen. The correction value change creates the printout of the recipe with the recalculated batching set point. The value is expressed in percentage or weight (Parameter "CORRECTION MODE" - page 22)
►0◄ ZERO	Semi-automatic Zero Command.
►T◄ TARE	Tare Command.
D.TARE	Deleting Tare Command.
START	Start batching command.
PRINT	Weight Print Command

INFO DISPLAY

ERROR INDICATIONS AND MESSAGES OF WEIGHT	
Net ⌵ / Min **NO-CAL** kg	Weight calibration not performed; flashing message, alternating with the display of the detected weight.
Net ⌵ / Min **------** kg	Indication displayed when the instrument is switched on, while waiting for the conditions necessary for automatic zeroing of the weight; in case of automatic reset disabled, this indication is not displayed.
Net ⌵ / Min **^^^^^^** kg	Overload warning, displayed when the gross weight exceeds the maximum load of the weighing system by more than 9 divisions or when the displayed weight exceeds 999999.
Net ⌵ / Min **O-L** kg	Signal weight absent or out of the weighing range.
Net ⌵ / Min **NO-COM** kg	Fieldbus network disconnected.
Net ⌵ / Min **E-FBUS** kg	Connection error with the Fieldbus interface.
⌵ / Net **E-EXT1** kg	Communication error with external input/output module (the address of the module that generated the error is reported).

When communicating with PC software "Optimation" for remote instrument setup, the following screen appears.
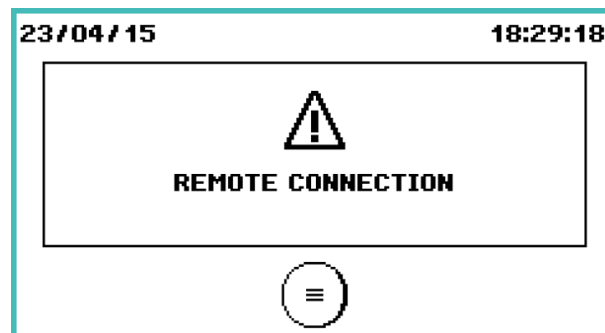
WEIGHT STATUS REPORTS	
Net	Display switched to net weight value.
⌵	Indication of stable weight.

OPERATING FUNCTIONS

SWITCHING THE GROSS/NET WEIGHT DISPLAY
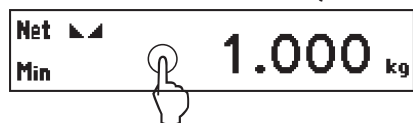
Press on the weight dial on the instrument main screen to switch the weight display. Each time the displayed weight changes between the following values:

- Gross - the gross weight is displayed in the weight dial.
- Net - the net weight is displayed in the weight dial.

SEMI-AUTOMATIC ZERO

This operation is performed to correct small scale zero displacements.

The command to reset the gross weight is not run under the following conditions:

- Unstable weight (the weight does not stabilize within 3 seconds of the reset command).
- Gross weight, compared to the original zero calibration, greater in positive or negative of the value entered in the Zero Band parameter (instrument setup menu, metrological parameters). If this parameter is set to 0, the semi-automatic zero function is disabled.

The operation to reset the gross weight is stored when the instrument is switched off.

AUTOMATIC TARE

Press on the button to run the automatic tare.

The automatic tare command is not executed under the following conditions:

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

The tare value is stored when the instrument is switched off.

DELETE TARE

This operation deletes the previously entered tare value.

PRINT

This operation allows to print the weight. (if the printer protocol is selected, the shown recipe is prepared). This operation is always executable; the conditions necessary for totalizing the weight are not

checked.	
12/11/2015	10:30
OPERATOR ID	1
GROSS WEIGHT	211.5 kg
TARE	2.5
kgNET WEIGHT	209.0 kg

RECIPE BATCHING SELECTION

Press on the recipe dial, in the instrument main screen, to access the active recipe selection screen.

Recipe

0001 **Cookies**	⬤
0002 **Muffin**	◯
0003 **Chocolate Plumcake**	◯
0004 **Crumble**	◯

↩ **NEXT** ▶▶

The available recipes are displayed, divided into pages of 4 elements. Press on the recipe line you want to activate. To quickly select an item in the archive, hold down the page change key for a long time, and the recipe index setting screen will be displayed. After setting the index, the page where the required element is present is automatically displayed.

The recipes can also be selected via inputs.

PROGRAMMING THE RECIPE CYCLE NUMBER

CYCL.
10

From the general screen, it is possible to access the programming of the number of cycles that will be automatically executed following a START batching.

- The number of cycles can be set from 1 to 99; by setting the value 99, the batching cycle is repeated indefinitely until the manual stop by the operator.

- At the end of the programmed cycle sequence, the value of this parameter is automatically reset to 1.

RECIPE CORRECTION FACTOR PROGRAMMING

From the general screen, it is possible to access the recipe correction factor programming.

C.FAC.
1.0

According to the "Correction Mode" parameter in the "Batching Parameters" menu, the correction factor is managed in the following ways:

- FACTOR - The correction of the recipe is performed by entering a multiplying factor of the setpoints. Parameter programmable from 0.01 to 10.00, which allows you to reduce up to one cent or multiply up to ten times the total weight of the recipe.

- WEIGHT - The correction of the recipe is performed by entering the total weight value that you wish to dose, so the recipe setpoints will be automatically recalculated to obtain the desired total.

Changing the correction value creates the printout of the recipe with the recalculated batching set point, if the "PRINT DOS" parameter is "ON".

BATCHING

Press the START operation button to start the batching, so the following screen is displayed:

Indication of batched weight and setpoint

Batching reports

Operation key F1
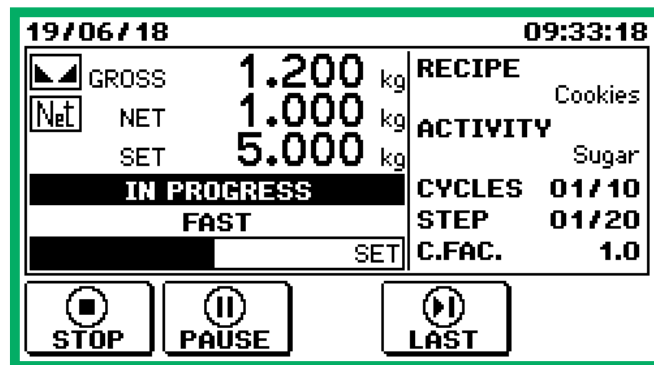
Indications of the recipe status

Operation key F4

Operation key F2   Operation key F3

OPERATION KEYS	
⏹ STOP	Batching stop command; it ends the batching procedure and returns to the basic screen display. The confirmation of the batching stop operation is always requested.
⏸ PAUSE	Batching pause command. The batching is temporarily suspended; to resume the batching, press the start button.
⏯ LAST	Stop control of the sequence of batching cycles. The current cycle is ended and the batching procedure is terminated.
▶ START	Batching start command. Following a batching pause command or after a blackout, the batching is suspended or interrupted.
✕ RESET	Alarm silencing command. Following a batching alarm, this command allows to continue the batching in progress.
↵ CONF.	Confirmation command, it is managed in the following conditions: • During a "wait for confirmation" activity, to continue with the next step in the recipe, press the confirmation button. • During a "manual batching" activity, to confirm the weight loaded manually and to continue with the next step of the recipe it is necessary to press the confirmation key. • At the beginning of a total unloading activity, in case of "end batching mode" parameter = CONFIRMATION. In this condition the dosed net weight is displayed (in the area dedicated to the display of the batching set), to activate the discharge outlet, it is necessary to press the confirmation key.

TECHNICAL NOTES REGARDING BATCHING

- At the beginning of the batching, different compatibility checks are performed between the selected recipe and the system conditions. Any errors are promptly selected.

- In the case of double-speed batching, the slow-down set point is so determined: SET - PRESET - Inflight.

- At the end of the batching in case of active tolerance control, it is verified (at stable weight and after any waiting time) that the net batching is within the tolerance window, calculated as: SET +/- TOLERANCE.

- The net weight is displayed during the set unloading steps, while the gross weight is displayed during the total unloading steps.

- After a blackout all the partial batching data are maintained and the next time the instrument is switched on, the suspended batching can be resumed from the same point.

BATCHING REPORTS
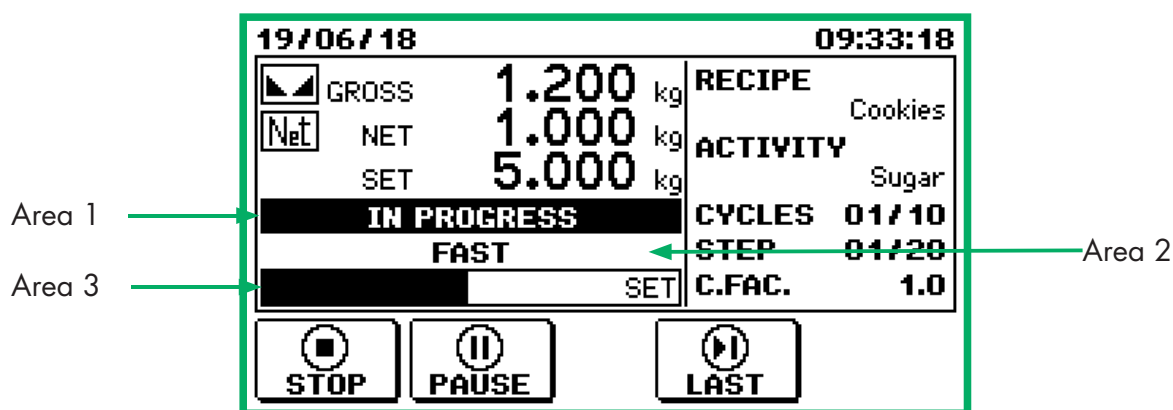
Batching REPORTS - AREA 1	
STOP	No batching operation in progress.
PAUSE	Temporarily suspended batching.
IN PROGRESS	Batching in progress.
ALARM	Alarm condition; the description of the alarm condition is displayed in AREA 2. Batching SIGNALS - AREA 2
Batching REPORTS - AREA 2	
COARSE	Coarse batching phase in progress.
FINE	Fine batching phase in progress
MANUAL	Manual batching phase in progress
WAITING TIME	Waiting phase for the stabilization of the weight and waiting time at the end of the batching of the product.
WAITING FOR CONFIRMATION	Phase of waiting for confirmation; to continue with the next step of the recipe you need to press the confirmation button.
CHECKING INPUT	Check phase of the input status
RESTART	Restart phase after a blackout; the instrument is waiting to receive the batching restart command or the suspended batching stop command.
UNLOADING	Unloading phase in progress (set unloading or total unloading).

RECIPE NOT SELECTED	Recipe error not selected; this condition is checked during the start of the batching.
EMPTY RECIPE	Unscheduled recipe error; this condition is checked during the start of the batching.
ERR. OF INFLIGHT > SET	Error concerning the product parameters (INFLIGHT> SET); this condition is checked during the start of the batching.
WEIGHT ERROR	Error concerning the batching recipe; the total weight of the recipe is greater than the weighing system capacity. This condition is checked during the start of the batching.
ERR. OF MIN. WEIGHT	Error in the zero control of the weight; the gross weight in the scale is greater than the set zero set point. This condition is checked during the start of the batching.
TOLERANCE	Batching error of the product out of tolerance; the net batched product does not fall within the tolerance window (calculated as SET +/- TOLERANCE).
NO PRODUCT	Error of lack of product during the batching. During the loading phase it is checked that the product is actually dosed; if the weight remains stable for the time set in the TIMEOUT parameter, this error is displayed.
Batching REPORTS - AREA 3	
▟▁▁ SET	Batching status bar in progress.

BATCHING INPUTS AND OUTPUTS

The operation of the batching inputs and outputs can be programmed from the instrument setup menu. The maximum number of inputs and outputs depends on the number of additional I/O modules connected (maximum 4 modules that can be connected to the instrument):

- 38 configurable outputs (6 internal outputs to the instrument plus 8 outputs for each additional I/O module). Depending on the type of activity, up to 2 outputs can be selected.

- 22 configurable inputs (6 internal inputs to the instrument plus 4 inputs for each additional I/O module). Depending on the type of activity, an input can be associated.

EXAMPLE OF PRINTING AT THE END OF BATCHING CYCLE

```
02/02/16              10:30
ID                        1
Cacao biscuits
CYCLE                 01/10
PROD.        SET     DOSED
              kg        kg
Sugar
          100.00    100.35
Cacao
          200.00    199.85
Flour[*]
          300.00    301.20
TOTAL
          600.00    601.40
```

- If enabled, printing takes place at the end of each batching step.
- The identification code of the instrument is printed (parameter "Address" of COM2); if the identification code is 0, the relevant line is not printed.
- In case of product dosed out of tolerance, an asterisk is printed.
- The indicated set corresponds to the actual set multiplied by the possible correction factor.

MENU STRUCTURE

The menu screens are subdivided into two types: command menu and parameter menu, depending on the context and structure of the data programming menus.

By pressing the key containing the description, you enter the relevant submenu.

Each screen allows you to view up to 6 parameters; the display of the other parameters will take place via page buttons that will appear automatically.

Pressing the key that contains the description of the parameter, you access the relevant setting.

OPERATION KEYS	
◀◀ PREVIUS	F1 operation key; it switches to the previous menu page (this button is only displayed if the menu has more than 6 items, it is never displayed on the first page).
NEXT ▶▶	Operation key F2; it switches to the next menu page (this button is only displayed if the menu has more than 6 items, it is never displayed on the last page).
↩	Exit button from the menu (the top-level menu or the base screen is displayed.

USER MENU

USER MENU (COMMANDS)	
MESSAGE	**DESCRIPTION**
ACT./REC. ARCHIVE	Programming menu of activities and recipes.
ACT./REC. TOTALS	Menu for viewing and managing totals, divided by activity and recipes.
Batching PARAMETERS	Batching parameters programming menu.
Batching SELECTIONS	Programming menu of the selections related to the operation of the recipe.
INSTRUMENT DATA	Summary screen of the setup parameters and the parameters identifying the firmware (program code and software version number).
HARDWARE TEST	Menu of the instrument's hardware test operation procedures.
INPUT	Programming menu for the operation of the inputs.
SETUP MENU	Menu of the programmable parameters that determine the start-up of the instrument.

ACTIVITY/ RECIPE PARAMETER PROGRAMMING MENU	
MESSAGE	**DESCRIPTION**
ACTIVITY	It accesses the management of the activity archive.
RECIPE	It accesses the management of the recipe archive.
ENTER ACTIVITY	It enters a new activity in the archive.
EDIT ACTIVITY	It edits an activity in the archive.
DELETE ACTIVITY	It permanently deletes an activity in the archive.
RESET ARCHIVE	It deletes all activities in the archive (function protected by password 13205).

ENTER AND EDIT ACTIVITY						
Message	Description	Type	Units	Default	Range	Fieldbus address
Name Activity	Alphanumeric name of the activity.	Alphanumeric setup		0	Max. 14 alphanumeric characters	0252-0258
Type of activity	Selection of the activity type. (*)	Selection		0	[0] AUTO DOS. [1] MAN. DOS. [2] TOT. UNL. [3] INT. UNL [4] SET ACT. [5] TIMER [6] OUTPUT [7] INPUT [8] UNL. DOS.	0259
Slow	Slow is the amount of weight that you want to batch at reduced speed. This value must be less than the set value set in the recipe. By programming this value to zero, the component is batched entirely at high speed. Parameter used only for "activity type"" = **AUTO DOS.**.	Numeric setup	Weight measurement unit	0	0÷Cell capacity	0260 (MSW) - 0261 (LSW)
Flight	The flight is the amount of material that by inertia of the system is added to the batched material after the slow speed batching output has switched off. The settable value must be less than the set value set. Load output deactivation set point = value set - flight Parameter used only for "activity type"" = **AUTO DOS.**.	Numeric setup	Weight measurement unit	0	0÷Cell capacity	0262 (MSW) - 0263 (LSW)
Tolerance	The set tolerance value is checked at the end of the batching. If the net weight batched does not fall within the range determined by set + tolerance and set - tolerance, an error message will be displayed until the alarm is manually silenced. By programming the tolerance value to 0, the control of the batched net weight is disabled (during the batching sequence the outputs will not be re-connected). Parameter used only for "activity type"" = **AUTO DOS.**.	Numeric setup	Weight measurement unit	2	0÷Cell capacity	0264 (MSW) - 0265 (LSW)

Waiting	This parameter represents the time that passes between the deactivation of the outputs at the end of the batching and the stable weight control for the acquisition of the net weight dosed. It is used to wait for the fall of the flying material. By programming the value to zero, no timing is performed. Parameter used only for "activity type"" = **AUTO DOS.**.	Numeric setup	Seconds	0	0.0÷999.9	0266
Timeout	This parameter represents the maximum time for the waiting of the product during the batching of a component, before the alarm of lack of product is enabled. By programming the zero value, no batching check is performed. Parameter used only for "activity type"" = **AUTO DOS.**.	Numeric setup	Seconds	0	0.0÷999.9	0267
Coarse output	This parameter allows you to set the fast output associated with this activity (the same output can be shared by several activities). By programming this parameter to zero, no fast output is associated with the activity. Parameter used in case of "activity type" = **AUTO DOS./ MAN DOS./ TIMER / OUTPUT.**	Numeric setup		0	0÷32	0268
Fine output	This parameter allows you to set the slow output associated with this activity (the same output can be shared by several activities). By programming this parameter to zero, no fast output is associated with the activity. Parameter used in case of "activity type" = **AUTO DOS./ MAN DOS./ TOT. UNL. / INT. UNL / TIMER / OUTPUT.**	Numeric setup		0	0÷32	0269
Coarse output logic	Operation logic of fast output. Parameter used in case of "activity type" = **AUTO DOS./ MAN DOS./ TOT. REJ. / INT. REJ / TIMER / OUTPUT.**.	Selection		0	[0] OPEN NO. [1] CLOSE NO.	0270
Fine output logic	Operation logic of slow output. Parameter used in case of "activity type" = **AUTO DOS./ MAN DOS./ TOT. UNL. / INT. UNL / TIMER / OUTPUT.**	Selection		0	[0] OPEN NO. [1] CLOSE NO.	0271

Input	This parameter allows you to associate an input to the activity. Parameter used in case of "activity type" = **MAN. DOS. / TOT. UNL.** (only if the parameter END Batching MODE = CONFIRM) / **INT. UNL.** (only if the parameter END Batching MODE = CONFIRM) / **EXP. CONF.** / **INPUT.**	Numeric setup		0	0÷22	0272
Spill ON	This parameter acts only if programmed the tolerance parameter. In case of batching weight less than the weight value - tolerance, the fine output is reactivated for the time set in this parameter. If the final weight value is reached before the expiration of this time, the fine output is still disabled.	Numeric setup	Seconds	0	0.0÷999.9	0273
Spill OFF	At the end of the reactivation of the fine output, if the batching weight has not yet reached the set value, the instrument checks during the time set in this parameter that the batching weight has been reached. Otherwise, reactivate the fine output.	Numeric setup	Seconds	0	0.0÷999.9	0274

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

- **Automatic batching:** Automatic batching under the load.

- **Manual batching:** Manual batching; to end this activity, the operator must press the confirmation key or close the selected input.

- **Total unloading:** complete unloading; the scale is considered as unloaded when the gross weight is lower than the programmable set point of unloading weight.

- **Intermediate unloading:** Unloading to set; the amount of weight to be unloaded is programmed in the recipe.

- **Waiting for confirmation:** Manual confirmation activity; to continue with the next recipe step, the operator must press the confirmation key or close the selected input.

- **Timer:** Waiting step; the waiting time is programmed in the recipe.

- **Output:** Set output status. The outputs to be checked are programmed in the activity parameters; the status that the outputs must take is programmed in the recipe (ON/OFF).

- **Input:** waiting input activation step.. The input to be checked is programmed in the activity parameters; the status to be controlled is programmed in the recipe (ON/OFF).

- **Unloading batching:** Automatic batching at the discharge of a single component.

DELETE ACTIVITY

The activities stored in the archive are displayed, divided into pages of 4 elements. To activate fast selection, long-press the page change key. Press on the line of the activity that you wish to delete; the confirmation of the deletion operation is always requested.

If the deleted activity is recalled in an archived recipe, this recipe is automatically reset and must be re-programmed by the operator.

RESET ACTIVITY ARCHIVE

Procedure of total cancellation of the activity archive; this function is protected by password (13205).

RECIPE ARCHIVE

RECIPE ARCHIVE (commands)	
Message	**Description**
ENTER RECIPE	It enters a new recipe in the archive.
EDIT RECIPE	It edits a recipe in the archive.
DELETE RECIPE	It permanently deletes a recipe in the archive.
RESET ARCHIVE	It deletes all recipes in the archive (function protected by password 13205).

ENTER/EDIT RECIPE (parameters, commands)						
Message	**Description**	**Type**	**Units**	**Default**	**Range**	**Fieldbus address**
Recipe name	Alphanumeric name of the recipe.	Alphanumeric setup			Max. 14 alphanumeric characters	0202-0208
Step no.	Number of recipe steps (*)	Numeric setup		0	0 - 20	0209
RECIPE SETUP	It accesses the recipe parameter setting function.					

(*) In case of unloading batching, the parameter "Steps no." must be set to 1; also in the recipe the selected activity must be of the "UNL.DOS." type.

ENTER/EDIT RECIPE

Activity in the archive

Alarm: total recipe greater than the capacity of cells

Step number being programmed

Total recipe

RECIPE PARAMETERS

01/20   Sugar   5.000kg
Total   5.000kg

DELETE   SAVE

OPERATION KEYS	
(back arrow icon)	It aborts the recipe programming procedure without saving the changes made.
(up arrow) 01/20 (down arrow)	It selects the previous step or the next step in the recipe.
(up arrow) Sugar (down arrow)	It selects one of the activities in the archive.
5.000 kg	Depending on the type of activity: • Programming of the batching setpoint. • Programming of the intermediate unloading setpoint. • Programming of waiting time. • Programming of outputs status. • Programming of inputs status.
◆ DELETE	Total cancellation of recipe parameters.
SAVE 💾	It saves the recipe and returns to the main screen.

DELETE RECIPE

The recipes stored in the archive are displayed, divided into pages of 4 elements. Press on the recipe line that you wish to delete; the confirmation of the deletion operation is always requested. To activate fast selection, long-press the page change key.

RESET RECIPE ARCHIVE

Procedure of total cancellation of the recipe archive; this function is protected by password **(13205)**.

ACTIVITY/RECIPE TOTAL MENU

ACTIVITY/RECIPE TOTALS (commands)	
Message	Description
ACTIVITY	It accesses the management of the totals by activity.
RECIPES	It accesses the management of the totals by recipe.

ACTIVITY/RECIPE TOTALS MANAGEMENT (commands)	
Message	Description
DISPLAY TOTALS	It accesses the display of the totals by recipe/activity.
RESET TOTALS	It deletes completely the totals.

DISPLAY TOTALS

The totals of the activities/recipes in the archive are displayed; in the case of displaying the totals by activity, only the activities of batching upon the load, manual batching and batching upon unloading are shown. Press on the line of the total you wish to view. To activate fast selection, long-press the page change key.

OPERATION KEYS	
◆ DELETE	It deletes the activity/recipe total displayed.
PRINT 🖶	Totals print function.

EXAMPLE OF TOTAL PRINT

```
03/08/17              11:09
ID                        1
ACTIVITY TOTAL

Sugar
              230,587  kg
Cacao
              750,879  kg
Flour 00
              826,742  kg
Salt
              326,820  kg


TOTAL
AMOUNT    2135.028  kg
```

- Only non-zero totals are printed.
- The identification code of the instrument is printed ("Address" parameter of COM2); if the identification code is 0, the relevant line is not printed.

RESET TOTALS

Procedure for the complete cancellation of the totals; confirmation of the deletion operation is always requested.

BATCHING PARAMETERS MENU

	BATCHING PARAMETERS					
Message	Description	Type	Units	Default	Range	Fieldbus address
Zero Control	This parameter represents the control set point of zero. This set point determines the maximum weight value allowed at the start of the BATCHING; with a higher weight, the batching will not start and the instrument will display an error message. To disable this control, reset the value of this set point.	Numeric setup	Weight measurement unit	0	0÷Load Cell capacity	0101 (MSW) - 0102 (LSW)
Unloading threshold	This parameter represents the empty scale set point. This set point is checked during unloading: when the weight falls below this set point, the unloading phase is considered complete.	Numeric setup	Weight measurement unit	0	0÷Load Cell capacity	0103 (MSW) - 0104 (LSW)
Unloading Prol.	This parameter represents the time of the unloading extension: during complete unloading (not set) when the weight becomes lower than empty scale tset point, the unloading phase is prolonged for the programmed time, to ensure the complete unloading of the tank.	Numeric setup	Seconds	0	0.0÷999.9	0105
Unloading end	This parameter represents the unloading end time: at the end of the unloading phase, this time is waited before moving on to the next step of the recipe (in the case of intermediate unloading), or before deactivating the cycle output in progress (in the case of final unloading of the batching cycle).	Numeric setup	Seconds	0	0.0÷999.9	0106
Cycle end	This parameter represents the end of cycle time that passes from the end of the last phase of the batching cycle to the beginning of a new batching cycle (in case of automatic repetition of the cycles) or the enabling of a new START batching command.	Numeric setup	Seconds	0	0.0÷999.9	0107
Cycle end output t.	This parameter represents the activation time of the end of cycle output, which is activated at the end of the last phase of the batching cycle.	Numeric setup	Seconds	0	0.0÷999.9	0108

Batch. End mode	In the case of CONFIRM selection, at the beginning of the total unloading activity, the net weight batched in the recipe is displayed. To activate the unloading output, the operator must press the confirmation key or close the input set in the activity.	Selection		0	[0] NORMAL [1] CONFIRM	0109
Corr. mode	In case of FACTOR selection, the correction of the recipe is performed by entering a multiplication factor of the sets (from 0.01 to 10.00). In the case of WEIGHT selection, the correction of the recipe is performed by entering the total weight value that you wish to batch; the recipe sets will be automatically recalculated to obtain the desired total.	Selection		0	[0] FACTOR [1] WEIGHT	0110
Minimum level	This parameter represents the minimum level set point compared to the gross weight. The minimum level output activates when the weight is lower than the set value.	Numeric setup		0	0÷Load Cell capacity	0111 (MSW) - 0112 (LSW)
Maximum level	This parameter represents the maximum level set point compared to the gross weight. The maximum level output activates when the weight is greater than the set value.	Numeric setup		0	0÷Load Cell capacity	0113 (MSW) - 0114 (LSW)
Min. level output	Output associated with the minimum level value. "NA" operating logic, activated when the gross weight is lower than the minimum level set point. In the case of a parameter set to 0, no output is associated.	Numeric setup		0	0÷32	0115
Max. level output	Output associated with the maximum level value. "NA" operating logic, activated when the gross weight is greater than the maximum level set point. In the case of a parameter set to 0, no output is associated.	Numeric setup		0	0÷32	0116
Cycle output	Output associated with the execution of a batching cycle. "NA" operating logic, it is activated with the start of the batching and deactivated at the end of the batching. In the case of a parameter set to 0, no output is associated.	Numeric setup		0	0÷32	0117

Cycle end output	Output associated with the end of a batching cycle. "NA" operating logic, it is activated at the end of the last phase of the batching cycle and remains ON for the cycle end time (settable parameter). In the case of a parameter set to 0, no output is associated.	Numeric setup		0	0÷32	0118
Alarm output	This output activates in an alarm condition ("NA" operating logic). In the case of a parameter set to 0, no output is associated.	Numeric setup		0	0÷32	0119
Timer mode	This parameter allows to select the unit of measurement of the time for the TIMER activity.	Selection		0	[0] SECONDS [1] MINUTES	0120
Batching start tare	Autotare execution selection at the beginning of the batching.	Selection		OFF	[0] OFF [1] ON	0151
Print Batch.	Automatic print selection at the end of each batching cycle.	Selection		OFF	[0] OFF [1] ON	0152

INSTRUMENT DATA DISPLAY

The instrument data display screen is divided into 4 sections:

- FIRMWARE: Code and firmware version installed; if assistance is required, it's important to communicate these data.

- PARAMETERS: Indication of the set full scale, the status of the internal jumper enabling metrological calibration and the value of the power supply voltage of the instrument.

- CONNECTIONS: Specification of the setup fieldbus type and the set fieldbus address.

- OPTIONS: Indication of the type of analog output setup, of the presence of additional memory (None, Alibi Memory).

In the case of PROFINET fieldbus, this screen displays the IP address programmed by the PLC; this field is updated only when the instrument is switched on. Following a change of the IP address from the PLC, the instrument must be switched off and on again to display the correct value.

HARDWARE TEST MENU

HARDWARE TEST (COMMANDS)	
MESSAGE	**DESCRIPTION**
LOAD CELLS	Indication of the weight with 10x resolution, of the signal acquired by the instrument in mV/V and of the percentage with respect to the full scale of the weighing system.
MEMORIES	Functional test of the optional memory (not present in case of no memory).
INPUT / OUTPUT	Display of the status of the digital inputs, and manual setting of the status of the digital outputs. In the case of setup external input/output modules, the outputs of the external modules are also managed.
COMMUNICATION PORTS	Test of setup ON communication ports. The test consists in resending the string received from the relevant serial line (echo test); moreover, the number of strings and the number of characters received in the last communication are displayed.
ANALOG OUTPUT	Function test of the analog output with manual setting at preset percentage values (not present in the absence of the analog output).

INPUTS MENU

Message	Description	Type	Units	Default	Range	Fieldbus address
In 1÷2 function	Function associated with input 1 ÷ 2. (*)	Selection		0	[0] NONE [1] ZERO [2] TARE [3] DEL. TARE [4] PRINT [5] RES.AL. [6] START [7] PAUSE [8] RESTART [9] STOP [10] SEL. N/L	1401 1402
[…]						
In 3÷6 function	Function associated with input 3 ÷ 6. (*)	Selection		0	[0] NONE [1] ZERO [2] TARE [3] DEL. TARE [4] PRINT [5] RES.AL. [6] START [7] PAUSE [8] RESTART [9] STOP [10] SEL. N/L [11] SEL. REC. (**)	1403 … 1406

(**) (**) The "SEL. REC." selection is only available for inputs 3, 4, 5 and 6.

(*) One of the following functions can be associated with each logical input:

- **Zero:** It performs zero calibration.
- **Tare:** It performs auto tare.
- **Del. Tare:** It deletes the tare.
- **Print:** It prints the weight.
- **Alarm reset:** It resets the alarm condition.
- **Start:** Batching start command.
- **Pause:** Batching pause command.
- **Restart:** Batching restart command, following a batching pause command or following a blackout.
- **Stop:** Batching stop command (the input must be kept ON for at least 3 seconds).
- **Net/gross weight selection:** It switches weight display (net/gross weight).
- **Recipe selection:** Selection of the active recipe; function available only for inputs 3, 4, 5 and 6. Where the input 3 represents the least significant bit and the input 6 the most significant bit of the selection (i.e. Input 3 ON + Input 4 ON + Input 5 OFF + Input 6 OFF = recipe 3).

ACCESSING THE SETUP MENU

SETUP MENU

MESSAGE	DESCRIPTION
WEIGHT CALIBRATION	Programming menu of parameters related to weight calibration. In this menu it is also possible, through a specific selection, to execute the sample weight calibration function or the table calibration function. (*)
ANALOG OUTPUT	Parameter programming menu for the analog output. In this menu it is also possible to execute the adjustment function of the analog output. This menu is only displayed in the case of an active analog option.
PORT OF COMMUNICATION	Parameter programming menu for serial communication ports.
METROL PARAMETERS.	Programming menu of the metrological weighing parameters. (*)
WEIGHT FILTER	Programming menu of the weight filter value. The filter factor can be selected from 9 preset values, or the individual parameters that determine the behavior of the weight filter (output rate, average number, etc.) can be setup manually.
OPERATING MODE	Parameter programming menu related to the functional characteristics of the instrument (stand-by, password to access the setup menu, etc.).
CLOCK / CALENDAR	Calendar/clock adjustment function.
DISPLAY CONTRAST	Display contrast adjustment function.
UPLOAD/ DOWNLOAD	Setup memory upload/download function.

The following pages describe all the parameters that can be set. At the end of the description of each parameter, if any, the fieldbus address corresponding to the parameter is shown. If the parameter is of the selectable type, the value to be entered in the register for the desired selection is indicated between "[ ]".

CALIBRATION MENU

MEASUREMENT UNIT

Measurement unit related to the weight value; it appears on the main screen and in all weight parameter settings.

Selectable values:
[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 the chosen measurement unit. The relationship between the system's capacity and the division value constitutes the resolution of the system (number of divisions).

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

Selectable values:
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
(*) The setting of the division values via fieldbus takes place differently from that made by the instrument. Refer to the 1101 and 1102 addresses of the MODBUS register table.

LOAD CELLS CAPACITY [1103-1104]

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

Values: from 0 to 999999
Default: 0

LOAD CELL SENSITIVITY [1105]

Set the value corresponding to the average sensitivity of the load cells, in mV/V. Values between 0.0 and 4 mV/V are accepted. If no value is programmed, 2 mV/V is assumed.

Following the change of the sensitivity value, the theoretical weight calibration is performed.

Values: from 0.0001 to 4.0000 mV/V
Default: 2.0000

FULL SCALE [1301-1302]

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

Values: from 0 to 999999
Default: 0

FIXED TARE OF WEIGHING SYSTEM [1106-1107]

Programming of the fixed tare value of the weighing system.

Values: from 0 to 999999
Default: 0

CALIBRATION TYPE

Selection of the type of calibration. Upon confirmation, one of the following procedures is started.

DEAD WEIGHT CALIBRATION [501 ÷ 503]

Calibration of Zero and Full Scale up to 5 points of linearization with the use of sample weights.

TABLE CALIBRATION [1151 ÷ 1172]

It allows manual programming of up to 5 calibration points. The values correspond to those determined by the linearization procedure with sample weights. In this way, it is possible to copy the calibration values made with sample weights.

EXAMPLE OF SETUP/CALIBRATION

By setting the parameters listed above, the theoretical calibration of the full scale of the MCT 1302 is carried out. This procedure must be completed with the zero calibration described below (*page 45). The procedure guarantees, in the absence of mechanical problems, a good accuracy of the system (max. error <1% F.S.).

When the division value selection is changed, the theoretical full scale calibration is automatically recalculated. Selections incompatible with the calibration parameters or with the calibration present in the memory are not accepted.

It is necessary to weigh a tank, with a weight of 750 Kg and with a capacity of 1000 liters, containing a product with a specific weight of 1.3 Kg/dm^3 whose weight is to be read with a display resolution of 0.2 kg.

Before proceeding with the setup, make sure that the load cells are connected correctly to the unit and that the tank is empty; you can proceed with the setting of the parameters.

You can use:

#3 load cells capacity 1000 Kg

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

Set the following values in the setup parameters:

Measurement unit = kg

Division value = 0.2

Load Cell capacity = 3000

Load Cell sensitivity = 2.0007

Full scale = 1500

Dead Weight = 0

Make sure that the value of the signal read in the HARDWARE TEST, LOAD CELLS menu 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 weight of the empty tank. The value should be about 0.5 mV/V

(*) At this point, you can proceed to the calibration described in the next paragraph or you can exit the setup menu by saving the data entered.

The instrument should indicate the value corresponding to the weight of the empty tank (for example 756.8).

You can enter the setup menu again and enter the value of the weight read in the "Pretare" parameter and enter the value 756.8

Exit the setup menu again by saving the data.

For greater accuracy, prepare sample weights or pre-weighed material on a certified scale and proceed with the calibration described in the next paragraph.

CALIBRATION WITH SAMPLE WEIGHTS

The calibration method described here must be carried out using sample weights and/or product pre-weighed on a sample scale.

Always perform zero calibration before proceeding with the full scale calibration.

CAUTION! If the instrument is switched off without leaving the set-up menu, the programmed settings are not stored.

If, after calibration, the system has linearity errors, it must be checked that the weighed structure is completely free from mechanical constraints.

```
                 CALIBRATION

                  13.02 kg   [Lin]

                  56 %     1.120 mV/V

      [▶0◀   ZERO]  (↰)  [F.S.    ▶▮◀]
```
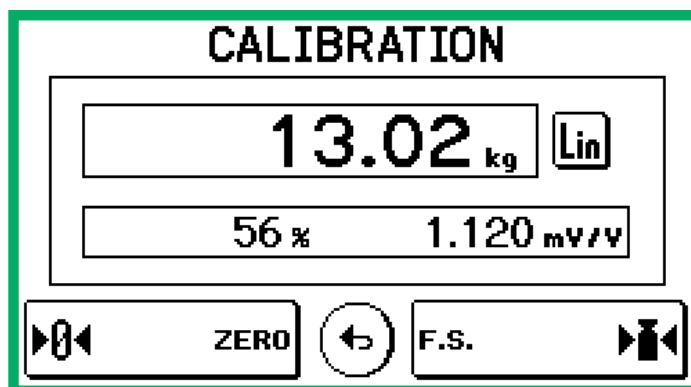
OPERATION KEYS	DESCRIPTION
▶0◀ ZERO	Zero calibration: carry out the operation with the scale unloaded but complete with the tare weight, with stabilized weight. The displayed weight must be reset; this operation can be repeated several times.
F.S. ▶▮◀	Calibration with sample weight: before carrying out this operation, load the sample weight on the scale and wait for it to stabilize. The display shows the measured value to be calibrated; set the corresponding weight value via touchscreen. If the set value is higher than the resolution offered by the instrument, the setting is not accepted and the display shows an error message for a few seconds. This operation can be repeated several times.
[Lin]	Activate linearization with sample weights. Up to 5 linearization points on a positive scale can be set. During the linearization phase, in the weight dial the progressive linearization points are displayed (eg "LIN 1") alternating with the current weight. Press the F.S button to set the value of the sample weight loaded on the scale. To end the procedure, press the LIN button again; it is possible to set a number of points lower than 5.
(↰)	Exit button from the calibration function.

TABLE CALIBRATION

It allows you to manually program up to 5 calibration points, in addition to the zero value. The values correspond to those determined by the linearization procedure with sample weights. In this way, it is possible to display the values determined automatically with this procedure, or modify and program them according to preset values.

TABLE CALIBRATION		
MESSAGE	**DESCRIPTION**	**UNITS**
Zero signal	Signal value corresponding to the zero scale.	mV/V
Value of weight P1	Weight value corresponding to the 1st calibration point.	Weight measurement unit
Signal P1	Signal value corresponding to the 1st calibration point.	mV/V
Value of weight P2	Weight value corresponding to the 2nd calibration point.	Weight measurement unit
Signal P2	Signal value corresponding to the 2nd calibration point.	mV/V
Value of weight P3	Weight value corresponding to the 3rd calibration point.	Weight measurement unit
Signal P3	Signal value corresponding to the 3rd calibration point.	mV/V
Value of weight P4	Weight value corresponding to the 4th calibration point.	Weight measurement unit
Signal P4	Signal value corresponding to the 4th calibration point.	mV/V
Value of weight P5	Weight value corresponding to the 5th calibration point.	Weight measurement unit
Signal P5	Signal value corresponding to the 5th calibration point.	mV/V
Zero Signal Acquisition	Signal acquisition function, in mV/V, corresponding to the zero scale	

The values programmed to zero are not taken into account. Table calibration is automatically canceled when a new theoretical calibration or a sample weight is performed.

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

ANALOG OUTPUT PARAMETERS (OPTIONAL)

ANALOG OUTPUT RANGE [1506]

Selection of the analog output range.

Selectable value:
0÷10 VDC [0]
0÷5 VDC [1]
4÷20 mA [2]
0÷20 mA [3]
Default: 0÷10 VDC

ANALOG OUTPUT OPERATION MODE [1505]

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

Selectable value:
NET [0]
GROSS [1]
Default: NET

ZERO OFFSET[1501-1502]

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

Analog value to subtract referred to the analog output full scale.

FULL SCALE [1503-1504]

It is the weight corresponding to the full scale of the analogue output.

Value that can be set from 0 to Capacity

Default: Capacity

OUTPUT ADJUSTMENT: This parameter adjusts the zero and full scale value of the selected analog output so that the PLC and the display of the MCT 1302 will indicate the same weight.

- ZERO ADJUSTMENT:

Measure the analog output value with a tester to perform zero calibration (0).

Use the + and - keys to adjust the analog output. Press and hold the key for a quick change. Press the SAVE key to store the data.

- F.S. ADJUSTMENT: [1508]

Measure the analog output value with a tester to perform full scale calibration (FS).

Use the + and - keys to adjust the analog output. Press and hold the key for a quick change. Press the SAVE key to store the data.

N.B. The analog output is calibrated at the factory for each selectable range. This procedure is available to the user for further adjustment, for each selectable range. In case of complete reset of the setup memory, the factory calibration is re-established.

COMMUNICATION PORTS

This menu allows you to setup the serial ports COM1, COM2 and COM3 and the communication parameters. The instrument has two independent serial ports:

COM1 always with RS232 interface.

COM2 can alternately mount the following interfaces: RS485, ETHERCAT, ETHERNET, ETHERNET IP, PROFINET.

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

COM1 (RS232)

VALUE SENT

Selection of the value sent on RS 232 output.

Selectable values:
NET, GROSS
Default: NET

PROTOCOL

It defines how to use the RS232 serial port:

Selectable values:
NONE *Serial communication deactivated*
CONTINUOUS: *Continuous sending of the weight string. It can be used, for example, to drive a weight repeater. See details in the appropriate paragraph.*
PRINT: *ASCII protocol. See details in the appropriate paragraph.*
Default: NONE

BAUD RATE

It defines the baudrate of the RS232 serial port:

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

Selectable values:
1200
2400
4800
9600
19200
38400
57600
115200
Default: 9600

FRAME FORMAT:

Frame type. In the case of SLAVE protocol, it is not possible to select 7-bit data format (E-7-1 and O-7-1):

Selectable values:

n-8-1

n-8-2

E-7-2

E-8-1

o-7-2

o-8-1

Default: n-8-1

COM 2 (RS485)

VALUE SENT

Selection of the value sent on RS 485 output.

Selectable values:
NET, GROSS
Default: NET

PROTOCOL

It defines how to use the RS485 serial port:

Selectable values:
NONE *Serial communication deactivated*
CONTINUOUS: *Continuous sending of the weight string. It can be used, for example, to drive a weight repeater. See details in the appropriate paragraph.*
MODBUS: *MODBUS RTU protocol. See details in the appropriate paragraph.*
Default: NONE

BAUD RATE

It defines the baudrate of the RS485 serial port:

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

Selectable values:
1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Default: 9600

FRAME FORMAT:

Frame type. In the case of a SLAVE or MODBUS protocol, it is not possible to select 7-bit data format (E-7-2 and O-7-2):

Selectable values:
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

PARAMETERS COM 2 WHEN PROFINET / ETHERCAT IS PRESENT

ENABLING FIELDBUS

Enabling the PROFINET / ETHERCAT; if OFF, no error message regarding the fieldbus communication is displayed:

Selectable values:
OFF, ON
Default: OFF

INPUT AREA SIZE

Dimension of the input area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

OUTPUT AREA SIZE

Dimension of the output area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

In the case of an PROFINET fieldbus, the XML "GSDML-V2.3-HILSCHER-NIC 50-RE PNS 32-20160122. xml" configuration file 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 ("INP.ADJ." And "OUT.ADJ." Parameters).

The instruments are supplied with the parameter "Profinet Name" not setup and with an IP address of 0.0.0.0.

In case of ETHERCAT fieldbus: the devices must be connected with a ring type (as specified by EtherCAT), so refer to the installation manual for the use of INPUT and OUTPUT ports.

4 different XML setting files are provided:

"Hilscher NIC 50-RE ECS V2.2 32 Byte.xml" (input area 32 bytes, output area 32 bytes).

"Hilscher NIC 50-RE ECS V2.2 64 Byte.xml" (input area 64 bytes, output area 64 bytes).

"Hilscher NIC 50-RE ECS V2.2 96 Byte.xml" (input area 96 bytes, output area 96 bytes).

"Hilscher NIC 50-RE ECS V2.2 128 Byte.xml" (input area 128 bytes, output area 128 bytes).

The file that corresponds to the size of the input and output areas selected in the device must be imported into the PLC (for example, if the device is set to ADJ. SET. = 128 and OUT.ADJ.=128, the file "Hilscher NIC 50-RE ECS V2.2 128 Byte.xml" must be imported into the PLC). Multiple files with different sizes can be imported, but, in this case, it will not be possible to perform the automatic search and setup of devices on the network.

PARAMETERS COM 2 WHEN ETHERNET IP IS PRESENT

ENABLING FIELDBUS

Enabling the ETHERNET IP; if OFF, no error message regarding the fieldbus communication is displayed:

Selectable values:
OFF, ON
Default: OFF

IP ADDRESS

IP protocol address ETHERNET.

Values from 0.0.0.0 to 255.255.255.255
Default: 0.0.0.0

SUBNET MASK

Mask protocol subnet ETHERNET IP.

Values from 0.0.0.0 to 255.255.255.255
Default: 0.0.0.0

INPUT AREA

Dimension of the input area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

OUTPUT AREA

Dimension of the output area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

In the case of an ETHERNET IP 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 (default input area of 128 bytes, default output area of 128 bytes) must match the size of the input and output areas selected in the instrument ("INP.ADJ." Parameters and "OUT.ADJ.").

PARAMETERS COM 2 WHEN ETHERNET IS PRESENT

VALUE SENT

Selection of the value sent on ETHERNET output.

Selectable values:
NET, GROSS
Default: NET

PROTOCOL

It defines how to use the ETHERNET serial port:

Selectable values:
NONE *Serial communication OFF*
CONTINUOUS: *Continuous sending of the weight string. It can be used, for example, to drive a weight repeater. See details in the appropriate paragraph.*
ON DEMAND: *When the operator presses the relevant front button or via Input 2, a weight string is sent. The command is accepted if the weight is stable. Between two successive transmissions the weight must undergo a variation equal to at least 20 divisions.*
AUTO: *A weight string is automatically sent when the weight stabilizes at a value above the minimum weight (20 divisions).*
SLAVE: *ASCII protocol. See details in the appropriate paragraph.*
MODBUS/TCP: *MODBUS TCP protocol. See details in the appropriate paragraph.*
Default: NONE

IP ADDRESS

IP protocol address ETHERNET.

Values from 0.0.0.0 to 255.255.255.255
Default: 192.168.0.201

SUBNET MASK

Mask protocol subnet ETHERNET.

Values from 0.0.0.0 to 255.255.255.255
Default: 255.255.255.0

GATEWAY

Protocol gateway ETHERNET.

Values from 0.0.0.0 to 255.255.255.255
Default: 192.168.0.1

PORT

Communication port for ETHERNET protocol.

Value from 1 to 65535
Default: 1800

PARAMETERS COM 2 WHEN PROFIBUS IS PRESENT

ENABLING FIELDBUS

Enabling the PROFIBUS fieldbus; if OFF, no error message regarding the fieldbus communication is displayed:

Selectable values:
OFF, ON
Default: OFF

PROFIBUS ADDRESS

Programming of the address used in the PROFIBUS protocol.

Value: from 0 to 126

Default: 01

INPUT AREA

Dimension of the input area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

OUTPUT AREA

Dimension of the output area for fieldbus (values expressed in bytes).

Selectable values:
32, 64, 96, 128
Default: 128

COM 3 / RS485

NUMBER OF MODULE

Number of input/output modules managed by the instrument.

Selectable values:
0÷4
Default: 0

BAUD RATE

The communication baudrate with external and fixed input/output modules at 38400 b/s.

WEIGHING PARAMETERS

The parameters allow to adjust the acquisition and updating times of the display and the manual or automatic resetting of the instrument.

STABILITY FACTOR [1303]

This parameter defines the number of divisions necessary to consider the weight as stable. A large number of divisions allows the instrument to quickly detect weight stability, which is necessary when performing tare and printing commands.

N.B. If the value selected is 0, the value 0 must be set in the TIMEOUT parameter.

Selectable value
0÷4
Default: 2

AUTOZERO SETPOINT [1304-1305]

This parameter defines the value of the maximum weight that can be reset at power up.

This operation corresponds to a zero calibration of the system and is only performed if the weight is stable and lower than the set value.

Value from 0 to Cell capacity.
Default: 0

ZERO TRACKING [1306]

The function allows to perform a momentary zero calibration, thus compensating for any thermal drift of the weight. When the instrument is turned off, the previous Zero calibration is automatically restored. The maximum weight that can be zeroed from this parameter is 2% of the system capacity. To disable the function, set the value 0.

Value	Change
0	Check 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 from the touchscreen or via the associated input.

Value from 0 to 200 divisions.
Default: 100

FILTER PARAMETERS

FILTER VALUE [1201]

This parameter adjusts not only the refresh rate of the display, but mostly the serial and analogue output. The maximum refresh rate of the display is limited to 10 Hz

High filter values speed up the display update.

Low filter values slow down the display update.

Factor (Hz)	Settling Time (mS)	Freq ADC (Hz)	Reading no.	Monotony time (mS)	Oscillation time (mS)	Oscillation range (div)
MANUAL [0]		Selectable	To be set by the	To be set by the	To be set by the	To be set by the
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, the frequency of weight acquisition is adjusted

Selectable values:
12.5 [0]
50 [1]
100 [2]
250 [3]
Default: it depends on the value set in the Filter Value parameter

AVERAGE NUMBER [1203]

This parameter allows you setting the number of readings that the filter will use to establish the average value.

Value from 0 to 50.
Default: it depends on the value set in the Filter Value parameter

MONOTONY [1204]

Parameter used to stabilize the weight when continuous variation of the last digit is detected. Normally used in case of resolution of the weight exceeding 10,000 divisions or with low sensitivity of the input signal. Value expressed in mS.

Value from 0 to 999.

Default: it depends on the value set in the Filter Value parameter

OSCILLATION TIME [1205]

Parameter used in conjunction with oscillation Range to reduce the slow and repetitive weight changes typical in lifting systems. Enter the value of the oscillation time expressed in mS.

Value from 0 to 9999.

Default: it depends on the value set in the Filter Value parameter

OSCILLATION RANGE [1206]

As for the parameter Oscillation time, used to reduce the oscillations. Enter the value of the oscillation expressed in weight divisions.

Value from 0 to 99.

Default: it depends on the value set in the Filter Value parameter

SETTING FUNCTIONAL FEATURES

STANDBY TIME [1001]

Inactivity time after which the instrument automatically decreases the brightness of the display. 0 = function OFF.

Value from 0 to 999.
Default: 0

PASSWORD SETUP [1002]

If programmed, enter the password to access the SETUP menu. In the case of subsequent accesses, it is no longer required to enter the password until the standby enables or the instrument is switched off.

Value from 0000 to 9999.
Default: 0000 (no Password)

LANGUAGE [1003]

It allows you selecting the language of the operator interface.

Selectable value:
ITALIAN [0]
ENGLISH [1]
Default: ITALIAN

KEY F1 [1004]

Selection of the function associated with the F1 operation key.

Selectable value:
[0] Blocked
[1] Zero
[2] Tare
[3] Delete tare
[4] Print
[5] Start
Default: Zero

KEY F2 [1005]

Selection of the function associated with the F2 operation key.

Selectable value:
[0] Blocked
[1] Zero
[2] Tare
[3] Delete tare
[4] Print
[5] Start
Default: Tare

KEY F3 [1006]

Selection of the function associated with the F3 operation key.

Selectable value:
[0] Blocked
[1] Zero
[2] Tare
[3] Delete tare
[4] Print
[5] Start
Default: Delete tare

KEY F4 [1007]

Selection of the function associated with the F4 operation key.

Selectable value:
[0] Blocked
[1] Zero
[2] Tare
[3] Delete tare
[4] Print
[5] Start
Default: Start

KEY CYCLES [1008]

Setpoints dial lock function.

Selectable value:
[0] Blocked
[1] ON
Default: Active

KEY WEIGHT [1009]

Weight dial lock function.

Selectable value:
[0] Blocked
[1] ON
Default: Active

KEY FACTOR [1010]

Lock function of the recipe correction factor setting key.

Selectable value:
[0] Blocked
[1] ON
Default: ON

KEY SEL. RECIPE [1011]

Block function of the dial for selecting the recipe.

Selectable value:
[0] Blocked
[1] ON
Default: ON

MENU - CLOCK / CALENDAR

TIME AND DATE

| 31 | 19/06/18 |
| 🕐 | 09:33:18 |

| 31 | DATE | (↩) | TIME | 🕐 |

DISPLAY CONTRAST

DISPLAY CONTRAST

| ▲ INCREASE | (↩) | DECREASE ▼ |
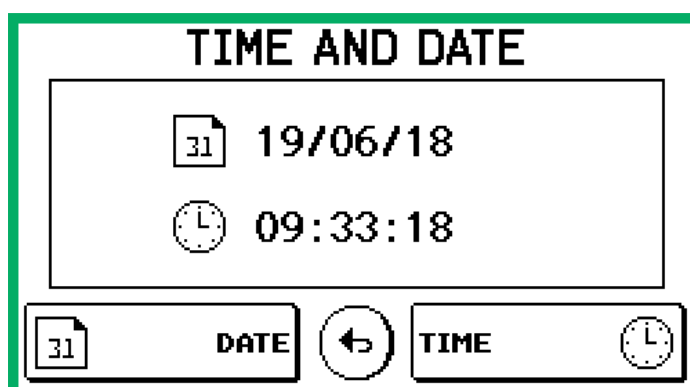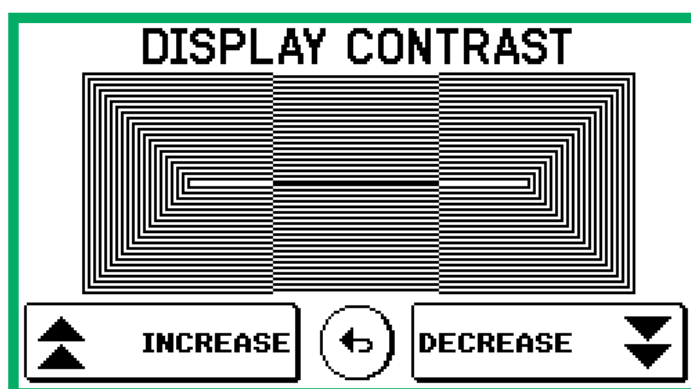
UPLOAD/DOWNLOAD FUNCTION

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

This function allows you downloading or uploading the setup configuration and calibration data stored in the instrument.

- Download function: the setup parameters of the instrument 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 relative procedure ("receive files" or "send files") in the TESTER 1008 instrument.

SERIAL COMMUNICATION PROTOCOLS

CONTINUOUS, AUTOMATIC AND MANUAL ASCII PROTOCOL

The continuous sending is performed at the weight update frequency, compatibly with the serial transmission baud rate. In case of communication on the Ethernet port, the frequency of the continuous transmission is limited to 12.5 Hz.

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

where:

STX (start of text) = 0x02h

ETX (end of text) = 0x03h

EOT (end of transmission) = 0x04.

<status> = character coded as in the following table (bit = 1 if condition is 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	Zero center

<weight> = field consisting of 8 ASCII characters with the weight value justified on the right without non-significant zeros, with any decimal point and negative sign.

The sent weight value can be the net weight, the gross weight or the peak value, based on the selection of the sent data (MODE parameter) in the setup menu of the serial communication ports (see the relevant paragraph).

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

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

In conditions of wrong reading, the field assumes the value: " O-L ".

<cheksum> = sum of control of string data. It is calculated by executing the exclusive OR (XOR) of all the characters from STX (or from <Addr>) to ETX excluding the latter; the result of the XOR is decomposed into 2 characters considering separately the 4 upper bits (first character) and the lower 4 bits (second character); the 2 characters obtained are then ASCII coded;

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

MODBUS RTU PROTOCOL

The addresses listed in the tables follow the standard addressing specified in the reference guide of the Modicom PI-MBUS-300 below that is an extract that helps the user to communicate with the instrument.o.

"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 the entry of a new value in E^{2}prom, execute the MAKE - BACKUP function. If this function is not run, by turning off the MCT 1302, the value before the change will be restored.

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

The MODBUS RTU protocol is only available on COM2 RS485.

HANDLING OF COMMUNICATION ERRORS

The communication strings are controlled by CRC (Cyclical Redundancy Check). In the event of a communication error, the slave does not respond with any string. The master must consider a timeout to receive the response. If it does not get an answer, it must deduce that a communication error has occurred.

HANDLING OF DATA ERRORS RECEIVED

In the case of a string is received correctly but is not executable, the slave responds with an EXCEPTION RESPONSE as shown in the following table.

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

SUPPORTED FUNCTIONS:

FUNCTION	DESCRIPTION
01	READ COIL STATUS (Reading of the logic output status)
02	READ INPUT STATUS (Reading of the logic input status)
03	READ HOLDING REGISTERS (Reading of programmable registers)
04	READ INPUT REGISTERS (Reading of "read only" registers)
05	FORCE SINGLE COIL (Writing of the single output status)
06	PRESET SINGLE REGISTER (Writing of 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 HOLDING REGISTERS OF THE MODBUS PROTOCOL

The parameters of the instrument that can be read or programmed through the communication interfaces available on the instrument, according to the hardware setup, are listed in the following table.

The registers of the R type are those readable while those of the W type are those writable.

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

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

The registers have a size of 16 bits.

Address	Holding Register	R/W	Notes
0001	Register Status	R	See the relevant table
0002	Gross weight (MSW)	R	Value INT. - Most significant word
0003	Gross weight (LSW)	R	Value INT. - Less significant word
0004	Net weight (MSW)	R	Value INT. - Most significant word
0005	Net weight (LSW)	R	Value INT. - Less significant word
0006	(Reserved)	R	
0007	(Reserved)	R	
0008	Digital inputs on board the MCT1302	R	See the relevant table.
0009	Digital outputs on board the MCT1302	R	See the relevant table.
0010	Cell signal	R	Value INT.
0011	Tare (MSW)	R/W	Value INT. - Most significant word
0012	Tare (LSW)	R/W	Value INT. - Less significant word
0101	Zero control (MSW)	R/W	Value INT. - Most significant word
0102	Zero control (LSW)	R/W	Value INT. - Less significant word
0103	Unload set point (MSW)	R/W	Value INT. - Most significant word
0104	Unload set point (LSW)	R/W	Value INT. - Less significant word
0105	Unload prolonged time	R/W	Value INT.
0106	Unload end time	R/W	Value INT.
0107	End cycle time	R/W	Value INT.
0108	Time to enable the end cycle output	R/W	Value INT.
0109	Dose end mode	R/W	Value INT.
0110	Correction mode	R/W	Value INT.
0111	Minimum level (MSW)	R/W	Value INT. - Most significant word
0112	Minimum level (LSW)	R/W	Value INT. - Less significant word
0113	Maximum level (MSW)	R/W	Value INT. - Most significant word
0114	Maximum level (LSW)	R/W	Value INT. - Less significant word
0115	Minimum level output	R/W	Value INT.
0116	Maximum level output	R/W	Value INT.
0117	Cycle output	R/W	Value INT.
0118	Cycle end output	R/W	Value INT.
0119	Alarm output	R/W	Value INT.
0120	Timer mode	R/W	Value INT.
0151	Batching start tare	R/W	Value INT.
0152	Batching print	R/W	Value INT.
0201	Number of recipes in the archive	R	Value INT.
0202	Recipe name (character 01 + character 02)	R/W	Value INT. To manage the archive from serial item.

0203	Recipe name (character 03 + character 04)	R/W	Value INT. To manage the archive from serial item.
0204	Recipe name (character 05 + character 06)	R/W	Value INT. To manage the archive from serial item.
0205	Recipe name (character 07 + character 08)	R/W	Value INT. To manage the archive from serial item.
0206	Recipe name (character 09 + character 10)	R/W	Value INT. To manage the archive from serial item.
0207	Recipe name (character 11 + character 12)	R/W	Value INT. To manage the archive from serial item.
0208	Recipe name (character 13 + character 14)	R/W	Value INT. To manage the archive from serial item.
0209	Number of recipe steps	R/W	Value INT. To manage the archive from serial item.
0210	Recipe/activity step	R/W	Value INT. To manage the archive from serial item.
0211	Recipe step, batching setpoint (MSW)	R/W	Value INT. - Most significant word To manage the archive from serial item.
0212	Recipe step, batching setpoint (LSW)	R/W	Value INT. Less significant word To manage the archive from serial item.
0251	Number of activities in the archive	R	Value INT.
0252	Activity name (character 01 + character 02)	R/W	Value INT. To manage the archive from serial item.
0253	Activity name (character 03 + character 04)	R/W	Value INT. To manage the archive from serial item.
0254	Activity name (character 05 + character 06)	R/W	Value INT. To manage the archive from serial item.
0255	Activity name (character 07 + character 08)	R/W	Value INT. To manage the archive from serial item.
0256	Activity name (character 09 + character 10)	R/W	Value INT. To manage the archive from serial item.
0257	Activity name (character 11 + character 12)	R/W	Value INT. To manage the archive from serial item.
0258	Activity name (character 13 + character 14)	R/W	Value INT. To manage the archive from serial item.
0259	Type of activity	R/W	Value INT. To manage the archive from serial item.
0260	Slow (MSW)	R/W	Value INT. - Most significant word To manage the archive from serial item.
0261	Slow (LSW)	R/W	Value INT. Less significant word To manage the archive from serial item.
0262	Flight (MSW)	R/W	Value INT. - Most significant word To manage the archive from serial item.
0263	Flight (LSW)	R/W	Value INT. Less significant word To manage the archive from serial item.
0264	Tolerance (MSW)	R/W	Value INT. - Most significant word To manage the archive from serial item.
0265	Tolerance (LSW)	R/W	Value INT. Less significant word To manage the archive from serial item.
0266	Waiting time	R/W	Value INT. To manage the archive from serial item.
0267	Product timeout	R/W	Value INT. To manage the archive from serial item.
0268	Fast output	R/W	Value INT. To manage the archive from serial item.
0269	Slow output	R/W	Value INT. To manage the archive from serial item.
0270	Fast logic output	R/W	Value INT. To manage the archive from serial item.
0271	Slow logic output	R/W	Value INT. To manage the archive from serial item.
0272	Entrance	R/W	Value INT. To manage the archive from serial item.
0273	Spill time ON	R/W	Value INT. To manage the archive from serial item.
0274	Spill time OFF	R/W	Value INT. To manage the archive from serial item.
0301	Selected recipe total (MSW)	R/W	Value INT. - Most significant word See command/data register

0302	Selected recipe total (LSW)	R/W	Value INT. - Less significant word See command/data register
0303	Selected activity total (MSW)	R/W	Value INT. - Most significant word See command/data register
0304	Selected activity total (LSW)	R/W	Value INT. - Less significant word See command/data register
0401	Active recipe	R/W	Value INT.
0402	Active recipe correction factor (MSW)	R/W	Value INT. - Most significant word
0403	Active recipe correction factor (LSW)	R/W	Value INT. - Less significant word
0404	Batching cycles	R/W	Value INT.
0451	Batching operation	R	See the relevant table
0452	Batching status	R	See the relevant table
0453	Current cycle	R	Value INT.
0454	Current step	R	Value INT.
0455	Current activity	R	Value INT.
0456	Batching setpoint (MSW)	R	Value INT. - Most significant word
0457	Batching setpoint (LSW)	R	Value INT. - Less significant word
0458	Dosed net (last MSW step finished)	R	Value INT. - Most significant word
0459	Dosed net (last LSW step finished)	R	Value INT. - Less significant word
0460	Dosed net alarm (last step finished)	R	Value INT.
0461	Digital inputs of external modules	R	See the relevant table
0462	Digital outputs of external modules (MSW)	R	See the relevant table
0463	Digital outputs of external modules (LSW)	R	See the relevant table
0501	Data Register (MSW)	W	Value INT. - Most significant word (See the relevant table)
0502	Data Register (LSW)	W	Value INT. Less significant word (See the relevant table)
0503	Command Register	W	See the relevant table
1001	Standby function	R/W	Value INT.
1002	Password Setup function	R/W	Value INT.
1003	Language	R/W	Value INT.
1004	Key F1	R/W	Value INT.
1005	Key F2	R/W	Value INT.
1006	Key F3	R/W	Value INT.
1007	Key F4	R/W	Value INT.
1008	Cycle key block	R/W	Value INT.
1009	Weight key block	R/W	Value INT.
1010	Factor key block	R/W	Value INT.
1011	Recipe key block	R/W	Value INT.
1101	Weight division value (*)	R/W	See the relevant table
1102	Decimals (*)	R/W	See the relevant table
1103	Load cell capacity (MSW) (*)	R/W	Value INT. Most significant word
1104	Load cell capacity (LSW) (*)	R/W	Value INT. Less significant word
1105	Load cell sensitivity (*)	R/W	Value INT.
1106	Fixed tare (MSW) (*)	R/W	Value INT. Most significant word
1107	Fixed tare (LSW) (*)	R/W	Value INT. Less significant word
1108	Calibration severity (MSW) (*)	R/W	Value INT. Most significant word
1109	Calibration gravity (LSW) (*)	R/W	Value INT. Less significant word
1110	Use gravity (MSW) (*)	R/W	Value INT. Most significant word

1111	Use gravity (MSW) (*)	R/W	Value INT. Less significant word
1151	Table cal. Zero signal (MSW) (*)	R/W	Value INT. - Most significant word
1152	Table cal. Zero signal (LSW) (*)	R/W	Value INT. - Less significant word
1153	Table cal. P1 signal (MSW) (*)	R/W	Value INT. - Most significant word
1154	Table cal. P1 signal (LSW) (*)	R/W	Value INT. - Less significant word
1155	Table cal. P2 signal (MSW) (*)	R/W	Value INT. - Most significant word
1156	Table cal. P2 signal (LSW) (*)	R/W	Value INT. - Less significant word
1157	Table cal. P3 signal (MSW) (*)	R/W	Value INT. - Most significant word
1158	Table cal. P3 signal (LSW) (*)	R/W	Value INT. - Less significant word
1159	Table cal. P4 signal (MSW) (*)	R/W	Value INT. - Most significant word
1160	Table cal. P4 signal (LSW) (*)	R/W	Value INT. - Less significant word
1161	Table cal. P5 signal (MSW) (*)	R/W	Value INT. - Most significant word
1162	Table cal. P5 signal (LSW) (*)	R/W	Value INT. - Less significant word
1163	Table cal. Value P1 (MSW) (*)	R/W	Value INT. - Most significant word
1164	Table cal. Value P1 (LSW) (*)	R/W	Value INT. - Less significant word
1165	Table cal. Value P2 (MSW) (*)	R/W	Value INT. - Most significant word
1166	Table cal. Value P2 (LSW) (*)	R/W	Value INT. - Less significant word
1167	Table cal. Value P3 (MSW) (*)	R/W	Value INT. - Most significant word
1168	Table cal. Value P3 (LSW) (*)	R/W	Value INT. - Less significant word
1169	Table cal. Value P4 (MSW) (*)	R/W	Value INT. - Most significant word
1170	Table cal. Value P4 (LSW) (*)	R/W	Value INT. - Less significant word
1171	Table cal. Value P5 (MSW) (*)	R/W	Value INT. - Most significant word
1172	Table cal. Value P5 (LSW) (*)	R/W	Value INT. - Less significant word
1201	Filter factor	R/W	See match on page 46
1202	Output rate ADC	R/W	See match on page 46
1203	Average reading number	R/W	Value INT.
1204	Monotony time	R/W	Value INT.
1205	Oscillation time	R/W	Value INT.
1206	Oscillation range	R/W	Value INT.
1301	Full scale (MSW) (*)	R/W	Value INT. - Most significant word
1302	Full scale (LSW) (*)	R/W	Value INT. - Less significant word
1303	Weight stability (*)	R/W	See match on page 46
1304	Autozero at power up (MSW) (*)	R/W	Value INT. - Most significant word
1305	Autozero at power up (LSW) (*)	R/W	Value INT. - Less significant word
1306	Tracking of zero (*)	R/W	See match on page 47
1307	Resettable divisions (MSW) (*)	R/W	Value INT. - Most significant word
1308	Resettable divisions (LSW) (*)	R/W	Value INT. - Less significant word
1401	Function of input 1	R/W	See Input/Output menu match
1402	Function of input 2	R/W	See Input/Output menu match
1403	Function of input 3	R/W	See Input/Output menu match
1404	Function of input 4	R/W	See Input/Output menu match
1405	Function of input 5	R/W	See Input/Output menu match
1406	Function of input 6	R/W	See Input/Output menu match
1501	Analog tare (MSW)	R/W	Value INT. - Most significant word
1502	Analog tare (LSW)	R/W	Value INT. - Less significant word
1503	Analog full scale (MSW)	R/W	Value INT. - Most significant word

1504	Analog full scale (LSW)	R/W	Value INT. - Less significant word
1505	Analog output mode	R/W	See match on page 35
1506	Analog output range	R/W	See match on page 35
1507	Analog zero adjustment	R/W	Value INT. Points of zero of the analog output; to end the adjustment procedure it is necessary to send the command to save data in permanent memory in the Command Register.
1508	Analog full scale adjustment	R/W	Value INT. Points of full scale of the analog output; to end the adjustment procedure it is necessary to send the command to save data in permanent memory in the Command Register.
2000	Monitor register	W	The programmed value is automatically copied to the Monitor Register (2100).
2100	Monitor register	R	

TABLE A - CODING THE STATUS REGISTER

BITS	15	14	13	12	11	10	9	8
Description	Setup (***)	Weight delta	0	0	0	0= Net displayed 1= Gross displayed	Run backup	0

BITS	7	6	5	4	3	2	1	0
Description	Not calibrated	Weight error	Overload	Under-load	Tare entered	Zero band	Stable weight	Zero center

TABLE B - CODING THE INTERNAL DIGITAL INPUTS/OUTPUTS OF MCT 1302

BITS	15÷6	5	4	3	2	1	0
Description	Reserved	In 6 - Out 6 ON	In 5 - Out 5 ON	In 4 - Out 4 ON	In 3 - Out 3 ON	In 2 - Out 2 ON	In 1 - Out 1 ON

WARNING: bits 15 to 4 are not managed and always are equal to 0.

TABLE B - CODING THE DIGITAL INPUTS/OUTPUTS OF EXTERNAL MODULES

BITS	31	30	29	28	26	26	25	24
Description	In 38 Out 38 ON	In 37 Out 37 ON	In 36 Out 36 ON	In 35 Out 35 ON	In 34 Out 34 ON	In 33 Out 33 ON	In 32 Out 32 ON	In 31 Out 31 ON

BITS	23	22	21	20	19	18	17	16
Description	In 30 Out 30 ON	In 29 Out 29 ON	In 28 Out 28 ON	In 27 Out 27 ON	In 26 Out 26 ON	In 25 Out 25 ON	In 24 Out 24 ON	In 23 Out 23 ON

BITS	15	14	13	12	11	10	9	8
Description	In 22 Out 22 ON	In 21 Out 21 ON	In 20 Out 20 ON	In 19 Out 19 ON	In 18 Out 18 ON	In 17 Out 17 ON	In 16 Out 16 ON	In 15 Out 15 ON

BITS	7	6	5	4	3	2	1	0
Description	In 14 Out 14 ON	In 13 Out 13 ON	In 12 Out 12 ON	In 11 Out 11 ON	In 10 Out 10 ON	In 9 Out 9 ON	In 8 Out 8 ON	In 7 Out 7 ON

TABLE C - CODING THE DIVISION AND DECIMAL VALUE

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

TABELE D - CODING THE COMMAND REGISTER / DATA REGISTER

REGISTER VALUE	COMMAND REGISTER FUNCTION	DATA REGISTER FUNCTION	NOTE
0x0001	Semi-automatic zero		
0x0002	Automatic tare		
0x0004	Zero calibration (**)		
0x0005	Full scale calibration (**)	Sample weight value in MSW and LSW	
0x0006	Analog test	Value between 0 and 100 in intervals of 10 in LSW	
0x0007	Saving data in permanent memory		
0x000B	Switching command from gross to net weight		
0x000C	Switching command from net to gross weight		
0x000D	Acquisition of zero signal (table calibration)		
0x000E	Tare cancellation command.		
0x000F	Print command.		
0x0010	Reading the recipe parameters.	Recipe index in MSB and LSB	The general recipe parameters (name and number of steps) and the parameters related to step 1 of the recipe are read. See registers from 0202 to 0212.
0x0011	Saving the recipe parameters.	Recipe index in MSB and LSB	Registers 0202 to 0209 are programmed in the recipe specified in the Data Register. If the change also concerns the recipe steps, the recipe steps must first be saved by command
0x0012	Reading the recipe step.	Recipe step in LSB	The "activity" registers (0210) and the "batching setpoint" registers (0211-0212) are updated with the values of the step specified in the Data Register.

0x0013	Saving the recipe step.	Recipe step in LSB	The step specified in the Data Register is programmed with the values written in the "activity" (0210) and "batching setpoint" registers(0211-0212). To save the changes in permanent memory, it is necessary to send the command 0x0011, which can be sent only once at the end of the recipe changes.
0x0014	Reading the activity parameters.	Activity index in LSB	See registers from 0252 to 0274.
0x0015	Saving the activity parameters.	Activity index in LSB	See registers from 0252 to 0274.
0x0016	Reading the recipe total.	Recipe index in MSB and LSB	The total of the recipe specified in the Data Register is read. See registers from 0301 to 0302.
0x0017	Reading the activity total.	Activity index in LSB	The total of the activity specified in the Data Register is read. See registers from 0303 to 0304.
0x0018	Delete the recipe total.	Recipe index in MSB and LSB	The total of the recipe specified in the Data Register is deleted. Write 0xFFFF in the Data Register to delete the totals of all the recipes.
0x0019	Delete the activity total.	Activity index in LSB	The total of the activity specified in the Data Register is deleted. Write 0xFFFF in the Data Register to delete the totals of all the activities.
0x001A	Delete recipe	Recipe index in MSB and LSB	The recipe specified in the Data Register is deleted.
0x001B	Delete activity	Recipe index in MSB and LSB	The recipe specified in the Data Register is deleted.
0x001C	Reset the batching alarm	-	-
0x001D	Start batching.	-	-
0x001E	Pause batching.	-	-
0x001F	Restart batching.	-	-
0x0020	Stop batching.	-	-
0x3FFF	Enabling the 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 zeroed, so the Fieldbus master must read the parameter values from the Input Data Area and copy them to the relevant Output Data Area registers, and then it must send the enable command to the Command Register. Otherwise, all the parameters managed in the Output Data Area would be reset at power up.

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

EXAMPLES

ZERO CALIBRATION

When the system is empty and stable, write the hexadecimal value 0004 in the Command Register (0503).

To save the new value of Zero permanently in the memory, write the hexadecimal value 0007 in the Command Register.

FULL SCALE CALIBRATION

Load the sample weight on the scale, example 1256 Kg.

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

Write the hexadecimal value 0005 in the Command Register (0503).

The Command Register and the Data Register can be written simultaneously using the multiple register function.

To save the new full scale value permanently in the memory, write the hexadecimal value 0007 in the Command Register.

TIMES OF RESPONSE OF THE INSTRUMENT

The instrument, to respond most queries, takes a variable time depending on the programming of the instrument parameters and the type of request as shown in the table:

Frequency of the measure update	12.5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Frequency of the analog output update.	12.5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Frequency of update and reading of the fieldbus memory area.	250 Hz	250 Hz	250 Hz	250 Hz	250 Hz
Frequency of the logic output update.	12.5 Hz	50 Hz	100 Hz	250 Hz	1000 Hz
Weight and status acquisition cycle from Modbus RTU (*)	$fmax = \dfrac{1}{\left(\left(\dfrac{(nchar + 8) * 10}{baud}\right) + 0,004\right)}$				
Weight and status acquisition cycle from ASCII protocol (*)	$fmax = \dfrac{1}{\left(\left(\dfrac{(nchar + 8) * 10}{baud}\right) + 0,004\right)}$				

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

Example of status query, net weight and gross weight (5 registers) in baud rate = 115.2 kbit/sec:

1 / (((8 + 15 + 8) * 10) / 115200) + 0.004) = 149 Hz

The exception is:

- the Backup command E^{2}PROM (Max time = 350mSec.)

- the writing of the registers Cell capacity, Cell sensitivity, Weighing net, System tare, Filter (Max time = 550mSec).

USE OF OPTIMATION VIA THE USB PORT

The PC OPTIMATION software supplied with the instrument allows:

- the total setup of all the setup parameters;l
- the testing of the different hardware sections;
- the consultation of the instrument documentation;
- the firmware update of the instrument;
- the storage over time of the weight values acquired by the instrument by means of Data-logger function;
- saving and loading of the setup parameters of the instrument on file.

All the operating procedures are shown in the dedicated manual.
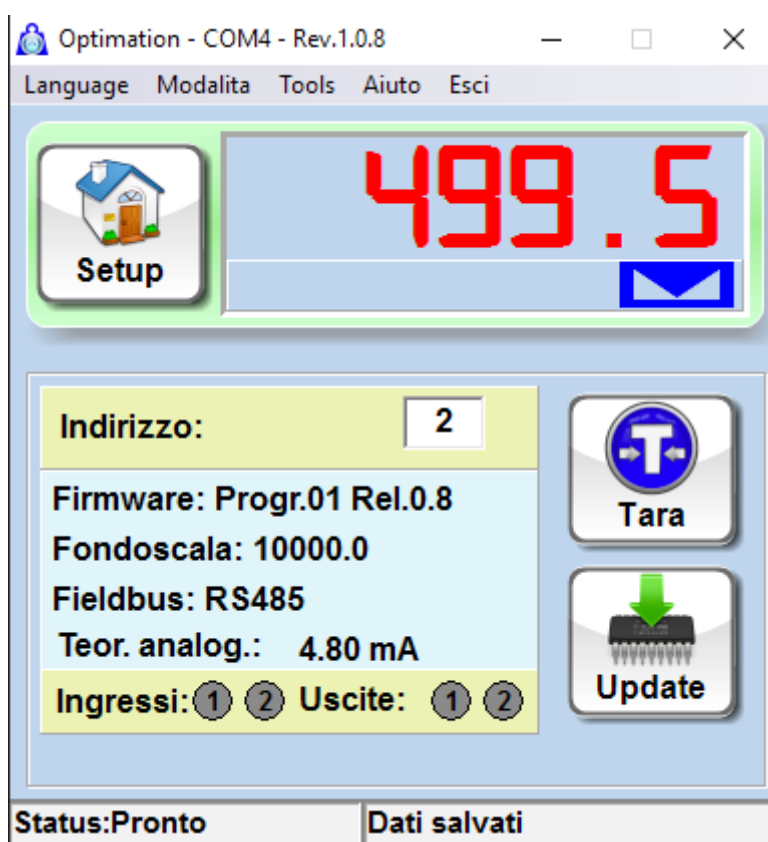
FIELDBUS PROTOCOL

INPUT DATA AREA

The following table lists the input area registers (prepared by the instrument and read from the master), common to all PROFINET, ETHERCAT, ETHERNET/IP fieldbuses. The registers have a size of 16 bits. The input area is updated to a maximum frequency of 90 Hz (60 Hz for PROFIBUS fieldbus). The size of the Input area set in the fieldbus master must coincide with the dimension set in the instrument.

Byte	Register address	INPUT AREA REGISTER	Notes
1-2	0	Register Status	See the relevant table
3-4	1	Gross weight (MSW)	Value INT. - Most significant word
5-6	2	Gross weight (LSW)	Value INT. - Less significant word
7-8	3	Net weight (MSW)	Value INT. - Most significant word
9-10	4	Net weight (LSW)	Value INT. - Less significant word
11-12	5	Digital inputs on board the MCT	See the relevant table.
13-14	6	Digital outputs on board the MCT	See the relevant table.
15-16	7	Digital inputs of external modules	See the relevant table.
17-18	8	Digital outputs of external modules (MSB)	Value INT. - Most significant word See the relevant table
	9	Digital outputs of external modules (LSB)	. Value INT. - Most significant word See the relevant table
19-20	10	Cell signal	Value INT.
21-22	11	Tare (MSW)	Value INT. - Most significant word
23-24	12	Tare (LSW)	Value INT. - Less significant word
25-26	13	Batching operation	See the relevant table
27-28	14	Batching status	See the relevant table
29-30	15	Current cycle	Value INT.
31-32	16	Current step	Value INT.
33-34	17	Current activity	Value INT.
35-36	18	Current batching setpoint (MSB)	Value INT. - Most significant word
37-38	19	Current batching setpoint (LSB)	Value INT. - Less significant word
39-40	20	Dosed net (last MSW step finished)	Value INT. - Most significant word
41-42	21	Dosed net (last LSW step finished)	Value INT. - Less significant word
43-44	22	Dosed net alarm (last step finished)	Value INT.
45-46	23	Monitor Register	This value corresponds to the equivalent register in the output area.
47-48	24	Active recipe	Value INT.
49-50	25	Active recipe correction factor (MSW)	Value INT. - Most significant word
51-52	26	Active recipe correction factor (LSW)	Value INT. - Less significant word
53-54	27	Batching cycles	Value INT. - Less significant word
55-56	28	Selected recipe total (MSW)	Value INT. - Most significant word See command/data register
57-58	29	Selected recipe total (LSW)	Value INT. - Less significant word See command/data register

59-60	30	Selected activity total (MSW)	Value INT. - Most significant word See command/data register
61-62	31	Selected activity total (LSW)	Value INT. - Less significant word See command/data register
63-64	32	Number of recipes in the archive	Value INT.
65-66	33	Number of activities in the archive	Value INT.
67-68	34	Recipe/activity name (character01 + character02)	INT value for archive management from fieldbus
69-70	35	Recipe/activity name (character03 + character04)	INT value for archive management from fieldbus
71-72	36	Recipe/activity name (character05 + character06)	INT value for archive management from fieldbus
73-74	37	Recipe/activity name (character07 + character08)	INT value for archive management from fieldbus
75-76	38	Recipe/activity name (character09 + character10)	INT value for archive management from fieldbus
77-78	39	Recipe/activity name (character11 + character12)	INT value for archive management from fieldbus
79-80	40	Recipe/activity name (character13 + character14)	INT value for archive management from fieldbus
81-82	41	Number of receipt steps	INT value for archive management from fieldbus
83-84	42	Recipe/activity steps	INT value for archive management from fieldbus
85-86	43	Recipe step, batching setpoint (MSW)	- Most significant INT word for archive management from fieldbus
87-88	44	Recipe step, batching setpoint (LSW)	- Most significant INT word for archive management from fieldbus
89-90	45	Type of activity	INT value for archive management from fieldbus
91-92	46	Slow (MSW)	- Most significant INT word for archive management from fieldbus
93-94	47	Slow (LSW)	- Most significant INT word for archive management from fieldbus
95-96	48	Flight (MSW)	- Most significant INT word for archive management from fieldbus
97-98	49	Flight (LSW)	- Most significant INT word for archive management from fieldbus
99-100	50	Tolerance (MSW)	Value INT. Most significant word for archive management from fieldbus
101-102	51	Tolerance (LSW)	Value INT. Most significant word for archive management from fieldbus
103-104	52	Waiting time	INT value for archive management from fieldbus
105-106	53	Product timeout	INT value for archive management from fieldbus
107-108	54	Fast output	INT value for archive management from fieldbus
109-110	55	Slow output	INT value for archive management from fieldbus
111-112	56	Fast logic output	INT value for archive management from fieldbus
113-114	57	Slow logic output	INT value for archive management from fieldbus
115-116	58	Entrance	INT value for archive management from fieldbus
117-118	59	Spill time ON	INT value for archive management from fieldbus
119-120	60	Spill time OFF	INT value for archive management from fieldbus

READING EXAMPLE

To read the gross weight from the MCT1302, you must the address 3 to 6 of the Input Area.

To read the net weight, instead, you must read the bytes from 7 to 10 of the Input Area.

If the instrument shows on the display the gross weight value of 12351 in the relative bytes, you shall read:

	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 have a size of 16 bits. The registers written by the master in the output area are read by the instrument at a maximum frequency of 90 Hz (60 Hz in the case of PROFIBUS fieldbus).

The size of the Output area set in the fieldbus master must coincide with the dimension set in the instrument.

Byte	Register address	OUTPUT AREA REGISTER	Notes
1-2	0	Command Register	See the relevant table
3-4	1	Data Register (MSW)	Value INT. - Most significant word (See Table)
5-6	2	Data Register (LSW)	Value INT. - Less significant word (See Table)
7-8	3	Monitor register	Value corresponds to the equivalent register in the input area.
9-10	4	Active recipe	Value INT.
11-12	5	Active recipe correction factor (MSW)	Value INT. - Most significant word
13-14	6	Active recipe correction factor (LSW)	Value INT. - Less significant word
15-16	7	Batching cycles	Value INT.
17-18	8	Recipe/activity name (character01 + character02)	INT value for archive management from fieldbus
19-20	9	Recipe/activity name (character03 + character04)	INT value for archive management from fieldbus
21-22	10	Recipe/activity name (character05 + character06)	INT value for archive management from fieldbus
23-24	11	Recipe/activity name (character07 + character08)	INT value for archive management from fieldbus
25-26	12	Recipe/activity name (character09 + character10)	INT value for archive management from fieldbus
27-28	13	Recipe/activity name (character11 + character12)	INT value for archive management from fieldbus
29-30	14	Recipe/activity name (character13 + character14)	INT value for archive management from fieldbus
31-32	15	Number of receipt steps	Value INT.
33-34	16	Recipe/activity steps	Value INT.
35-36	17	Recipe step, batching setpoint (MSW)	Value INT. - Most significant word for archive management from fieldbus
37-38	18	Recipe step, batching setpoint (LSW)	Value INT. - Most significant word for archive management from fieldbus
39-40	19	Type of activity	INT value for archive management from fieldbus
41-42	20	Slow (MSW)	Value INT. - Most significant word for archive management from fieldbus
43-44	21	Slow (LSW)	Value INT. - Most significant word for archive management from fieldbus
45-46	22	Flight (MSW)	Value INT. - Most significant word for archive management from fieldbus
47-48	23	Flight (LSW)	Value INT. - Less significant word
49-50	24	Tolerance (MSW)	Value INT. - Most significant word
51-52	25	Tolerance (LSW)	Value INT. - Less significant word
53-54	26	Waiting time	Value INT. - Most significant word for archive management from fieldbus

55-56	27	Product timeout	Value INT. - Most significant word for archive management from fieldbus
57-58	28	Fast output	Value INT. - Most significant word for fieldbus archive management
59-60	29	Slow output	Value INT. - Most significant word for fieldbus archive management
61-62	30	Fast logic output	Value INT. - Most significant word for fieldbus archive management
63-64	31	Slow logic output	Value INT. - Most significant word for fieldbus archive management
65-66	32	Entrance	Value INT. - Most significant word for fieldbus archive management
67-68	33	Spill time ON	Value INT. - Most significant word for fieldbus archive management
69-70	34	Spill time OFF	Value INT. - Most significant word for fieldbus archive management
71-72	35	Number of recipes in the archive	Value INT. - Most significant word for fieldbus archive management
73-74	36	Number of activities in the archive	Value INT. - Most significant word for fieldbus archive management

WRITING EXAMPLES

To write the Set-up parameters, follow the example below:

In bytes 1-2 (Command Register) write the value HEX 3FFF that opens the internal writing area of the MCT1302.

Example: You want to change the values of Set-Point 1 and Set-Point 2 to 120 and 9740 respectively.

Set-Point 1	Byte 21	Byte 22
Hex	00	78

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

Save the data by writing the HEX value 7 in the Byte 1-2

N.B. The instrument does not accept writing a value equal to the value already present.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The display shows the message O-L	The weight acquired is not detectable because the load cell is absent or incorrectly connected.	Check the load cell connections.
The display shows the underscore on the upper display.	The weight acquired cannot be represented because it exceeds the five figures available or is greater than the capacity of the load cells.	
The display shows the underscore on the lower display.	The weight acquired cannot be represented because negative over -9999.	
The number of decimals is incorrect.	The correct division value was not selected.	Select the correct division value in the main menu.
Serial communication does not work correctly.	The installation was not performed correctly. The selection of the serial interface operation is incorrect.	Check the connections as described in the installation manual. Select the settings appropriately.
The semiautomatic zero function does not work.	The gross weight exceeds the action limit of semiautomatic zero. The weight does not stabilize.	To restore zero, the weight must be calibrated. Wait for the weight to stabilize or adjust the weight filter parameter.
The semi-automatic tare function does not work.	The gross weight is negative or exceeds the maximum capacity value. The weight does not stabilize.	Check the gross weight. Wait for the weight to stabilize or adjust the weight filter parameter.

EU DECLARATION OF CONFORMITY (DOC)

The Company

Pavone Sistemi S.r.l.

Via Tiberio Bianchi, 11/13/15

20863 Concorezzo, MB, Italy

declares that the DoC was released under its own responsibility, and belong to the following product:

Model of tool / Product: **MCT 1302**

Type: Weighing Instrument

The object of the above statement used as shown in the installation and use manual complies with the relevant European Union harmonization standards:

Directive **2014/30/UE** on electromagnetic compatibility

The below harmonized standards and technical specifications have been applied:

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

Directive **2014/35/UE** Low Voltage

The below harmonized standards and technical specifications have been applied:

EN 61010-1: 2011

Directive **2014/31/UE** Measurement instruments

The below harmonized standards and technical specifications have been applied:

EN 45501: 2015

Signed in the name and on behalf of:

Concorezzo: 16/01/2017

Di Reda Donato - Head

PAVONESYSTEMS