

TECHNICAL MANUAL



DAT 100 Serial and analog weighing Indicator/Trasmitter

Software versione PW0305

TABLE OF CONTENTS

WARNINGS.....	Page	2
INTRODUCTION	Page	3
TECHNICAL FEATURES	Page	4
INSTALLATION	Page	5
FRONT PANEL.....	Page	9
USING THE KEYBOARD	Page	9
DISPLAY INDICATIONS.....	Page	10
VIEWING, ZEROING THE WEIGHT AND AUTOTARE.....	Page	11
SET-UP	Page	13
FLOW CHART MENU.....	Page	14
WEIGHING SET-UP MENU	Page	15
WEIGHT CALIBRATION MENU	Page	16
WEIGHING PARAMETERS SET-UP MENU	Page	17
SERIAL COMMUNICATIONS PORTS MENU	Page	19
LOGIC INPUT AND OUTPUT MENU	Page	23
ANALOG OUTPUT MENU	Page	25
SERIAL COMMUNICATION PROTOCOLS	Page	26
NOTES ON THE ANALOG OUTPUT OPERATION	Page	32
TROUBLESHOOTING	Page	33

WARNINGS

READ this manual BEFORE operating or servicing on the instrument.

FOLLOW these instructions carefully.

SAVE this manual for future use.



CAUTION

The installation and maintenance of this instrument must be allowed to qualified personnel only.

Be careful when you perform inspections, testing and adjustment with the instrument switched on.

Failure to observe these precautions may be dangerous.

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

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

INTRODUCTION

The DAT 100 is a weight transmitter to be matched to the load cells to detect the weight in every situation.

The module is easy to install and can be mounted on 35 mm DIN rail.

The display allows easy reading of the weight, the configuration parameters and errors.

The 3 keys located below the display and protected by the front door allow the Operator to perform the functions of ZERO and CALIBRATION as well as datasheet and real calibration.

The DAT 100 with its multiple serial interfaces (RS485, RS232, ASCII and Modbus RTU protocols) can be connected to PC, PLC and remote units.

The analog output (0÷20 mA, 4÷20 mA, 0÷10 Vdc, 0÷5 Vdc) allows an additional interfacing to PLC and remote displays.

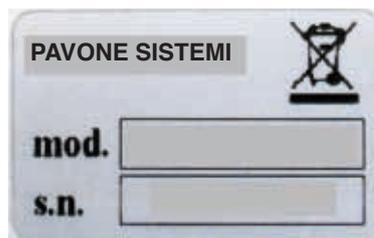
The DAT 100 also has two programmable SET POINTs to utilize as levels, set points, etc.

AVAILABLE VERSION:

- **DAT 100/A:** weight transmitter with selectable analog output under voltage or current. Two programmable set points, 2 inputs and Peak function.
- **DAT 100/RS485:** weight transmitter with serial output RS232, RS485 and Peak function. Supported protocols are Modbus RTU, continuous, slave and request.

IDENTIFICATION PLATE OF THE INSTRUMENT

It's important to communicate this data, in the event of a request for information. The software number and release number are shown on the cover of the manual and also displayed when the instrument is switched on.



WARNINGS

The following procedures must be performed by qualified personnel.

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

TECHNICAL FEATURES

Power supply	24 Vdc \pm 10% protected against reverse polarity. Protection with resettable fuse.
Max. absorption	2W
Isolation	Class II
Operating temperature	-10°C \div +50°C (max. humidity 85% non-condensing)
Storage temperature	-20°C \div +60°C
Weight display	Numerical with 5 red led digits and 7 segments (h 7 mm)
Led	2 LEDs of 3 mm
Keyboards	3 mechanical keys (behind the red front door)
Overall dimensions	112 x 119 x 23 mm (l x h x w), including terminal boards.
Installation	Brackets for DIN section or OMEGA bar
Material	Self-extinguishing Blend PC/ABS
Connections	Removable terminal boards with screws, pitch 5.08 mm
Input of the load cells with following features	max. 4 of 350 Ω in parallel (or 8 cells of 700 Ω).
Load cell excitation	4 Vdc
Linearity	<0.01% of the full scale
Temperature drift	<0.001% of the full scale / °C
Internal resolution	24 bit
Measuring range	-3.9 \div +3.9 mV/V
Digital filter	To be selected from 0.2 Hz to 25 Hz
Number of decimals weight	0 \div 4 decimal places
Calibration of zero and full scale	From the buttons.
Check of load cell cable interruption	Always present
Logic outputs (DAT 100/A)	2 relay outputs with No contact Relay load Max. 1A, 24 Vdc/Vca
Logic Inputs (DAT 100/A)	No. 2 opto-isolated
Serial ports	RS232 half duplex RS485 half duplex (DAT 100/RS485)
Baud rate	2400 \div 115200 baud
Maximum cable length	15m (RS232) and 1000m (RS485)
Analog output (DAT 100/A)	Voltage: \pm 10 V / \pm 5 V (min. 10 K Ω) Current: 0 \div 20 mA / 4 \div 20 mA (max 300 Ω)
Resolution	16 bits
Calibration	Digital from keys
Linearity	0.03% of the full scale
Temperature drift	0.002% of the full scale / °C
In compliance with the standards	EN61000-6-2, EN61000-6-3 for EMC EN61010-1 for Electrical Safety UL: FILE NO E474362



INSTALLATION

GENERAL INFORMATION

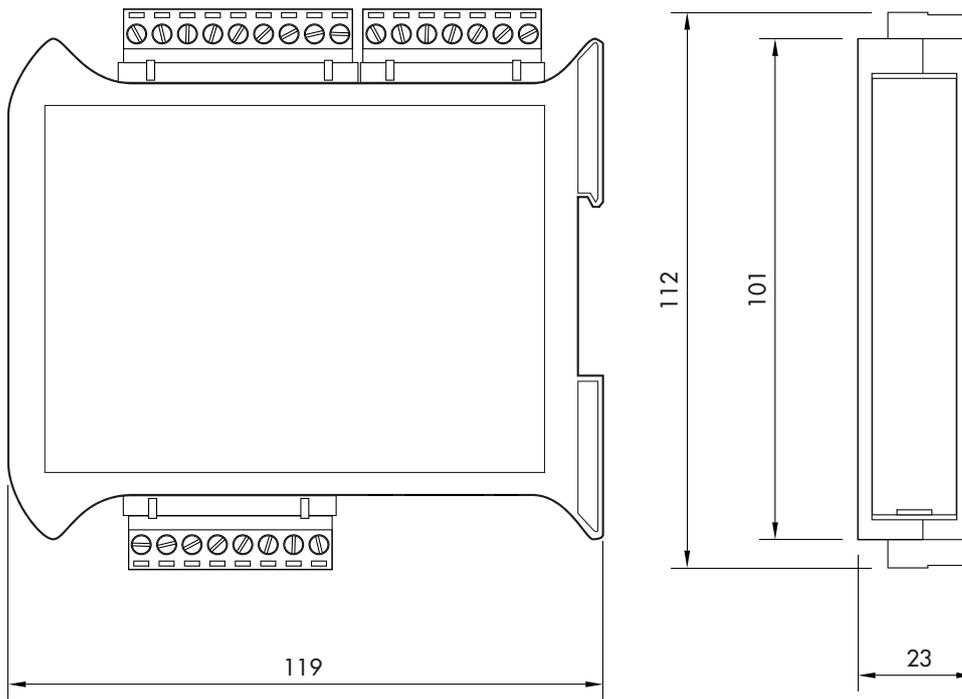
The DAT 100 consists of a motherboard, to which are added the options available, accommodated in a plastic enclosure for DIN rail 35mm.



The DAT 100 should not be immersed in water, subjected to jets of water and cleaned or washed with solvents.

Do not expose to heat or direct sunlight.

OVERALL DIMENSIONS



ELECTRIC INSTALLATION



DAT 100 is equipped with removable screw, pitch 5.08 mm.

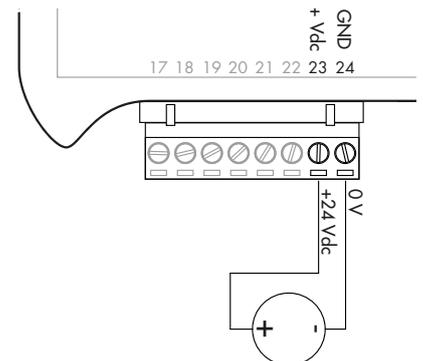
The load cell cable must be shielded and channeled away from power cables to prevent electromagnetic interferences.

INSTRUMENT POWER SUPPLY

The instrument is powered through the terminals 23 and 24. The power supply cable must be channeled separately from other cables.

The internal circuit is galvanically isolated from the supply voltage.

Power supply voltage: 24 Vdc \pm 10%, max. 2W



LOAD CELL CONNECTIONS

The cable of the load cell (or load cells) should not be channeled with other cables, but has to follow its own path.

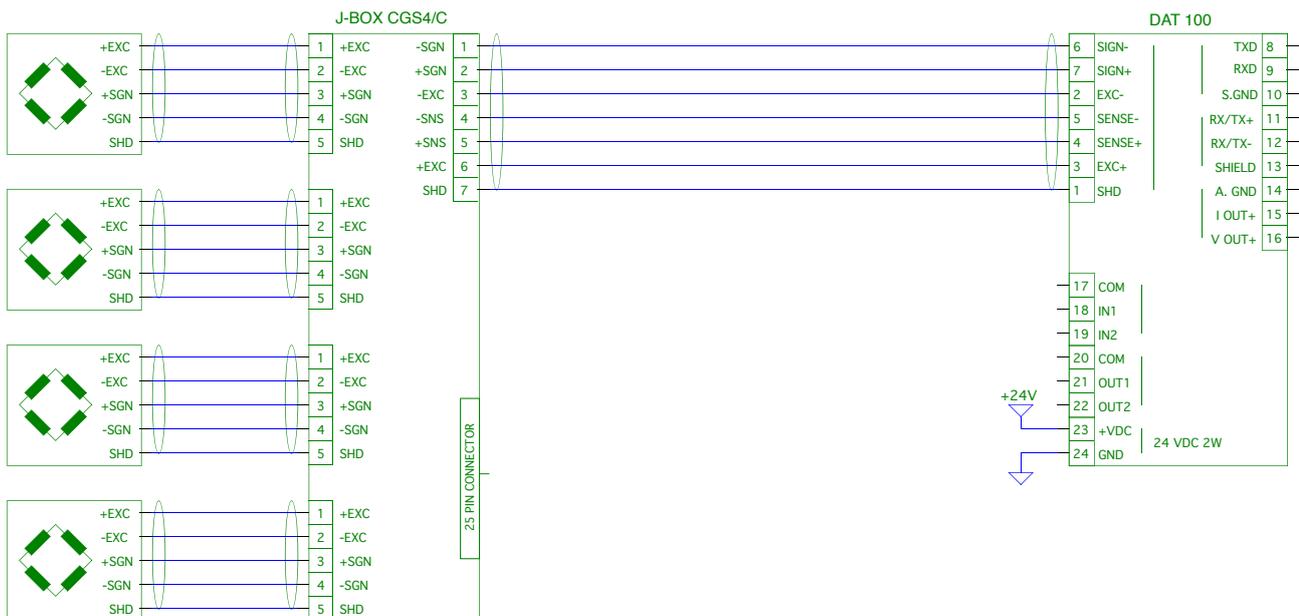
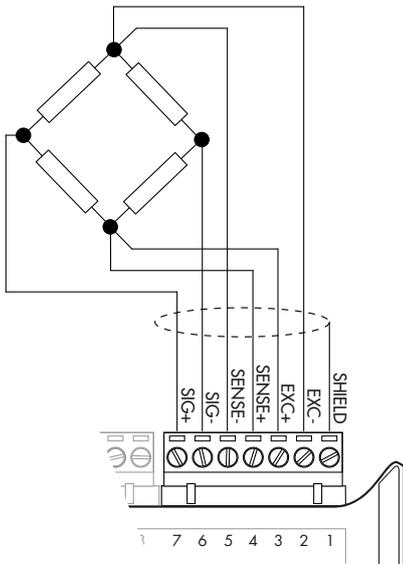
The instrument can be connected up to maximum 4 load cells of 350 ohm in parallel. The supply voltage of the load cells is 4 Vdc and is protected by temporary short circuit.

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

The cable of the load cells must be connected to terminals 2-7 of the 7-pin removable terminal board. In the case of 4-wire load cell cable, jump terminals 2 with 5 and 3 with 4.

Connect the cell cable shield to the terminal 1.

In the case of the usage of two or more load cells, use special junction boxes (CEM4/C or CSG4/C).



LOGIC INPUTs

The two logic inputs are opto-isolated.

The connection cable should not be channeled with power cables .

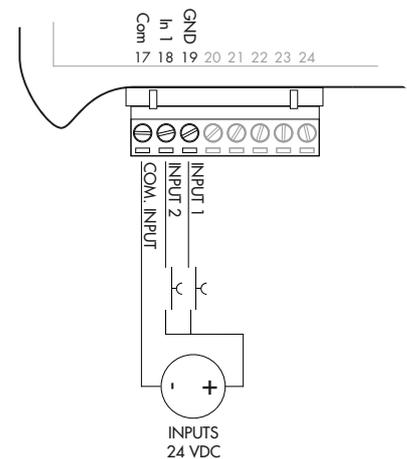
The function of the two inputs is as follows:

INPUT 1* TARE/ZERO

INPUT 2 PRINT

The activation of the two functions is accomplished by bringing the external 24 VDC power supply to the corresponding terminals as shown in the figure here beside.

* Activating the INPUT 1 when the gross weight is positive, it switches the display from gross weight to net weight. When the gross weight is negative, gross weight is zeroed.



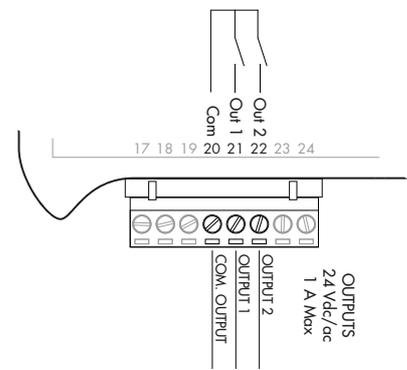
RELAY OUTPUTs

The two outputs are with contact normally open.

Each contact is 24 Vdc / Vac, Max. 1 A.

The connections cable should not be channeled with power cables.

The connection should be as short as possible.



SERIAL COMMUNICATION

RS232:

The RS232 serial port is always present and can handle several protocols.

To achieve the serial connection use a suitable shielded cable and make sure to ground the screen at one of the two ends: to pin 13, if attached on the side of the instrument, to the ground, if connected on the other side.

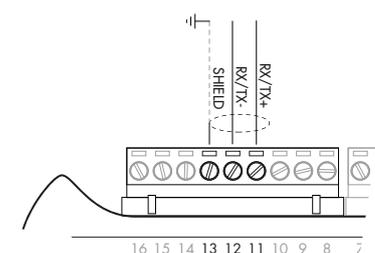
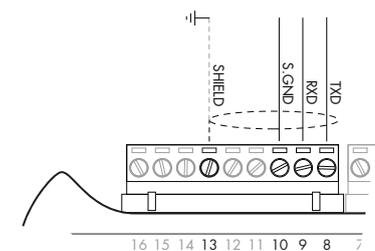
The cable must not be channeled with power cables, maximum length of 15 meters (EIA RS-232-C), beyond which you should take the optional RS485 interface.

RS485:

The RS485 serial port (2-wire) is only present in the model DAT 100/RS485.

To achieve the serial connection use a suitable shielded cable and make sure to connect the shield to one of two ends: to pin 13, if connected on the side of the instrument, to the ground if connected on the other side.

The cable must not be channeled with power cables.



DAT 100/A TRANSMITTER

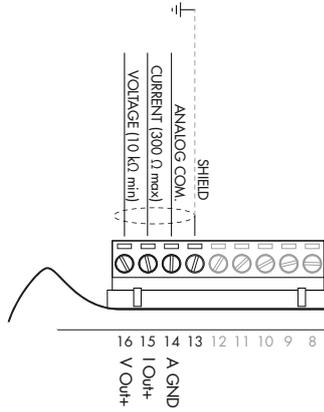
ANALOG OUTPUT

The instrument provides an analog output in current and voltage.

Analog voltage output: range from -10 to +10 V or -5 to +5 volts, 10K ohm minimum load.

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

To achieve the connection, use a shielded cable, making sure to connect the shield to one of the two ends.

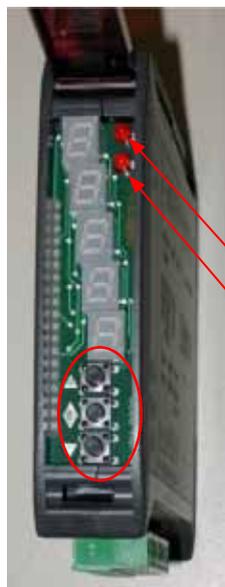


FRONT PANEL

The DAT 100 transmitter has a front door that protects the 5 digits display, the 2 status LEDs and the three front keys.

In operating mode the display shows the weight and the LEDs indicate the status of weight (net-gross).

The set-up parameters are easily accessible and can be changed through the use of the three front keys used to select, edit, confirm and save the new settings.



DISPLAY

On the 5 digits display the lowest digit indicates the least significant digit. Normally, the display shows the measured weight. During set-up procedure, the display shows the sequence of the parameters and their values, that allow the operator to set the instrument.

LED INDICATORS

In the upper part of the display there are two LED indicators:

LED 1 (on = net weight, off = gross weight, flashing = peak)

LED 2 (on = tare entered, off = no tare)

In bar-graph view, both LEDs are flashing.

USING THE KEYBOARD

The instrument is programmed and controlled through the 3 keys keyboard, with the following functions:

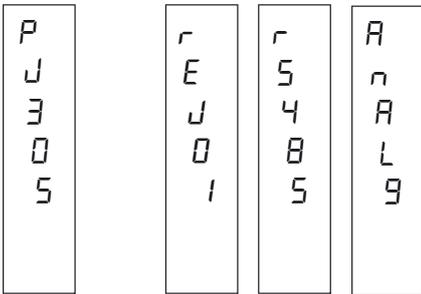
KEY	FUNCTIONS IN WEIGHT INDICATION CONDITIONS
▲	Short press: Display switches from Gross to Net weight. Long press: Display switches from Weight to Peak
◆	Short press: Display switches from Numerical to Bar-graph or to gross weight. Long press: Zeroing of the weight/peak displayed.
▼	Short press: Sending the data to the serial line (if the manual protocol was selected) Long press: Set point programming (DAT 100/A)
▼ ◆	Pressed at the same time: Accessing the Main Menu

KEY	FUNCTION IN THE MANAGEMENT OF THE SET UP MENU
▲	Exits the set up menu or returns to the higher level.
◆	Access its submenu, or access the set up or confirms the selected parameter.
▼	Goes to the next menu item.

KEY	FUNCTION IN THE MANAGEMENT OF THE SET UP SUBMENU
▲	Increases the blinking digit / select the higher value.
◆	Select the next digit. If the flashing digit is the last one, confirm the value and end the set up / selection.
▼	Decrease the blinking digit / select the lower value.

DISPLAY INFO

When the instrument is switched ON the test-display is performed. In sequence there are: software code, software version and hardware version.

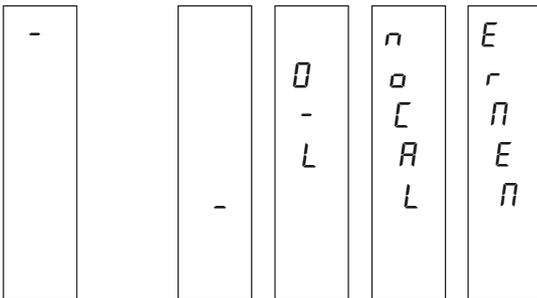


r 5485 hardware DAT 100/RS485 module

ANALG hardware DAT 100/A module

It's important to communicate these data in the event of a request for assistance.

ERRORS NOTIFICATION



In the operating mode, the display can report the following error codes.

- Overload: The weight applied to the load cell exceeds by more than 9 divisions the maximum capacity of the weighing system.
- Underload: The weight applied to the load cell is lower than -9999 divisions the maximum capacity of the weighing system.

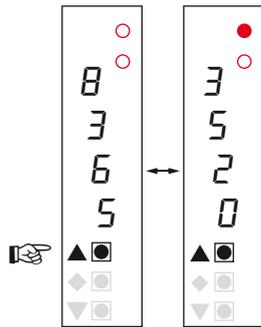
O-L O-L : No signal from the load cells or outside of the field of measurement mV/V.

n o C A L NOCAL: Transmitter not calibrated. Recalibration needed.

E r M E M ERMEM: Error in E²PROM. You can reprogram the instrument to the factory settings, erasing any calibration by pressing  key.

VIEWING, ZEROING THE WEIGHT AND AUTO TARE

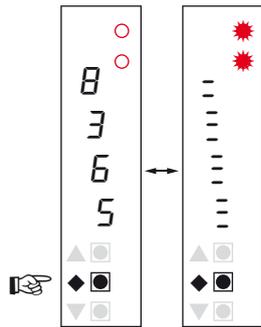
When the instrument is switched ON, the display shows the current net weight.



VIEWING THE NET WEIGHT /GROSS WEIGHT

Press the key ▲ to toggle between the net weight to gross weight and vice versa. The value displayed is reported by the LED 1 (lit: net weight). If you have not entered the tare, the net weight is equal to the gross weight.

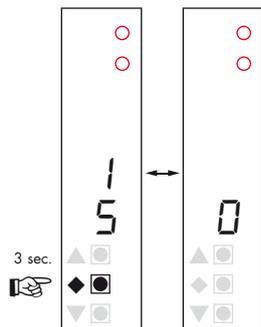
In case of negative weight, it is displayed the minus sign before the most significant digit. In case of negative weight greater than 9999, the minus sign is displayed alternatively with the most significant digit.



NUMERICAL VIEWING /BAR-GRAPH OF THE GROSS WEIGHT

Press the key ◆ to toggle from numerical display of the weight to the graphical representation of the gross weight and vice versa. The resolution is limited to 15 divisions and therefore each segment represents 1/15 of full scale.

The bar-graph display is indicated by both LEDs flashing.



ZEROING THE WEIGHT

This operation is performed to correct small movements of the zero of the scale. To perform the reset function, it is necessary to switch the display to gross weight.

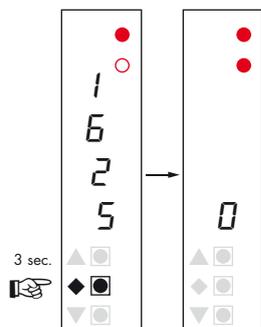
Press ◆ key for 3 seconds to zeroing gross weight.

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

Unstable weight.

Gross weight greater (positive or negative) than the OBAND value set.

If you previously performed the autotare function, this is automatically delayed. When the instrument is switched off, it is restored the value of Zero made during calibration.



AUTOMATIC TARE

To perform the auto-tare function, it is necessary to switch the display to Net weight (LED 1 on).

Press ◆ key for 3 seconds to to perform Autotare function. Led 2 switched on. The automatic tare command does not run under the following conditions:

Unstable weight.

Negative gross weight.

Gross weight greater than the maximum capacity.

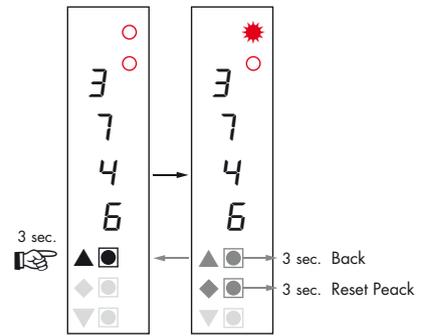
If the automatic tare is performed with gross weight = 0, the display shows again gross weight (Led 1 switched off).

PEAK FUNCTION

The peak is related to the gross weight and is always calculated, even when it is not displayed. When you see the peak, the top LED flashes.

To store the value press ▲ key for 3 seconds. To go back to weight display press ▲ key for 3 seconds. To reset the peak value press ◆ key for 3 seconds.

The calculated peak is not retained at power off.



WEIGHT SETPOINT SET UP (ONLY DAT 100/A)

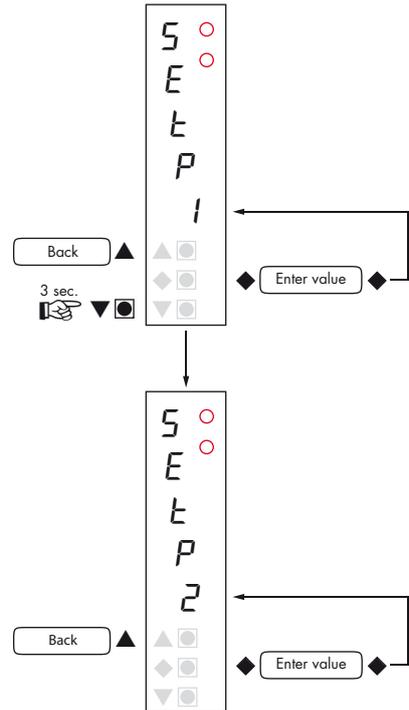
The set point values are compared to the weight to drive its logic output. The comparison criteria is established in the set up procedure of the logic I / O (see relevant paragraph).

To access the set point set up press ▼ key for 3 seconds. Then press ◆ to set the value of set point 1 through ▲ and ▼ keys. Confirm the value with ◆ key.

Press ▼ key to set the set point 2.

Press ▲ key to go back to weight display.

During the setting of set point, both outputs are disabled. If the set point value in memory is 0, the corresponding output is never enabled, regardless of the set-up of the selected set point. When the weight is not detectable or out of range, all outputs are disabled (contact open or closed depending on the function MODE; see the relevant chapter).



INPUT / OUTPUT FUNCTIONS (ONLY DAT 100/A)

INPUT	
1	Storing tare (impulsive)
2	Sending the data to the serial line (if the manual protocol was selected).
OUTPUT	
1	Setpoint 1
2	Setpoint 2

SET UP

GENERAL INFO

All functions of the DAT 100 can be and amended through a simple setup menu, shown on the next page. All the settings activated or selected are stored even after switching off the transmitter.

The DAT 100 is factory set. See the "default" parameters on the following pages.

At the first installation in the field some parameters need to be amended to obtain a correct indication of the displayed weight (datasheet adjustment).

This procedure may be required when you purchase the DAT 100.

The settings of the setup menu can be changed using the three front buttons.

CHANGING AND ENTERING THE PARAMETERS:

The setup parameters are grouped into a number of main menus.

To access the setup menu press simultaneously for 3 seconds  and  keys.

The display shows the message `CONF` which is the first of the main menus

Use the  and  keys to select the menu to edit

Press the  key to enter the selected menu.

KEY	PROGRAMMING FUNCTION DURING THE MAIN MENU
	Exits the programming menu or returns to the higher level.
	Access the relevant menu or programming or confirm the selected parameter.
	Skip to the next menu.

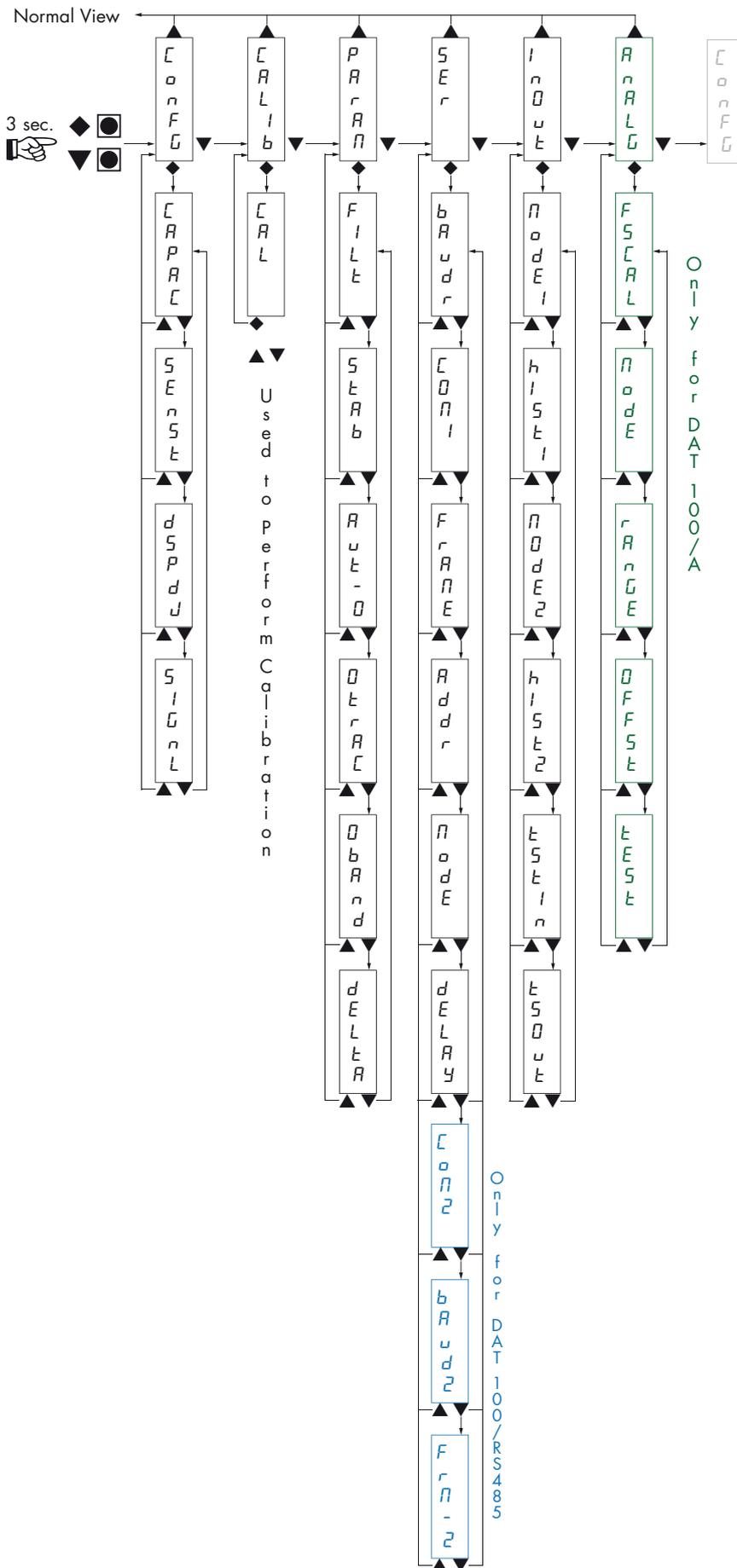
KEY	FUNCTION DURING PARAMETERS PROGRAMMING
	Increases the blinking digit / select the higher value.
	Select the next digit. If the flashing digit is the last, confirms the value and ends the programming / selection.
	Decreases the blinking digit / select the lower.

The parameters of the menu can take selectable values and numerical value.

-  key. Increment the flashing digit, select the next alternative value, goes back to the higher level or exits the setup menu.
-  key. Select the next digit, confirm the setting of the selected parameter, access the set up parameters and access the set up submenu.
-  key. Decrement the flashing digit, select the previous alternative value.

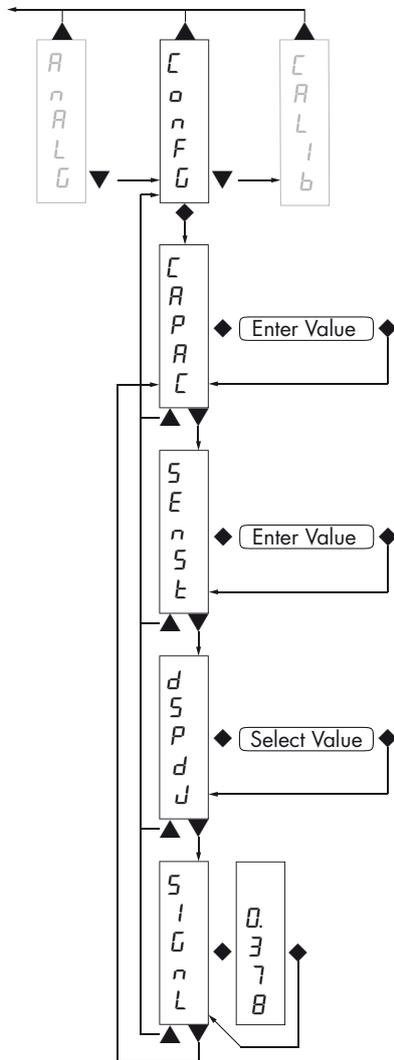
NB. To exit and save the changed data, press the  button until the indicator returns to the operating mode.

FLOW CHART MENU



CONFIGURATION PARAMETERS

Through the setting of the parameters listed below, the DAT 100 Full Scale datasheet calibration is performed. You must complete these steps with the zero calibration described on the next page. The procedure ensures, in the absence of mechanical problems, a good accuracy of the system (maximum error <1% FS).



CAPAC CAPACITY OF THE WEIGHING SYSTEM

It defines the value corresponding to the sum of the rated capacity of the load cells. In case of single load cell systems and "N" fixed supports, enter the capacity value of the load cell for the total number of supports. This figure represents the full scale value of the weighing system. Following the change of the parameter value, the datasheet calibration of the weight is recalculated.

Values: from 1 to 99999

Unit: the same of that displayed

Default: 10000

SENS LOAD CELLS SENSITIVITY

Set the value corresponding to the average of the load cells sensitivity, in mV/V. The instrument accepts values between 0.5 and 4 mV/V. If no value is entered, the unit assumes it is 2 mV/V.

Following the change of the sensitivity value, the datasheet tare of the weight is recalculated.

Values: from 0.5000 to 4.0000 mV/V

Default: 2.0000

dSPdJ DIVISION VALUE

The ratio between the maximum capacity of the system and the division value is the resolution of the system (number of divisions).

Following the change of the capacity of the system, it is automatically selected the division value to the best of 5000 divisions.

Following the change of the division value, if the maximum capacity does not change, the calibration of the weight 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

SIGNL TESTING THE LOAD CELLS SIGNAL

It's displayed the signal acquired from the load cells expressed in mV / V.

CALIB - CALIBRATION

The calibration method below, is used to correct or reduce the linearity error of the weighing system. The calibration should be performed with the use of sample weight or pre-weighed product on a sample weighing system.

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

During the calibration phase, the display shows the weight intermittently with the inscription `CAL`.

ATTENTION: at power off without exiting the set-up menu, the programming executed are not stored.

NB In the event that after calibration the system has linearity errors, verify that the structure weighed is completely free from mechanical constraints.

ZERO CALIBRATION

Perform the operation when the system is empty (including the fixed tare) and the weight is stable. The zero of the system is done by pressing the `▼` key. The display shows `2-0h` confirming the operation.

The weight displayed resets and the display shows `CAL` alternated by `0`. It is possible to repeat this operation more times.

CALIBRATION OF FULL SCALE

Prior F.S. calibration load the sample weight on the system and wait for the stabilization; the display shows a weight value.

Press the `▲` key to adjust the weight. The display shows `00000` with the first digit flashing.

Use the `▲` or `▼` keys, enter the weight value starting with the first digit flashing. Switch to the next digit by pressing `◆`. The confirmation of the last digit performs the correction of the weight. The display shows `CAL` alternated to the weight entered.

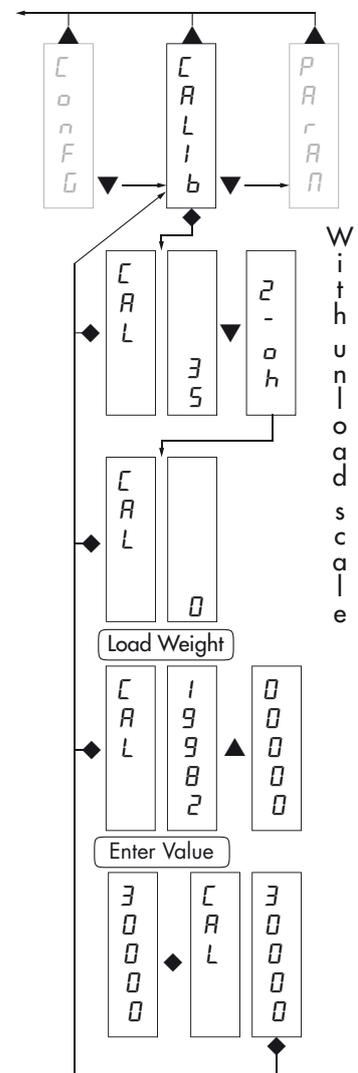
If the weight value is higher than the resolution, it is not accepted and the display shows an error message for a few seconds.

You can always repeat the F.S. calibration.

EXIT FROM CALIBRATION MENU

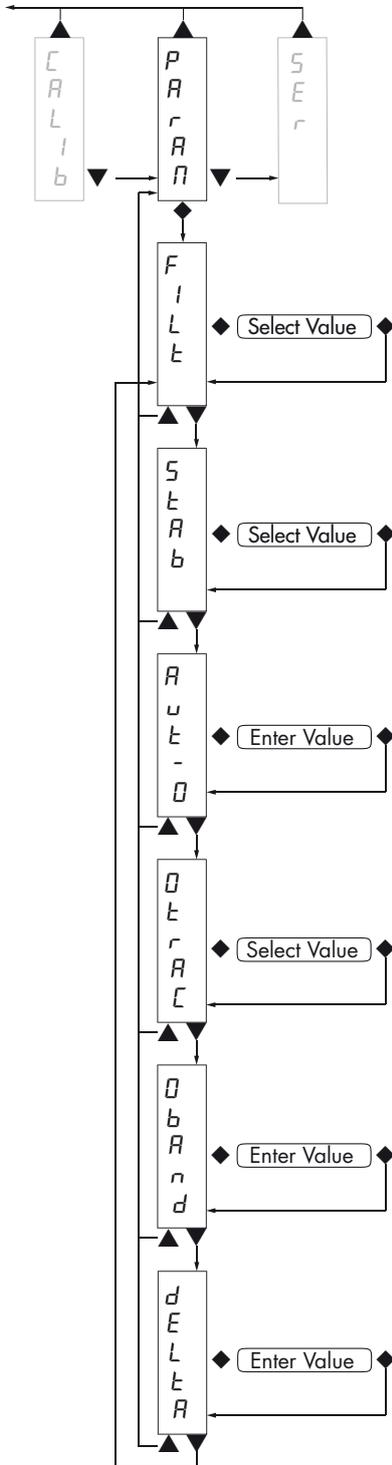
The exit from the menu `CALIB` is done by pressing `◆` key.

The display shows `CALIB`. To store the new setting and exit the setup menu, press the `▲` key.



PARAM - WEIGHING PARAMETERS

The parameters in this menu allow to adjust the timing of the acquisition and updating of the display and the manual or automatic zeroing that the transmitter performs.



FILt WEIGHT FILTER

This parameter adjusts the refresh speed of the display and the analog output.

Low values of the filter speed up the display refresh.

High values of the filter slow down the display refresh.

Value	Updated	Response
0	123 Hz	25 Hz
1	62 Hz	16 Hz
2	50 Hz	8 Hz
3	33 Hz	5 Hz
4	16 Hz	2.5 Hz
5	12 Hz	1.5 Hz
6	10 Hz	1 Hz
7	8 Hz	0.7 Hz
8	6 Hz	0.4 Hz
9	4 Hz	0.2 Hz

Default: 5

StAb WEIGHT STABILITY

This parameter defines the divisions number needed to deem the weight stable.

A large number of divisions allows the transmitter to detect quickly the weight stability, which is needed when executing tare and print commands.

Value	Change
0	Always stable weight
1	Stability reached quickly
2	Stability reached with medium parameters
3	Stability reached accurately
4	Stability reached with the highest accuracy

Default: 2

Aut-0 AUTOZERO AT POWER ON

This parameter defines the maximum resettable weight upon power on.

This operation corresponds to a zero calibration of the system and is executed only if the weight is stable and below the set value.

Value from 0 to the value of the CAPAC parameter.

Default: 0

0tRc TRACKING THE ZERO

This function allows a momentary zero calibration compensating the eventual temperature drift of the weight.

At power off it automatically returns to the previous calibration.

The maximum weight resettable by this parameter is 2% of the range of the system.

To disable this feature, use the value 0.

<i>Value</i>	<i>Change</i>
0	Control OFF
1	0.5 div/sec
2	1 div/sec
3	2 div/sec
4	3 div/sec

Default: 0

0bRn d ZERO BAND

This parameter defines the number of divisions resettable by pressing the zero front button.

Values: from 0 to 200

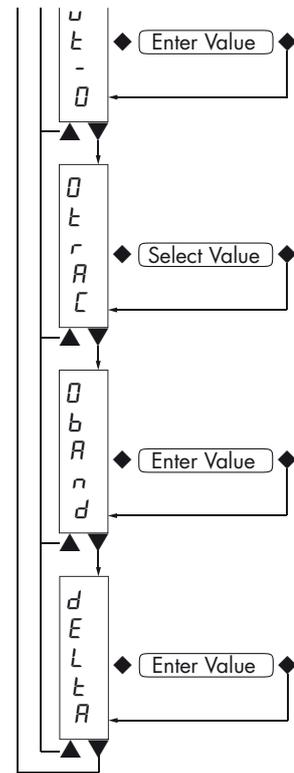
Default: 100

dELLA WEIGHT DELTA

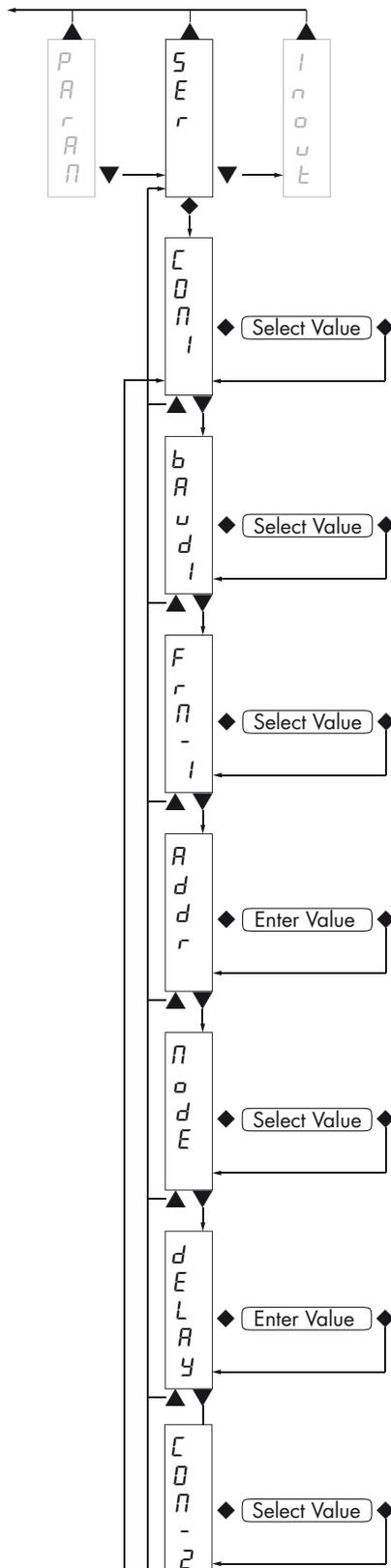
It defines the minimum number of divisions needed to discriminate two consecutive weighing in serial transmissions of the weight.

Values: from 0 to 200

Default: 20



SER - SETTING THE SERIAL COMMUNICATION PORTS



COM1: It defines the use of the COM1 serial port.

None: Serial communication OFF

Contn: Continuous transmission of the weight string. It can be used, for example, to drive a remote display. See details in the relevant paragraph.

Deman: When the Operator presses the front button or through Input 2, a string of weight is transmitted. The command is accepted if the weight is stable. Between two consecutive transmissions the weight must have a variation of at least the parameter "Weight delta".

Auto: It's automatically transferred to a string of weight when the weight stabilizes at a value higher than the minimum weight (20 divisions). Between two consecutive transmissions the weight must have a variation of at least the value set in the parameter "Delta Weight".

Slav: ASCII protocol. See details in the relevant paragraph.

Modbs: MODBUS RTU (slave) protocol. See details in the relevant paragraph.

Selectable Values:

- None
- Contn
- Deman
- Auto
- Slav
- Mdbs
- Default: Mdbs

bA Ud I BAUD RATE COM1

It defines the RS232 serial port baudrate.

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

Selectable Values:

- 2400
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200
- Default: 9600

Frn-1 COM1 DATA FORMAT

It defines the data format of the RS232 serial port.

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

In the case of MODBUS or SLAVE protocol, selections of the 7-bit data formats (E-7-1 and O-7-1) are not accepted (error message "Nvalid").

Selectable Values:

N-8-1

N-8-2

E-8-1

O-8-1

E-7-1

O-7-1

Default: N-8-1

Raddr COM1 / COM2 SERIAL COMMUNICATION ADDRESS

Configuration of the address used in the transmission protocols and in the MODBUS protocol.

Value from 000 to 99.

Default: 01

node TRANSMITTED DATA WEIGHT COM1 / COM2

Selecting the value transmitted with continuous, automatic and manual protocols (see relevant paragraph).

Selectable Values:

Net

Gross

Peak

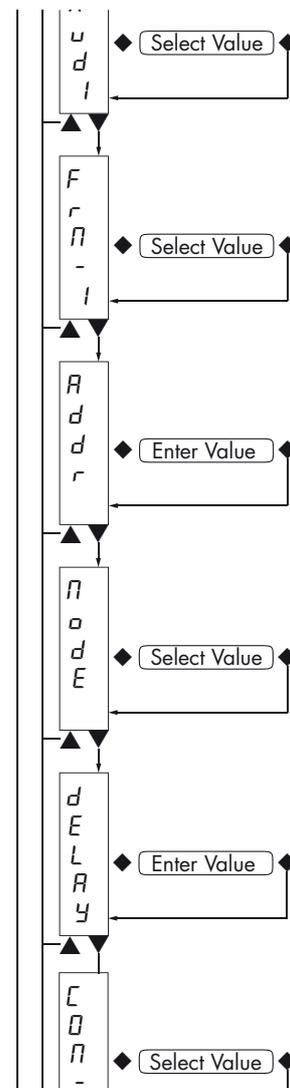
Default: Gross

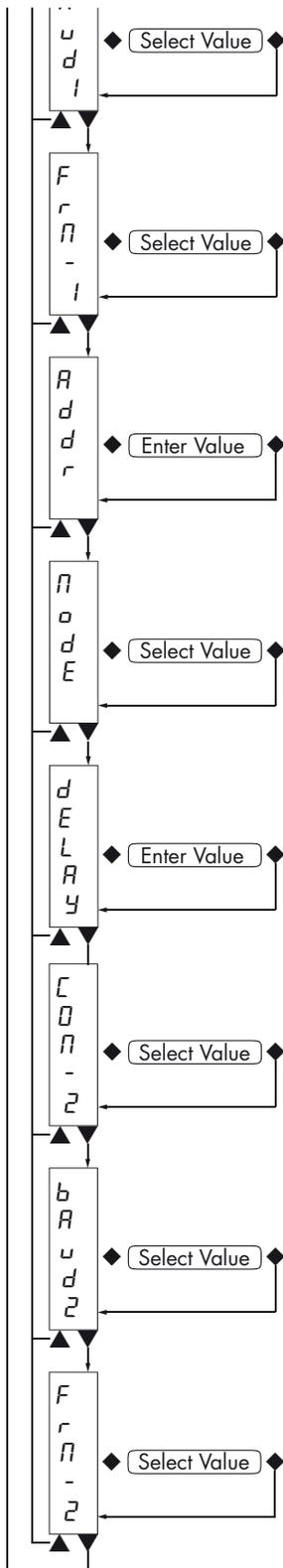
dELAY DELAYED RESPONSE OF THE SLAVE AND MODBUS RTU COM1 / COM2 PROTOCOLS

Value in milliseconds, representing the delay of the instrument when sending the response to the request of the master.

Values: from 0 to 999

Default: 000





Parameters only for dat 100/rs485

COM2 **COM2:** It defines the use the COM2 serial port.

None: Serial communication OFF

Contn: Continuous transmission of the weight string. It can be used, for example, to drive a remote display. See details in the relevant paragraph.

Deman: When the Operator presses the front button or through Input 2, a string of weight is transmitted. The command is accepted if the weight is stable. Between two consecutive transmissions the weight must have a variation of at least the value set in the parameter "Delta Weight".

Auto: Automatic transmission of a weight string when the weight stabilizes at a value higher than the minimum weight (20 divisions). Between two consecutive transmissions the weight must have a variation of at least the value set in the parameter "Delta Weight".

Slav: ASCII protocol. See details in the relevant paragraph.

Modbs: MODBUS RTU (slave) protocol. See details in the relevant paragraph.

Selectable Values:

- None
- Contn
- Deman
- Auto
- Slav
- Modbs
- Default: Modbs

bAud2 **BAUD RATE COM2**

It defines the COM2 serial port baudrate.

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

Selectable Values:

- 2400
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200
- Default: 9600

F r n - 2 **COM2 DATA FORMAT**

It defines the COM2 serial port data format.

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

In the case of MODBUS or SLAVE protocol, selections of the 7-bit data formats (E-7-1 and O-7-1) are not accepted (error message "Nvalid").

Selectable Values:

N-8-1

N-8-2

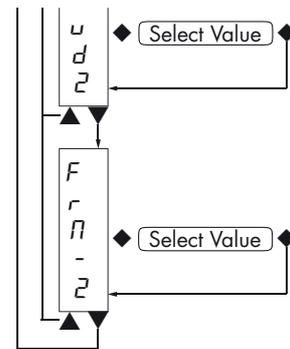
E-8-1

O-8-1

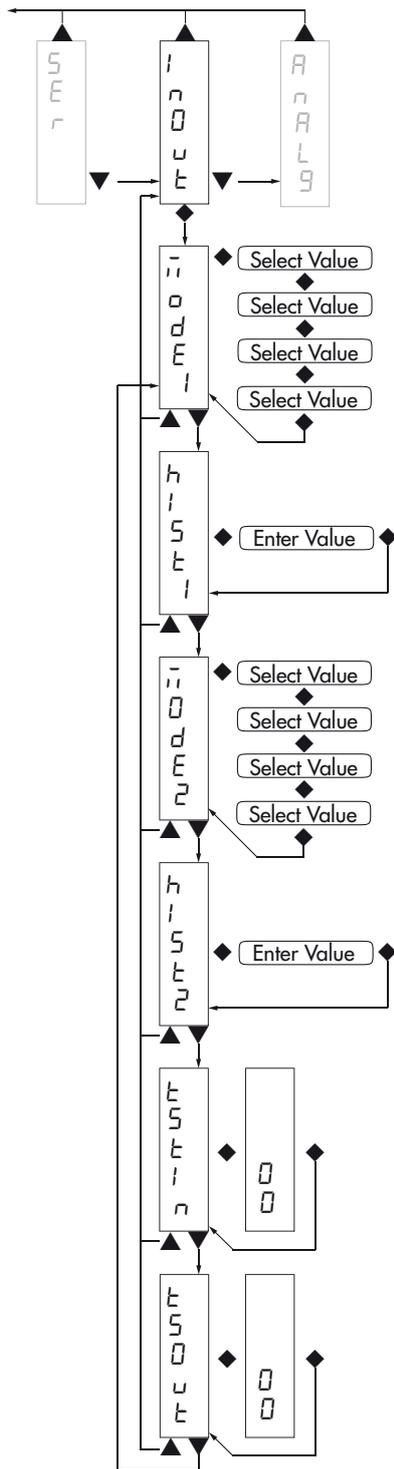
E-7-1

O-7-1

Default: N-8-1



INOUT - LOGIC INPUTS AND OUTPUT (DAT 100/A ONLY)



MODE 1 SETPOINT 1 OPERATION MODE

Select 4 operation criterias of the SET POINT 1 in sequence:

NET The relay output is active in Net Weight mode

GROSS The relay output is active in Gross Weight mode

PEAK The relay output is active in Peak mode

Default: *GROSS*

Comparison with net weight, gross weight or peak. In this last case, the comparison is made with the last peak value acquired, even when the peak function is not active.

N.O. The relay 1 is normally open

N.C. The relay 1 is normally closed

Default *N.O.*

POS. The output is operating with positive weight

NEG. The output is operating with negative weight

Default: *POS*

NORML Output 1 is active with unstable weight

STABL The output is active with stable weight

Default: *Norml*

HIST 1 HYSTERESIS OF THE SET POINT 1

Hysteresis value compared to the SET POINT value

Values from 000 to 999

Default: 2

MODE 2 SET POINT 2 OPERATION MODE

Select 4 operation criterias of the SET POINT 2 in sequence:

NET The relay output is active in Net Weight mode

GROSS The relay output is active in Gross Weight mode

PEAK The relay output is active in Peak mode

Default: *GROSS*

Comparison with net weight, gross weight or peak. In this last case, the comparison is made with the last peak value acquired, even when the peak function is not active.

N.O. The relay 2 is normally open

N.C. The relay 2 is normally closed

Default *N.O.*

POS. The output is operating with positive weight

NEG. The output is operating with negative weight

Default: *POS*

NORML Output 2 is active with unstable weight

STABL Output 2 is active with stable weight

Default: *Norml*

hyst HYS TERESIS OF THE SET POINT 2

Hysteresis value compared to the SET POINT value

Values: from 000 to 999

Default: 2

t5t In LOGIC INPUTS TEST PROCEDURE

The display shows the Inputs status.

0 = input disabled

1 = input activated.

The Input 1 corresponds to the 1st value on the bottom.

Enable and disable the inputs to check the corresponding state on the display. During this procedure, the normal function of the inputs is not active. Use this procedure only to check the hardware.

t5out LOGIC OUTPUTS TEST PROCEDURE.

The display shows the Outputs status.

0 = Output disabled, 1 = Output activated.

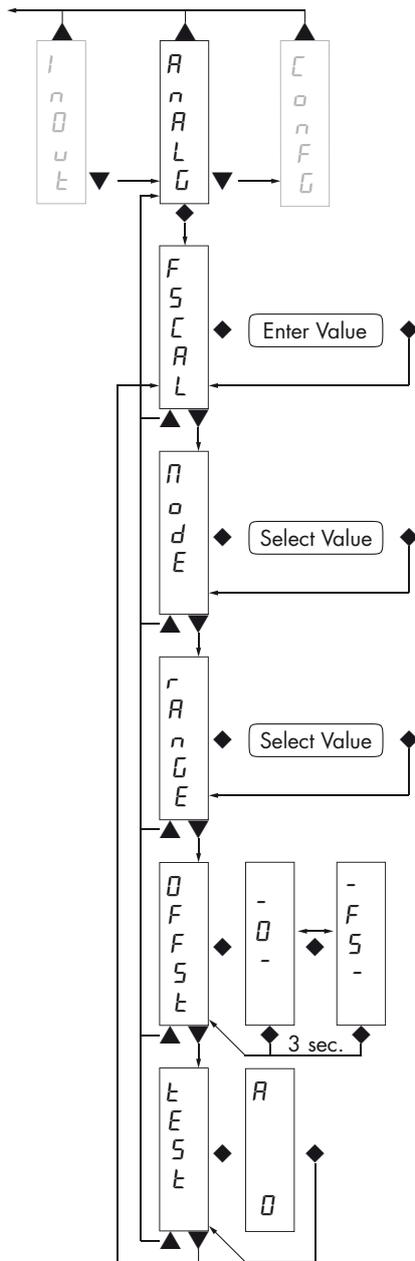
The Output 1 corresponds to the 1st value on the bottom.

▲ button to enable / disable the output 2.

▼ button to enable / disable the output 1.

During this procedure, the normal function of the outputs is not active. Use this procedure only to check the hardware.

ANALG - ANALOG OUTPUT PARAMETERS (DAT 100/A ONLY)



F S C A L **FULL SCALE**

It's the weight corresponding to the full scale of the analog Output that can be different from the capacity of the weighing system.

Values from 000 to 99999.

Default: the same value of the CAPACITY parameter

O d E **ANALOG OUTPUT OPERATION MODE**

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

Selectable Values:

NET

GROSS

PEAK

Default: GROSS

R A N G E **ANALOG OUTPUT RANGE**

Select the analog output range.

Selectable Values:

0÷20mA

4÷20mA

0÷10Vdc

0÷5Vdc

Default: 0÷10Vdc

O F F S E T **OFFSET CALIBRATION ADJUSTING**

Measure the analog output value with a multimeter to perform the calibration of zero (0) and full scale (FS).

Use the ▲ and ▼ to adjust the analog output. Press and hold down the key for a rapid change.

Press the ◆ key to switch from offset of zero and full scale.

Long press the ◆ key to exit this function.

T E S T **ANALOG OUTPUT TEST PROCEDURE**

With this procedure is possible to check the operation of the analog output, obtaining the output value through the use of the keyboard.

The display shows the percentage of the output value compared to the full scale value.

Use the ▲ and ▼ keysto increase/decrease the output value.

SERIAL COMMUNICATION PROTOCOLS

The COM1 RS232 serial port is always available, while the COM2 RS485 serial port is only available in the instrument:

DAT 100 /RS485.

On the COM2 RS485 the serial transmission protocols and the MODBUS RTU protocol are handled.

CONTINUOUS, AUTOMATIC AND MANUAL TRANSMISSION PROTOCOL

These protocols have been programmed into their programming menu.

The string transmitted is as follows:

STX	<code><state></code>	<code><weight></code>	ETX	<code><chksum></code>	EOT
-----	----------------------------	-----------------------------	-----	-----------------------------	-----

Where

STX (start of text) = 0x02h

ETX (end of text) = 0x03h

EOT (end of transmission) = 0x04.

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

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Tare entered	Zero band	Stable weight	Zero center

`<weight>` = field consisting of 8 ASCII characters with the weight value justified on the right. (without leading zeros, with possible decimal point and negative sign).

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

Under conditions of overload, the weight field assumes the value: "^^^^^^^".

Under conditions of underload (negative weight greater than 99999), the weight field assumes the value: "_____".

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

`<csum>` = checksum of the string data. It is calculated by performing the exclusive OR (XOR) of all characters from STX (or from `<ind>`) to ETX excluded the latter; the result of the XOR is decomposed into 2 characters by considering separately the upper 4 bits (first character) and lower 4 bits (second character); the 2 characters obtained are then ASCII encoded (example: XOR = 5Dh; `<csum>` = "5Dh" namely 35h and 44h).

In the case of continuous communication protocol, the given string is transmitted at a frequency of 10 Hz, regardless of the weight filter selected.

In the case of automatic and manual communication protocols, between 2 consecutive weight transmissions, they must undergo a corresponding change to the value set in DELTA parameter, in the setup menu of weighing parameters (see relevant paragraph).

SLAVE TRANSMISSION PROTOCOL

LIST OF THE CONTROLS AVAILABLE:

- Request of the current gross weight.
- Request of the current net weight.
- Request of the current peak value.
- Control of self-calibration.
- Control of semi-automatic zero.
- Control to reset the peak value.
- Setup of the weight SET POINTs.
- Request of the entered SET POINTs.
- Control of activation of the logic outputs (only if SET POINTs set to 0).
- Request of the logic inputs status.
- Control of the SET POINTs storage in permanent memory.

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

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

CONTROLS FORMAT DESCRIPTION:

The double quotes enclose constant characters (observe upper and lower case); the <and> symbols contain variable numeric fields.

REQUEST OF THE CURRENT GROSS WEIGHT

Master: <Addr> "L" EOT

DAT 100: <Addr> "L" <status> <gross> ETX <checksum> EOT

REQUEST OF THE CURRENT NET WEIGHT

Master: <Addr> "N" EOT

DAT 100: <Addr> "N" <status> <net> ETX <checksum> EOT

REQUEST OF THE CURRENT PEAK VALUE

Master: <Addr> "P" EOT

DAT 100: <Addr> "P" <status> <peak> ETX <checksum> EOT

CONTROL OF SELF-CALIBRATION

Master: <Addr> "A" EOT

DAT 100: <Addr> "A" ACK EOT

CONTROL OF SEMI-AUTOMATIC ZERO

Master: <Addr> "Z" EOT

DAT 100: <Addr> "Z" ACK EOT

CONTROL TO RESET THE PEAK VALUE

Master: <Addr> "X" EOT

DAT 100: <Addr> "X" ACK EOT

PROGRAMMING THE WEIGHT SET POINTS

Master: <Addr> "S" <set1> <set2> ETX <chksum> EOT

DAT 100: <Addr> "S" ACK EOT

REQUEST OF THE PROGRAMMED WEIGHT SET POINTS

Master: <Addr> "R" EOT

DAT 100: <Addr> "R" <set1> <set2> ETX <chksum> EOT

CONTROL OF ACTIVATION OF THE LOGIC OUTPUTS (ONLY FOR PROGRAMMED SET POINTS TO 0).

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

DAT 100: <Addr> "U" ACK EOT

REQUEST OF THE LOGIC INPUTS STATUS

Master: <Addr> "I" EOT

DAT 100: <Addr> "I" <inputs> ETX <chksum> EOT

CONTROL OF THE SET POINTS STORAGE IN PERMANENT MEMORY

Master: <Addr> "E" EOT

DAT 100: <Addr> "E" ACK EOT

In the case of communication error or otherwise unrecognized command from DAT 100, it will respond with the following string:

DAT 100: <Addr> NAK EOT

FIELDS DESCRIPTION

The double quotes enclose constant characters (observe upper and lower case); the <and> symbols contain variable numeric fields.

STX (start of text) = 0x02h,

ETX (end of text) = 0x03h,

EOT (end of transmission) = 0x04h,

ACK (acknowledgment) = 0x06h,

NAK (No acknowledgment) = 0x15h.

<Addr> = Serial communication address + 0x80h (i.e., address 2: <Addr> = 0x82h (130 decimal number)).

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

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Tare entered	Zero band	Stable weight	Zero center

<gross>, <net>, <peak> = field consisting of 8 ASCII characters with the weight value justified on the right (no leading zeros, with possible decimal point and negative sign).

Under conditions of overload, the weight field assumes the value: "^^^^^^^^".

Under conditions of underload, the weight field assumes the value: "_____".

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

<set1>, <set2> = field consisting of 6 ASCII characters with the weight value justified on the right. (without leading zeros, with possible decimal point and negative sign).

<Outputs>, <Inputs> = field consisting of only 1 ASCII character coded as per the table below (bit = 1 if Output/Input ON)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	0	0	Input 2 / Output 2	Input 1 / Output 1

<csum> = checksum of the string data. It is calculated performing the exclusive OR (XOR) of all characters from STX (or from <ind>) to ETX excluded the latter; the result of the XOR is decomposed into 2 characters considering separately the upper 4 bits (first character) and lower 4 bits (second character); the 2 characters obtained are then ASCII encoded (example: XOR = 5Dh; <csum> = "5Dh" namely 35h and 44h).

MODBUS RTU PROTOCOL

For any hardware configuration of the instrument (RS485 or Ana), the MODBUS RTU protocol is always available on COM1 RS232; in the event of hardware DAT 100 / RS485, the MODBUS RTU protocol is also available on COM2 RS485.

WARNINGS: The addresses listed in the tables below follow the standard routing specified in the reference guidelines of the Modicon PI-MBUS-300 Rev.J (www.modbus.org), referred to below is an excerpt that helps the user to communicate with the instrument.

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

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

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

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

The values of the registers with address greater than 40100 are permanently stored in memory only after the data save command (see Command Register table). If this function is not performed by turning off the instrument, it will return to the value before the change.

If not otherwise specified, the numerical values (such as addresses, codes and data) are expressed as decimal values.

COMMUNICATION ERRORS HANDLING

In case of MODBUS RTU, the communication strings are controlled by the CRC (Cyclic Redundancy Check). In the case of a communication error, the slave does not respond with a string. The master must consider a timeout for the receipt of the response. In case of no answer there is a communication error.

RECEIVED DATA ERROR HANDLING

In the case of string received correctly, but that cannot be executed, the slave responds with an EXCEPTION RESPONSE according to the following table.

Code	Description
1	ILLEGAL FUNCTION (The function is not valid or not supported)
2	ILLEGAL DATA ADDRESS (The address of the specified data is not available)
3	ILLEGAL DATA VALUE (The received data have invalid value)

SUPPORTED FUNCTIONS

FUN 03 READ HOLDING REGISTER

FUN 06 WRITE SINGLE REGISTER

FUN 16 WRITE MULTIPLE REGISTERS

LIST OF THE MODBUS PROTOCOL HOLDING REGISTERS

Address	Holding Register	R/W	Notes
40001	Status Register	R	See relevant table.
40002	Gross weight (MSB)	R	FLOAT value.
40003	Gross weight (LSB)	R	FLOAT value.
40004	Net weight (MSB)	R	FLOAT value.
40005	Net weight (LSB)	R	FLOAT value.
40006	Peak (MSB)	R	FLOAT value.
40007	Peak (LSB)	R	FLOAT value
40008	Logic Inputs	R	Only DAT 100 ANA. It's always 0 in the other versions.
40009	Logic Outputs	R/W	Writing of outputs enabled only if the SET POINTs are programmed to 0.
40201	SET POINT 1 (MSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
40202	SET POINT 1 (LSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
40203	SET POINT 2 (MSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
40204	SET POINT 2 (LSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
40501	Data Register (MSB)	W	FLOAT value. Writing before or with the same query of Command Register.
40502	Data Register (LSB)	W	FLOAT value. Writing before or with the same query of Command Register.
40503	Command Register	W	See relevant table.
41001	Capacity of the load cells (MSB)	R/W	
41002	Capacity of the load cells (LSB)	R/W	
41003	Sensitivity of the load cells	R/W	
41004	Weight division value	R/W	See relevant table.
41101	Weight filter factor	R/W	
41102	Weight stability factor	R/W	
41103	Auto-zero SET POINT	R/W	FLOAT value.
41104	Auto-zero SET POINT	R/W	FLOAT value.
41105	Zero tracking factor	R/W	
41106	Zero band	R/W	
41107	Weight Delta	R/W	
41201	Operation mode of the thersold 1	R/W	See relevant table. Used only for DAT 100 ANA.
41202	Hysteresis of the SET POINT 1	R/W	FLOAT value. Used only for DAT 100 ANA.
41203	Hysteresis of the SET POINT 1	R/W	FLOAT value. Used only for DAT 100 ANA.
41204	Operation mode of the thersold 2	R/W	See relevant table. Used only for DAT 100 ANA.
41205	Hysteresis of the SET POINT 2	R/W	FLOAT value. Used only for DAT 100 ANA.
41206	Hysteresis of the SET POINT 2	R/W	FLOAT value. Used only for DAT 100 ANA.
41401	Analog full scale (MSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
41402	Analog full scale (LSB)	R/W	FLOAT value. Used only for DAT 100 ANA.
41403	Oper. mode Anal. Output	R/W	0 = net, 1 = gross, 2 = peak. Used only for DAT 100 ANA.
41404	Analog Output range	R/W	0 = 0-20 mA, 1 = 4-20 mA, 2 = 0-10 V, 3 = 0-5 V.
42000	Monitor register	W	The programmed value is automatically copied to Monitor Register (42100).
42100	Monitor register	R	

REGISTER STATUS CODING TABLE

BIT	15	14	13	12	11	10	9	8
Description	Not used	Not used	Output 2	Output 1	Input 2	Input 1	Memory Flag	Not used
BIT	7	6	5	4	3	2	1	0
Description	Not calibrated	Wrong weight	Over-load	Under-load	Tare entered	Zero band	Stable weight	Zero center

WARNING: bits 13, 12, 11 and 10 are managed only in the event of hardware version DAT 100/A, in the other hardware versions these bits are always 0.

COMMAND REGISTER CODING TABLE FOR MODBUS PROTOCOL

Register value	COMMAND REGISTER FUNCTION	DATA REGISTER FUNCTION
0x0001	Semiautomatic zero	-
0x0002	Self-calibration	-
0x0003	Peak reset	-
0x0010	Calibration of the weight zero	-
0x0011	Calibration of the full weight scale	FLOAT sample weight
0x0020	Saving the data in the permanent memory	-

Address	Data stored in memory with command 0x0020
41001-41002	Load cells capacity
41003	Load cells sensitivity
41004	Weight division value
41101	Weight filter factor
41102	Weight stability factor
41103-41104	Auto-zero SET POINT
41105	Zero tracking factor
41106	Zero band
41107	Weight Delta

CODING DIVISION VALUE TABLE

Register value	0	1	2	3	4	5	6	7	8
Division value	0.0001	0.0002	0.0005	0.001	0,002	0,005	0.01	0.02	0.05

Register value	9	10	11	12	13	14	15	16	17
Division value	0.1	0.2	0.5	1	2	5	10	20	50

NOTES ON THE OPERATION OF THE ANALOG OUTPUT

LIMITS

When the weight exceeds the analog full-scale, the output takes a positive saturation value of about 10.7 V for the voltage output and 21.2 mA for current output.

When the weight is negative or in an error condition, the output takes a negative saturation value of about -10.5 V for the voltage output and -0.2 mA for current output.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The display shows the O-L message.	The weight gained is not detectable because the cell is absent or incorrectly connected	Check the connections of the cells.
The display shows the upper hyphen on the display	The weight gained cannot be shown because it exceeds the available five digits or is greater than the capacity of the cells.	
The display shows the lower underscore on the display.	The weight gained is not representable because negative, more than -9999.	
The number of decimal places is wrong.	You have not selected the correct division value.	Select the correct division value in the main menu.
The serial communication does not work properly.	You have not performed the installation correctly. The selection of the operation of the serial interface is incorrect.	Check the connections as described in the installation manual. Select the settings as appropriate.
The function of semiautomatic zero doesn't work.	The gross weight exceeds the action limit of semi-automatic zero. The weight doesn't stabilize.	To re-establish the zero, you need to calibrate the weight. Wait for the stabilization of the weight or adjust the weight filter parameter.
The semiautomatic tare function does not work.	The gross weight is negative or exceeds the maximum capacity. The weight doesn't stabilize.	Check the gross weight. Wait for the stabilization of the weight or adjust the weight filter parameter.

EU Declaration of conformity (DoC)

We

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

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

Apparatus model/Product: **DAT 100**
Type: Weighing instrument

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

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

The following harmonized standards and technical specification have been applied:

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

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

The following harmonized standards and technical specification have been applied:

EN 61010-1:2011

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

Di Reda Donato - Manager





PAVONESYSTEMS

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ISO 9001