KX6

CONTROLLER WITH SERVOMOTOR DRIVE OUTPUT

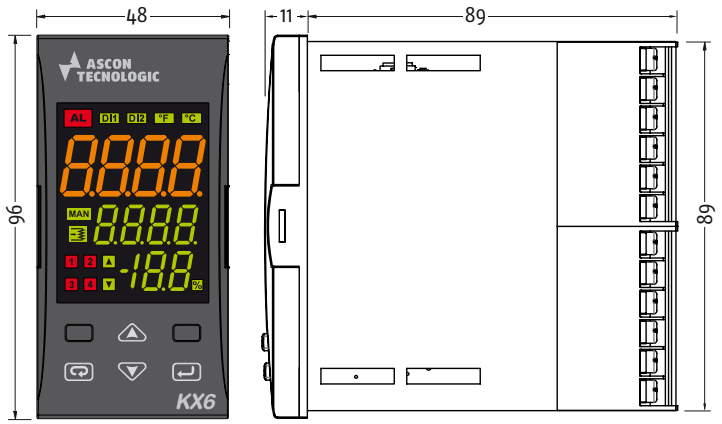
Engineering Manual

Code : ISTR-MKX6-ENG00 - Vr. 0.1 (ENG)

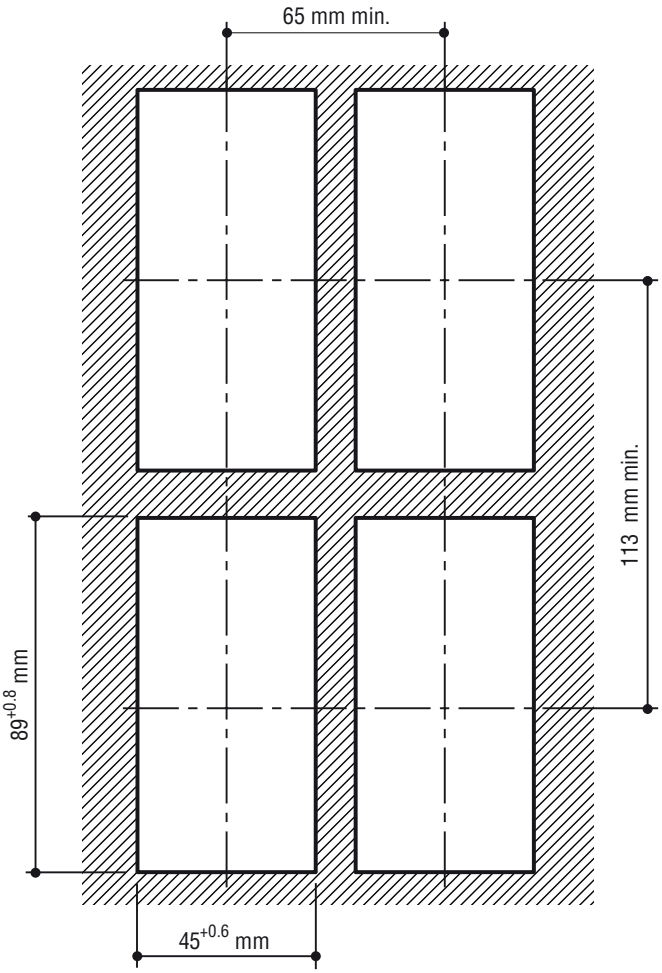
Ascon Tecnologic S.r.l.
Viale Indipendenza 56, 27029 Vigevano (PV) - ITALY
Tel.: +39 0381 69871/**FAX:** +39 0381 698730
www.ascontecnologic.com
e-mail: info@ascontecnologic.com

1. OUTLINE DIMENSIONS (mm)

1.1 Dimensions



1.2 Panel cutout



1.3 Mounting requirements

This instrument is intended for permanent installation, for indoor use only, in an electrical panel which encloses the rear housing, exposed terminals and wiring on the back.

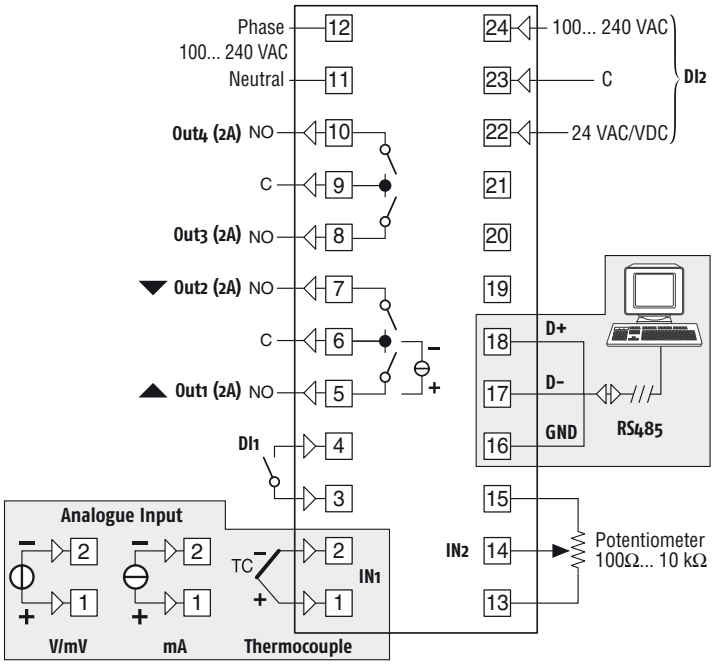
Select a mounting location having the following characteristics:

1. It should be easily accessible;
2. There is minimum vibrations and no impact;
3. There are no corrosive gases;
4. There are no water or other fluids (i.e. condensation);
5. The ambient temperature is in accordance with the operative temperature (0... 50°C);
6. The relative humidity is in accordance with the instrument specifications (20... 85%);

The instrument can be mounted on panel with a maximum thickness of 15 mm.

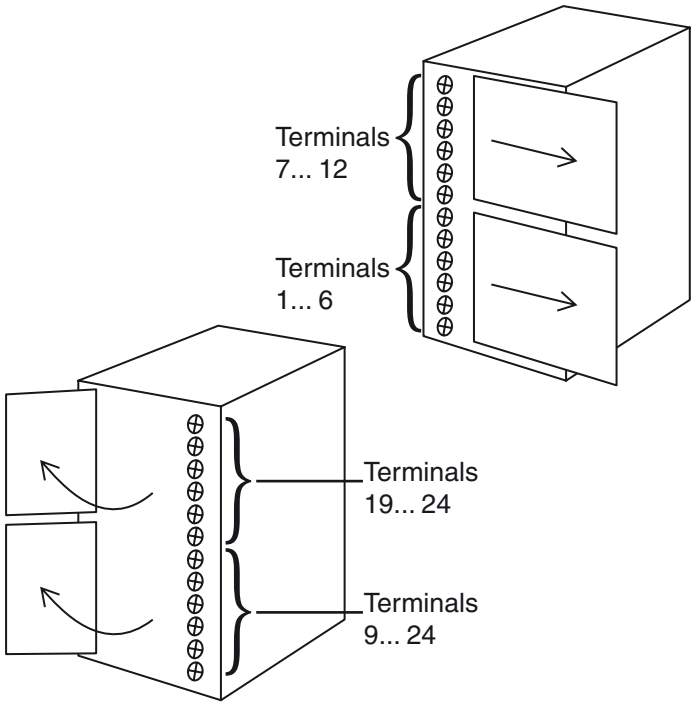
When the maximum front protection (IP65) is desired, the optional gasket must be mounted.

2. CONNECTION DIAGRAM



2.1 Terminal covers

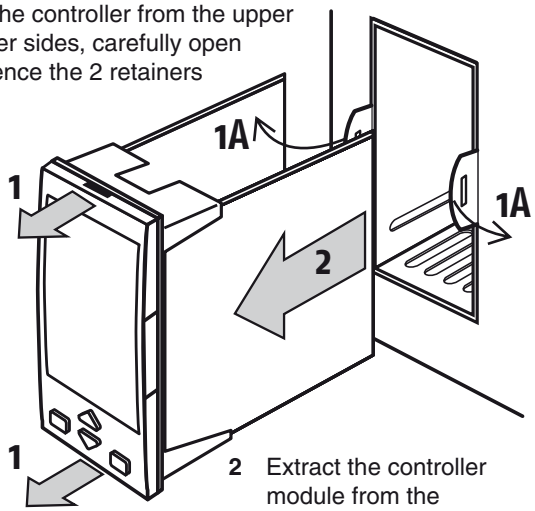
The controller terminals are protected with plastic covers. In order to make the connections, move the covers as shown in the illustrations.



2.2 Controller unplugging

The controller can be extracted from its housing (without removing the cabling).

1, 1A Pulling the controller from the upper and lower sides, carefully open in sequence the 2 retainers



2 Extract the controller module from the external housing

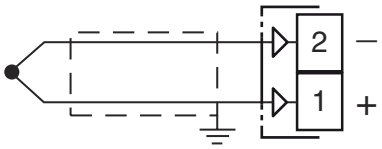
To re-insert the controller in its housing, reverse the extraction procedure.

2.3 General notes about wiring

1. Do not run input wires together with power cables.
2. External components (like zener barriers, etc.) connected between sensor and input terminals may cause errors in measurement due to excessive and/or not balanced line resistance or possible leakage currents.
3. When a shielded cable is used, it should be connected at one point only.
4. Pay attention to the line resistance; a high line resistance may cause measurement errors.

2.4 Inputs

2.4.1 Thermocouple Input



External resistance: 100Ω max., maximum error 25 μV.

Cold junction: automatic compensation between 0... 50°C.

Cold junction accuracy: 0.05°C/°C after a warm-up of 20 minutes.

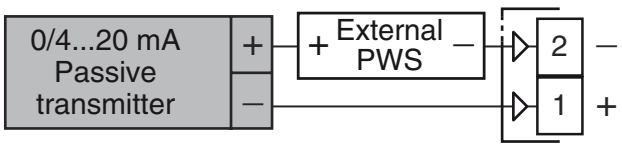
Input impedance: > 1 MΩ.

Calibration: According to EN 60584-1.

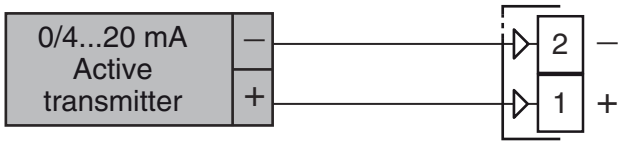
Note: For TC wiring use proper compensating cable preferable shielded.

2.4.2 mA Input

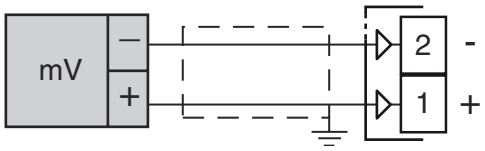
0/4... 20 mA input wiring for passive transmitter using an external pws



0/4... 20 mA input wiring for active transmitter

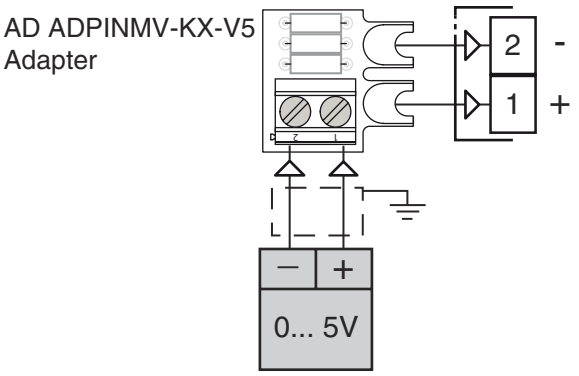


2.4.3 mV input



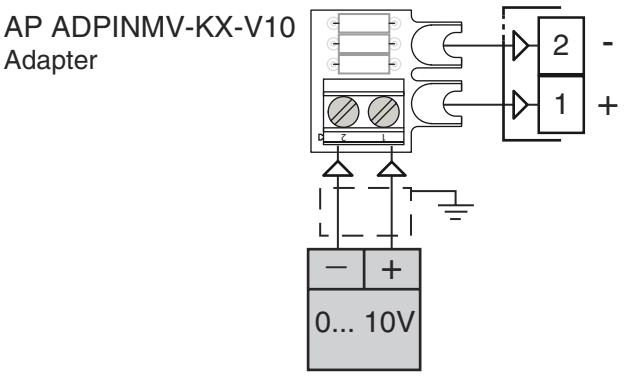
Input impedance: > 1 MΩ.

2.4.4 0... 5 V input



Input impedance: > 4 kΩ.

2.4.5 0... 10 V input



Input impedance: > 10 kΩ.

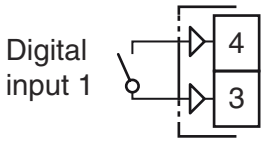
2.4.6 Logic Inputs

Safety notes:

– Do not run logic input wiring together with power cables;

– The instrument needs 150 ms to recognize a contact status variation;

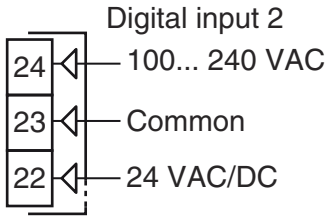
Logic input 1 - Driven by dry contact



Maximum contact resistance: 100Ω.
Contact rating: 10 V, 6 mA;

Note: Logic input 1 is **NOT** isolated by the measuring input. A double or reinforced isolation between logic input 1 and power line must be assured by the external elements.

Logic input 2 - Driven by 24 VAC/DC or 100... 240 VCA

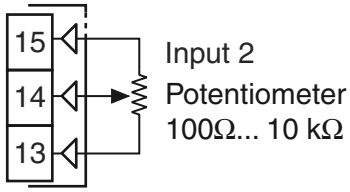


Note: Logic input 2 is isolated by the measuring input. A double or reinforced isolation between logic input 2 and power line is assured by the instrument.

2.4.7 Potentiometer input

Safety notes:

– Do not run potentiometer input wiring together with power cables.



Potentiometer range: From 100Ω to 10 kΩ.

2.5 Outputs

Safety notes:

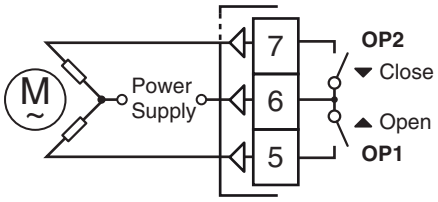
– To avoid electrical shocks, connect power line at last.

– For supply connections use No. 16 AWG or larger wires rated for at last 75°C.

– Use copper conductors only.

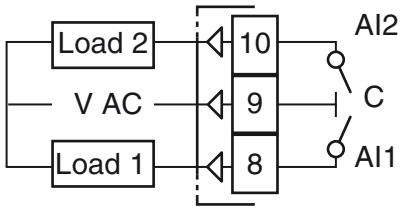
WARNING! Before connecting the output actuators, we recommend to configure the parameters to suit your application (e.g.: input type, Control strategy, alarms, etc.).

2.5.1 Servomotor output



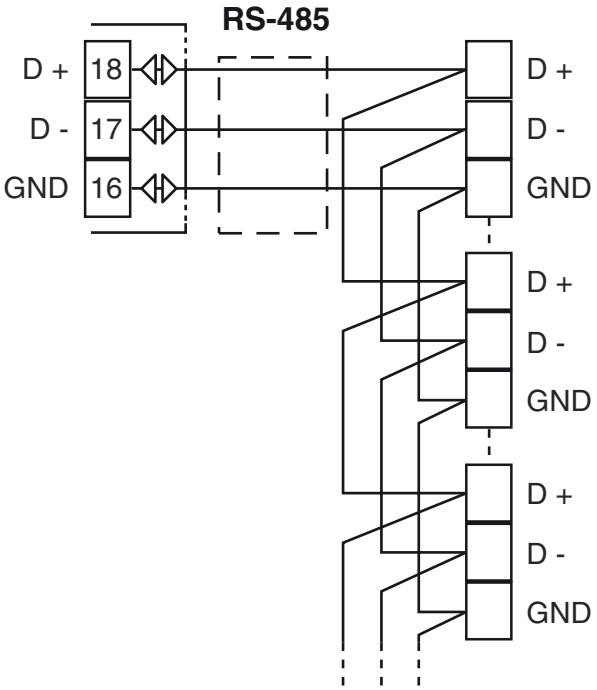
Contact rating: • 4 A /250 V cosφ =1;
• 2 A /250 V cosφ =0.4.
Operation: 1 x 10^5.

2.5.2 Alarm 1 and Alarm 2 output



Contact rating: • 2 A /250 V cosφ = 1;
• 1 A /250 V cosφ = 0.4.
Operation: 1 x 10^5.

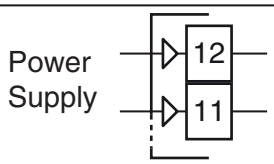
2.6 Serial Interface



Interface type: Isolated (50 V) RS-485;
Voltage levels: According to EIA standard;
Protocol type: MODBUS RTU;
Byte format: 8 bit with no parity;
Stop bit: 1 (one);
Baud rate: Programmable between 1200... 38400 baud;
Address: Programmable between 1... 255.

Notes: 1. RS-485 interface allows to connect up to 30 devices with one remote master unit.
2. The cable length must not exceed 1.5 km at 9600 baud.

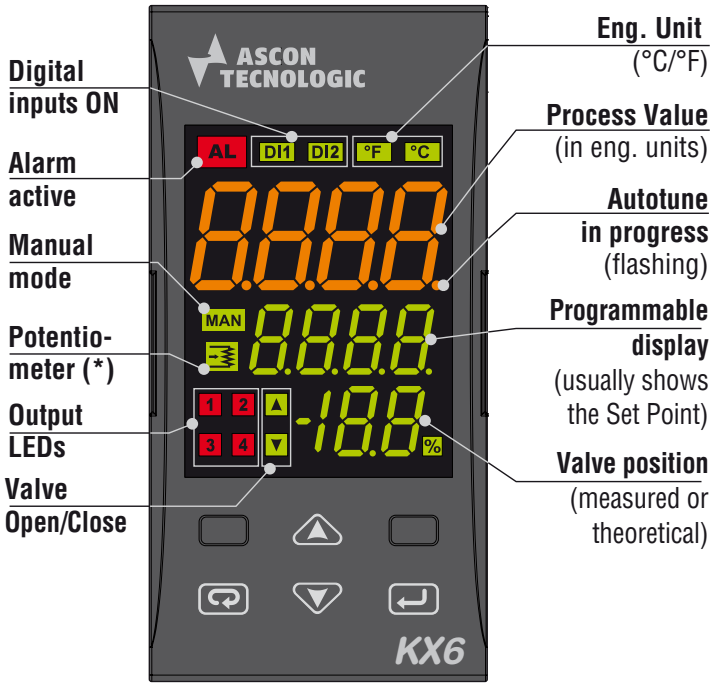
2.7 Power Supply



Supply Voltage: 100... 240 VAC (-15... +10%).

Notes: 1. Before connecting the instrument to the power line, make sure that line voltage is equal to the voltage shown on the identification label;
2. The polarity of the power supply has no importance;
3. The power supply input is NOT fuse protected. Please, provide a T type 1A, 250 V fuse externally.
4. When the instrument is powered by the A01 key, the outputs are NOT supplied and the instrument can show the “ouLd” (Out 4 Overload) indication.

3. PANEL DESCRIPTION



* Lit when the instrument is using the potentiometer; flashes when a potentiomter malfunction is detected.

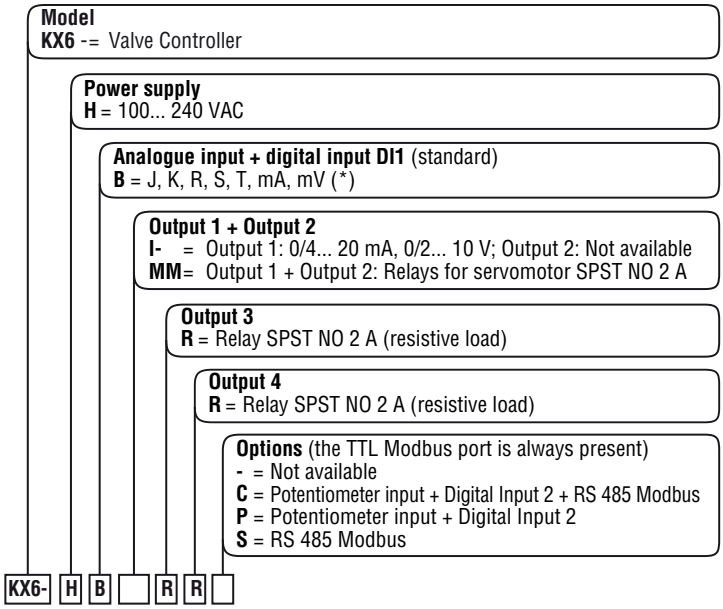
4. TECHNICAL CHARACTERISTICS

Case: Plastic, self-extinguishing degree: V-0 according to UL 94;
Front protection: IP65 (when the optional panel gasket is mounted) for indoor locations according to EN 60070-1;
Terminals protection: IP20 according to EN 60070-1;
Installation: Panel mounting;
Terminal block: 24 M3 screw terminals for cables of 0.25... 2.5 mm² (AWG22... AWG14) with connection diagram;
Dimensions: 48 x 96, depth 89,15 mm.
Panel cutout: 45(+0.6) x 89(+0.6) mm [1.78(+0.023) x 3.5(+0.023) in.]
Weight: 160 g max..
Power supply: 100... 240 VAC (-15... +10% of the nominal value);
Power consumption: 5 VA max.;
Insulation voltage: 2300 V rms according to EN 61010-1;
Display updating time: 500 ms;
Sampling time: 130 ms;
Resolution: 30000 counts;
Total Accuracy: ±0.5% F.S.V. ±1 digit @ 25°C of room temperature;

Electromagnetic compatibility and safety requirements

Compliance: directive EMC 2004/108/CE (EN 61326-1), directive LV 2006/95/CE (EN 61010-1);
Installation category: II;
Pollution category: 2;
Temperature drift: It is part of the global accuracy;
Operating temperature: 0... 50°C (32... 122°F);
Storage temperature: -30... +70°C (-22... +158°F);
Humidity: 20... 85% RH, not condensing.

5. HOW TO ORDER



* It is possible to obtain a 0... 10 V or 0... 5 V input, ordering the following part no., respectively:

- AP ADPINMV-KX-V10 (for 0... 10 V);
- AD ADPINMV-KX-V5 (for 0... 5 V).

6.1 Introduction

When the instrument is powered, it starts immediately to work according to the parameters values loaded in its memory.

The instrument behaviour and its performance are governed by the value of the stored parameters.

At the first start up the instrument will use a “default” parameter set (factory parameter set); this set is a generic one (e.g. a TC J input is programmed).

WARNING! **Before connecting the output actuators**, we recommend to configure the parameters to suit your application (e.g.: input type, Control strategy, alarms, etc.).

WARNING! Do not change the **[5] Unit (Engineering Unit)** value during process control as the set point inserted by the user (thresholds, limits etc.) are not automatically rescaled by the instrument.

To change these parameters you need to enter the “Configuration mode”.

6.2 Instrument behaviour at Power ON

At power ON the instrument can start in one of the following mode depending on its configuration:

Auto mode.

– The upper display will show the measured value;

– The meddle display will show the Set point value;

– The lower display will show the valve position (measured or theoretical according to the control strategy selected).

– The instrument is performing the standard PID control with servo-motor drive output.

Manual mode (oPLo).

– The upper display shows the measured value;

– The middle display shows the power output [preceded by H (for heating) or C (for cooling)]. The MAN LED is lit;

– The lower display will show the valve position (measured or theoretical according to the selected control).

– The instrument does not perform Automatic control;

– The control output can be manually modified by ▲ and ▼ buttons.

Stand by mode (St.bY).

– The upper display will show the measured value;

– The middle display will show alternately the set point value and the message StbY or oFF;

– The lower display will show the valve position (measured or theoretical according to the control strategy selected).

– The instrument does not perform any control (the Out 2 [close] is ever ON);

– The instrument is working as an indicator.

6.3 Configuration modes

6.3.1 How to enter the “Configuration modes”

The configuration mode allows to take advantage of all instrument features.

The instrument have one complete parameter set.

We call this set “configuration parameter set” (or “configuration parameters”).

The access to the configuration parameters is protected by a password.

Note: The instrument will show only the parameters consistent with the specific hardware and in accordance with the value assigned to the previous parameters (e.g.: if you set an Alarm as “not used” the instrument will mask all other parameters related to this Alarm).

6.3.2 Complete configuration procedure

The configuration parameters are collected in various groups. Every group defines all parameters related with a specific function (e.g.: control, alarms, output functions).

1. Push the ↵ button for more than 5 seconds. The upper display will show PASS while the middle display will show 0.
2. Using ▲ and ▼ buttons set the programmed password.

Notes: **1.** The factory default password for configuration parameters is equal to 30.

2. During parameter modification the instrument continue to perform the control.
In certain conditions, when a configuration change can produce a heavy bump to the process, it is advisable to temporarily stop the controller from controlling during the programming procedure (control output will be OFF).
A password equal to 2000 + the programmed value (e.g. 2000 + 30 = 2030).
The control will restart automatically when the configuration procedure will be manually closed.

3. Push the ↵ button.
If the password is correct the display will show the acronym of the first parameter group preceded by the symbol: -.
In other words the upper display shows: - inP
(group of the **Input parameters**).

The instrument is in configuration mode.

6.3.3 How to exit the “Configuration mode”

Push ↩ button for more than 5 seconds, the instrument will come back to the “standard display”.

6.4 Keyboard functions during parameter changing

↩ A short press allows to exit from the current parameter group and select a new parameter group.
A long press allows you to close the configuration parameter procedure (the instrument will come back to the “standard display”).

↵ When the upper display is showing a group and the middle display is blank, this key allows to enter in the selected group.
When the upper display is showing a parameter and the middle display is showing its value, this key allows

to store the selected value for the current parameter and access the next parameter within the same group.

Allows to increase the value of the selected parameter.

Allows to decrease the value of the selected parameter.

+ These two keys allow to return to the previous group. Proceed as follows:
Push the button and maintaining the pressure, then push the button; release both the buttons.

Note: The group selection is cyclic as well as the selection of the parameters in a group.

6.5 Factory reset - Default parameters loading procedure

Sometime, e.g. when you re-configure an instrument previously used for other works or from other people or when you have made too many errors during configuration and you decided to re-configure the instrument, it is possible to restore the factory configuration.

This action allows to put the instrument in a defined condition (the same it was at the first power ON).

The default data are those typical values loaded in the instrument prior to ship it from factory.

To load the factory default parameter set, proceed as follows:

1. Press the button for more than 5 seconds. The upper display will show PASS while the middle display shows 0;
2. Using and buttons set the value -48 1;
3. Push button;
4. The instrument will turn OFF all LEDs for a few seconds, then the upper display will show dFLt (default) and then all LEDs are turned ON for 2 seconds. At this point the instrument restarts as for a new power ON.

The procedure is complete.

Note: The complete list of the default parameters is available in Appendix A.

6.6 Configuring all Parameters

In the following pages we will describe all the parameters of the instrument. However, the instrument will only show the parameters applicable to its hardware options in accordance with the specific instrument configuration (i.e. setting AL 1t [Alarm 1 type] to nonE [not used], all parameters related to alarm 1 will be skipped).

inP Group - Main input configuration

[1] SEnS - Input type

Available: Always.

Range: • When the code of the input type is equal to **C** (see paragraph "How to order").

J =	TC J	(0... 1000°C/32... 1832°F);
crAL =	TC K	(0... 1370°C/32... 2498°F);
S =	TC S	(0... 1760°C/32... 3200°F);
r =	TC R	(0... 1760°C/32... 3200°F);
t =	TC T	(0... 400°C/32... 752°F);
0.20	0... 20 mA linear;	
4.20	4... 20 mA linear;	
0.60	0... 60 mV linear (see note 3);	
12.60	12... 60 mV Linear (see note 3).	

Notes: 1. When a TC input is selected and a decimal figure is programmed (see the next parameter) the max. displayed value becomes 999.9°C or 999.9°F.

2. Every change of the SEnS parameter setting will force the [2] dP = 0 and it will change all parameters related with dP (e.g. set points, proportional band, etc.);
3. In order to obtain a 0... 5 V or a 0... 10 V input, select 0... 60 mV and connect the adapter:
- 0... 5 V = AD ADPINMV-KX-V5;
- 0... 10 V = AP ADPINMV-KX-V10;
4. In order to obtain a 0... 5 V or a 0... 10 V input, select 12... 60 mV and connect the adapter:
- 0... 5 V = AD ADPINMV-KX-V5;
- 0... 10 V = AD ADPINMV-KX-V10.

[2] dP - Decimal point position

Available: Always.

Range: When [1] SenS = Linear input: from 0 to 3.
When [1] SenS different from linear input: 0 or 1.

Note: Every change of the dP parameter setting will produce a change of the parameters related with it (e.g.: set points, proportional band, etc.).

[3] SSc - Initial scale read-out for linear inputs

Available: When a linear input is selected by [1] SEnS.

Range: -1999... 9999.

Notes: 1. SSc allows the scaling of the analogue input to set the read-out value shown when the instrument detect the minimum measurable value.
The instrument will show a measured value up to 5% less then SSc value and than it will show an underrange error.

2. It is possible to set a initial scale read-out higher then the full scale read-out in order to obtain a reverse read-out scaling. For example:
0 mA = 0 mBar and 20 mA = -1000 mBar (vacuum).

[4] FSc - Full scale read-out for linear input

Available: When a linear input is selected by [1] SenS.

Range: -1999... 9999

Notes: 1. Fsc allows the scaling of the analogue input to set the read-out value shown when the instrument detect the maximum measurable value.
The instrument will show a measured value up to 5% higher than [4] FSc value and then it will show an overrange error.

2. It is possible to set a full scale read-out lower than the initial scale read-out in order to obtain a reverse read-out scaling. For example:
0 mA = 0 mBar and 20 mA = -1000 mBar (vacuum).

[5] unit - Engineering unit

Available: When a temperature sensor is selected by [1] SenS parameter.

Range: °c = Centigrade;
°F = Fahrenheit.

WARNING! The instrument does not rescale the temperature values inserted by the user (thresholds, limits etc.).

[6] FiL - Digital filter on the measured value

Available: Always.

Range: oFF (No filter)
0.1... 20.0 s.

Note: This is a first order digital filter applied on the measured value. For this reason it will affect the measured value but also the control action and the alarms behaviour.

[7] inE -Selection of the Sensor Out of Range type that will enable the safety output value

Available: Always.

Range: **our** = When an overrange or an underrange is detected, the power output will be forced to the value of [8] oPE parameter.
or = When an overrange is detected, the power output will be forced to the value of [8] oPE parameter.
ur = When an underrange is detected, the power output will be forced to the value of [8] oPE parameter.

[8] oPE - Safety output value

Available: Always.

Range: OFF;
-100... 100% of the output.

Notes: 1. When the instrument is programmed with one control action only (heat or cool), setting a value outside of the available output range, the instrument uses Zero. For example:
When heat action only has been programmed, and oPE is equal to -50% (cooling) the instrument uses 0.

2. When ON/OFF control is programmed and an out of range is detected, the instrument will perform the safety output value using a fixed cycle time equal to 20 seconds.

3. When the control output is a Open Loop valve control, a value equal or lower than zero will turn ON the “close” output (OUT2) while a positive value will turn ON the “open” output (Out 1).

4. When OFF is selected the instrument will operate as follows: when a burnout condition is detected the instrument goes automatically in MAN mode. Removed the burnout condition, the instrument remains in MAN mode until Auto mode is selected (by OPEr parameter, a command by serial link, digital imput or by the key pressure).

[9] diF1 - Digital input 1 function

Available: Always.

Range: **oFF** = No function;
1 Alarm Reset [status];
2 Alarm acknowledge (ACK) [status];
3 Hold of the measured value [status];
4 Stand by mode of the instrument [status]. When the contact is closed the instrument operates in stand by mode;
5 Manual mode;
6 HEAt with SP1 and CooL with “SP2” [status] (see “Note about digital inputs”);
7 SP1/SP2 selection [status];

[10] diF2 - Digital input 2 function

Available: When [9] Io4.F = diG2.

Range: **oFF** = No function;
1 Alarm Reset [status];
2 Alarm acknowledge (ACK) [status];
3 Hold of the measured value [status];
4 Stand by mode of the instrument [status]. When the contact is closed the instrument operates in stand by mode;
5 Manual mode;
6 HEAt with SP1 and CooL with “SP2” [status] (see “Note about digital inputs”);
7 SP1/SP2 selection [status];

Notes: 1. When [10] diF1 or [11] diF2 (e.g. diF1) are equal to 6 the instrument operates as follows:
- When the contact is open, the control action is an heating action and the active set point is SP.
- When the contact is closed, the control action is a cooling action and the active set point is SP2.

[11] di.A - Digital Inputs Action

Available: Always.

Range: **0** DI1 Direct action, DI2 (when present) Direct action;
1 DI1 Reverse action, DI2 (when present) Direct action;
2 DI1 Direct action, DI2 (when present) Reverse action;
3 DI1 Reverse action, DI2 (when present) Reverse action.

out Group - Output parameters

[12] O1.t - tOut 1 type

Available: when the out1 is a linear output (hardware)

Range: Range:
0-20 = 0-20 mA
4-20 = 4-20 mA
0-10 = 0 – 10 V
2-10 = 2 – 10 V

Note: When Out 1 is linear, the Out1 LED will be OFF when the output is equal to zero and ON when the power output is different from zero.

[13] o1F - Output 1 function

Available: Always

Range: nonE = Output not used
H.rEG = Heating output (reverse)
c.rEG = Cooling output (direct)

Note: In order to select a valve control (e.g. Heating) it is necessary to set O1F and O2F in the ame way (e.g. O1F = HrEG and O2F = H.rEG) and than set [39]cont equal to 3Pt.

[14] o2F - Output 2 function

Available: when the out2 is a relay output (hardware):

Range: nonE = Output not used
H.rEG = Heating output (reverse)
c.rEG = Cooling output (direct)

[15] o3.AL - Alarms linked up with Out 3

Available: Always.

Range: 0... 31 with the following rule:
+1 Alarm 1;
+2 Alarm 2;
+4 Loop break alarm;
+8 Sensor break (burn out);
+16 Potentiometer break alarm.

[16] o3Ac - Out 3 action

Available: Always.

Range: dir = Direct action;
rEU = Reverse action;
dir.r = Direct action with reverse LED indication;
rEU.r = Reverse action with reverse LED indication.

Notes: 1. Direct action: the output repeats the status of the driven element.
Example: the output is an alarm output with direct action. When the alarm is ON, the relay will be

energized (logic output 1).

2. Reverse action: the output status is the opposite of the status of the driven element.
   Example: the output is an alarm output with reverse action. When the alarm is OFF, the relay will be energized (logic output 1). This setting is usually named “fail-safe” and it is generally used in dangerous process in order to generate an alarm when the instrument power supply goes OFF or the internal watchdog starts.

[17] o4.AL - Alarms linked up with Out 4

Available: Always.

Range: 0... 31 with the following rule:

+1 Alarm 1;
+2 Alarm 2;
+4 Loop break alarm;
+8 Sensor break (burn out);
+16 Potentiometer break alarm.

[18] o4Ac - Out 4 action

Available: Always.

Range: dir = Direct action;
rEU = Reverse action;
dir.r = Direct action with reverse LED indication;
rEU.r = Reverse action with reverse LED indication.

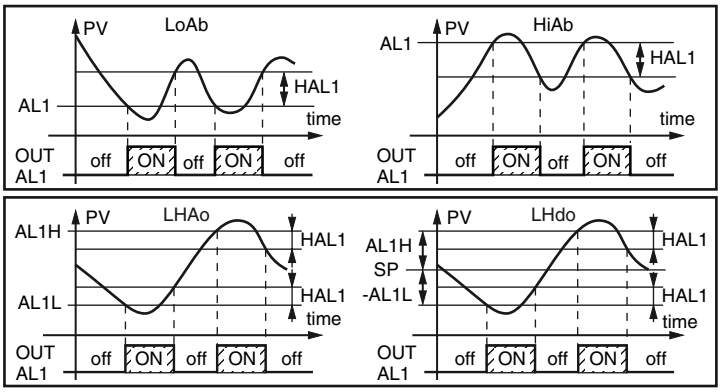
AL1 Group - Alarm 1 parameters

[19] AL1t - Alarm 1 type

Available: Always.

Range: •
nonE = Alarm not used;
LoAb = Absolute low alarm;
HiAb = Absolute high alarm;
LHAo = Absolute band alarm with alarm indication out of the band;
LHAi = Absolute band alarm with alarm indication inside the band;
SE.br = Sensor break;
LodE = Deviation low alarm (relative);
HidE = Deviation high alarm (relative);
LHdo = Relative band alarm with alarm indication out of the band;
LHdi = Relative band alarm with alarm indication inside the band;
• When no output is programmed as control output;
nonE = Alarm not used;
LoAb = Absolute low alarm;
HiAb = Absolute high alarm;
LHAo = Absolute band alarm with alarm indication out of the band;
LHAi = Absolute band alarm with alarm indication inside the band;
SE.br = Sensor break.

Notes: 1. The relative and deviation alarms are “relative” to the operative set point value.



2. The (SE.br) sensor break alarm will be ON when the display shows ---- indication.

[20] Ab1 - Alarm 1 function

Available: When [19] AL1t is different from nonE.

Range: 0... 15 with the following rule:

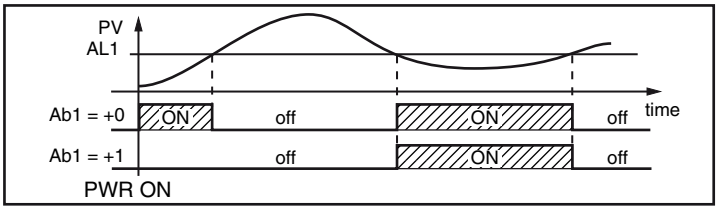
+1 Not active at power up;
+2 Latched alarm (manual reset);
+4 Acknowledgeable alarm;
+8 Relative alarm not active at set point change.

Example: Setting Ab1 equal to 5 (1+4) the alarm 1 will be “not active at power up” and “Acknowledgeable”.

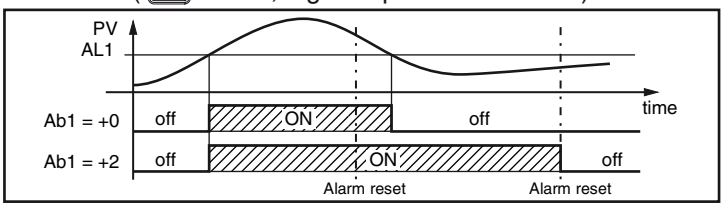
Notes: 1. The “not active at power up” selection allows to inhibit the alarm function at instrument power up or when the instrument detects a transfer from:

- Manual mode (oplo) to auto mode;
- Stand-by mode to auto mode.

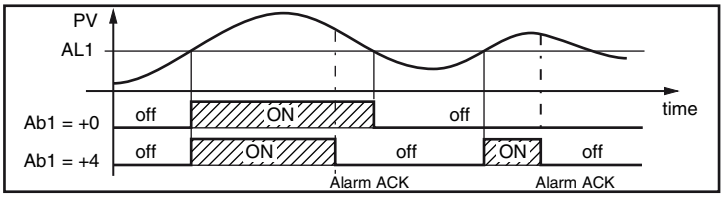
The alarm will be automatically enabled when the measured value reaches, for the first time, the alarm threshold ±hysteresis (in other words, when the initial alarm condition disappears).



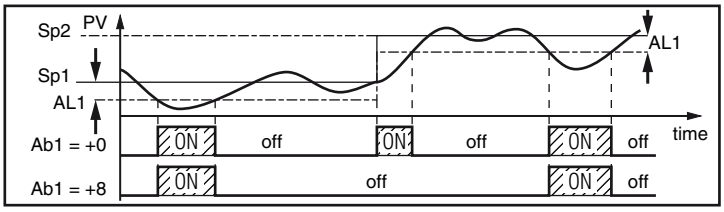
2. A “Latched alarm” (manual reset) is an alarm that will remain active even if the conditions that generated the alarm no longer persist. Alarm reset can be done only by an external command (button, digital inputs or serial link).



3. An “Acknowledgeable” alarm is an alarm that can be reset even if the conditions that generated the alarm are still present. Alarm acknowledge can be done only by an external command (button, digital inputs or serial link).



A “relative alarm not active at set point change” is an alarm that masks the alarm condition after a set point change until process variable reaches the alarm threshold ± hysteresis.



4. The instrument does not store in EEPROM the alarm status. For this reason, the alarm status will be lost if a power down occurs.

[21] AL1L - For High and low alarms, it is the low limit of the AL1 threshold - For band alarm, it is low alarm threshold

Available: When [19] AL1t is different from nonE or [19] AL1t is different from SE.br.

Range: From -1999 to [22] AL1H engineering units.

[22] AL1H - For High and low alarms, it is the high limit of the AL1 threshold - For band alarm, it is the high alarm threshold

Available: When [19] AL1t is different from nonE or [19] AL1t is different from SE.br.

Range: From [21] AL1L to 9999 engineering units.

[23] AL1- Alarm 1 threshold

Available: When:
[19] AL1t = LoAb - Absolute low alarm;
[19] AL1t = HiAb - Absolute high alarm;
[19] AL1t = LodE - Deviation low alarm (relative);
[19] AL1t = LidE - Deviation high alarm (relative).

Range: From [21] AL1L to [22] AL1H engineering units.

[24] HAL1 - Alarm 1 hysteresis

Available: When [19] AL1t is different from nonE or [19] AL1t is different from SE.br.

Range: 1... 9999 engineering units.

Notes: 1. The hysteresis value is the difference between the Alarm threshold value and the point the Alarm automatically resets.

2. When the alarm threshold plus or minus the hysteresis is out of input range, the instrument will not be able to reset the alarm.

Example: Input range 0... 1000 (mBar).

– Set point equal to 900 (mBar);

– Deviation low alarm equal to 50 (mBar);

– Hysteresis equal to 160 (mBar) the theoretical reset point is 900 - 50 + 160 = 1010 (mBar) but this value is out of range. The reset can be made only by turning the instrument OFF, removing the condition that generate the alarm and then turn the instrument ON again.

– All band alarms use the same hysteresis value for both thresholds;

– When the hysteresis of a band alarm is bigger than the programmed band, the instrument will not be able to reset the alarm.

Example: Input range 0... 500 (°C).

– Set point equal to 250 (°C);

– Relative band alarm;

– Low threshold equal to 10 (°C);

– High threshold equal to 10 (°C);

– Hysteresis equal to 25 (°C).

[25] AL1d - Alarm 1 delay

Available: When [19] AL1t is different from nonE.

Range: From oFF (0) to 9999 seconds.

Note: The alarm goes ON only when the alarm condition persists for a time longer than [25] AL1d time but the reset is immediate.

[26] AL1o - Alarm 1 enabling during Stand-by mode and out of range indications

Available: When [19] AL1t is different from nonE.

Range: 0 Never;
1 During stand by;
2 During overrange and underrange;
3 During overrange, underrange and stand-by.

AL2 Group - Alarm 2 parameters

[27] AL2t - Alarm 2 type

Available: Aways

Range: •

nonE = Alarm not used;
LoAb = Absolute low alarm;
HiAb = Absolute high alarm;
LHAo = Absolute band alarm with alarm indication out of the band;
LHAi = Absolute band alarm with alarm indication inside the band;
SE.br = Sensor break;
LodE = Deviation low alarm (relative);
HidE = Deviation high alarm (relative) ;
LHdo = Relative band alarm with alarm indication out of the band;
LHdi = Relative band alarm with alarm indication inside the band..

Note: The relative alarm are “relative” to the current set point (this may be different from the Target set point if you are using the ramp to set point function).

[28] Ab2 - Alarm 2 function

Available: When [27] AL2t is different from nonE.

Range: 0... 15 with the following rule:
+1 Not active at power up;
+2 Latched alarm (manual reset);
+4 Acknowledgeable alarm;
+8 Relative alarm not active at set point change.

Example: Setting Ad2 equal to 5 (1+4) the alarm 2 will be “not active at power up” and “Acknowledgeable”.

Note: For other details see [20] Ab1 parameter.

[29] AL2L - For High and low alarms, it is the low limit of the AL2 threshold - For band alarm, it is low alarm threshold

Available: When [24] AL2t is different from nonE or [24] AL2t is different from SE.br.

Range: -1999 to [27] AL2H engineering units.

[30] AL2H - For High and low alarms, it is the high limit of the AL2 threshold
- For band alarm, it is high alarm threshold

Available: When [27] AL2t is different from nonE or [27] AL2t is different from SE.br.

Range: From [26] AL2L to 9999 engineering units.

[31] AL2 - Alarm 2 threshold

Available: When:
[27] AL2t = LoAb Absolute low alarm;
[27] AL2t = HiAb Absolute high alarm;
[27] AL2t = LodE Deviation low alarm (relative);
[27] AL2t = LidE Deviation high alarm (relative).

Range: From [29] AL2L to [30] AL2H engineering units.

[32] HAL2 - Alarm 2 hysteresis

Available: When [27] AL2t is different to nonE or [27] AL2t is different from SE.br.

Range: 1... 9999 engineering units.

Note: For other details see [24] HAL1 parameter.

[33] AL2d - Alarm 2 delay

Available: When [27] AL2t different from nonE.

Range: From oFF (0) to 9999 seconds.

Note: The alarm goes ON only when the alarm condition persist for a time longer than [33] AL2d time but the reset is immediate.

[34] AL2o - Alarm 2 enabling during Stand-by mode and out of range indications

Available: When [27] AL2t different from nonE.

Range: 0 Never;
1 During stand by;
2 During overrange and underrange;
3 During overrange, underrange and stand-by.

LbA group - Loop break alarm

General note about LBA alarm

The LBA operate as follows: applying the 100% of the power output to a process, the process variable, after a time due to the process inertia, begins to change in a known direction (increases for an heating action or decreases for a cooling action).

Example: If I apply 100% of the power output to a furnace, the temperature must go up unless one of the component in the loop is faulty (heater, sensor, power supply, fuse, etc...)

The same philosophy can be applied to the minimum power. In our example, when I turn OFF the power to a furnace, the temperature must go down, if not the SSR is in short circuit, the valve is jammed, etc..

LBA function is automatically enabled when the PID requires the maximum or the minimum power.

When the process response is slower than the programmed limit the instrument generates an alarm.

Notes: 1. When the instrument is in manual mode, the LBA function is disabled.
2. When LBA alarm is ON the instrument continues to perform the standard control. If the process response comes back into the programmed limit, the instrument automatically resets the LBA alarm.

[35] LbAt - LBA time

Available: Always.

Range: • oFF = LBA not used;
• 1... 9999 seconds.

[36] LbSt - Delta measure used by LBA during Soft start

Available: When [35] LbAt is different from oFF.

Range: • oFF = loop break alarm is inhibit during soft start;
• 1... 9999 engineering units.

[37] LbAS - Delta measure used by loop break alarm (loop break alarm step)

Available: When [35] LbAt is different from oFF.

Range: 1... 9999 engineering units.

[38] LbcA - Condition for LBA enabling

Available: When [35] LbAt is different from oFF.

Range: uP = Enabled when the PID requires the maximum power only;
dn = Enabled when the PID requires the minimum power only;
both = Enabled in both condition (when the PID requires the maximum or the minimum power).

LBA application example:
LbAt (LBA time) = 120 seconds (2 minutes);
LbAS (delta LBA) = 5°C.

The machine has been designed in order to reach 200°C in 20 minutes (20°C/min).

When the PID demands 100% power, the instrument starts the time count.

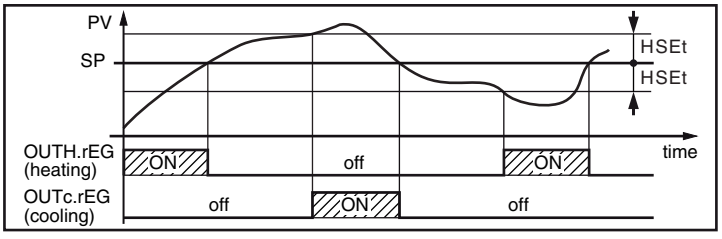
During time count if the measured value increases more than 5°C, the instrument restarts the time count. Otherwise if the measured value does not reach the programmed delta (5°C in 2 minutes) the instrument will generate the alarm.

rEG group - Control parameters.

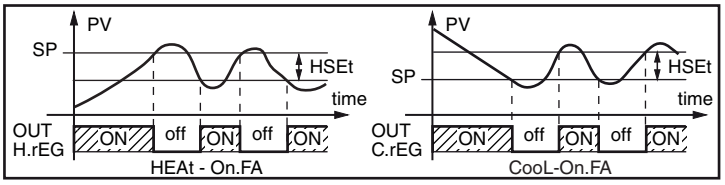
[39] cont - Control type:

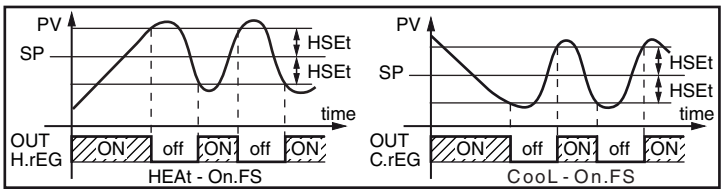
Available: When at least one output is programmed as control output (H.rEG or C.rEG).

Range: • When two control actions (heat & cool) are programmed:
Pid = PID (heat and cool);
nr = Heat/Cool ON/OFF control with neutral zone;



• When one control action (heat or cool) is programmed:
Pid = PID (heat or cool);
On.FA = ON/OFF asymmetric hysteresis;
On.FS = ON/OFF symmetric hysteresis;
3Pt = Servomotor control (available when Output 2 and Output 3 have been ordered as "**M**").





Notes: 1. ON/OFF control with asymmetric hysteresis:
- OFF when PV ≥ SP;
- ON when PV ≤ (SP - hysteresis).

2. ON/OFF control with symmetric hysteresis:
- OFF when PV ≥ (SP + hysteresis);
- ON when PV ≤ (SP - hysteresis).

[40] Auto - Auto tune selection

Ascon Tecnologic has developed three auto-tune algorithms:

– Oscillating auto-tune;

– Fast auto-tune;

– EvoTune.

1. The **oscillating** auto-tune is the usual auto-tune and:
- It is more accurate;
- Can start even if PV is close to the set point;
- Can be used even if the set point is close to the ambient temperature.

2. The **fast type** is suitable when:
- The process is very slow and you want to be operative in a short time;
- When an overshoot is not acceptable;
- In multi-loop machinery where the fast method reduces the calculation error due to the effect of the other loops.

3. The **EvoTune** type is suitable when:
- You have no information about your process;
- You can not be sure about the end user skills;
- You desire an auto tune calculation independently from the starting conditions (e.g. set point change during tune execution, etc).

Note: Fast auto-tune can start only when the measured value (PV) is lower than (SP + 1/2SP).

Available: When [39] cont = PID or 3Pt.

Range: -4... 8 where:
- **-4** Oscillating auto-tune with automatic restart at all set point change;
- **-3** Oscillating auto-tune with manual start;
- **-2** Oscillating auto-tune with automatic start at the first power up only;
- **-1** Oscillating auto-tune with automatic restart at every power up;
- **0** Not used;
- **1** Fast auto tuning with automatic restart at every power up;
- **2** Fast auto-tune with automatic start at the first power up only;
- **3** FAST auto-tune with manual start;
- **4** FAST auto-tune with automatic restart at all set point change.
- **5** EvoTune with automatic restart at every power up;
- **6** EvoTune with automatic start at the first power up only;
- **7** EvoTune with manual start;
- **8** EvoTune with automatic restart at all set point change.

Note: All auto-tunes are inhibited during program execution.

[41] tunE - Manual start of the auto-tune

Available: When [39] cont = PID or 3Pt.

Range: oFF = The instrument is not performing the auto-tune;
on = The instrument is performing the auto-tune.

[42] HSEt - Hysteresis of the ON/OFF control

Available: When [39] cont is different from PID or 3Pt.

Range: 0... 9999 engineering units.

[43] Pb - Proportional band

Available: When [39] cont = PID or 3Pt.

Range: 1... 9999 engineering units.

Note: Auto-tune functions calculate this value.

[44] ti - Integral time

Available: When [39] cont = PID or 3Pt.

Range: OFF = Integral action excluded;
1... 9999 seconds;
inF= Integral action excluded.

Note: Auto-tune functions calculate this value.

[45] td - Derivative time

Available: When [39] cont = PID or 3Pt.

Range: oFF - derivative action excluded;
1... 9999 seconds.

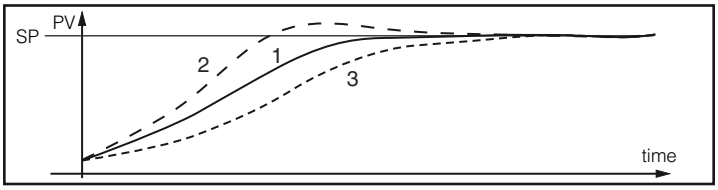
Note: Auto-tune functions calculate this value.

[46] Fuoc - Fuzzy overshoot control

This parameter reduces the overshoot usually present at instrument start up or after a set point change and it will be active only in this two cases.

Setting a value between 0.00 and 1.00 it is possible to slow down the instrument action during set point approach.

Setting **Fuoc = 1** this function is disabled.



Available: When [39] cont = PID or 3Pt.

Range: 0... 2.00.

Note: Fast auto-tune calculates the Fuoc parameter while the oscillating one sets it equal to 0.5.

[47] tcH - Cycle time of the heating output

Available: When at least one output is programmed in order to be the heating output (H.rEG), [56] cont = PID.

Range: 1.0... 130.0 seconds.

[48] rcG - Power ratio between heating and cooling action (relative cooling gain)

The instrument uses the same PID parameter set for heat and for cool action but the efficiency of the two actions are usually different.

This parameter allows to define the ratio between the efficiency of the heating system and the efficiency of the cooling one.

An example will help us to explain you the philosophy.

Consider one loop of a plastic extruder. The working temperature is equal to 250°C.

When you want to increase the temperature from 250 to 270°C (ΔT = 20°C) using 100% of the heating power (resistor), you will need 60 seconds.

On the contrary, when you want to decrease the temperature from 250 to 230°C (ΔT = 20°C) using 100% of the cooling power (fan), you will need 20 seconds only.

In our example the ratio is equal to 60/20 = 3 ([67] rcG = 3) and it say that the efficiency of the cooling system is 3 time more efficient of the heating one.

Available: When two control action are programmed (H.rEG and c.rEG) and [39] cont = PID.

Range: 0.01... 99.99

Note: Auto-tune functions calculate this value.

[49] tcc - Cycle time of the cooling output

Available: When at least one output is programmed in order to be the cooling output (c.rEG), [56] cont = PID.

Range: 1.0... 130.0 seconds.

[50] rS - Manual reset (integral pre-load)

It allows to drastically reduce the undershoot due to a hot restart. When your process is steady, the instrument operates with a steady power output (e.g.: 30%).

If a short power down occurs, the process restarts with a process variable close to the set point while the instrument starts with an integral action equal to zero.

Setting a manual reset equal to the average power output (in our example 30%) the instrument will start with a power output equal to the value it will use at steady state (instead of zero) and the undershoot will become very little (in theory equal to zero).

Available: When [39] cont = PId or 3Pt.

Range: -100.0... +100.0%.

[51] Str.t - Servomotor stroke time.

Available: When [39] cont = 3Pt.

Range: 5... 300 seconds;

Notes: 1. When a open loop **with** potentiometer input is selected, this parameter ia automatically calculated by the “automatic calibration system” (see [48] P.cAL parameter).

[52] db.S - Servomotor dead band

Available: When [39] cont = 3Pt.

Range: 0... 10.0%.

[53] OP.L - Minimum power output

Available: When: [39] cont = PId;
[39] cont = 3Pt and [58] Pot. = Pot.o;
[39] cont = 3Pt and [58] Pot. = Pot.c.

Range: -100... [54]OP.H%.

[54] OP.H - Maximum power output

Available: When: [39] cont = PId;
[39] cont = 3Pt and [58] Pot. = Pot.o;
[39] cont = 3Pt and [58] Pot. = Pot.c.

Range: [53] OP.L ... 100%.

[55] St.P - Maximum power output used during soft start

Available: When: [39] cont = PId;
[39] cont = 3Pt and [58] Pot. = Pot.c.

Range: -100... +100%.

Notes: 1. When St.P parameter have a positive value, the limit will be applied to the heating output(s) only.

2. When St.P parameter have a negative value, the limit will be applied to the cooling output(s) only.

3. When a program with automatic start at power up and soft start function are programmed, the instrument performs the soft start and than the program function.

4. The auto-tune function will be performed after soft start function.

5. The Soft start function is available also when ON/OFF control is used.

[56] SSt - Soft start time

Available: When: [39] cont = PId;
[39] cont = 3Pt and [58] Pot. = Pot.c.

Range: oFF = Function not used;
0.01... 7.59 hh.mm;
inF = Soft start always active.

[57] SS.tH - Threshold for soft start disabling

Available: When: [39] cont = PId;
[39] cont = 3Pt and [58] Pot. = Pot.c.

Range: -1999... 9999 engineering units.

Notes: 1. When the power limiter has a positive value (the limit is applied to the heating action) the soft start function will be aborted when the measured value is greater or equal to SS.tH parameter.

2. When the power limiter has a negative value (the limit is applied to the cooling action) the soft start function will be aborted when the measured value is lower or equal to SS.tH parameter.

[58] POt - Potentiometer enabling

Available: When [39] cont = 3Pt.

Range: nonE = potentiometer not used;
Pot.o = potentiometer used for indication only;

[59] P.cAL - Automatic Potentiometer Calibration

Available: When [39] cont = 3Pt and [58] Pot. = Pot.c.

Range: no = The automatic pot. calibration do not start;
YES = The automatic pot. calibration will start.

Notes about Automatic Potentiometer Calibration

When [59] P.cAL = **YES**, pushing the ↵ button the instrument operates as follows:

1. The instrument goes in **MANUAL** mode;

2. The instrument energizes the **Open valve output** (Out 1), then verifies if the measure of the potentiometer position starts growing.

2.1 If the potentiometer position value decreases, the instrument de-energizes Out 1 and shows the message: E.P.rE (Error - potentiometer reversed). The message disappears as soon as the ↵ button is pressed (the instrument returns to the PcAL parameter).

2.2 If, after 10 seconds, the measure does not increase, the instrument **de-energizes** the **Open valve relay** and **energizes** the **Close valve relay** (Out 2).

2.2.1. If, after 10 seconds, the measure does not decrease, the instrument **de-energizes Out 2 relay**, considers the potentiometer disconnected and shows the message noPt (No potentiometer) on the middle display. The message disappears as soon as the ↵ button is pressed (the instrument returns at PcAL parameter).

2.2.2. If the measure starts decreasing, the instrument keeps active the “**Close valve**” output until the measure changes. When the measure stops changing for more than 5 seconds, the instrument stores this value as 0% (zero) position and goes to the next step.

3. The instrument **de-energizes** the **Close valve relay** and **energizes** the **Open valve relay** until the measured value increases.
4. When the measure stops changing for more than 5 seconds, the instrument stores this value as 100% position.
   4.1 If the count detected from 0% to 100% is lower than 30% of the instrument counts, on the middle display the instrument shows the error message: E.P.c.A (Potentiometer calibration error). The message disappears as soon as the ↵ button is pressed (the instrument returns at P.c.AL parameter).
5. During the potentiometer calibration the instrument detects the (real) valve stroke time and stores it in the Str.t (Stroke time) parameter. At the end of the automatic potentiometer calibration the instrument moves the valve to zero and shows "donE". The message disappears as soon as the ↵ button is pressed (the instrument returns at P.c.AL parameter).

Note also:

If, during normal operations, the instrument detects a potentiometer malfunction, it operates as follows:

– Switches immediately to the "Servo motor without potentiometer" control mode;
– Ignores parameters [53] OP.L and [54] OP.H;
– The potentiometer icon starts flashing to warn the user about the problem detected.

[60] PoSi - Valve position at start up

Available: When [39] cont = 3Pt and [58] Pot. = nonE.
Range: no = No action;
oPEn = At all power ON the instruemnt energizes the Open valve relay for the programmed stroke time;
CloSe = At all power up the instruemnt will energize the Close valve relay for the programmed stroke time.

SP Group - Set point parameters

[61] nSP - Number of used set points

Available: Always.
Range: 1... 4.
Note: When you change the value of this parameter, the instrument operates as follows:
- [68] A.SP parameter will be forced to SP.
- The instrument verifies that all used set point are within the limits programmed by [62] SPLL and [63] SPHL. If an SP is out of this range, the instrument forces it to the maximum acceptable value.

[62] SPLL - Minimum set point value

Available: Always.
Range: From -1999 to [63] SPHL engineering units
Notes: 1. When you change the [62] SPLL value, the instrument checks all local set points (SP, SP2, SP3 and SP4 parameters). If an SP is out of this range, the instrument forces it to the maximum acceptable value
2. A [62] SPLL change produces the following actions:
- When [69] SP.rt = SP the remote set point will be forced to be equal to the active set point.
- When [69] SP.rt = trim the remote set point will be forced to zero.
- When [69] SP.rt = PErc the remote set point will be forced to zero.

[63] SPHL - Maximum set point value

Available: Always.
Range: From [62] SPLL to 9999 engineering units.
Note: For other details see [62] SPLL parameter.

[64] SP - Set Point 1

Available: Always.
Range: From [62] SPLL to [63] SPHL engineering units.

[65] SP 2 - Set Point 2

Available: When [61] nSP ≥ 2.
Range: From [62] SPLL to [63] SPHL engineering units.

[66] SP 3 - Set Point 3

Available: When [61] nSP ≥ 3.
Range: From [62] SPLL to [63] SPHL engineering units.

[67] SP 4 - Set Point 4

Available: When [61] nSP =4.
Range: From [62] SPLL to [63] SPHL engineering units.

[68] A.SP - Selection of the active Set point

Available: When [61] nSP ≥ 2
Range: From **SP** to [61] nSP.
Notes: 1. A [68] A.SP change produces the following actions:
- When [69] SP.rt = SP - the remote set point will be forced to be equal to the active set poin;
- When [69] SP.rt = trin - the remote set point will be forced to zero;
- When [69] SP.rt = PErc - the remote set point will be forced to zero.

2. SP2, SP3 and SP4 selection will be shown only when the relative set point is enabled (see [61] nSP parameter).

[69] SP.rt - Remote set point type

These instruments will communicate with each other, using RS 485 serial interface without a PC. An instrument can be set as a Master while the other are (as usual) Slave units. The Master unit can send his operative set point to the slave units.

In this way, for example, it is possible to change simultaneously the set point of 20 instruments by changing the set point of the master unit (e.g. hot runner application).

[69] SP.rt parameter defines how the slaves units will use the value coming from serial link.

The [86] tr.SP [selection of the value to be retransmitted (Master)] parameter allows to define the value sent by master unit.

Available: When serial interface is present.
Range: rSP = The value coming from serial link is used as remote set point (RSP).
trin = The value coming from serial link will be algebraically added to the local set point selected by A.SP and the sum becomes the operative set point.
PErc = The value coming from serial will be scaled on the input range and this value will be used as remote set point.
Note: A [69] SPrt change produces the following actions:
- When [69] SP.rt = rSP - the remote set point will be forced to be equal to the active set point;
- When [69] SP.rt = trin - the remote set point will be forced to zero;
- When [69] SP.rt = PErc - the remote set point will be forced to zero.

Example: A 6 zone reflow-oven for PCB. The master unit sends its set point value to 5 other zones (slave controllers).

The Slave zones use it as a set point trim.

The first zone is the master zone and it uses a set point equal to 210°C.

The second zone has a local set point equal to -45°C.

The third zone has a local set point equal to -45 (°C).

The fourth zone has a local set point equal to -30.

The fifth zone has a local set point equal to +40.

The sixth zone has a local set point equal to +50.

In this way, the thermal profile will be the following:

– Master SP = 210°C;

– Second zone SP = 210 -45 = 165°C;

– Third zone SP = 210 -45 = 165°C;

– Fourth zone SP = 210 - 30 = 180°C;

– Fifth zone SP = 210 + 40 = 250°C;

– Sixth zone SP = 210 + 50 = 260°C.

Changing the SP of the master unit, all the other slave units will immediately change their operative set point.

[70] SPLr - Local/remote set point selection

Available: When at least one output is programmed as control output.

Range: Loc = Local set point selected by [68] A.SP;
rEn = Remote set point (coming from serial link).

[71] SP.u - Rate of rise for positive set point change (ramp up)

Available: When at least one output is programmed as control output.

Range: 0.01... 99.99 units per minute;
inF = Ramp disabled (step transfer).

[72] SP.d - Rate of rise for negative set point change (ramp down)

Available: When at least one output is programmed as control output.

Range: 0.01... 99.99 units per minute;
inF = Ramp disabled (step transfer).

General note about remote set point:
When the remote set point (RSP) with trim action is programmed, the local set point range becomes:
from [62] SPLL + RSP to [63] SPHL - RSP.

PAn group - Operator HMI

[73] PAS2 - Level 2 password: Limited access level

Available: Always.

Range: oFF = Level 2 not protected by password (as level 1 = Operator level);
1... 200.

[74] PAS3 - Level 3 password: Complete configuration level

Available: Always.

Range: 3... 200.

Note: Setting [73] PAS2 equal to [74] PAS3, the level 2 will be masked.

[75] uSrb - button function during RUN TIME

Available: Always.

Range: nonE = No function;
tunE = Auto-tune/self-tune enabling. A single press (longer than 1 s) starts the auto-tune;
oPLo = Manual mode. The first pressure puts the instrument in manual mode (oPLo) while the second one puts the instrument in Auto mode;
AAc = Alarm reset;
ASi = Alarm acknowledge;
St.by = Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto mode;
SP1.2 = SP/SP2 selection.

Notes: 1. When "SP1.2" is used, every press of the key (longer than 1 second) revert the set point selected. When a new set point is selected using the key, the display will show for 2 seconds the acronym of the new set point (e.g. SP2).

2. When "SP1.2" is used, the [49] nSP parameter must be equal to 2.

[76] diSP - Middle Display Management

Available: Always.

Range: nonE = Display not used;
SPF = Final set point;
SPo = Operative set point;
AL1 = Alarm 1 threshold;
AL2 = Alarm 2 threshold;
Po = Power output

[77] di.CL - Display colour

Available: Always.

Range: **0** The display colour is used to show the actual deviation (PV - SP);
1 Display red (fix);
2 Display green (fix);
3 Display orange (fix).

[78] AdE - Deviation for display colour management

Available: When [123] di.CL = 0.

Range: 1... 9999 engineering units.

[79] diS.t - Display time out

Available: Always.

Range: oFF = The display is ever ON;
0.1... 99.59 minutes and seconds.

Note: This function allows to turn OFF the display when no alarm is present and no action is made on the instrument. When dISt is different from oFF and no button is pressed for more than the programmed time out, the display goes OFF and only 4 segments of the less significant digit are turned ON in sequence in order to show that the instrument is working correctly.
If an alarm occurs or a button is pressed, the display will come back to the normal operation.

[80] FiLd - Filter on the displayed value

Available: Always.

Range: oFF = Filter disabled;
0.1... 20.0 engineering units.

Note: This is a "window filter" related to the set point, it is applied to the displayed value only and has no effect on the other functions of the instrument (control, alarms, etc.).

[81] dSPu - Status of the instrument at power up

Available: Always.

Range: AS.Pr = Starts in the same way it was prior to the power down;
Auto = Starts in Auto mode;
oP.0 = Starts in manual mode with a power output equal to zero.
St.bY = Starts in stand-by mode

Note: When you change the value of [70] oPr.E, the instrument forces [71] oPEr parameter equal to Auto.

[82] oPr.E - Operative modes enabling

Available: Always.

Range: ALL = All modes will be selectable by the next parameter.
Au.oP = Auto and manual (oPLo) mode only will be selectable by the next parameter;
Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter.

Note: Manual changing the value of [70] oPr.E, the instrument forces parameter [71] oPEr = Auto.

[83] oPEr - Operative mode selection

Available: Always.

Range: When [82] oPr.E = ALL:
Auto = Auto mode;
oPLo = Manual mode;
St.bY = Stand by mode.
When [82] oPr.E = Au.oP:
Auto = Auto mode;
oPLo = Manual mode.
When [82] oPr.E = Au.Sb:
Auto = Auto mode;
St.bY = Stand by mode.

Ser group - Serial link parameter

[84] Add - Instrument address

Available: Always.

Range: oFF = Serial interface not used;
1... 254.

[85] bAud - Baud rate

Available: When [73] Add different from oFF.

Range: 1200 = 1200 baud;
2400 = 2400 baud;
9600 = 9600 baud;
19.2 = 19200 baud;
38.4 = 38400 baud.

[86] trSP -Selection of the value to be retransmitted (Master)

Available: When [72] Add different from oFF.

Range: nonE = Retransmission not used (the instrument is a slave);
rSP = The instrument become a Master and it retransmits the operative set point;
PErc = The instrument become a Master and it retransmits the power output.

Note: For more details see [57] SP.rt (Remote set point type) parameter.

CAL group - User calibration group

This function allows to calibrate the complete measuring chain and to compensate the errors due to:

– Sensor location;
– Sensor class (sensor errors);
– Instrument accuracy.

[87] AL.P - Adjust Low Point

Available: Always.

Range: -1999... (AH.P - 10) engineering units.

Note: The minimum difference between AL.P and AH.P is equal to 10 Engineering Units.

[88] AL.o - Adjust Low Offset

Available: Always.

Range: -300... +300 engineering units.

[89] AH.P - Adjust High Point

Available: Always.

Range: From (AL.P + 10) to 9999 engineering units.

Note: The minimum difference between AL.P and AH.P is equal to 10 Engineering Units.

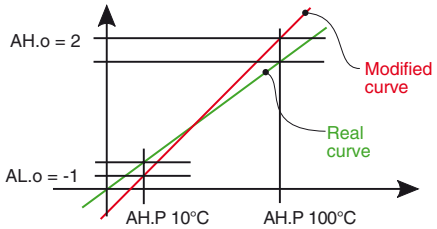
[90] AH.o - Adjust High Offset

Available: Always.

Range: -300... +300 Engineering Units.

Example: Environmental chamber with an operative range: 10... 100°C.

1. Insert in the chamber a reference sensor connected with a reference instrument (usually a calibrator).
2. Start the control of the instrument, and set a set point equal to the minimum value of the operative range (e.g.: 10°C). When the temperature in the chamber is steady, take note of the temperature measured by the reference system (e.g.: 9°C).
3. Set [75] AL.P = 10 (low working point) and [76] ALo = -1 (it is the difference between the reading of the instrument and the reading of the reference system). Note that after this set the measured value of the instrument is equal to the measured value of the reference system.
4. Set a set point equal to the maximum value of the operative range (e.g. 100°C). When the temperature in the chamber is steady, take note of the temperature measured by the reference system (e.g. 98°C).
5. Set [77] AH.P = 100 (low working point) and [78] AHo = +2 (it is the difference between the reading of the instrument and the reading of the reference system). Note that after this set the measured value of the instrument is equal to the measured value of the reference system.



The most important step of the configuration procedure is completed.

In order to exit from configuration parameter procedure, proceed as follows:

- Push button.
- Push button for more than 10 s. The instrument will come back to the “standard display”.

7. PARAMETER PROMOTION

Another important step of the instrument configuration is due to the possibility to create a custom HMI (interface) in order to make the instrument easy to use for the operator and comfortable for the assistance.

By a special procedure, named promotion, the OEM can create two parameter subsets.

The first one is the “limited access” level. This subset is protected by the password programmed by [61] PAS2 parameter.

The last subset is the “Operator” set (Level1). This level is NOT password protected.

Notes: 1. The “limited access” parameter are collected in a list.

2. The sequence of the “limited access” parameters is programmable and can be made according to your needs.

3. The parameter sequence of the operator level is the same programmed for “limited access” level but only specified parameters can be displayed and modified. This set must be create according to your requirements.

7.1 Parameter promotion procedure

The limited access parameter set is a list, so that, before to start promotion procedure, we suggest to operate as follows:

1. Prepare the exact parameter list you want to make accessible for limited access.

2. Number the desired parameters in the same sequence you want to have in the limited access.

3. Define which of the selected parameter will be available in Operator level also.

Example: I would like to obtain the following limited access list:

- OPEr - Operative mode selection
- SP - first set point
- SP2 - Second set point
- A.SP - Set point selection
- AL1 - Alarm 1 threshold
- AL2 - Alarm 2 threshold
- Pb - Proportional band
- ti - Integral time
- td - Derivative time
- Aut.r - Manual start of the auto-tune

But I want that the operator to be able to change: the operative mode, the SP value and the AL1 value. In this case the promotion will be the following:

Parameter	Promotion	Limited Access	Operator
- OPEr -	o 1	OPEr	OPEr
- SP -	o 2	SP	SP
- SP2 -	A 3	SP2	
- A.SP -	A 4	A.SP	
- AL1 -	o 5	AL1	AL1
- AL2 -	A 6	AL2	
- Pb -	A 7	Pb	
- ti -	A 8	ti	
- td -	A 9	td	
- Aut.r -	A 10	Aut.r	

Now, proceed as follows:

1. Push the [↵] button for more than 3 seconds.

2. The upper display will show PASS while the lower display will show 0.

3. By [▲] and [▼] buttons set a password equal to -81.

4. Push [↵] button.
The instrument will show the acronym of the first configuration parameter group InP.

5. By [↵] button select the group of the first parameter of your list.

6. By [↵] button select the first parameter of your list

7. The upper display will show the acronym of the parameter while the middle display will show his current promotion level. The promotion level is defined by a letter followed by a number. The letter can be:
- c: It shows that this parameter is **NOT** promoted and it is present only in configuration. In this case the number is forced to zero.
- A: It shows that this parameter has been promoted to the limited access level. The number will show the position in the limited access list.
- o: It shows that the parameter has been promoted to the Operator level. The number will show the position in the limited access list.

8. By [▲] and [▼] buttons assign to this parameter the desired position.

Note: Setting a value different from 0 the letter c will change automatically to A and the parameter is automatically promoted to the limited access level.

9. In order to modify the level from limited access to operator and vice versa, push [↩] button and, maintaining the pressure, push [▲] button. The letter will change from A to o and vice versa.

10. Select the second parameter that you want to add to the assistance level and repeat step 6, 7 and 8.

11. Repeat steps 5, 6, 7, 8 until the list has been completed.

12. When you need to exit from promotion procedure, push [↩] button and maintain the pressure for more than 10 s. The instrument will show the “standard display”.

Note: When you set the some number to two parameter, the instrument will use only the last programmed parameter.

Example: In the previous example, I have set for SP2 a promotion value equal to A3.

If now I set for SP3 a promotion value equal to o3, the Limited Access list and the operator list becomes.

Parameter	Promotion	Limited Access	Operator
- OPEr -	o 1	OPEr	OPEr
- SP -	o 2	SP	SP
- SP3 -	o 3	SP3	SP3
- A.SP -	A 4	A.SP	
- AL1 -	o 5	AL1	AL1

8. OPERATIVE MODES

As we said at paragraph 4.1, when the instrument is powered, it starts immediately to work according to the memorized parameter value.

In other words, the instrument has one status only, the “run time” status.

During “run time” we can force the instrument to operate in three different modes: Automatic mode, Manual mode or Stand by mode:

– In **Automatic mode** the instrument drives automatically the control output according to the parameter value set and the set point/measured value.
– In **Manual mode** the upper display shows the measured value while the middle display shows the power output [preceded by H (for heating) or C (for cooling)], MAN is lit and the instrument allows you to set manually the control output power. **No Automatic action will be made**.
– In **Stand by** mode the instrument operates as an indicator. It will show on the upper display the measured value and on the middle display the set point alternately to the “StbY” messages and forces the control outputs to zero.

As we have seen, it is always possible to modify the value assigned to a parameter independently from the operative modes selected.

8.1 Modify a parameter during “Operator level”

The instrument is showing the “standard display”.

1. Press the ↵ button.
2. The upper display will show the acronym of the first parameter promoted to this level while the middle display will show its value.
3. By ▲ and ▼ button assign to this parameter the desired value.
4. Press the ↵ button in order to memorize the new value and go to the next parameter.
5. When you want to come back to the “standard display” push the ↵ button for more than 5 seconds.

Note: The parameter modification of the Operator level is subject to a time out. If no button is pressed for more than 10 seconds, the instrument goes back to the “standard display” and the new value of the last selected parameter will be lost.

8.2 Enter the “Limited access level”

The instrument is showing the “standard display”.

1. Press the ↵ button for more than 5 seconds;
2. The upper display will show PASS while the middle display will show 0;
3. By ▲ and ▼ buttons set the value assigned to [61] PAS2 (Level 2 password).

Notes: 1. The factory default password for configuration parameters is equal to 20.

2. Operator and assistange level of Parameter modification are protected by a time out. If no button is pressed for more than 10 second the instrument comes automatically back to the Standard display, the new value of the last selected parameter is lost and the parameter modification procedure is closed.

When you desire to remove the time out (e.g. for the first configuration of an instrument) you can use a password equal to 1000 plus the programmed password
(e.g. 1000 + 20 [default] = 1020).

It is always possible to manually End the parameter configuration procedure (see below).

3. During parameter modification the instrument continues to perform the control.

In certain conditions (e.g. when a parameter change can produces a heavy bump to the process) it is advisable to temporarily stop the controller from controlling during the programming procedure (its control output will be Off). A password equal to 2000 + the programmed value (e.g. 2000 + 20 = 2020) will switch the control out off during configuration. The control will restart automatically when the para-meter modification procedure will be manually ended.

4. Push ↵ button.
5. The instrument will show on the upper display the acronym of the first parameter promoted to this level and on the middle display its value.
6. By ▲ and ▼ buttons assign to this parameter the desired value.
7. Press the ↵ button in order to memorize the new value and go to the next parameter.
8. When you want to come back to the “standard display” push the ↵ button for more than 5 s.

8.3 How to see but not modify the “Limited access parameters”

Sometime it is necessary to give to the operator the possibility to see the value assigned to the parameter promoted in the Limited Access level but it is important that all changes are made by authorized personnel only.

In this cases, proceed as follows:

1. Press the ↵ button for more than 5 seconds;
2. The upper display will show PASS while the middle display will show 0;
3. By ▲ and ▼ button set the value -181;
4. Push ↵ button;
5. The upper display will show the acronym of the first parameter promoted to the level 2 and middle display will show its value;
6. Using ↵ button it is possible to see the value assigned to all parameter present in level 2 but it will not be possible to modify it;
7. It is possible to come back to the “standard display” by pushing the ↵ button for more than 3 seconds or by pushing no buttons for more than 10 seconds.

8.4 OEM Reset/ OEM Default Parameters Set

In addition to the “Factory default” these instruments allow the OEM to store his own default parameter set. In this way if an end-user tampers the parameter values, the after sales support of the OEM has a fast and easy way to reset the machine and return to the proprietary parameter set.

8.4.1 Storing the OEM default parameter set

Once the OEM has configured his own paratameter set and is returned to the “Standard display”, in order store these values as a “Proprietary default” the OEM must proceed as follows:

1. Press the button for more than 5 seconds. The upper display will show PASS while the middle display shows 0;
2. Using and buttons set the value -682;
3. Push button;
4. The instrument shows LoAd on the upper display in order to highlight that the memorization has been made, then returns to the “Standard display” mode.

8.4.2 Loading the OEM default parameter set

1. Press the button for more than 5 seconds. The upper display will show PASS while the middle display shows 0;
2. Using and buttons set the value -581;
3. Push button;
4. The instrument turns ON all the LEDs for a few seconds, then returns to the “Standard display” mode.

Notes: 1. If the instrument **does not turn ON all the LEDs for at least 2 seconds**, it means that the password inserted was incorrect and the **OEM parameter set has NOT been loaded**.

2. Using the serial link it is always possible to send to the address 13H the corretct password in order to obtain the desired action (-481 for the Factory set, -581 for OEM set or -682 to store the OEM set).

8.5 Automatic Mode

8.5.1 Keyboard function when the instrument is in Auto mode

Performs the action programmed by [63] uSrb (button function during RUN TIME) parameter.

Enters the parameter modification procedures.

Starts the “Direct set point modification” function (see below).

Displays the “additional information” (see below).

8.5.2 Direct set point modification

This function allows to modify rapidly the set point value selected by [56] A.SP (selection of the active Set point) currently in progress.

The instrument is showing the “standard display”.

1. Push button.
   The upper display shows the acronym of the selected set point (e.g. SP2) and the middle display will show its value.
2. By and buttons, assign to this parameter the desired value
3. Do not push any button for more than 5 second or push the button.

In both cases the instrument stores the new value and returns to the “standard display”.

Note: If the selected set point has not been promoted to the Operator level, the instrument allows you to see the value but not to modify it.

8.5.3 Additional information

This instrument is able to show you the power output calculated by the PID.

1. When the instrument is showing the “standard display” push button.
   The middle display will show H or c followed by a number. This value is the current power output calculated by the PID. The H show you that the action is a Heating action while the c show you that the action is a Cooling action.
2. Push button again. The instrument returns to the “standard display”.

Note: The additional information visualization is subject to a time out. If no button is pressed for more than 10 second the instrument comes automatically back to the Standard display.

8.5.4 Display management

This instrument allows you to program (see parameter [67] diS.t the time out of the display.

This function allows to turn OFF the display when no alarm is present and no action is made on the instrument.

When [67] diS.t is different to OFF (display ever ON) and no button is pressed for more than the programmed time out, the display goes OFF and only 4 segments of the less significant digit are turned ON in sequence in order to show that the instrument is working correctly.

If an alarm occurs or a button is pressed, the display returns to the normal operation.

8.5.5 The display colour shows the Deviation

This instrument allows to program the deviation (PV - SP) for colour display change (see parameter [66] AdE).

In this way the upper display will be:

– Amber when PV is lower than SP - AdE;

– Green when (SP - AdE) < PV<SP + AdE);

– Red when PV is higher than SP + AdE.

8.6 Manual mode

This operative mode allows you to deactivate automatic control and manually set valve position.

When the instrument is in manual mode, the upper display shows the measured value, the middle display shows the power output [preceded by H (for heating action) or C (for cooling action)] while the lower display continue to show the valve position (measured or calculated according to [47] Pot parameter setting).

MAN LED is lit.

When manual control is selected, the instrument will start to operate with the same power output as the last one supplied by automatic mode and it can be modified using the and buttons.

Notes: 1. During manual mode, the alarms are operative.

2. If you set manual modes during self-tune execution, the self- tune function will be aborted.

8.7 Stand by mode

This operative mode also deactivates the automatic control but forces the control output (valve position) to zero.

In this mode the instrument operates as an indicator.

When the instrument is in stand by mode the upper display will show the measured value while the middle display will show alternately the set point and the message “St.bY”.

Notes: 1. During stand by mode, the relative alarms are disabled while the absolute alarms are operative or not according to the ALxo (Alarm x enabling during Stand-by mode) parameter setting.

2. If you set stand by mode during self-tune execution, the self- tune function will be aborted.

3. When the instrument is swapped from stand by to auto modes, the instrument will start automatically the alarm masking, the soft start functions and the auto-tune (if programmed).

9. ERROR MESSAGES

9.1 Out of range signals

The upper display shows the OVER-RANGE and UNDER-RANGE conditions with the following indications:

Over-range

Under-range

The sensor break will be signalled as an out of range

Note: When an over-range or an under-range is detected, the alarms operate as in presence of the maximum or the minimum measurable value respectively.

To check the out of span Error condition, proceed as follows:

1. Check the input signal source and the connecting line.

2. Make sure that the input signal is in accordance with the instrument configuration.
Otherwise, modify the input configuration (see section 4).

3. If no error is detected, send the instrument to your supplier to be checked.

9.2 List of possible errors

ErAT Fast Auto-tune cannot start. The measure value is too close to the set point.
Push the ↵ button in order to delete the error message.

ouLd Overload on output 4.
The message shows that a short circuit is present on Out 4 when it is used as output or transmitter power supply. When the short circuit disappears the output restarts to operate.

NoAt Auto-tune not finished within 12 hours.

ErEP Possible problem in the instrument memory.
The message should automatically disappear, if the error persists, send the instrument to your supplier.

RonE Possible problem of the firmware memory.
If this error is detected, send the instrument to your supplier.

Errt Possible problem of the calibration memory.
If this error is detected, send the instrument to your supplier.

10.1 Proper use

Every possible use not described in this manual must be consider as a improper use.

This instrument is in compliance with EN 61010-1 “Safety requirements for electrical equipment for measurement, control and laboratory use”; for this reason it could not be used as a safety equipment.

Whenever a failure or a malfunction of the control device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional safety devices.

Ascon Tecnologic S.r.l. and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, wrong or improper use or in any case not in compliance with the instrument’s features.

10.2 Warranty

This product is under warranty against manufacturing defects or faulty materials that are found within 18 months from delivery date. The warranty is limited to repairs or to the replacement of the instrument.

The tampering of the instrument or an improper use of the product will bring about the immediate withdrawal of the warranty effects.

In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company.

The faulty product must be shipped to Ascon Tecnologic with a detailed description of the faults found, without any fees or charge for Ascon Tecnologic, except in the event of alternative agreements.

10.3 Maintenance

This instrument does not requires periodical recalibration and it have no consumable parts so that no particular maintenance is required.

Sometimes it is advisable to clean the instrument.

1. **SWITCH THE EQUIPMENT OFF** (power supply, relay output, etc.).
2. Using a vacuum cleaner or a compressed air jet (max. 3 kg/cm^2) remove all deposits of dust and dirt which may be present on the case and on the internal circuits being careful not to damage the electronic components.
3. To clean external plastic or rubber parts use only a cloth moistened with:
   - Ethyl Alcohol (pure or denatured) [C_2H_5OH] or
   - Isopropyl Alcohol (pure or denatured) [$(CH_3)_2CHOH$] or
   - Water (H_2O).
4. Make sure that there are no loose terminals.
5. Before turning ON the instrument make sure it is perfectly dry.
6. Apply the power supply to the instrument.

10.4 Accessories

The instrument has a lateral socket into which a special tool can be inserted. This tool, named A01, allows:

– To store a complete instrument configuration and to use it for other instruments.

– To transfer a complete instrument configuration to a PC or from a PC to an instrument

– To transfer from a PC to an instrument a complete instrument configuration

– To transfer a configuration from an A01 to another one.

– To test serial interface of the instruments and to help the OEM during machine start up.

Note: When the instrument is powered by the A01 key, the outputs are NOT supplied.

Appendix A

inP GROUP - Main and auxiliary input configuration

no.	Param.	Description	Dec. Point	Values	Default
1	SEnS	Input type	0	J = TC J (0... 1000°C/32... 1832°F); crAL = TC K (0... 1370°C/32... 2498°F); S = TC S (0... 1760°C/32... 3200°F); r = TC R (0... 1760°C/32... 3200°F); t = TC T (0... 400°C/32... 752°F); 0.20 = 0... 20 mA linear; 4.20 = 4... 20 mA linear; 0.60 = 0... 60 mV linear; 12.60 = 12... 60 mA linear.	J
2	dp	Decimal Point Position (linear inputs)	0	0... 3	0
3	SSc	Initial scale read-out for linear inputs	dp	-1999... 9999	0
4	FSc	Full Scale Readout for linear inputs	dp	-1999... 9999	1000
5	unit	Engineer unit		°C/°F	°C
6	Fil	Digital filter on the measured value	1	0 (= OFF) - 0.1... 20.0 s	1.0

7	inE	Sensor error used to enable the safety output value		or = Over range;
				ou = Under range;
				our = Over and under range.
					our

8	oPE	Safety output value (% of the output)		-100... 100% of the oputput	0
9	diF1	Digital Input 1 function		oFF = No function; 1 = Alarm reset; 2 = Alarm acknowledge (ACK); 3 = Hold of the measured value; 4 = Stand by mode; 5 = Manual mode; 6 = HEAt with SP1 and CooL with SP2; 7 = SP1 - SP2 selection.	oFF
10	diF2	Digital Input 2 function			oFF
11	di.A	Digital Inputs Action (DI2 only if configured)		0 = DI1 direct action, DI2 direct action; 1 = DI1 reverse action, DI2 direct action; 2 = DI1 direct action, DI2 reverse action; 3 = DI1 reverse action, DI2 reverse action.	0

Out group

no.	Param.	Description	Dec. Point	Values	Default
12	o1t	Output 1 type (when Out 1 is a linear output)		0-20 = 0... 20 mA; 4-20 = 4... 20 mA; 0-10 = 0... 10 V; 2-10 = 2... 10 V.	0-20
13	o1F	Out 1 function (when Out 1 is a digital output)		NonE = Output not used; H.rEG = Heating output; c.rEG = Cooling output.	H.rEG
14	o2F	Out 2 function (when the instrument is equipped with2 digital output)		NonE = Output not used; H.rEG = Heating output; c.rEG = Cooling output.	
15	o3AL	Alarms linked up with Out 3	0	0... 31: +1 = Alarm 1; +2 = Alarm 2; +4 = Loop break alarm; +8 = Sensor break; +16 = Potentiometer break alarm.	AL2

16	o3Ac	Out 3 action	0	dir = Direct action;
				rEU = Reverse action;
				dir.r = Direct with reversed LED;
				ReU.r = Reverse with reversed LED.
					dir

17	o4AL	Alarms linked up with the out 4	0	0... 31: +1 = Alarm 1; +2 = Alarm 2; +4 = Loop break alarm; +8 = Sensor break; +16 = Potentiometer break alarm.	AL1 + AL2

18	o4Ac	Out 4 action	0	dir = Direct action;
				rEU = Reverse action;
				dir.r = Direct with reversed LED;
				ReU.r = Reverse with reversed LED.
					dir

AL1 group

no.	Param.	Description	Dec. Point	Values	Default
19	AL1t	Alarm 1 type	0	nonE = Alarm not used; LoAb = Absolute low alarm; HiAb = Absolute high alarm; LHAo = Windows alarm in alarm outside the windows; LHAi = Windows alarm in alarm inside the windows; SE.br = Sensor Break; LodE = Deviation low alarm (relative); HidE = Deviation high alarm (relative); LHdo = Relative band alarm in alarm out of the band; LHdi = Relative band alarm in alarm inside the band.	HiAb
20	Ab1	Alarm 1 function	0	0... 15: +1 = Not active at power up; +2 = Latched alarm (manual reset); +4 = Acknowledgeable alarm; +8 = Relative alarm not active at set point change.	0
21	AL1L	- For High and low alarms, it is the low limit of the AL1 threshold; - For band alarm, it is low alarm threshold	dp	From -1999 to AL1H (E.U.)	-1999
22	AL1H	- For High and low alarms, it is the high limit of the AL1 threshold; - For band alarm, it is high alarm threshold	dp	From AL1L to 9999 (E.U.)	9999
23	AL1	AL1 threshold	dp	From AL1L to AL1H (E.U.)	0
24	HAL1	AL1 hysteresis	dp	1... 9999 (E.U.)	1
25	AL1d	AL1 delay	0	From 0 (oFF) to 9999 (s)	oFF
26	AL1o	Alarm 1 enabling during Stand-by mode and out of range conditions	0	0 = Alarm 1 disabled during Stand by and out of range; 1 = Alarm 1 enabled in stand by mode; 2 = Alarm 1 enabled in out of range condition; 3 = Alarm 1 enabled in stand by mode and in out of range condition.	0

AL2 group

no.	Param.	Description	Dec. Point	Values	Default
27	AL2t	Alarm 2 type	0	nonE = Alarm not used; LoAb = Absolute low alarm; HiAb = Absolute high alarm; LHAo = Windows alarm in alarm outside the windows; LHAi = Windows alarm in alarm inside the windows; SE.br = Sensor Break; LodE = Deviation low alarm (relative); HidE = Deviation high alarm (relative); LHdo = Relative band alarm in alarm out of the band; LHdi = Relative band alarm in alarm inside the band.	Loab
28	Ab2	Alarm 2 function	0	0... 15: +1 = Not active at power up; +2 = Latched alarm (manual reset); +4 = Acknowledgeable alarm; +8 = Relative alarm not active at set point change	0
29	AL2L	- For High and low alarms, it is the low limit of the AL2 threshold; - For band alarm, it is low alarm threshold	dp	From -1999 to AL2H (E.U.)	-1999
30	AL2H	- For High and low alarms, it is the high limit of the AL2 threshold; - For band alarm, it is high alarm threshold	dp	From AL2L to 9999 (E.U.)	9999
31	AL2	AL2 threshold	dp	From AL2L to AL2H (E.U.)	0
32	HAL2	AL2 hysteresis	dp	1... 9999 (E.U.)	1
33	AL2d	AL2 delay	0	From 0 (oFF) to 9999 (s)	oFF
34	AL2o	Alarm 2 enabling during Stand-by mode and out of range conditions	0	0 = Alarm 2 disabled during Stand by and out of range; 1 = Alarm 2 enabled in stand by mode; 2 = Alarm 2 enabled in out of range condition; 3 = Alarm 2 enabled in stand by mode and in out of range condition.	0

LBA group - Loop Break Alarm Parameters

no.	Param.	Description	Dec. Point	Values	Default
35	LbAt	LBA time	0	From 0 (oFF) to 9999 (s)	oFF
36	LbSt	Delta measure used by LBA during Soft start	dP	From 0 (oFF) to 9999 (E.U.)	10
37	LbAS	Delta measure used by LBA	dP	1...9999 (E.U.)	20
38	LbcA	Condition for LBA enabling	0	uP = Active when Pout = 100%; dn = Active when Pout = -100%; both = Active in both cases.	both

rEG group - Control Parameters

no.	Param.	Description	Dec. Point	Values	Default
39	cont	Control type (when the controller is equipped with digital outputs)		Pid = PID (Single or double action); On.FA = ON/OFF asymmetric (Single action); On.FS = ON/OFF symmetric (Single action); nr = ON/OFF double action with neutral zone; 3Pt = Servomotor control (Out 1 = open, Out 2 = close).	
40	Auto	Autotuning selection	0	-4 = Oscillating auto-tune with automatic restart at power up and after all point change; -3 = Oscillating auto-tune with manual start; -2 = Oscillating -tune with automatic start at the first power up only; -1 = Oscillating auto-tune with automatic restart at every power up; 0 = Not used; 1 = Fast auto tuning with automatic restart at every power up; 2 = Fast auto-tune with automatic start the first power up only; 3 = FAST auto-tune with manual start; 4 = FAST auto-tune with automatic restart at power up and after a set point change; 5 = Evo-tune with automatic restart at every power up; 6 = Evo-tune with automatic start the first power up only; 7 = Evo-tune with manual start; 8 = Evo-tune with automatic restart at power up and after a set point change.	7
41	tunE	Manual start of the Autotuning	0	oFF = Not active; on = Active	oFF
42	hSet	Hysteresis of the ON/OFF control	dP	0... 9999 (E.U.)	
43	Pb	Proportional band	dP	1... 9999 (E.U.)	50
44	ti	Integral time	0	From 0 (oFF) to 9999 (s)	200
45	td	Derivative time	0	From 0 (oFF) to 9999 (s)	50
46	Fuoc	Fuzzy overshoot control	2	0.00... 2.00	0.50
47	tch	Heating output cycle time	1	0.1... 130.0 (s)	20.0
48	rcG	Power ratio between heating and cooling action	2	0.01... 99.99	1.0
49	tcc	Cooling output cycle time	1	0.1... 130.0 (s)	20.0
50	rS	Manual reset (Integral pre-load)	1	-100.0... +100.0 (%)	0.0
51	Str.t	Servomotor stroke time	0	5... 300 seconds	60
52	db.S	Servomotor dead band	0	0...10.0%	50
53	oP.L	Minimum Power Output		From 100 to OP.H%	
54	oP.H	Maximum Power Output		From OP.L to 100%	
55	St.P	Maximum power output used during soft start	0	-100... 100 (%)	0
56	SSt	Soft start time	2	- 0.00 (oFF); - 0.01... 7.59 (hh.mm); - inF (always ON).	oFF
57	SS.tH	Threshold for soft start disabling	dP	-1999... +9999 (E.U.)	9999
58	Pot	Potentiometer enabling		nonE = Potentiometer not used; Pot.o = Potentiometer used for indication only; Pot.c = Potentiometer used for feedback control	
59	P.caL	Automatic potentiometer calibration		no = The automatic potentiometer calibration is disabled; YES = The automatic potentiometer calibration is enabled.	

SP group - Set point parameters

no.	Param.	Description	Dec. Point	Values	Default
60	nSP	Number of used set points	0	1... 4	1
61	SPLL	Minimum set point value	dP	From -1999 to SPHL	-1999
62	SPHL	Maximum set point value	dP	From SPLL to 9999	9999
63	SP	Set point 1	dP	From SPLL to SPLH	0
64	SP 2	Set point 2	dP	From SPLL to SPLH	0
65	SP 3	Set point 3	dP	From SPLL to SPLH	0
66	SP 4	Set point 4	dP	From SPLL to SPLH	0
67	A.SP	Selection of the active set point	0	From 1 (SP 1) to nSP	1
68	SP.rt	Remote set point type	0	rSP = The value coming from serial link is used as remote SP; trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point; PErc = The value will be scaled on the input range and this value will be used as remote SP.	trin
69	SPLr	Local/remote set point selection	0	Loc = Local; rEn = Remote.	Loc
70	SP.u	Rate of rise for **POSITIVE** set point change (ramp UP)	2	0.01... 99.99 (inF) engineering units per minute	inF
71	SP.d	Rate of rise for **NEGATIVE** set point change (ramp DOWN)	2	0.01... 99.99 (inF) engineering units per minute	inF

PAn group - Operator HMI parameters

no.	Param.	Description	Dec. Point	Values	Default
72	PAS2	Level 2 password (limited access level)	0	- oFF (Level 2 not protected by password); - 1... 200.	20
73	PAS3	Level 3 password (complete configuration level)	0	3... 200	30

74	uSrb	button function during RUN TIME		nonE = No function;
				tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune;
				oPLo = Manual mode. The first pressure puts the instrument in manual mode (oPLo) while a second one puts the instrument in Auto mode;
				AAc = Alarm reset;
				ASi = Alarm acknowledge;
				St.by = Stand by mode. The first press puts the instrument in stand by mode while a second one puts the instrument in Auto modet;
				SP1.2 = SP/SP2 selection.
					tunE

75	diSP	Middle display management		nonE = Standard display; SPF = Final set point; Spo = Operative set point; AL1 = Alarm 1 threshold; AL2 = Alarm 2 threshold; Po = Power Output	0
76	di.cL	Colour of the upper display		0 = The display colour is used to show the actual deviation (PV - SP); 1 = Display red; 2 = Display green; 3 = Display orange.	0
77	AdE	Deviation for display colour management		1... 9999 (E.U.)	5
78	diS.t	Display Timeout	2	- oFF (display always ON); - 0.1... 99.59 (mm.ss).	oFF
79	fiLd	Filter on the displayed value	1	- oFF (filter disabled); - 1... 100 (E.U.).	oFF
80	dSPu	Instrument status at power ON		AS.Pr = Starts in the same way it was prior to the power down; Auto = Starts in Auto mode; oP.0 = Starts in manual mode with a power output equal to zero; St.bY = Starts in stand-by mode.	AS.Pr
81	oPr.E	Operative modes enabling		ALL = All modes will be selectable by the next parameter; Au.oP = Auto and manual (oPLo) mode only will be selectable by the next parameter; Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter	ALL
82	oPEr	Operative mode selection		If oPr.E = ALL: - Auto = Auto mode; - oPLo = Manual mode; - St.bY = Stand by mode; If oPr.E = Au.oP: - Auto = Auto mode; - oPLo = Manual mode; If oPr.E = Au.Sb: - Auto = Auto mode; - St.bY = Stand by mode.	Auto

Ser group - Serial link parameters

no.	Param.	Description	Dec. Point	Values	Default
83	Add	Instrument address		- oFF; - 1... 254.	1
84	bAud	Baud rate		1200 = 1200 baud; 2400 = 2400 baud; 9600 = 9600 baud; 19.2 = 19200 baud; 38.4 = 38400 baud	9600
85	trSP	Selection of the value to be retransmitted (Master)		nonE = Retransmission not used (the instrument is a slave); rSP = The instrument becomes a Master and retransmits the operative set point; PErc = The instrument become a Master and it retransmits the power output	nonE

cAL group - User calibration parameters

no.	Param.	Description	Dec. Point	Values	Default
86	AL.P	Adjust Low Point		From -1999 to (AH.P - 10) in engineering units	0
87	AL.o	Adjust Low Offset		-300... +300 (E.U.)	0
88	AH.P	Adjust High Point		From (AL.P + 10) to 9999 engineering units	9999
89	AH.o	Adjust High Offset		-300... +300	0