1 YEAR
WARRANTY

OMEGA™

User's Guide

Shop online at omega.com

e-mail: info@omega.com
For latest product manuals:
www.omegamanual.info

DP400S
Strain Indicator

omega.com info@omega.com

Servicing North America:

U.S.A. Headquarters: Omega Engineering, Inc.
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com
For Other Locations Visit omega.com/worldwide

Table of Contents

Introduction

Thanks for choosing an Omega device.
DP400S is an indicator/panel meter for acquisition and retransmission of processes, also with fast transient. It is provided with relay outputs for alarm purpose, analog output for retransmission of process/setpoints and programmable digital inputs.
Available in standard format 96 x 48 mm, the device can be configured both for horizontal and vertical mounting.
Distinctive feature is the intuitive multilingual interface, supported by a graphic OLED monochromatic yellow display 128 x 64 pixel.
Visualization options include bar graph and process trend with programmable sampling time.
Software features include mathematical functions related to process value like totalizer and sum.
Serial connectivity relies on RS485 and Modbus-RTU protocol.

Safety guide lines

Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device. Disconnect power supply before proceeding to hardware settings or electrical wirings.
Only qualified personnel should be allowed to use the device and/or service it and in accordance to technical data and environmental conditions listed in this manual. Do not dispose electric tools together with household waste material.
In observance European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

1 Model identification

Model 24..230 Vac/Vdc +/-15% 50/60 Hz – 8 VA	
DP400S	2 Relays 2A + 1 output mA + 2 D.I.+ RS485 + OLED display + RFID

2 Technical Data

2.1 General data

Display	Backlighting graphic OLED 2.42'' (DP400S)
Operating temperature	Temperature 0-40 °C - Humidity 35..95 Rh%
Sealing	IP54 front panel (with gasket) - IP20 box and terminals
Material	Box: Polycarbonate V0
Weigh	Approx. 165 g

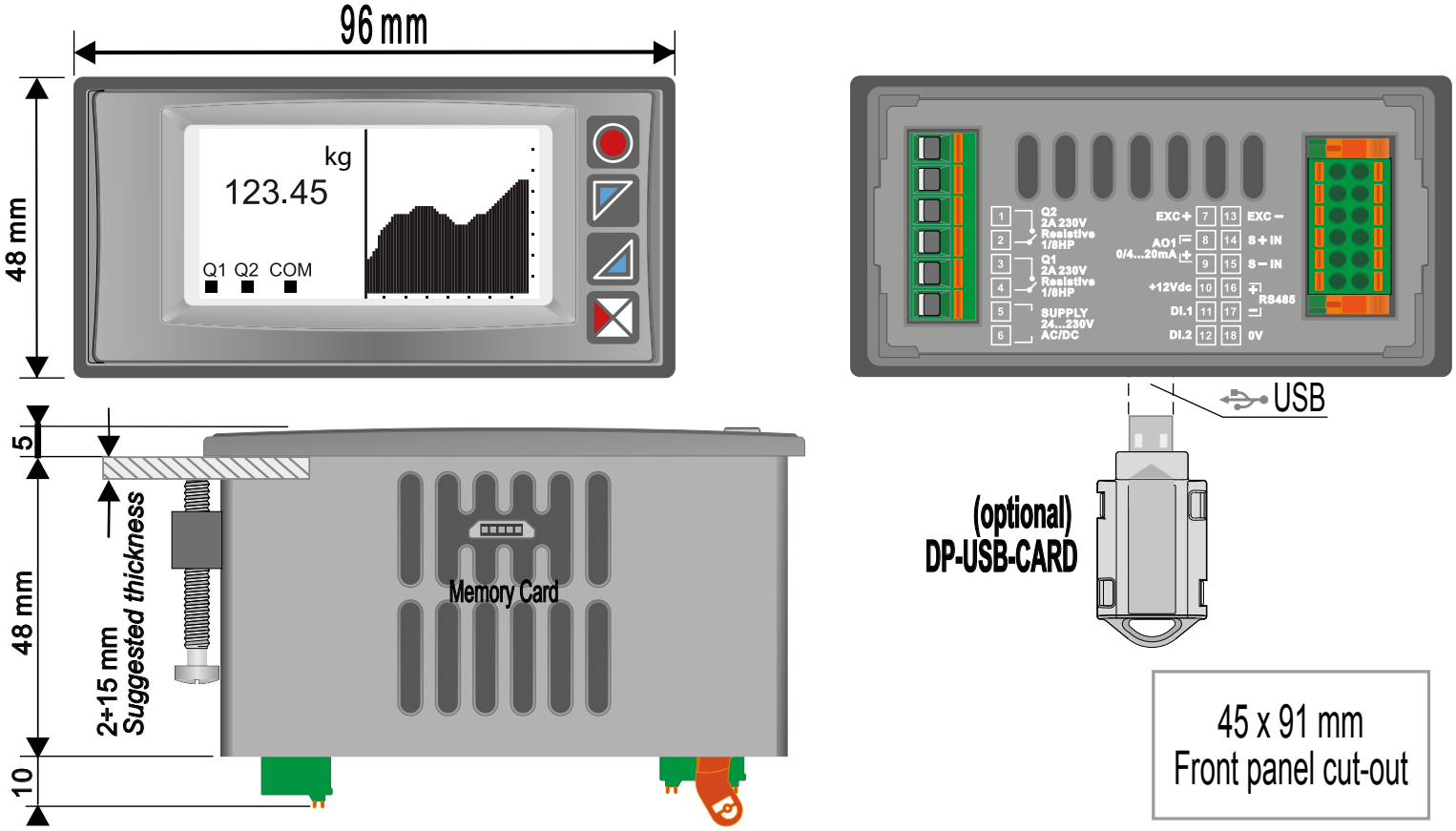
3 Hardware data

Power supply	Extended power supply range 24..230 Vac/Vdc ±15% 50/60 Hz	Consumption: 8 VA.
Analog input	IN+ / IN- Differential input, software-configurable - for strain-gauge (load cells or Melt sensors), max 7,5 mV/V with 5V power supply (max 4 cells 350 Ω in parallel). - for potentiometer (min. 200 Ω, 5V power supply.	Tolerance (25 °C) +/-0.2% ±1 digit (f.s.) Impedance Ri>1 MΩ
Relay outputs	2 Relays	Contacts 2A - 250 Vac. Resistive charge.
Analog output	Config. as 0..20mA or 4..20mA.	Resolution 16bit +/-0.2% (F.s.)

3.1 Software data

Alarms regulation	ON/OFF with hysteresis
Alarm mode	Absolute/Threshold, Band with instantaneous/delayed/ retentive action/activation by digital input , Sensor failure / Activation by serial line/net weight/Gross weight/Stable weight/Sum
Sum Function	By digital input or by keyboard it is possible to sum different process measurements over time
Totalizer Function	Visualization of instant process value and total value since last reset
Trend visualization	Trend visualization up to 59 samples, with selectable time basis 0,1 s to 3600 s
Analog retransmission	Process values/alarm value via analog output
Digital transmission	Process values/Setpoint/Parameters via RS485
Calibration function	Following options are available for calibration procedure: • Calibration with 2-points sampling value • Calibration on full-scale % value • Calibration value mV/V.
Data logging function	Selectable time basis 1s to 3600s, tot. memory 1K samplings
Text menus	English/Italian/Deutsch/French/Spanish
Autozero	Measure reset at starting
Net / Fross	Net/gross weight function by key, digital input or serial.
Stability	Signaling of configurable stable weight

4 Dimensions and Installation



5 Electrical wirings

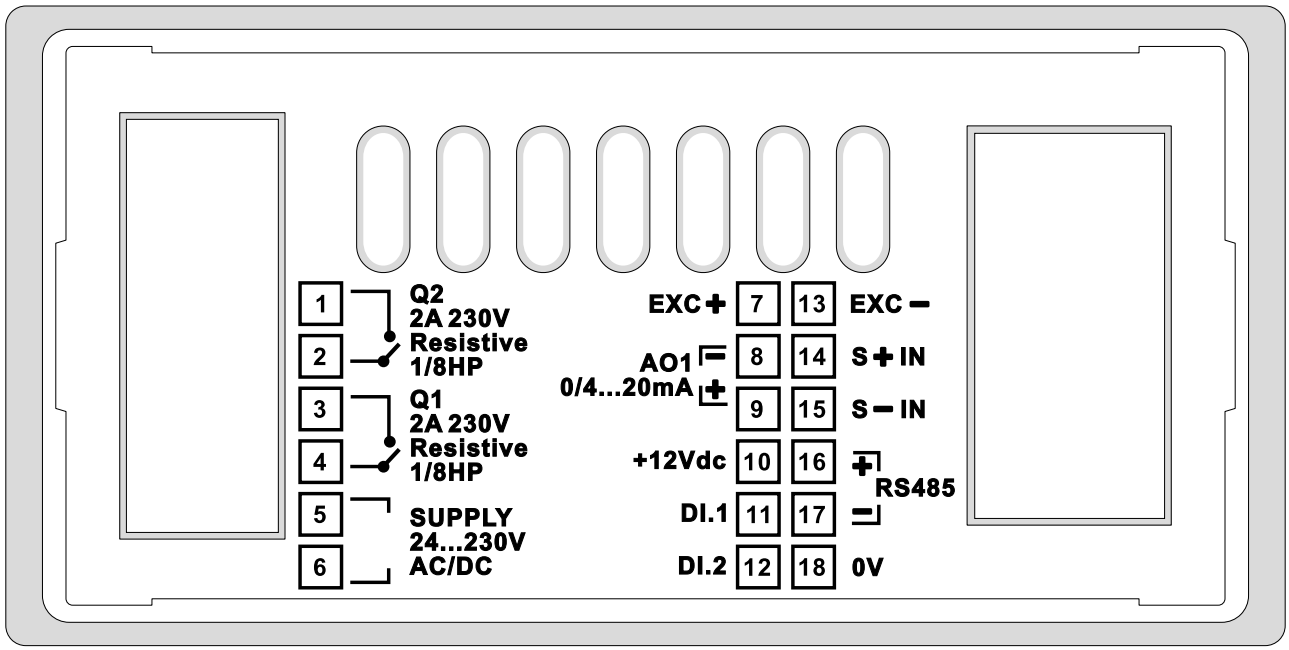
Although this controller has been designed to resist noises in an industrial environment, please notice the following safety guidelines:

- Separate control lines from the power wires.
- Avoid the proximity of remote control switches, electromagnetic meters, powerful engines.
- Avoid the proximity of power groups, especially those with phase control.

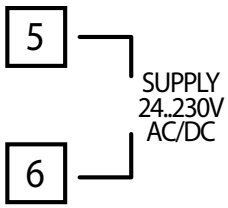
For permanently connected equipment:

- supply wiring must be ≥18 AWG with cables suitable for temperatures > 70° C;
- for requirements about any external switch or circuit-breaker see EN 61010-1 par. 6.11.3.1 and about external overcurrent protection devices see EN 61010-1 par. 9.6.2; the switch or circuit-breaker must be near the equipment.

5.1 Wiring diagram

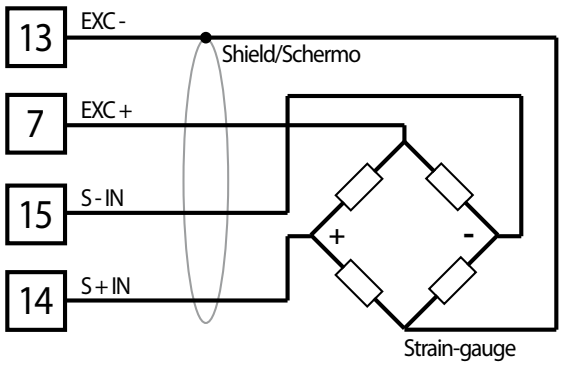


5.1.a Power supply



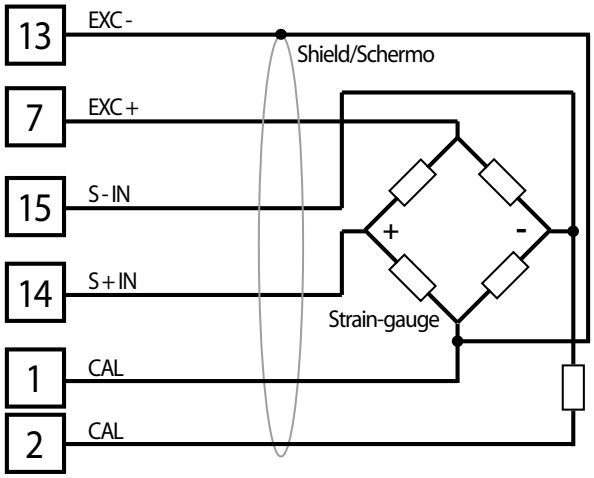
Switching supply, extended range 24..230 Vac/Vdc ±15% 50/60 Hz – 8 VA (galvanically isolated).

5.1.b S +IN / S -IN analog input



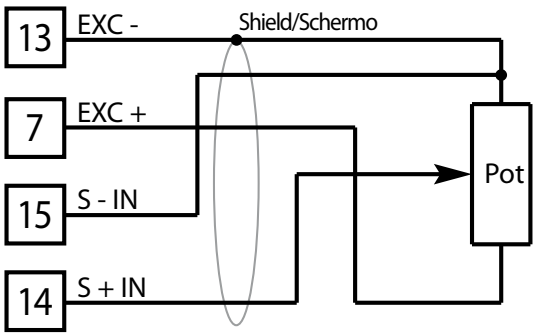
For strain-gauge sensors (4 wires)

- Comply with polarity.
- When shielded cable is used, it should be connected to pin 13 (EXC-).



For strain-gauge sensors (4 wires+ 2 calibration wires) or Melt sensors

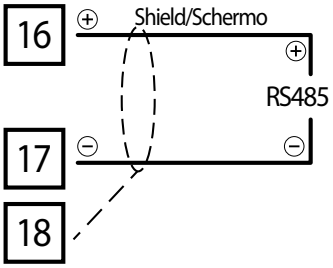
- Comply with polarity.
- To perform semi-automatic calibration, connect the 2 calibration wires to the relay contact Q2 and set properly the parameter for output Q2.
- When shielded cable is used, it should be connected to the pin 13 (EXC-).



For linear potentiometers

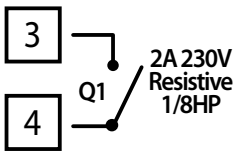
- Use potentiometers with resistive value greater than 200 Ω.
- When shielded cable is used, it should be connected to pin 13 (EXC-)

5.1.c Serial input



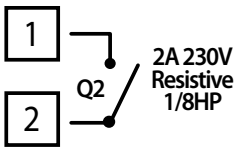
RS485 Modbus RTU communication

5.1.d Relay Q1 output

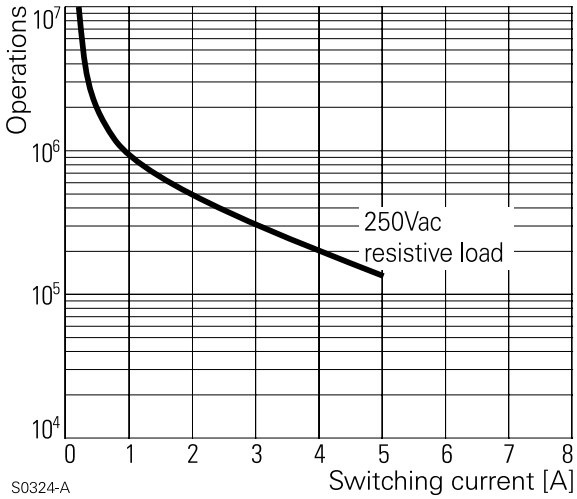


Contacts capacity 2 A/250 Vac for resistive loads.
NB: see picture below

5.1.e Relay Q2 output

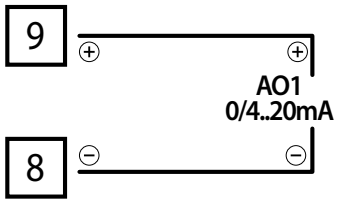


Contacts capacity: 2A/250 Vac for resistive loads.
NB: see picture below



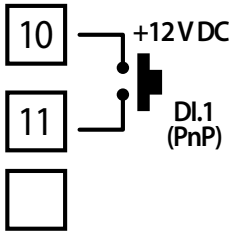
Electrical endurance Q1 / Q2.
2 A, 250 Vac, resistive load, 10^5 operations.
20/2 A, 250 Vac, cosφ = 0.3, 10^5 operations.

5.1.f Output AO1 mA



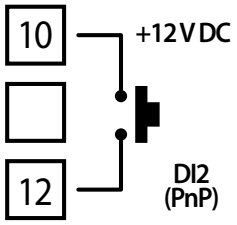
Pins 8-9: analog output in **mA** configurable by parameters as retransmission of process or alarm setpoints (see parameters 112-116).

5.1.g Digital Input 1



PNP digital input.
Digital input configurable by parameter 95
Short-circuit pins 10 and 11 to activate digital input 1.

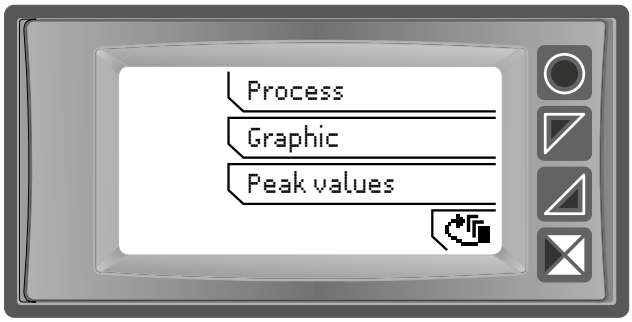
5.1.h Digital Input 2



PNP digital input.
Digital input configurable by parameter 100
Short-circuit pins 10 and 12 to activate digital input 2.

6 Display and Key Functions

6.1 Keys

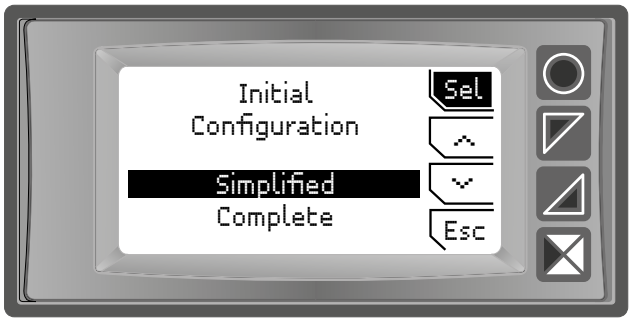


Keys are multifunction: in correspondence of each key its meaning is displayed.
If no description is shown, press a key to visualize it. Some menus are visualized only if enabled.

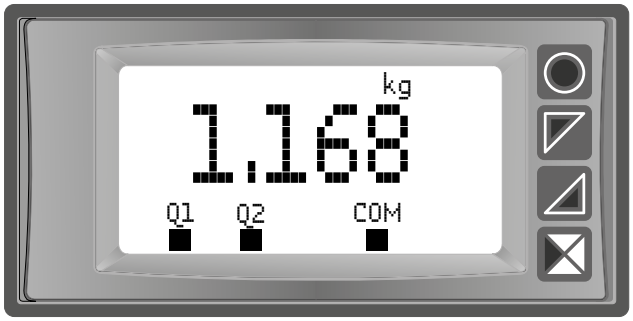
6.2 Display

It visualizes the process, the setpoints and all configuration parameters. The programming/ operation interface with text menus in 5 languages makes the navigation intuitive

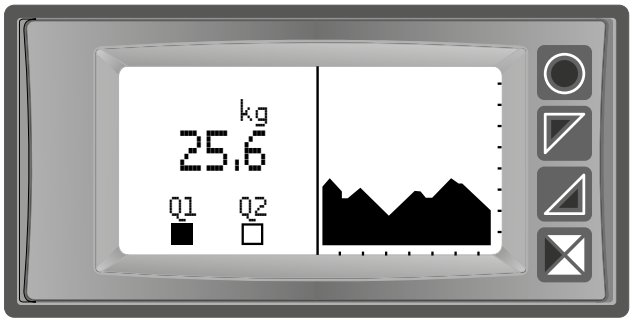
At first start-up, display shows the language selection.



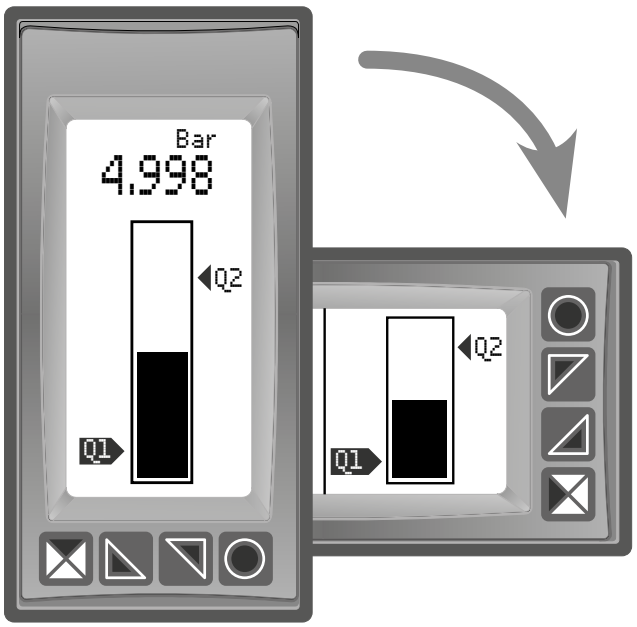
Once selected the language, it is possible to choose between two configuration modes: simplified or complete. The first mode allows to enter directly the parameter of pre-selected Easy-Up configurations, while selecting the second option it is possible to enter the complete configuration menu. “Esc” cancels configuration procedure.



This page displays the process, the relays status and the serial communication (if available).



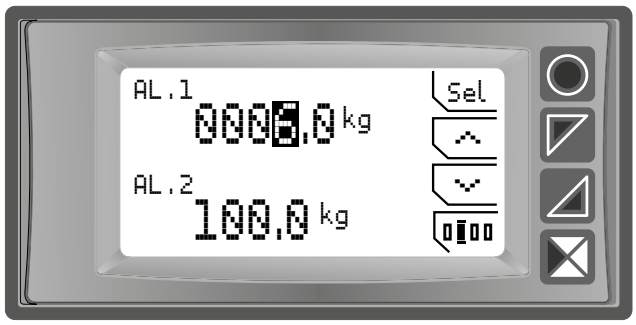
This page displays the process, the relays status and a graph representing the process trend.



This page displays the process and its graphic representation as bar graph. .

7 Controller Functions
7.1 Modifying alarm thresholds

Selecting one or more absolute/ band alarms, it is possible to modify the alarm thresholds directly by the user menu, without entering configuration.

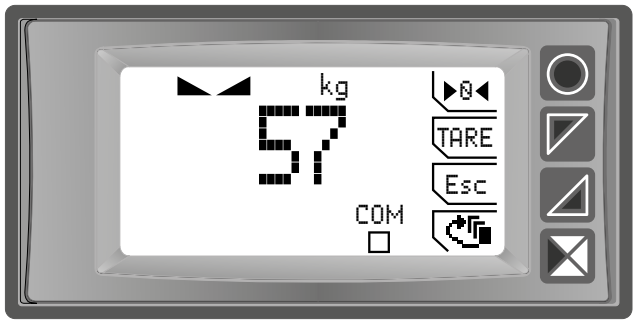


Press "Load data" to enter the thresholds modification.

For the modification procedure refer to the following table:

	Press	Display	Do
1	"Sel"	Selects the setpoint to be modified.	Press "^" and "v" to modify the value. Pressing "□■□□" it is possible to modify single digit
2	"Sel"	Selects the next setpoint (if activated), otherwise go to point 3.	See point 1.
3	"Sel"	"^" and "v" disappear.	Press "Esc" to exit procedure.

7.2 Zero function, net/gross weight



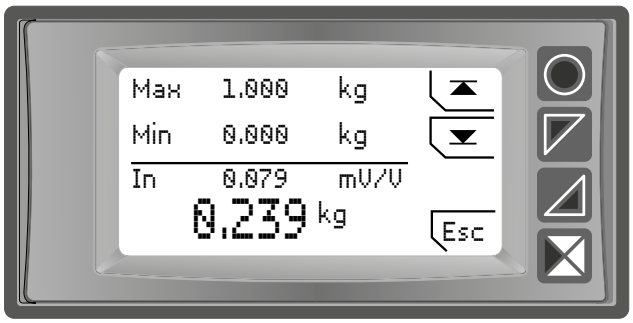
These functions, enabled by the relevant parameters during configuration, allow to reset the measure or to switch from gross to net weight and vieceversa. This window can be entered by process visualization, pressing one of the function keys.

Key	Short pressure	Long pressure (1 s)
“>0<”		This function is enabled only if the parameter 135 ->0<- is selected as Enabled. Executes the reset of visualized weight. This reset is kept also at switching off if the parameter 13 Store is selected as Enabled.
“TARE”		This function is enabled only if the parameter 135 TARE is selected as Enabled. Executes the switch from gross to net weight and vice-versa. Ex.: once put the container on the scale, display will show its weight. Press TARE to visualize the net weight at 0 (on the upper left side of display appears NET). Putting the weighing item into the container, display will show the product weight. This operation can be repeated several consecutive times. Net/gross value is lost at switching off.
“Esc”	Back to process visualization	
“”	Switch to menu visualization	

7.3 Calibration function

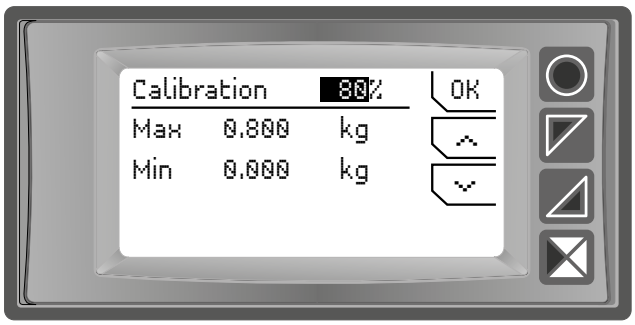
This function allows to activate a field calibration of linear input for strain-gauge or potentiometer. Different calibration options are available and may be selected by parameter, according to type of sensor/transducer and its relevant application. To activate calibration procedure, enter configuration mode, select the parameters group “Analog Inp.”, select Calibration parameter and chose one of the available options pressing “Sel”. Following calibration options are available:

- **Sampling value**. This proceeding performs a calibration of the analog input on two points of the scale taking as reference two known values (for example for a load cell these values could be Zero balance and Reference weight). It is possible to link the calibration lower limit (parameter 6 Lower lim.) to the minimum value of the sensor or to the minimum position of the potentiometer while the calibration upper limit (parameter 7 Upper lim.) may be linked to the max value of the sensor or the maximum position of the potentiometer.

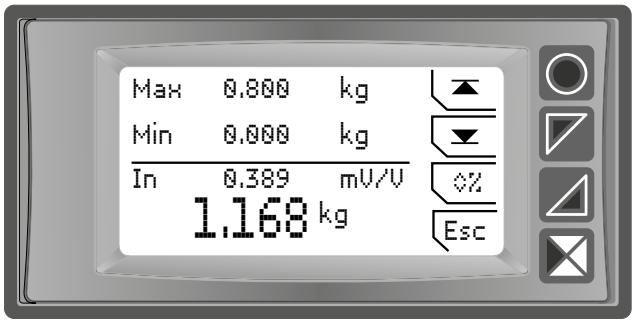


Press "⩡" to calibrate lower limit and "⩠" to calibrate the upper limit.

- **Full-scale % value**. This proceeding is available for 6wires (4wires+2 wires calibration) strain-gauge sensors and for Melt transducers. It is possible to calibrate reading of analog input by choosing the percentage of the full-scale value at which the calibration of the upper limit will be performed. At first the operator will be asked to select the percentage for the calibration of the upper limit. Afterward the lower limit value and upper limit value (% of full-scale value) will also be calibrated, as for the sampling value. The two calibration wires of the sensor can be connected to relay of output Q2 to perform a semi-automatic calibration. In this case it is necessary to select the option Calibration % on parameter Alarm 2 - Type of alarm. If contact Q2 will not be used to generate sensor calibration signal, it is possible to short-circuit externally the two wires, waiting for stabilization of reading on the device and then proceeding to calibration of upper limit.

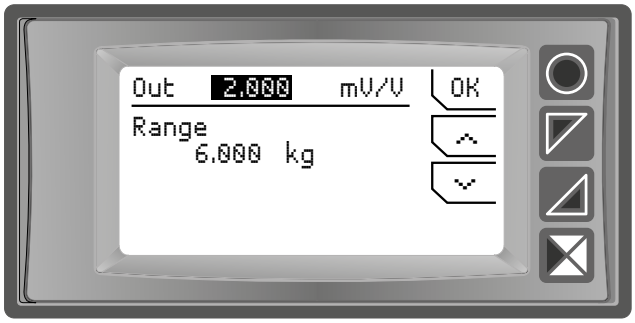


Use the arrow keys to set the calibration percentage, then confirm with "Ok".

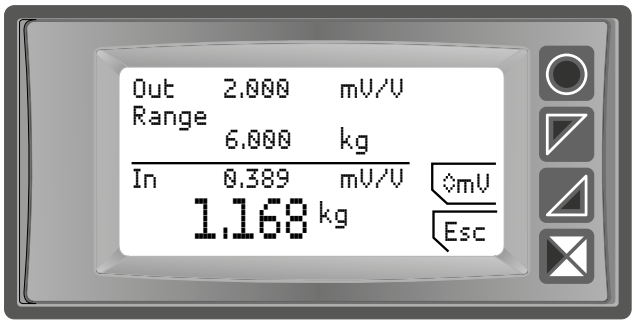


Press "⩡" to calibrate lower limit and "⩠" to **for the upper limit**. Press "◊%" to go back to calibration percentage.

Value mV/V. This calibration option is available only for strain-gauge sensors and it is basing on the setting of correct ratio mV/V for the sensor. Process value will be calculated considering both the entered ratio mV/V and the effective mV/V value detected by the analog input.



Use the arrow keys to set the correct mV/V ratio of strain gauge. Press "Ok" to confirm.

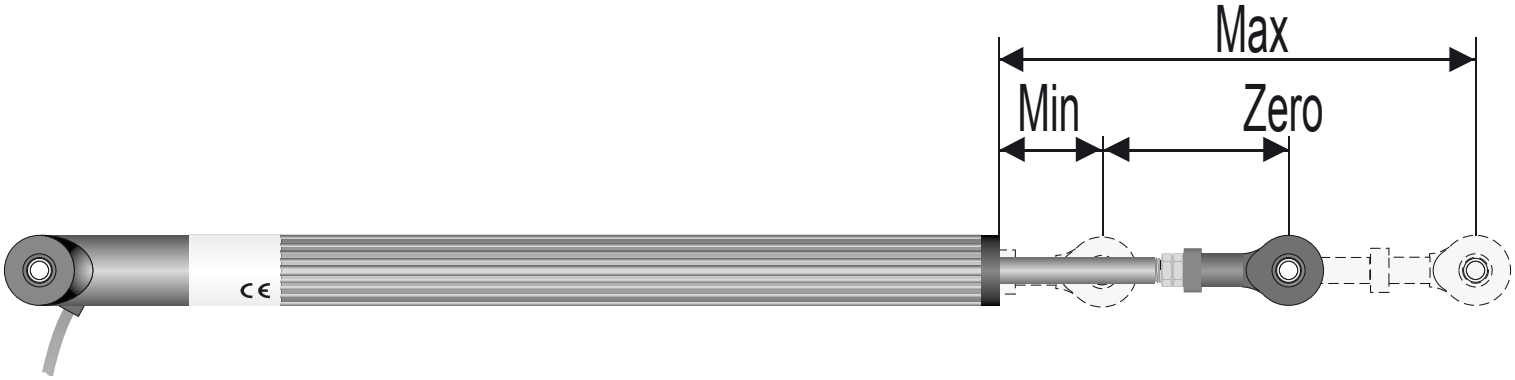


Press "◊mV" to go back to setting of mV/V ratio.

For the calibration procedure refer to the following table:

Press	Display	Do
1		Place sensor on its minimum operating position (related to **Lower limit calibration**).

	Press	Display	Do
2	"^" and "v"	**Full-scale% value**: enter the % of full-scale value at which the calibration of upper limit will be performed. **Value mV/V**: enter the correct value mV/V of the sensor.	
3	"Ok"	**Full-scale% value**: confirm the selected %. **Value mV/V**: Confirm the selected mV/V value.	Visualization will automatically switch to sensor calibration page where real-time value read by the device is visualized.
4	"◊%" and "◊mV"	Press to go back to settings of calibration % or to settings of mV/V value of the sensor.	Visualization will automatically switch to the page for the setting of full-scale % or mv/V value.
5	"⩡"	Set the value on minimum.	Place the sensor on its maximum operating position (related to **Upper limit**).
6	"⩠"	Set the value to maximum	To exit standard procedure press "Esc". For zero setting place the sensor on the zero point (tare).
7	">0<"	Set the virtual zero value	Press "Esc" to exit procedure.



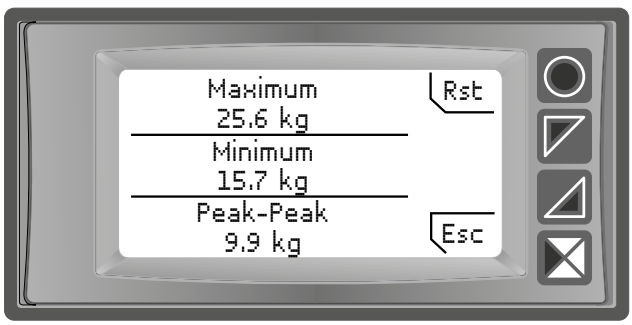
7.4 Digital input functions

On the DP400S, digital inputs can be enabled by configuring the parameter 95 **Digital input 1** and the parameter 100 **Digital Input 2.**

- **Enable outputs**: Enable operation of relays and analog outputs
- **Hold**: Lock the conversion.
- **Tare zero (AI)**: Set to zero the process value (tare function).
- **Alarm reset:** if one or more alarms are selected with manual reset and alarm conditions are no longer present, closing the digital input it is possible to restore the output related to alarm.
- **Totalizer reset**: if totalizer function is active, using the digital input it is possible to reset the counter.
- **Peaks reset**: Reset min. peak/max. peak/peak-to-peak values
  Sum total: if sum function is active, using the digital input it is possible to increase the Sum counter adding the process value.
- **Sum reset**: if the sum function is active, using the digital input it is possible to reset the Sum counter.
- **Config. lock**: if the digital input is active it is not possible to enter configuration or to modify the setpoints.
- **Gross/net TARE**: switches from the gross to the net weight visualization and vice versa.

Selecting **Digital input 1** or **Digital input 2** on the alarm parameters, the related relays will activate together with the digital input; functions selected on parameters 95 and 100 will continue to work.

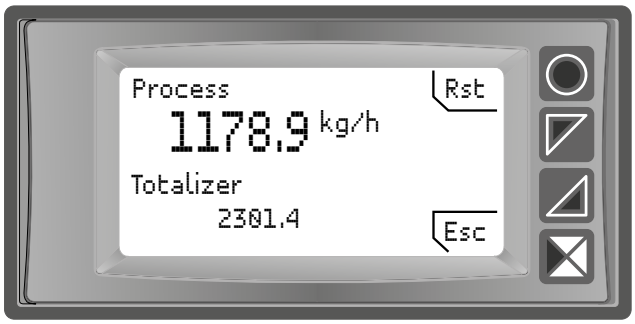
7.5 Peak values



The DP400S is provided with a page for the visualization of peak values: max. peak, min. peak and peak-to-peak of analog input. Keeping pressed "Rst" it is possible to reset the visualized values.

7.6 Totalizer function

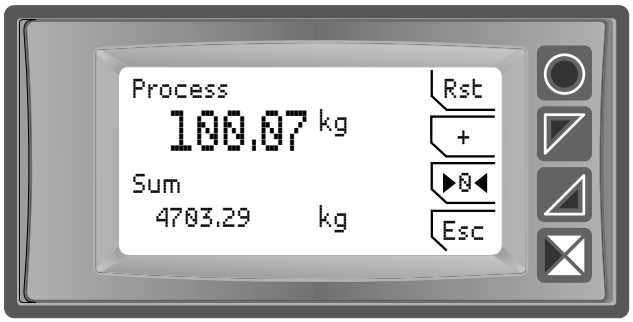
The totalizer function, which can enabled by parameter 9 **Totalizer**, performs an instant measurement of the process and sums it on a time basis to the previously totalized value.



On the dedicated page it is possible to see the instant process value and the totalized value: keeping pressed "Rst" it is possible to reset this value.

7.7 Sum function

The sum function, which can be enabled by parameter 10 **Sum function,** allows to increase a counter adding the process value upon relevant command. It is a typical application for weighing systems and it allows getting the total weighed value over a period of time.



Press "Sum function" to enter the related page. Pressing "+" the **Process** value is added to the counter. It is possible to reset the total value keeping pressed "Rst" and to fix **zero** of the process pressing ">0<".

Functions tare, sum and reset can also be managed by digital input if enabled on parameter 95 **Digital Input 1** and parameter 100 **Digital Input 2**.

7.8 Customizable linearisation of analog input

Selecting **16 steps** on parameter 17 **V/I custom** and connecting a linear sensor it is possible to customize the linear input for a max. of 16 steps. On parameters **xx-Input value** it is necessary to enter the value of the input to which the value selected on the corresponding parameter **xx-Custom value** will be related.

EExample: sensor 0-5V.

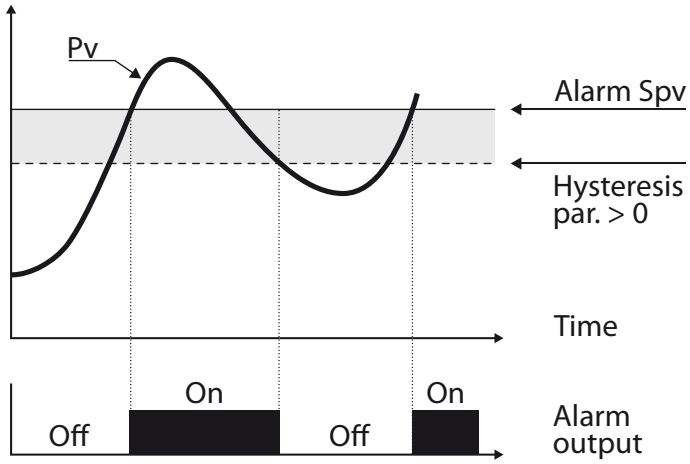
01-Input value=> 0.000V	01-Custom value=>0mBar
02-Input value => 2.000V	02-Custom value=>100mBar
03-Input value => 4.000V	03-Custom value=>500mBar
04-Input value => 5.000V	04-Custom value.=>1000mBar

At each value in Volt (input) a value in mBar (customized) is related: if the sensor supplies 2V the device visualizes 100mBar, if it supplies 4V the device visualizes 500mBar. For intermediate tension values the value in mBar is calculated linearly between the entered values containing it: 1V = 50mBar, 3V=300mBar and 4,5V=750mBar.

8 Alarm Intervention Modes

8.a Absolute alarm (absolute selection)

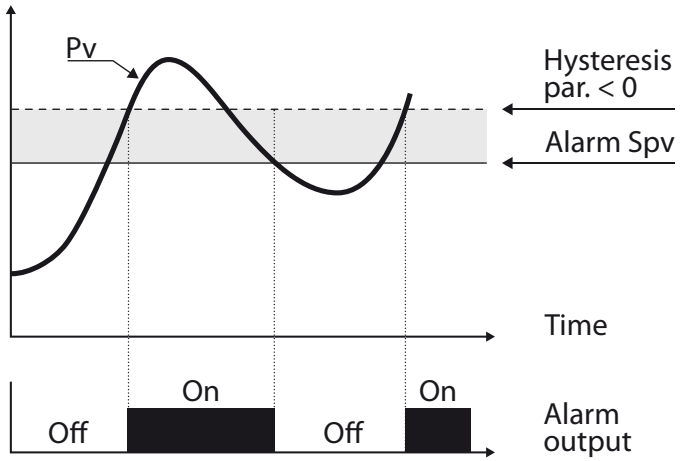
1



Absolute alarm and hysteresis value greater than “0” (Parameter 58 **hysteresis** > 0).

N.B. The example refers to alarm 1; the function can also be enabled for alarms 2

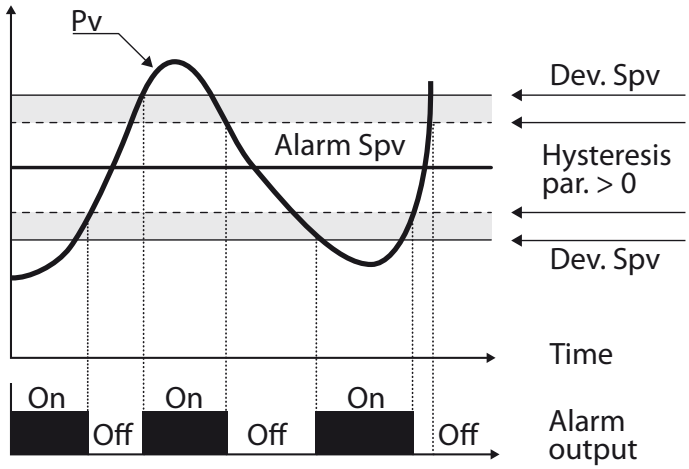
2



Absolute alarm and hysteresis value less than “0” (Parameter 58 **hysteresis** < 0).
N.B. The example refers to alarm 1; the function can also be enabled for alarms 2.

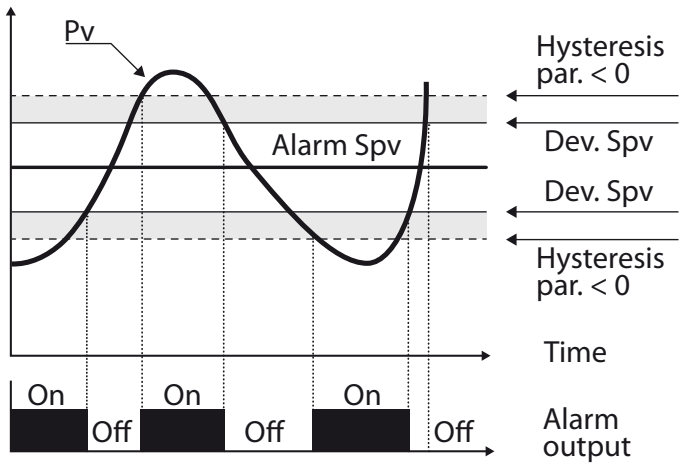
8.b Band alarm (band selection)

1



Band alarm and hysteresis value greater than “0” (Parameter 58 **hysteresis** > 0).
N.B. The example refers to alarm 1; the function can also be enabled for alarm 2.

2



Band alarm and hysteresis value less than “0” (Parameter 58 **hysteresis** < 0).
N.B. The example refers to alarm 1; the function can also be enabled for alarm 2.

8.c Digital input alarm (selection “Digital input 1” or “Digital input 2”)

Alarm related to digital input: the relay activates with digital input active.

8.d Sensor failure alarm (selection“Sensor failure”)

Sensor failure alarm: the relay activates in case of strain-gauge failure.

8.e Remote control alarm (selection “Remote control”)

The relay activates writing 1 on Modbus Word 1018 for alarm 1 and on Modbus word 1019 for alarm 2. Writing 0 the relay deactivates.

8.f Gross weight alarm (selection “Gross weight”)

The relays are activated when gross weight is selected (TARE function enabled by parameter 136).

8.g Net weight alarm (selection “Net weight”)

The relays are activated when net weight is selected (TARE function enabled by parameter 136).

8.h Stable weight alarm (selection “Stable weight”)

The relays are activated when the process reading is stable (stability function enabled by parameters 137 and 138).

8.i Sum alarm (selection “Sum”)

Absolute alarm managed on the sum value. For functioning details, refer to the graphics of the process absolute alarm.

8.j Alarm “ calibration % control “ (option “Calibration %”)

This option is available only for Alarm 2. Relay activates when, during calibration proceeding “Calibration on full-scale % value“, the calibration of sensor upper limit is activated by pressing the key. At the end of calibration, relay will automatically deactivate.

9 Data logger

DP400S features a basic data logger function which can be enabled on parameter 109 **Data logger.** After the initial start-up following the switch-on, the device will start to save process data on EEPROM according to a selected time basis. Sampling time must be selected on parameter 110 **Datalogger time**. Stored data may be read via Modbus protocol starting from address 6001 (MSW) or 9001 (LSW) (see following section of this manual). The following table provides info about the stored data:

6001(H)	6002 (L)	Data logger: firmware version
6003(H)	6004 (L)	Data logger: sensor type
6005(H)	6006 (L)	Data logger: decimal point
6007(H)	6008 (L)	Data logger: measure unit
6009(H)	6010 (L)	Data logger: sampling time in seconds
6011(H)	6012 (L)	Data logger: flag end of memory. **0** indicates that memory is still available. **1** indicates memory is saturated and device restarted to store data from address 6033/6034
6033(H)	6034(L)	First analog input value stored.
6035(H)	6036(L)	Second analog input value stored.
...	...	...
8031(H)	8032(L)	Last analog input value stored.

Reading of value 0x80000000 (-2147483648) stands for end of stored data: eventual data which should be read afterwards are not valid.

10 Serial communication

DP400S is equipped with RS485, it can receive and broadcast data via serial communication using MODBUS-RTU protocol. The device is configured as a Slave. This function enables the control of multiple devices connected to a supervisory system. Each controller responds to a master query only if the query contains the same address as that in the parameter 126 **Slave address**.
The permitted addresses range from 1 to 254 and there must not be controllers with the same address on the same line.

Address 255 can be used by the master to communicate with all the connected equipment (broadcast mode), while with 0 all the devices receive the command, but no response is expected.
DP400S can introduce a delay (in milliseconds) in response to the master request. This delay must be set on parameter 129 **Serial Delay**.
Each parameter change is saved by the controller on EEPROM memory (100000 writing cycles).

NB: changes made to Words that are different from those reported in the following table can lead to malfunction.

Modbus RTU protocol features	
Baud-rate	Selection on parameter 127 **Baud Rate**: 1.200 baud 28.800 baud 2.400 baud 38.400 baud 4.800 baud 57.600 baud 9.600 baud 115.200 baud 19.200 baud
Format	Selection on parameter 128 **Serial format**: 8, N, 1 (8 bit, no parity, 1 stop) 8, E, 1 (8 bit, even parity, 1 stop) 8, O, 1 (8 bit, odd parity, 1 stop) 8, N, 2 (8 bit, no parity, 2 stop) 8, E, 2(8 bit, even parity, 2 stop) 8, O, 2 (8 bit, odd parity, 2 stop)
Supported functions	WORD READING (max 20 word) (0x03, 0x04) SINGLE WORD WRITING (0x06) MULTIPLE WORDS WRITING (max 20 word) (0x10)

Looking at the table here below it is possible to find all available addresses and functions:

RO	Read Only	R/W	Read / Write	WO	Write Only

Modbus Address	Description	Read Write	Reset value
0	Device type	RO	EEPROM
1	Software version	RO	EEPROM
5	Slave address	RO	EEPROM
6	Boot version	RO	EEPROM
1000	Process (H)	RO	0
1001	Process (L)	RO	0
1002	Min. peak (H)	RO	0
1003	Min. peak (L)	RO	0
1004	Max. peak (H)	RO	0
1005	Max. peak (L)	RO	0
1006	Peak-to-peak (H)	RO	0
1007	Peak-to-peak (L)	RO	0
1008	Totalizer value (H)	RO	EEPROM
1009	Totalizer value (L)	RO	EEPROM
1010	Sum value (H)	RO	EEPROM
1011	Sum value (L)	RO	EEPROM
1012	Relays status (0 = Off, 1 = On): Bit 0 = Relay **Q1** Bit 1 = Relay **Q2**	RO	0
1013	Digital inputs status (0 = Off, 1 = Active): Bit 0 = **D.I.1** Bit 1 = **D.I.2**	RO	-
1014	Keys status(0 = released, 1 = pressed): Bit 0 =  Bit 1 =  Bit 2 =  Bit 3 = 	RO	0

Modbus Address	Description	Read Write	Reset value
1015	Error flags Bit 0 = Wrong calibration data Bit 1 = Wrong parameters Bit 2 = Wrong status data Bit 3 = Missing calibration error Bit 4 = EEPROM writing error Bit 5 = EEPROM reading error Bit 6 = Hardware error Bit 7 = Generic error Bit 8 = Process error (sensor) Bit 9 = Parameter out of range	RO	0
1016	Alarms status (0 = None, 1 = Active) Bit 0 = Alarm 1 Bit 1 = Alarm 2	RO	0
1017	Manual reset: write 0 to reset all alarms. In reading (0 = Not resettable, 1 = Resettable) Bit 0 = Alarm 1 Bit 1 = Alarm 2	R/W	0
1018	Alarm 1 status (remote control)	R/W	0
1019	Alarm 2 status (remote control)	R/W	0
1020	mA analog output value (remote control)	R/W	0
1021	Run by serial 0 = Inhibited outputs 1 = Active outputs	R/W	1
1022	Hold by serial 0 = Active analog input 1 = Analog input in Hold	R/W	0
1023	Tare zero AI (write 1)	R/W	0
1024	Totalizer reset (write 1)	R/W	0
1025	Peaks reset (write 1)	R/W	0
1026	Sum total (write 1)	R/W	0

Modbus Address	Description	Read Write	Reset value
1027	Total sum reset (write 1)	R/W	0
1028	Set net weight NET (write 1)	W	0
1029	Set gross weight (write 1)	W	0
1030	Stable 0 = not stable 1 = stable	RO	0
1100	Process (L)	RO	0
1101	Process (H)	RO	0
1102	Min. peak (L)	RO	0
1103	Min. peak (H)	RO	0
1104	Max. peak (L)	RO	0
1105	Max. peak (H)	RO	0
1106	Peak-to-peak (L)	RO	0
1107	Peak-to-peak (H)	RO	0
1108	Totalizer value (L)	RO	EEPROM
1109	Totalizer value (H)	RO	EEPROM
1110	Sum value (L)	RO	EEPROM
1111	Sum value (H)	RO	EEPROM
2001	Parameter 1 (H)	R/W	EEPROM
2002	Parameter 1 (L)	R/W	EEPROM
...	...	R/W	EEPROM
2300	Parameter 150 (L)	R/W	EEPROM
3001	Parameter 1 (L)	R/W	EEPROM
3002	Parameter 1 (H)	R/W	EEPROM
...	...	R/W	EEPROM
3300	Parameter 150 (H)	R/W	EEPROM
4001	Parameter 1 (H)*	R/W	EEPROM
4002	Parameter 1 (L)*	R/W	EEPROM
...	...	R/W	EEPROM
4300	Parameter 150 (L)*	R/W	EEPROM
5001	Parameter 1 (L)*	R/W	EEPROM

Modbus Address	Description	Read Write	Reset value
5002	Parameter 1 (H)*	R/W	EEPROM
...	...	R/W	EEPROM
5300	Parameter 150 (H)*	R/W	EEPROM
6001	Data logger: firmware version (H)	RO	EEPROM
6002	Data logger: firmware version (L)	RO	EEPROM
6003	Data logger: sensor type (H)	RO	EEPROM
6004	Data logger: sensor type (L)	RO	EEPROM
6005	Data logger: decimal point (H)	RO	EEPROM
6006	Data logger: decimal point (L)	RO	EEPROM
6007	Data logger: measure unit (H)	RO	EEPROM
6008	Data logger: measure unit (L)	RO	EEPROM
6009	Data logger: sampling time in seconds (H)	RO	EEPROM
6010	Data logger: sampling time in seconds (L)	RO	EEPROM
6011	Data logger: flag end memory. 0 indicates that memory is still available. 1 indicates memory is saturated and device restarted to store data from address 6033/6034 (H)	RO	EEPROM
6012	Data logger: flag end memory. 0 indicates that memory is still available. 1 indicates memory is saturated and device restarted to store data from address 6033/6034 (L)	RO	EEPROM
6033	First analog input value stored (H)	RO	EEPROM
6034	First analog input value stored (L)	RO	EEPROM
6035	Second analog input value stored (H)	RO	EEPROM
6036	Second analog input value stored (L)	RO	EEPROM
...	...	RO	EEPROM
8031	Last analog input value stored (H)	RO	EEPROM
8032	Last analog input value stored (L)	RO	EEPROM
9001	Data logger: firmware version (L)	RO	EEPROM
9002	Data logger: firmware version (H)	RO	EEPROM

Modbus Address	Description	Read Write	Reset value
9003	Data logger: sensor type (L)	RO	EEPROM
9004	Data logger: sensor type (H)	RO	EEPROM
9005	Data logger: decimal point (L)	RO	EEPROM
9006	Data logger: decimal point (H)	RO	EEPROM
9007	Data logger: measure unit (L)	RO	EEPROM
9008	Data logger: measure unit (H)	RO	EEPROM
9009	Data logger: sampling time in seconds (L)	RO	EEPROM
9010	Data logger: sampling time in seconds (H)	RO	EEPROM
9011	Data logger: flag end memory. 0 indicates that memory is still available. 1 indicates memory is saturated and device restarted to store data from address 9033/9034 (L)	RO	EEPROM
9012	Data logger: flag end memory. 0 indicates that memory is still available. 1 indicates memory is saturated and device restarted to store data from address 9033/9034 (H)	RO	EEPROM
9033	First analog input value stored (L)	RO	EEPROM
9034	First analog input value stored (H)	RO	EEPROM
9035	Second analog input value stored (L)	RO	EEPROM
9036	Second analog input value stored (H)	RO	EEPROM
...	...	RO	EEPROM
10031	Last analog input value stored (L)	RO	EEPROM
10032	Last analog input value stored (H)	RO	EEPROM

* *Parameters modified using serial address 4001 to 4300 and 5001 to 5300, will be stored on EEPROM only after 10s since last writing of one parameter.*

11 Error messages

The instrument signals failures/anomalies by means of messages on the display. The following are the possible messages:

Probe error	Detected a fault in the load cell or on the Melt sensor. The control on sensor is executed at each device starting.
Read EEPROM failure	Error during EEPROM memory reading
Write EEPROM fail	Error during EEPROM memory writing
Wrong tarature data	Error on device calibration data
Wrong parameters	Error on device configuration parameters
Wrong status data	Error on device status data
Param. out of range	Detected a parameter value out of range.
Missing calibration	Error on device calibration data

In all of these situations, the instrument might not be able to operate correctly. Switch it off and back on. If the problem persists, contact assistance.

12 Configuration

12.1 Modifying configuration parameters

For configuration parameters see paragraph 11

	Press	Display	Do
1	"Configuration"	Shows 0000 with the 1st digit selected.	
2	"^" and "v"	Changes the selected digit and moves to the next one using "□■□□"	Enter password 1234
3	"Sel" to confirm	Shows the names of the parameter groups.	
4	"^" and "v"	Scroll up / down the parameter groups.	
5	"Sel" to enter the parameter group	Shows the parameters of the selected group.	"^" and "v" to select parameter to be modified.

Press	Display	Do
6	"Sel" to enter the parameter modification	Shows all parameter possible selections or the parameter numeric value.	Press "^" and "v" to modify parameter. For numeric parameters, pressing "□■□□" it is possible to modify digit-to-digit. Press "Sel" to confirm modification. Press "<-" to exit without modify.

12.2 Loading default values

Enter password 9999 to restore factory settings of the device. Entering password 9911, at next restarting will be required only the language selection.

12.3 Configuration by NFC/RFID

Quick device setup by Direct Link app (only for Android®) on smartphones provided with NFC. The app is available for download on Google® PlayStore.

Position of the NFC/RFID antenna for communication with smartphone and reading / writing of data.

Configuration can also be done with device switched-off. If this operation is done with device switched-on, display will show a restarting message.

12.4 Configuration via DP-USB-CARD

The instrument can be configured quickly via a DP-USB-CARD. The DP-USB-CARD is connected to the micro-USB connector at the bottom of the instrument.

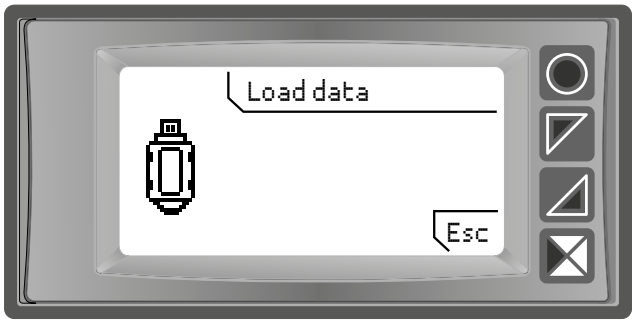
12.5 Creation of the DP-USB-CARD

To save a configuration of parameters on the DP-USB-CARD, with the instrument on, connect it to the micro-USB connector, enter configuration, set the parameters necessary and exit configuration. At this point, the instrument acknowledges the presence of the DP-USB-CARD and saves the configuration just made on the DP-USB-CARD as well.

Saving is signaled by a message on the display.

12.6 Loading configuration from DP-USB-CARD

To load a configuration previously made and saved on a DP-USB-CARD, connect it to the micro-USB connector and power the instrument. At this point, if the DP-USB-CARD is detected and the data it contains is considered valid, the display will view the request for loading data from the DP-USB-CARD.



The user can either “Load data” load the parameters from the DP-USB-CARD or “Esc” cancel the operation without modifying the current configuration.

13 Table complete of configuration parameters

13.1 Analog input

Parameters to configure the analog input.

1 Sensor type

Analog input configuration/sensor selection

Strain-gauge (**Default**)	4 wires (+ 2 optional calibration wires)
Potentiometer	min. 200 Ω

2 mV/V sensor

This parameter sets the ratio mV/V for the chosen strain-gauge. It has no meaning if a potentiometer is selected as sensor

0,001..20,000 mV/V, **Default**: 2,000 mV/V.

3 Decimal Point

Select type of the visualized decimal point

0 **Default**	0.00 2 Decimals
0.0 1 Decimal	0.000 3 Decimals

4 Measure unit

Select the visualized measure unit

g	mH2O	K	m/m	kg/h
kg (**Def.**)	N	V	m/h	no unit
q	kN	mV	l/s	Ncm
t	Nm	A	l/m	MN
oz	kNm	mA	l/h	daN
lb	kgf	mm	m^3/s	cN
bar	kgp	cm	m^3/m	mN
mbar	kip	dm	m^3/h	in-oz
psi	lbf	m	rpm	in-lb
Pa	ozf	km	%rh	ft-lb
mmHg	°C	in	ph	Torr
atm	°F	m/s	pcs	mTorr

5 Full-scale

Full-scale value of strain-gauge sensor, used during calibration type "**Calibration on full-scale % value**".
-999999 +999999 [digit[1]], **Default**: 1000.

6 Lower limit

Lower limit of sensor, used during input calibration type **Sampling value** or **Calibration on full-scale % value**.
-999999 +999999 [digit[1]], **Default**: 0.

7 Upper limit

Upper limit of sensor, used during input calibration type **Sampling value** or **Calibration on full-scale % value**
-999999 +999999 [digit[1]], **Default**: 1000.

8 Offset calibration

Analog input offset correction. Value added / subtracted to the process visualization.
-10000..+10000 [digit[1]], **Default** 0.0.

9 Gain calibration

Percentage value that is multiplied for the process value (allows to calibrated the working point)
-100.0%..+100.0%, **Default**: 0.0
ex: to correct the range from 0..1000kg showing 0..1010kg, set the parameter to -1.0.

10 Calibration

Selection of calibration type for the analog input. After finishing or deleting calibration proceeding, this parameter will automatically return to default setting (=Disabled).

Disabled (**Default**)	Full-scale % value
Sampling value	mV/V Value

11 Totalizer

Visualize on corresponding page the total value of measured process considering the sensor signal as unit/time value (ex. if full-scale of the connected sensor is 2000m^3/hour, parameter 11 **Totalizer** has to be selected as **Hour** and display will visualize the total fluid volume from the last RESET/START signal till present).

Disabled	Display visualizes process value (**Default**)
Second	Display visualizes rate in unit/s
Minute	Display visualizes rate in unit/min
Hour	Display visualizes rate in unit/hour

12 Sum function

Enable the sum function and its dedicated page. Allow to sum the process value to a variable.

Disabled (**Default**)

Enabled

13 Store

Enable to store in EEPROM the values of peaks, totalizer, sum function and zero tare. If disabled, at starting the above-mentioned values start from 0. The storing is done automatically every 5 minutes.

Disabled (**Default**)

Enabled

14 Conversion filter

ADC Filter: defines the type of digital filter applied to the reading of the analog input.

Filter 4th ord.

No filter

Average 2 samp.

...

Average 20 samp.

When average increase, control loop speed slows down.

Default: Average 10 samp.

15 Sampling frequency

Sampling frequency of analog / digital converter.

NB: Increasing the conversion speed will slow down reading stability (ex: for fast transients like pressure, it is advisable to increase sampling frequency)

1200 Hz	0.83ms (Maximum speed conversion)
600 Hz	1.67ms
240 Hz	4.16ms
75 Hz	13.3ms
37.5 Hz	26.7ms
30.0 Hz	33.3ms
15.0 Hz	66.7ms
12.5 Hz (**Default**)	(80ms Ideal for filtering noises 50 / 60 Hz)
2.5 Hz	400ms
1.86 Hz	533ms
1.18 Hz	851ms (Minimum speed conversion)

13.2 Weight management

Parameters to manage the device as a scale.

133 Max zero set

Set the max. weight value which is possible to reset by ">0<", digital inputs or serial.

0..Full-scale (**Default**: 1000)

134 Autozero start

Sets the max. weight value which is possible to reset at starting by the autozero function. If at starting the value of the revealed weight is less than this value, the weight is automatically reset. To disable this function keep the parameter to 0.

0..20% Full-scale (**Default**: 0)

135 Key ->0<-

Selects if enable or not ">0<" to reset the weight.
Disabled (**Default**)
Enabled

136 Key TARE

Selects if enable or not "TARE" to execute the weight net/gross function.
Disabled (**Default**)
Enabled

137 Show stability

Selects if visualize or not, on the process (weight) visualization display, the symbol which indicates measure stability.
Disabled (**Default**)
Enabled

138 Stability tolerance

Defines the max. tolerance allowed to consider the measure stable.
0..10% Full-scale (**Default**: 0)

13.3 V/I custom

Parameters to configure the customizable linearization of analog input.

17 V/I custom

Select the linearization type for the analog input if selected as linear.

Lower and upper limits	The input will be linearized by parameters 6 and 7 (**Default**)
16 steps	The input will be linearized by parameters 18-49

18 01-Input value

Define the input value to which the 1st customized value is assigned
0..5.000V **Default**: 0.

19 01-Custom value

Define the 1st customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

20 02-Input value

Define the input value to which the 2nd customized value is assigned
0..5.000V **Default**: 0.

21 02-Custom value

Define the 2nd customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 1000.

22 03-Input value

Define the input value to which the 3rd customized value is assigned
0..5.000V **Default**: 0.

23 03-Custom value

Define the 3rd customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

24 04-Input value

Define the input value to which the 4th customized value is assigned
0..5.000V **Default**: 0.

25 04-Custom value

Define the 4th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

26 05-Input value

Define the input value to which the 5th customized value is assigned
0..5.000V **Default**: 0.

27 05-Custom value

Define the 5th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

28 06-Input value

Define the input value to which the 6th customized value is assigned
0..5.000V **Default**: 0.

29 06-Custom value

Define the 6th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

30 07-Input value

Define the input value to which the 7th customized value is assigned
0..5.000V **Default**: 0.

31 07-Custom value

Define the 7th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

32 08-Input value

Define the input value to which the 8th customized value is assigned
0..5.000V **Default**: 0.

33 08-Custom value

Define the 8th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

34 09-Input value

Define the input value to which the 9th customized value is assigned
0..5.000V **Default**: 0.

35 09-Custom value

Define the 9th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

36 10-Input value

Define the input value to which the 10th customized value is assigned
0..5.000V **Default**: 0.

37 10-Custom value

Define the 10th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

38 11-Input value

Define the input value to which the 11th customized value is assigned
0..5.000V **Default**: 0.

39 11-Custom value

Define the 11th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

40 12-Input value

Define the input value to which the 12th customized value is assigned
0..5.000V **Default**: 0.

41 12-Custom value

Define the 12th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

42 13-Input value

Define the input value to which the 13th customized value is assigned
0..5.000V **Default**: 0.

43 13-Custom value

Define the 13th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

44 14-Input value

Define the input value to which the 14th customized value is assigned
0..5.000V **Default**: 0.

45 14-Custom value

Define the 14th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

46 15-Input value

Define the input value to which the 15th customized value is assigned
0..5.000V **Default**: 0.

47 15-Custom value

Define the 15th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

48 16-Input value

Define the input value to which the 16th customized value is assigned
0..5.000V **Default**: 0.

49 16-Custom value

Define the 16th customized value assigned to the input
-999999..+999999 [Digit[1]] **Default**: 0.

13.4 Dynisco MELT

This parameter allows to quickly set the device for operation with a selection of Dynisco melt pressure sensors.

52 Easy-up

Select one of the listed Dynisco melt pressure sensors to automatically configure the parameters suitable for that sensor

---------- (**Default**)

ECHO-MV3-PSI-R20
ECHO-MV3-PSI-R21
ECHO-MV3-PSI-R22
ECHO-MV3-PSI-R23
PT462E-15M-6/18

In particular, these selections should be set to the following parameters:

Sensor type
mV / V sensor
Decimal point
Measure unit
Full-scale
Lower limit
Upper limit
Alarm type 1 (absolute)
Contact type alarm 1
Alarm threshold 1
Hysteresis alarm 1
Lower limit alarm 1
Upper limit alarm 1
Alarm type 2 (calibration)
Graphic lower limit
Graphic upper limit

13.5 Alarm 1

Parameters to configure Alarm 1

54 Alarm type

Alarm 1 selection

Disabled (**Default**)
Absolute alarm
Band alarm
Digital input 1
Digital input 2
Sensor failure
Remote control
Gross weight
Net weight
Stable weight
Sum

55 Contact type

Select the alarm 1 output contact and intervention type

Normally open (**Default**)	N.O. - Disabled at starting
Normally closed	N.C. - Disabled at starting

56 Alarm threshold

Select setpoint for alarm 1

-999999..+999999 [Digit^2], **Default**: 0.0.

57 Deviation threshold

Select deviation value from alarm 1 setpoint for the band alarm

0..+999999 [Digit^2], **Default**: 0.0.

58 Hysteresis

Alarm 1 hysteresis

-10000..+10000 [Digit^2], **Default**: 0.0.

59 Reset type

Alarm 1 contact reset type

Automatic	(**Default**)
Manual	Manual reset by keyboard
Manual stored	Keeps relay status also after an eventual power failure

60 Error contact

State of contact for alarm 1 output in case of error

Open (**Default**)

Closed

62 Actuation delay

Alarm 1 delay.

-3600..+3600 seconds. **Default**: 0

Negative: delay in alarm exit phase.

Positive: delay in alarm entry phase.

63 Lower limit

Lower limit for alarm 1 setpoint.
-999999..+999999 [Digit^2]. **Default**: 0.

64 Upper limit

Upper limit for alarm 1 setpoint.
-999999..+999999 [Digit^2]. **Default**: 1000.

65 Protection

Alarm 1 set protection. Does not allow user to modify setpoint

Free	Modification allowed (**Default**)
Lock	Protected
Hide	Protected and not visualized

13.6 Alarm 2

Parameters to configure Alarm 2.

69 Alarm type

Alarm 2 selection

Disabled (**Default**)	Remote control
Absolute alarm	Gross weight
Band alarm	Net weight
Digital input 1	Stable
Digital input 2	Sum
Sensor failure	Calibration %

70 Contact type

Select alarm 2 output contact and intervention type
Normally open (**Default**)
Normally closed
N.O. - Disabled at starting
N.C. - Disabled at starting

71 Alarm threshold

Select setpoint for alarm 2
-999999..+999999 [Digit^2], **Default**: 0.0.

72 Deviation threshold

Select deviation value from alarm 2 setpoint for the band alarm
0..+999999 [Digit^2], **Default**: 0.0.

73 Hysteresis

Alarm 2 hysteresis
-10000..+10000 [Digit^2], **Default**: 0.0.

74 Reset type

Alarm 2 contact reset type

Automatic	(**Default**)
Manual	Manual reset by keyboard
Manual stored	Keeps relay status also after an eventual power failure

75 Error contact

State of contact for alarm 2 output in case of error
Open (**Default**)
Closed

77 Actuation delay

Alarm 2 delay. **-3600..+3600** s. **Default**: 0
Negative: delay in alarm exit phase.
Positive: delay in alarm entry phase.

78 Lower limit

Lower limit for alarm 2 setpoint
-999999..+999999 [Digit^2]. **Default**: 0.

79 Upper limit

Upper limit for alarm 2 setpoint
-999999..+999999 [Digit^{2}]. **Default**: 1000.

80 Protection

Alarm 2 set protection. Does not allow user to modify setpoint

Free	Modification allowed (**Default**)
Lock	Protected
Hide	Protected and not visualized

13.7 Display

84 Language

Select the language of the text menus

English (**Default**)	Français
Italiano	Español
Deutsch	

86 Contrast

Select the contrast value for the display
0%..100%, **Default**: 35%.

88 Screen timeout

Select the display backlighting duration

Always on (**Default**)		
15 seconds	2 minutes	30 minutes
30 seconds	5 minutes	1 hour
1 minute	10 minutes	

89 Display direction

Select the display visualization direction
Horizontal (**Default**)
Vertical

90 Starting page

Select the page visualized at starting after the initial splash screen

Process (**Default**)	Totalizer
Graphic	Sum function
Peak values	

13.8 Digital input 1

Parameters to configure digital input 1.

95 Input function

Select function of digital input 1

Disabled (**Default**)	Reset peaks
Enables outputs	Sum total (pulse operation)
Hold	Reset sum (pulse operation)
Tare zero »0« (pulse operation)	Config. lock.
Alarms reset	Gross/net TARE
Reset totalizer (pulse operation)	

96 Contact type

Select inactive contact for digital input 1

Normally open	(**Default**) Executes function with closed contact
Normally closed	Executes function with open contact

13.9 Digital input 2

Parameters to configure digital input 2.

100 Input function

Select function of digital input 2

Disabled (**Default**)
Enables outputs
Hold
Tare zero »0« (pulse operation)
Alarms reset
Reset totalizer (pulse operation)
Reset peaks
Sum total (pulse operation)
Reset sum (pulse operation)
Config. lock.
Gross/net TARE

101 Contact type

Select inactive contact for digital input 2

Normally open (**Default**) Executes function with closed contact
Normally closed Executes function with open contact

13.10 Graphic

Parameters to configure trend and bar graph management.

105 Graphic type

Select the type of graph to be visualized on the relevant page

Trend (**Default**)
Bar graph

106 Lower limit

Trend or bar graph lower limit

-999999 +999999 [Digit^2], **Default**: 0.

107 Upper limit

Trend or bar graph upper limit.

-999999 +999999 [Digit^2], **Default**: 1000.

108 Trend time

Select the trend sampling time
0,1..3600,0 seconds, **Default**: 60,0s.

109 Data logger

Enable the registration of process data on EEPROM
Disabled (**Default**)
Enabled

110 Data logger time

Select the data logger sampling time
1..3600 seconds, **Default**: 60s.

13.11 Analog output in mA

Parameters to configure the analog output in mA

112 Retransmission

Enable analog output
Disabled (**Default**)
Process
Alarm 1
Alarm 2
Remote Ctrl

113 Signal type

Select the signal for the analog output in mA
0..20 mA
4..20 mA (**Default**)

114 Lower limit

Analog output mA lower limit range
-999999..+999999 [Digit^2], **Default**: 0

115 Upper limit

Analog output mA upper limit range
-999999..+999999 [Digit[2]] **Default**: 1000

116 Error value

Select the value of the analog output in mA in case of error
0 mA (**Default**)
4 mA
20 mA

13.12 Serial communication

Parameters to configure the serial communication port.

126 Slave address

Select slave address for serial communication
1..254. **Default**: 240

127 Baud Rate

Select the baud rate for serial communication

1.200 baud	28.800 baud
2.400 baud	39.400 baud
4.800 baud	57.600 baud (**Default**)
9.600 baud	115.200 baud
19.200 baud	

[2] *Display of decimal point depends on setting of parameter 3 Decimal point.*

128 ComPort setting

Select the format for serial communication

8,N,1	8bit, No parity, 1 Stop bit (**Default**)
8,E,1	8bit, Even parity, 1 Stop bit
8,O,1	8bit, Odd parity, 1 Stop bit
8,N,2	8bit, No parity, 2 Stop bit
8,E,2	8bit, Even parity, 2 Stop bit
8,O,2	8bit, Odd parity, 2 Stop bit

129 Serial delay

Select the serial delay.

0..100 ms. **Default**: 10

Notes / Updates

Table of configuration parameters

WARRANTY / DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at omega.com

TEMPERATURE

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assy
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gages
- ☑ Load Cells & Pressure Gages
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

PH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Data Logging Systems
- ☑ Recorders, Printers & Plotter

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

2300.10.288-RevG
181218

M5726/0119