



K_5P

CONTROLLER, PROGRAMMER and SET POINT SETTER



Engineering Manual

23/02 - Code: ISTR_M_K-5PSERIES_E_00_--

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1 DIMENSIONS (mm)

1.1 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 are minimum vibrations and no impacts;
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%);

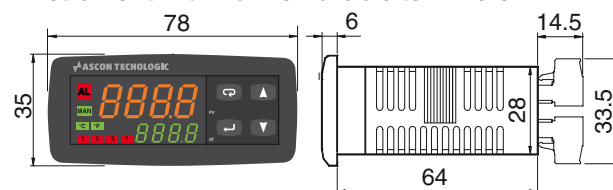
The instrument can be mounted on panel with a maximum thickness of 15 mm.

When the maximum front protection (IP65) is required, the optional gasket must be installed for KM5P and KX5P or must be used the optional screw type bracket for the KR5P.

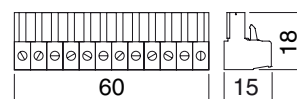
1.2 KR5P

1.2.1 Outline Dimensions

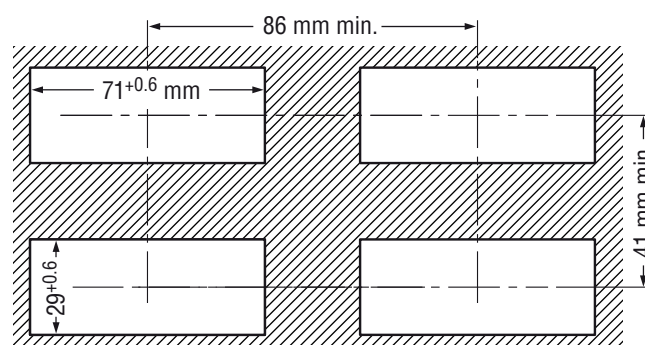
Instrument with non removable terminals



Removable terminals



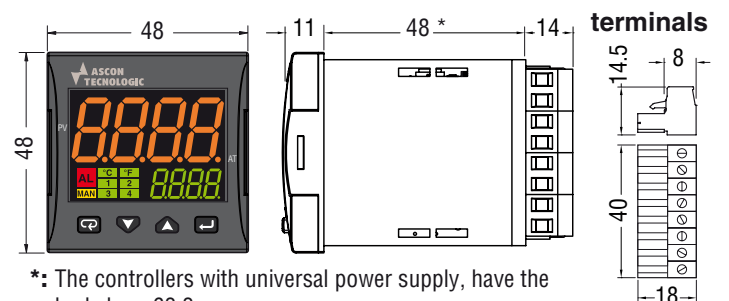
1.2.2 Panel cutout



1.3 KM5P

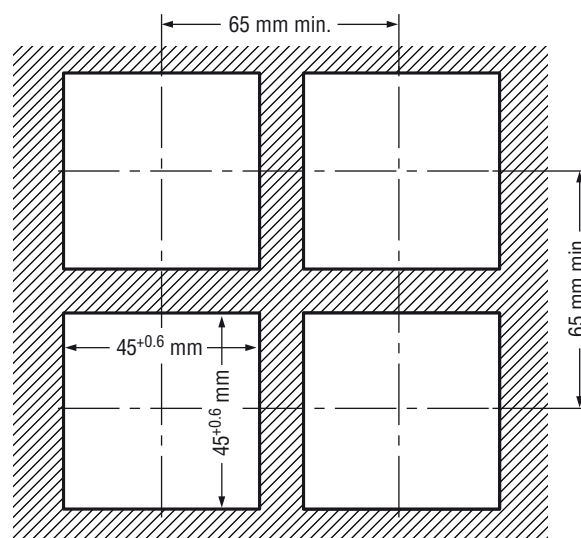
1.3.1 Outline Dimensions

Instrument with non removable terminals



*: The controllers with universal power supply, have the body long 63.3 mm.

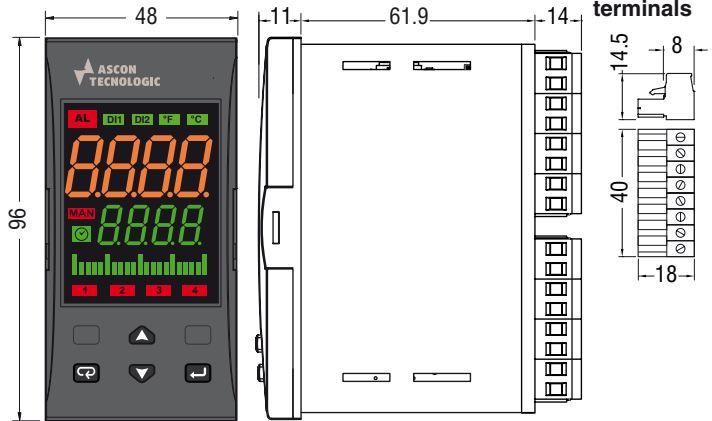
1.3.2 Panel cutout



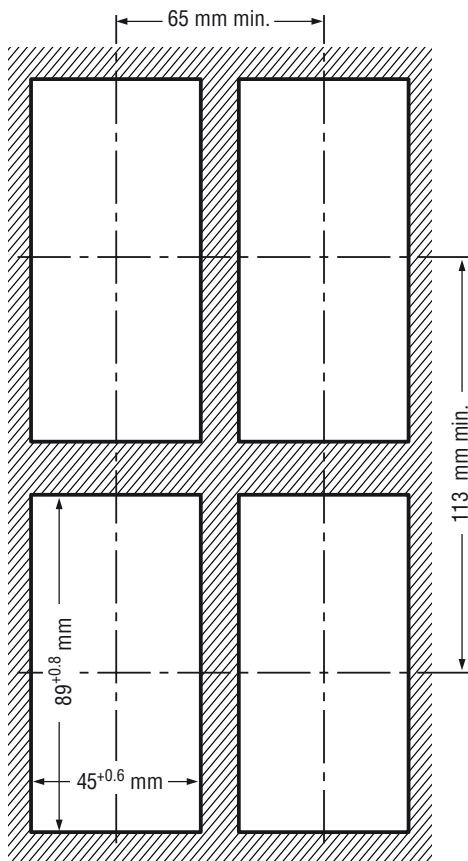
1.4 KX5P

1.4.1 Outline Dimensions

Instrument with non-removable terminals



1.4.2 Panel cutout



2 ELECTRICAL CONECTIONS

2.1 General notes about wiring

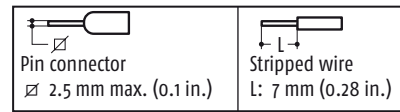
1. Do not run input wires together with power cables.
2. External components (like zener barriers, etc.) connected between sensor and input terminals may cause errors in measurement due to excessive and/or not balanced line resistance or possible leakage currents.
3. When a shielded cable is used, it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

2.2 Wiring diagrams



If not specifically indicated the following connecting diagrams are valid for all the models. When the connections are different, the connection of each model is illustrated.

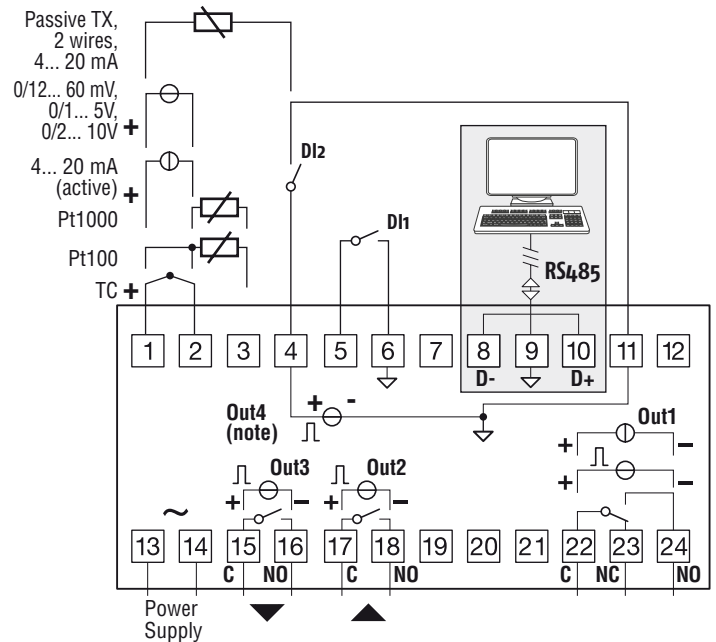
2.2.1 Terminal types



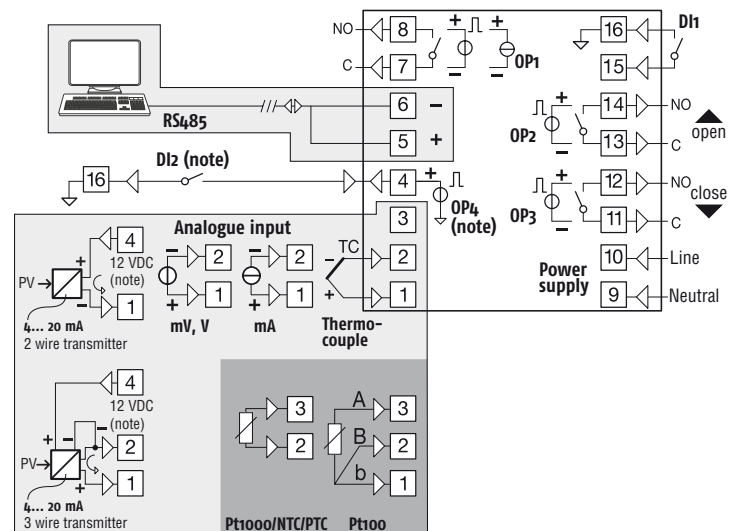
Note: Terminal 4 can be programmed as:

- Digital Input (DI2) connecting a dry contact between terminals 4 - 11 (KR5P), 4 - 16 (KM5P), 4 - 5 (KX5P);
- 0... 12 V SSR Drive Output (OP4) connecting the load between terminals 4 - 11 (KR5P), 4 - 16 (KM5P), 4 - 5 (KX5P);
- 12 Vdc (20 mA) transmitter power supply connecting the 2 wire transmitter between terminals 4 and 1; for 3 wire transmitter connect terminal 4 to transmitter power supply input and terminal 1 and 2 to transmitter signal output.

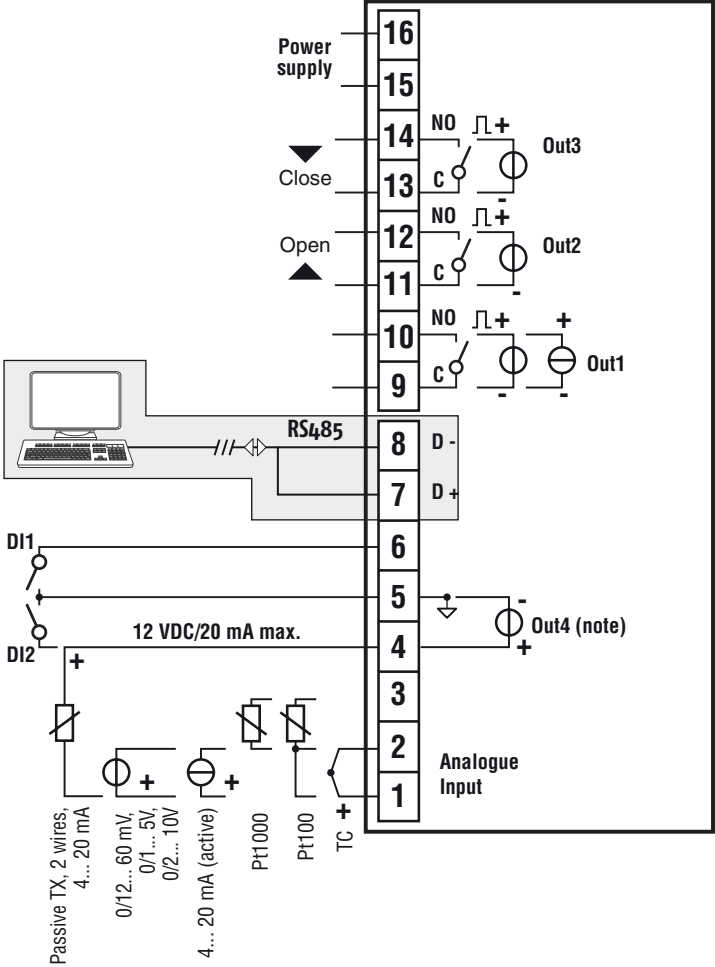
2.2.2 KR5P



2.2.3 KM5P

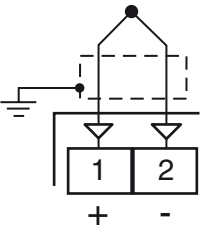


2.2.4 KX5P



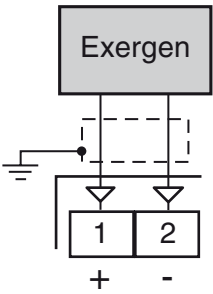
2.3 Inputs

2.3.1 Thermocouple Input



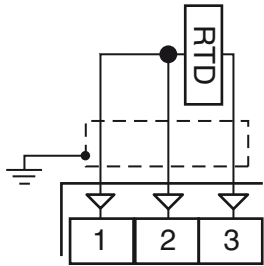
Continuity detection current: 250 nA;
Cold junction: automatic compensation between 0... 50°C;
Cold junction thermal drift: 0.1°C/°C after a warm-up of 20 minutes;
Input impedance: > 1 MΩ;
Calibration: According to EN 60584-1.
Note: For TC wiring use proper compensating cable preferable shielded.

2.3.2 Infrared Sensor Input



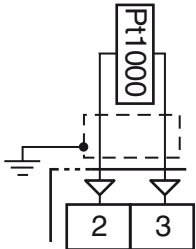
External resistance: Not relevant;
Cold junction: Automatic compensation between 0... 50°C;
Cold junction thermal drift: 0.1°C/°C;
Input impedance: > 1 MΩ.

2.3.3 RTD Pt 100 Input



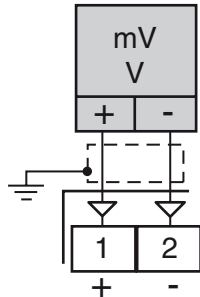
Input circuit: Current injection (150 µA);
Line resistance: Automatic compensation up to 20Ω/wire with maximum error 0.3°C;
Calibration: According to EN 60751/A2.
Note: The resistance of the 3 wires must be the same.

2.3.4 RTD Pt 1000, NTC and PTC Input



Line resistance: Not compensated;
Pt 1000 input circuit: Current injection (15 µA);
Pt 1000 calibration: According to EN 60751/A2.

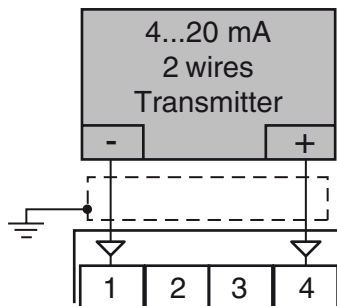
2.3.5 V and mV Input



Input impedance: > 1 MΩ for mV Input,
500 kΩ for V Input.

2.3.6 mA Input

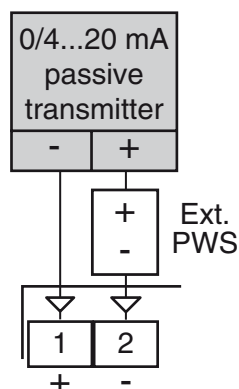
0/4... 20 mA Input wiring for passive transmitter using the auxiliary PWS



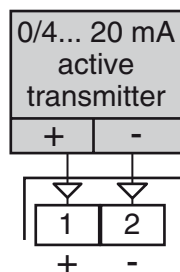
Input impedance: < 53Ω;

Internal auxiliary PWS: 12 VDC (±20%), 20 mA max..

0/4... 20 mA Input wiring for passive transmitter using an external PWS



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



2.3.7 Logic Inputs

DRY CONTACT LOGIC INPUT CHARACTERISTICS

Maximum contact resistance: 100 Ω;

Contact rating: DI1 = 10 V, 6 mA;
DI2 = 12 V, 30 mA.

24 VDC LOGIC INPUTS CHARACTERISTICS

Logic status 1: 6... 24 VDC;

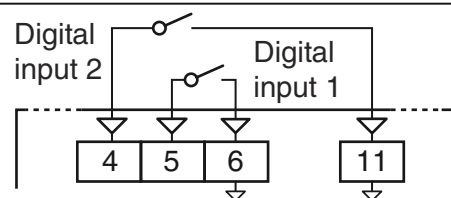
Logic status 0: 0... 3 VDC.

Safety notes:

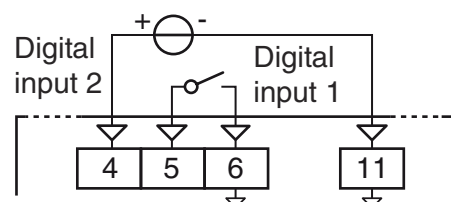
- Do not run logic input wiring together with power cables;
- The instrument needs 150 ms to recognize a contact status variation;
- Logic inputs are **NOT insulated** from the measuring input. A double or reinforced insulation between logic inputs and power line must be assured by the external elements.

KR5P

LOGIC INPUT DRIVEN BY DRY CONTACT

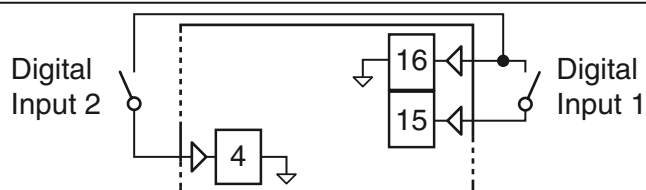


LOGIC INPUTS DRIVEN BY 24 VDC

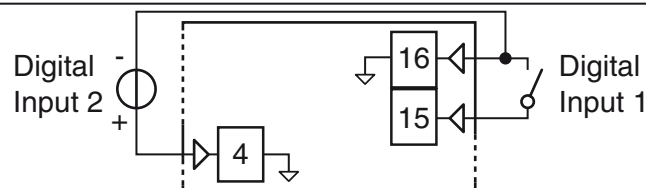


KM5P

LOGIC INPUT DRIVEN BY DRY CONTACT

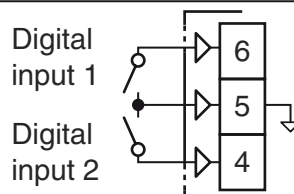


LOGIC INPUTS DRIVEN BY 24 VDC

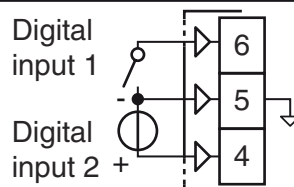


KX5P

LOGIC INPUT DRIVEN BY DRY CONTACT



LOGIC INPUTS DRIVEN BY 24 VDC



2.4 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 least 75°C.
- Use copper conductors only.
- SSR outputs are not isolated. A reinforced isolation must be assured by the external solid state relays.
- For SSR, mA and V outputs if the line length is longer than 30 m use a shielded wire.



Before connecting the outputs to the actuators, we strongly recommend to check that the parameters are the desired ones and that the application works correctly in order to avoid malfunctions which can cause irregularities in the system and which could cause damage to people, things or animals.

2.4.1 Output 1 (OP1)

RELAY OUTPUT CHARACTERISTICS

Contact rating: - 4 A / 250 V $\cos\phi = 1$;
- 2 A / 250 V $\cos\phi = 0.4$;

Operation: 1×10^5 .

SSR OUTPUT CHARACTERISTICS

Logic level 0: $V_{out} < 0.5 \text{ VDC}$;

Logic level 1: $12 \text{ V} \pm 20\%$, 15 mA max..

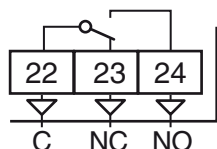
ANALOGUE OUTPUTS CHARACTERISTICS

mA output: 0/4... 20 mA, galvanically isolated, maximum load resistance: 500 Ω .

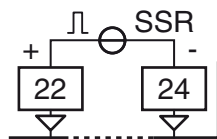
V output: 0/2... 10 V, galvanically isolated, minimum load resistance: 500 Ω .

KR5P

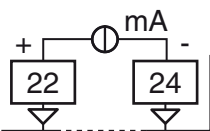
RELAY OUTPUT



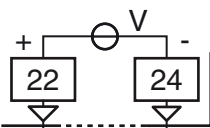
SSR OUTPUT



CURRENT ANALOGUE OUTPUT

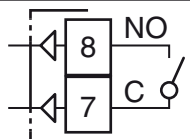


VOLTAGE ANALOGUE OUTPUT

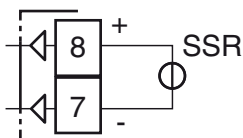


KM5P

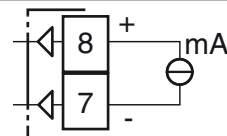
RELAY OUTPUT



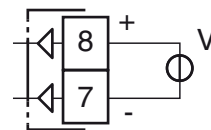
SSR OUTPUT



CURRENT ANALOGUE OUTPUT

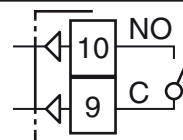


VOLTAGE ANALOGUE OUTPUT

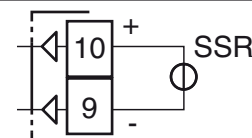


KX5P

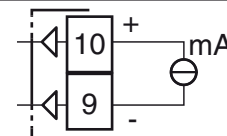
RELAY OUTPUT



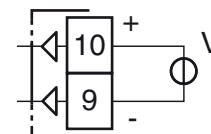
SSR OUTPUT



CURRENT ANALOGUE OUTPUT



VOLTAGE ANALOGUE OUTPUT



2.4.2 Output 2 (OP2)

RELAY OUTPUT CHARACTERISTICS

Contact rating: - 2 A / 250 V $\cos\phi = 1$;
- 1 A / 250 V $\cos\phi = 0.4$;

Operation: 1×10^5 .

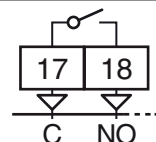
SSR OUTPUT CHARACTERISTICS

Logic level 0: $V_{out} < 0.5 \text{ VDC}$;

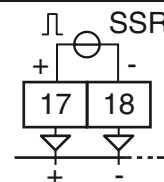
Logic level 1: $12 \text{ V} \pm 20\%$, 15 mA max..

KR5P

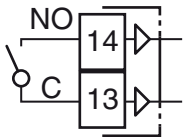
RELAY OUTPUT



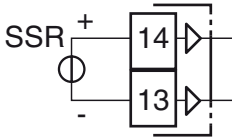
SSR OUTPUT



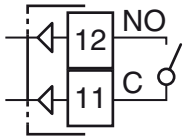
KM5P
RELAY OUTPUT



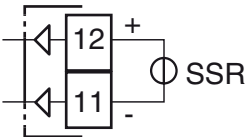
SSR OUTPUT



KX5P
RELAY OUTPUT



SSR OUTPUT



2.4.3 Output 3 (OP3)

RELAY OUTPUT CHARACTERISTICS

Contact rating: - 2 A /250 V cosφ = 1;
- 1 A /250 V cosφ = 0.4;

Operation: 1 x 10⁵.

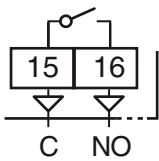
SSR OUTPUT CHARACTERISTICS

Logic level 0: Vout < 0.5 VDC;

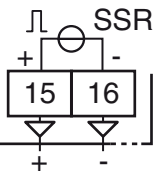
Logic level 1: 12 V ± 20%, 15 mA max..

KR5P

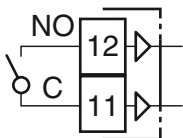
RELAY OUTPUT



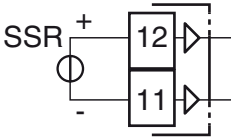
SSR OUTPUT



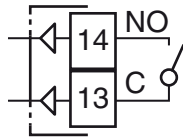
KM5P
RELAY OUTPUT



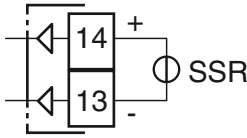
SSR OUTPUT



KX5P
RELAY OUTPUT



SSR OUTPUT



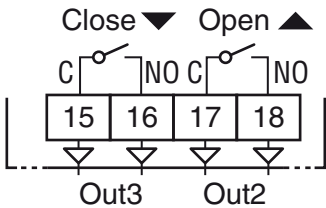
Output 2 (OP2) and Output 3 (OP3) Servomotor Drive

SERVOMOTOR DRIVE CHARACTERISTICS

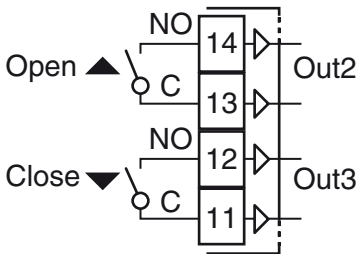
OP2/3 contact rating: - 2 A /250 V cosφ = 1;
- 1 A /250 V cosφ = 0.4.

Operation: 1 x 10⁵.

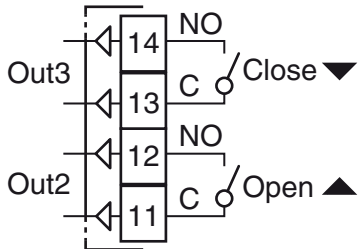
KR5P



KM5P



KX5P



Output 4 (OP4)

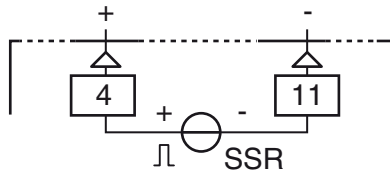
SSR OUTPUT CHARACTERISTICS

Logic level 0: Vout < 0.5 VDC;

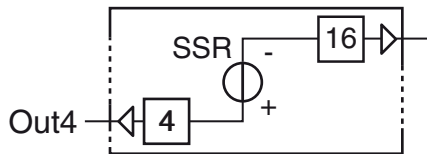
Logic level 1: 12 V ± 20%, 20 mA max..

Note: Overload protected.

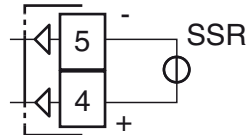
KR5P



KM5P

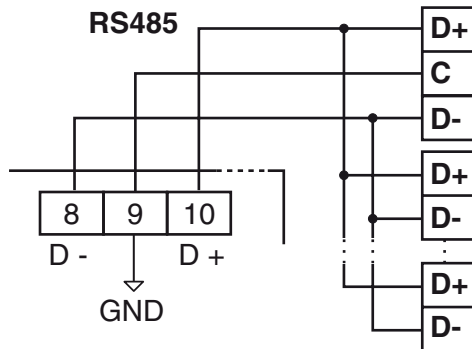


KX5P

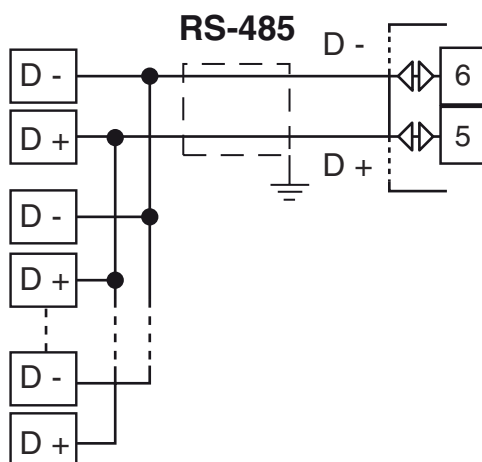


2.5 Serial Interface

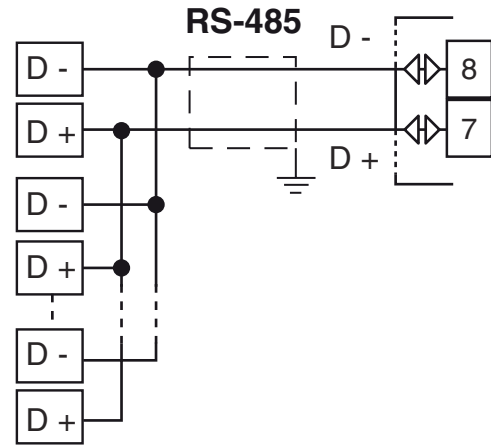
KR5P



KM5P



KX5P



Interface type: Insulated (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.

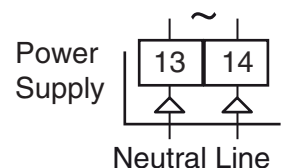
Notes: 1. RS-485 interface allows to connect up to 30 devices with one remote master unit.
 2. Cable length must not exceed 1.5 km at 9.6 kbaud.

2.6 Power Supply

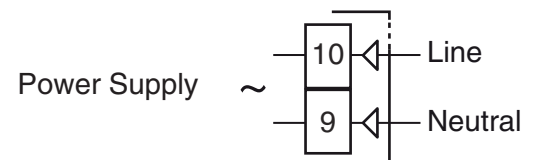
Supply Voltage: • 24 VAC/DC ($\pm 10\%$);
 • 100... 240 VAC ($-15\% \dots +10\%$)
 • 24... 240 VAC ($\pm 10\%$) **KM5P only.**

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.

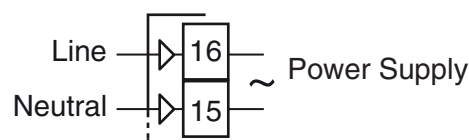
KR5P



KM5P



KX5P



3 TECHNICAL CHARACTERISTICS

Case: Plastic, self-extinguishing degree: V-0 according to UL 94;

Front protection: IP65 with optional gasket for KM5P/KX5P or with optional screw-type bracket for KR5P; for indoor use according to EN 60070-1;

Terminals protection: IP20 according to EN 60070-1;

Installation: Panel mounting;

Terminal blocks:

- **KR5P:** 24 M3 screw/spring terminals, for cables of 0.25... 2.5 mm² (AWG 22... AWG 14),
- **KM5P and KX5P:** 16 M3 screw/spring terminals for cables of 0.25... 2.5 mm² (AWG22... AWG14);

Dimensions:

- **KR5P:** 78 x 35 depth 69.5 mm (3.07 x 1.37 depth 2.73 in.),
- **KM5P:** 48 x 48 (1.77 x 1.77), depth 75.5... 99 mm (2.97... 3.89 in.) depending on the model selected and the type of terminals adopted,
- **KX5P:** 48 x 96, depth 75.9 mm, (1.77 x 3.78 x 2.99 in.);

Panel cutout:

- **KR5P:** 71(+0.6) x 29(+0.6) mm [2.79(+0.023) x 1.14(+0.023) in.],
- **KM5P:** 45(+0.6) x 45(+0.6) mm [1.78(+0.023) x 1.78(+0.023) in.],
- **KR5P:** 45(+0.6) x 89(+0.6) mm [1.78(+0.023) x 3.5(+0.023) in.];

Weight:

- **KR5P:** 180 g max.,
- **KM5P:** 126... 151 g depending on the model selected,
- **KX5P:** 160 g max.;

Power supply:

- 24 VAC/DC ($\pm 10\%$ of the nominal value);
- 100... 240 VAC (-15% ... $+10\%$ of the nominal value);
- 24... 240 VAC/DC ($\pm 10\%$ of the nominal value) **KM5P only**;

Power consumption: 3 VA max.;

Insulation voltage: 3000 Vrms according to EN 61010-1;

Display updating time: 500 ms;

Sampling time: 130 ms;

Resolution: 30000 counts;

Total Accuracy: $\pm 0.5\%$ F.S.V. ± 1 digit @ 25°C of room temperature;

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.

Display:

- **KR5P:** Main: 4 digits height 10.9 mm with 3 dynamic/fixed colours, Secondary: 4 digits height 6 mm green,
- **KM5P:** Main: 4 digits height 15.5 mm with 3 dynamic/fixed colours or white (KM5PW), Secondary: 4 digits height 7.6 mm green,
- **KX5P:** Main: 4 digits height 15.5 mm with 3 dynamic/fixed colours, Secondary: 4 digits height 7.6 mm green, + a 21 segments bargraph;

Electromagnetic compatibility and safety requirements

Compliance:

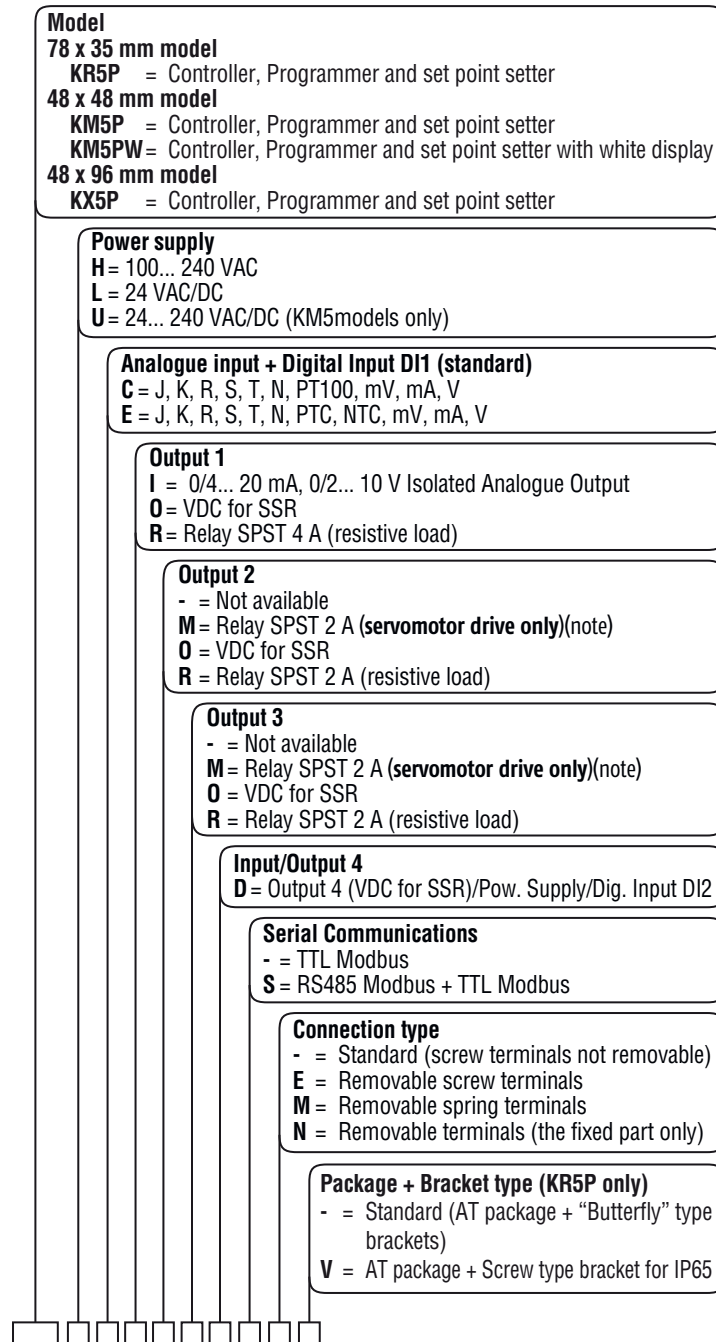
- EMC Directive (EN 61326-1),
- Safety Directive (EN 61010-1);

Installation category: II;

Pollution category: 2.

4 HOW TO ORDER

4.1 KR5P, KM5P and KX5P



Note: For servomotor drive, both **Output 1** (Out 1) and **Output 2** (Out 2) codes must be selected as "M".

5.1 Introduction

When the instrument is powered, it performs a LED test (all LED ON) and a self test. During self test the upper display shows the label: *LESE*, while the lower display shows the FirmWare version (e.g.: r.1.0.0). At the end of self test the instrument starts immediately working in accordance with the parameters values loaded in its memory. The instrument behaviour and its performance are governed by the value of the stored parameters. At first start up the instrument uses a "default" parameter set (factory parameter set); this set is a generic one (e.g. a TC J input is programmed).



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

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



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



5.2 Instrument behaviour at Power ON

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

Auto mode without program functions.

- The upper display shows the measured value;
- The lower display shows the Set point value;
- The decimal figure of the less significant digit of the upper display is OFF;
- The instrument is performing the standard closed loop control.

Manual mode (oPLo).

- The upper display shows the measured value;
- The lower display shows the power output and the MAN LED is lit;
- The instrument performs NO Automatic control;
- The control output is equal to 0% and can be manually modified by  and  keys.

Stand-by mode (St.bY).

- The upper display shows the measured value;
- The lower display shows alternately the set point value and the message *St.bY* or *od*;
- The instrument performs NO control at all (the control outputs are OFF);
- The instrument is working as an indicator.

Auto mode with automatic program start up.




- The upper display shows the measured value;
- The lower display shows one of the following information;
 - The operative set point (when it is performing a ramp)
 - The time of the segment in progress (when it is performing a soak);

NOTE VERY WELL: In all cases, the decimal figure of the less significant digit of the lower display is lit.

We define all the above described conditions as "Standard Display".

5.3 Entering the "Configuration modes"

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. Press the  key for more than 5 seconds. The upper display shows *PASS* while the lower display shows *0*.
2. Using  and  keys set the programmed password.

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

2. During parameter modification the instrument continues to control the process.


In certain conditions, when a configuration change can produce a heavy bump to the process, it is advisable to temporarily stop the control during the programming operations (the control output will be Off). In this case, use 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. Press the  key. If the password is correct the display starts showing the acronym of the first parameter group preceded by the symbol: . In other words the upper display will show:  *INP* (group of the **Input parameters**).

The instrument is in configuration mode.

5.4 Exiting the "Configuration mode"

Push  key for more than 5 seconds, the instrument returns to the "Standard display".

5.5 Keyboard functions during parameter changing



A short pression on the key exits from the current parameter group and selects a new parameter group. A long pression allows to close the configuration parameter procedure (the instrument returns to the "Standard display").



When the upper display is showing a group and the lower display is blank, this key allows to enter in the selected group.

When the upper display is showing a parameter and the lower 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.






Increases the value of the selected parameter.



Decreases the value of the selected parameter.



+  These two keys allow to return to the previous group. Proceed as follows:

Push the  key and maintaining the pressure, push the  key; release both the keys.

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






5.6 Factory reset - default parameters loading procedure

Sometimes, e.g. when you re-configure an instrument previously used for other works (or by 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  key for more than 5 seconds;
2. The upper display starts showing *PRSS* while the lower display shows ;
3. Using  and  keys set the value *-48* ;
4. Push  key;
5. The instrument turns OFF all LEDs for a few seconds, then the upper display shows *dFLt* (default) and after that 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**.


5.7 Parameters configuration

In the following pages we will describe all the instrument parameters. However, the instrument only shows those parameters applicable to the hardware options in accordance with the specific instrument configuration (i.e.: setting *ALt* [Alarm 1 type] to *none* [not used], all parameters related to alarm 1 will be skipped).


Group - Main and auxiliary input configuration

[1] SEnS - Input type

Available: Always.

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

J	TC J	(-50... +1000°C/-58... +1832°F);
crAL	TC K	(-50... +1370°C/-58... +2498°F);
S	TC S	(-50... +1760°C/-58... +3200°F);
r	TC R	(-50... +1760°C/-58... +3200°F);
t	TC T	(-70... +400°C/-94... +752°F);
n	TC N	(-50... +1300°C/-58... +2372°F);
Ir.J	Exergen IRS J	(-46... +785°C/-50... +1445°F);
Ir.cA	Exergen IRS K	(-46... +785°C/-50... +1445°F);
Pt1	RTD Pt100	(-200... +850°C/-328... +1562°F);
Pt10	RTD Pt1000	(-200... +850°C/-328... +1562°F);
0.60		0... 60 mV linear;
12.60		12... 60 mV linear;
0.20		0... 20 mA linear;
4.20		4... 20 mA linear;
0.5		0... 5 V linear;
1.5		1... 5 V linear;
0.10		0... 10 V linear;
2.10		2... 10 V linear.

- When the code of the input type is equal to  (see "How to order" paragraph).

J	TC J	(-50... +1000°C/-58... +1832°F);
crAL	TC K	(-50... +1370°C/-58... +2498°F);
S	TC S	(-50... +1760°C/-58... +3200°F);
r	TC R	(-50... +1760°C/-58... +3200°F);
t	TC T	(-70... +400°C/-94... +752°F);
n	TC N	(-50... +1300°C/-58... +2372°F);
Ir.J	Exergen IRS J	(-46... +785°C/-50... +1445°F);
Ir.cA	Exergen IRS K	(-46... +785°C/-50... +1445°F);
Ptc	PTC	(-55... +150°C/-67... +302°F);
ntc	NTC	(-50... +110°C/-58... +230°F);
0.60		0... 60 mV linear;
12.60		12... 60 mV linear;
0.20		0... 20 mA linear;
4.20		4... 20 mA linear;
0.5		0... 5 V linear;
1.5		1... 5 V linear;
0.10		0... 10 V linear;
2.10		2... 10 V linear.

- Notes:**
1. When a TC or RTD 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. All changes to SEnS parameter setting forces [2] dP = 0 and this causes a change to all parameters related with it (e.g. set points, proportional band, etc.).

[2] dP - Decimal point position

Available: Always.

Range: When [1] SenS = Linear input: 0... 3.

When [1] SenS different from linear input: 0 or 1.

Note: All changes to dP parameter setting causes a change to all 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 defines, for linear inputs, the value that is to be displayed when the instrument measures the minimum measurable value.
The instrument is able to display the measured value until it reaches a value of 5% lower than SSc, below which shows the Underrange message.
 2. It is possible to set an initial scale read-out higher than the full scale read-out in order to obtain a reverse read-out scaling.
E.g.:
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 defines, for linear inputs, the value that is to be displayed when the instrument measures the maximum measurable value.
The instrument is able to display the measured value until it reaches a value of 5% higher than FSc, above which shows the Overrange message.
 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.
E.g.:
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 Celsius;
°F Fahrenheit.



An engineering unit modification does NOT produce the automatic re-scaling of all parameters related with the engineering unit (e.g. alarm thresholds, proportional band, 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: -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 will use Zero.
E.g.: When heat action only has been programmed, and oPE is equal to -50% (cooling) the instrument will use the zero value.
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.

[9] io4.F - I/O4 function selection

Available: Always.



Range: **on** Out 4 forced to ON (used as a transmitter power supply);
out4 Used as digital output 4;
dG2.c Digital input 2 for dry contact;
dG2.U Digital input 2 driven by 12... 24 VDC.

Notes: 1. Setting [9] io4.F = dG2.C or dG2.V, the parameter [24] O4F becomes not visible while [11] diF2 parameter becomes visible.
2. Setting [9] io4.F = on the [24] O4F parameter and the [11] diF2 parameter will NOT be visible.
3. Setting [9] io4.F different from dG2.c or dG2.U, the instrument forces [12] diF2 parameter to nonE. If [11] diF1 was equal to (SP4 or UPDN) it will be forced to nonE.
4. The transfer from [9] io4.F = on to [9] io4.F = Out4 makes parameter [24] O4F visible equal to nonE.

[10] 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 Program Run [transition].
The first closure allows to start program execution but a second closure restart the program execution from the beginning;
- 7 Program Reset [transition].
A contact closure allows to reset program execution;
- 8 Program Hold [transition].
The first closure allows to hold program execution and a second closure continues program execution;
- 9 Program Run/Hold [status]. When the contact is closed the program is running;
- 10 Program Run/Reset [status]:
 - Contact closed - Program run;
 - Contact open - Program reset;
- 11 SP1/SP2 selection [status];
- 12 Binary selection of the set point made by digital input 1 (less significant bit) and digital input 2 (most significant bit) [status];
- 13 Digital input 1 works in parallel with  key while digital input 2 works in parallel with  key;
- 14 [Available from Firmware version r.1.1.0]
Selection of the program to run [status]:
When **programs page 1** is selected
 - Contact open - Program 1;
 - Contact closed - Program 2;When **programs page 2** is selected:
 - Contact open - Program 5;
 - Contact closed - Program 6;
- 15 [Available from Firmware version r.1.1.0]
Binary selection of the program to run made by digital input 1 (less significant bit) and digital input 2 (most significant bit) [status].

Notes: 1. When [10] diF1 = 12, [11] diF2 setting is forced to 12 and diF2 cannot perform another function.
2. When [10] diF1 = 12 and [11] diF2 = 12, the set point selection will be:

DI1	DI2	Operative set point
Off	Off	Set point 1
On	Off	Set point 2
Off	On	Set point 3
On	On	Set point 4

3. When [10] diF1 is equal to 13, [11] diF2 setting is forced to up.du (13 value) and cannot perform another function.
4. When [10] diF1 = 15 also [11] diF2 = 15, and **programs page 1** is selected the selection of the program to run will be:

DI1	DI2	Program
Off	Off	Program 1
On	Off	Program 2

Off	On	Program 3
On	On	Program 4



When programs page 2 is selected:

DI1	DI2	Program
Off	Off	Program 5
On	Off	Program 6
Off	On	Program 7
On	On	Program 8

[11] 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 Program Run [transition].
The first closure allows to start program execution but a second closure restart the program execution from the beginning;
- 7 Program Reset [transition].
A contact closure allows to reset program execution;
- 8 Program Hold [transition]
The first closure allows to hold program execution and a second closure continue program execution;
- 9 Program Run/Hold [status]. When the contact is closed the program is running;
- 10 Program Run/Reset [status]:
 - Contact closed - Program run;
 - Contact open - Program reset;
- 11 SP1/SP2 selection [status];
- 12 Binary selection of the set point made by digital input 1 (less significant bit) and digital input 2 (most significant bit) [status];
- 13 Digital input 1 works in parallel with  key while digital input 2 works in parallel with  key;
- 14 **[Available from Firmware version r.1.1.0]**
Selection of the program to run [status]:
When **program page 1** is selected
 - Contact open - Program 1;
 - Contact closed - Program 2;
 When **program page 2** is selected:
 - Contact open - Program 5;
 - Contact closed - Program 6;
- 15 **[Available from Firmware version r.1.1.0]**
Binary selection of the program to run made by digital input 1 (less significant bit) and digital input 2 (most significant bit) [status].

[12] di.A - Digital Inputs Action

Available: Always.

- Range: 0** DI1 Direct action,
DI2 (if configured) Direct action;
- 1 DI1 Reverse action,
DI2 (if configured) Direct action;
 - 2 DI1 Direct action,
DI2 (if configured) Reverse action;
 - 3 DI1 Reverse action,
DI2 (if configured) Reverse action.

Output Group - Output parameters

[13] o1.t - Out 1 type

Available: When Out1 is a linear output.

Range: **0-20** 0... 20 mA;
4-20 4... 20 mA;
0-10 0... 10 V;
2-10 2... 10 V.

[14] o1.F - Out 1 function

Available: Always.

Range: • When Out 1 is a linear output:

nonE Output not used. With this setting the status of this output can be driven directly from serial link;

H.rEG Heating output;

c.rEG Cooling output.

r.inP Analogue retransmission of the measured value;

r.Err Analogue retransmission of the measured error (PV-SP);

r.SP Analogue retransmission of the operative set point;

r.SEr Analogue retransmission of a value coming from serial link;

• When out 1 is a digital output (relay or SSR):

nonE Output not used. With this setting the status of this output can be driven directly from serial link;

H.rEG Heating output;

c.rEG Cooling output;

AL Alarm output;

P.End Program end indicator;

P.HLd Program hold indicator;

P.uit Program wait indicator;

P.run Program run indicator;

P.Et1 Program Event 1;

P.Et2 Program Event 2;

or.bo Out-of-range or burn out indicator;

P.FAL Power failure indicator;

bo.PF Out-of-range, Burnout and Power failure indicator;

St.By Stand By status indicator;


diF1 Repeats the digital input 1 status;

diF2 Repeats the digital input 2 status;

on Out1 always ON;

riSP Inspection request.

Notes: 1. When two or more outputs are programmed in the same way, these outputs will be driven in parallel.

2. The power failure indicator will be reset when the instrument detect an alarm reset command by  key, digital input or serial link.

3. When no control output is programmed, all the relative alarm (when present) will be forced to **nonE** (not used).

[15] A.o1L - Initial scale value of the analogue retransmission

Available: When Out 1 is a linear output and [14] O1F is equal to r.IMP, r.Err, r.SP or r.SEr

Range: -1999 to [16] Ao1H.

[16] A.o1H - Full scale value of the analogue retransmission

Available: When Out 1 is a linear output and [14] O1F is equal to r.IMP, r.Err, r.SP or r.SEr.

Range: [15] Ao1L to 9999.

[17] o1.AL - Alarms linked up with the out 1

Available: When [14] o1F = AL.

Range: 0... 63 with the following rules:

- +1** Alarm 1;
- +2** Alarm 2;
- +4** Alarm 3;
- +8** Loop break alarm;
- +16** Sensor break (burn out);
- +32** Overload on Out 4 (short circuit on the Out4).

Example 1: Setting 3 (2+1) the output will be driven by the alarm 1 and 2 (OR condition).

Example 2: Setting 13 (8+4+1) the output will be driven by alarm 1 + alarm 3 + loop break alarm.

[18] o1.Ac - Out 1 action

Available: When [14] o1F is different from nonE.

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.

[19] o2F - Out 2 function

Available: When the instrument has out 2 option.

Range: **nonE** Output not used. With this setting the status of this output can be driven directly from serial link;

H.rEG Heating output;
c.rEG Cooling output;
AL Alarm output;
P.End Program end indicator;
P.HLd Program hold indicator;
P.uit Program wait indicator;
P.run Program run indicator;
P.Et1 Program Event 1;
P.Et2 Program Event 2;
or.bo Out-of-range or burn out indicator;
P.FAL Power failure indicator;
bo.PF Out-of-range, Burnout and Power failure indicator;
St.By Stand By status indicator;
diF1 Repeats the digital input 1 status;
diF2 Repeats the digital input 2 status;
on Out2 always ON;
riSP Inspection request.

For other details see [14] O1F parameter.



When a servomotor control is desired, **both Out2 and Out3** are to be selected as Heating or Cooling (**o2F = o3F = H.rEG** or **o2F = o3F = c.rEG**).
Parameter **[56] cont** must be set as **3PL**.

[20] o2.AL - Alarms linked up with Out 2

Available: When [19] o2F = AL.

Range: 0... 63 with the following rule:

- +1** Alarm 1;
- +2** Alarm 2;
- +4** Alarm 3;
- +8** Loop break alarm;
- +16** Sensor break (burn out);
- +32** Overload on Out 4 (short circuit on the Out4).

For more details see [17] o1.AL parameter.

[21] o2Ac - Out 2 action

Available: When [19] o2F is different from nonE.

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

For more details see [18] o1.Ac parameter.

[22] o3F - Out 3 function

Available: When the instrument has out 3 option.

Range: **nonE** Output not used. With this setting the status of this output can be driven directly from serial link;

H.rEG Heating output;
c.rEG Cooling output;
AL Alarm output;
P.End Program end indicator;
P.HLd Program hold indicator;
P.uit Program wait indicator;
P.run Program run indicator;
P.Et1 Program Event 1;
P.Et2 Program Event 2;
or.bo Out-of-range or burn out indicator;
P.FAL Power failure indicator;
bo.PF Out-of-range, Burnout and Power failure indicator;
St.By Stand By status indicator;
diF1 Repeats the digital input 1 status;
diF2 Repeats the digital input 2 status;
on Out2 always ON;
riSP Inspection request.



When a servomotor control is desired, **both Out2 and Out3** are to be selected as Heating or Cooling (**o2F = o3F = H.rEG** or **o2F = o3F = c.rEG**).
Parameter **[56] cont** must be set as **3PL**.

For other details see [14] O1F parameter.

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

Available: When [21] o3F = AL.

Range: 0... 63 with the following rule:

- +1** Alarm 1;
- +2** Alarm 2;
- +4** Alarm 3;
- +8** Loop break alarm;
- +16** Sensor break (burn out);
- +32** Overload on Out 4 (short circuit on the Out4).

For more details see [17] o1.AL parameter.

[24] o3Ac - Out 3 action

Available: When [20] o3F is different from *nonE*.

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

For more details see [18] o1.Ac parameter.

[25] o4F - Out 4 function

Available: When the [9] io4.F = Out4.

Range: **nonE** Output not used. With this setting the status of this output can be driven directly from serial link;

H.rEG Heating output;
c.rEG Cooling output;
AL Alarm output;
P.End Program end indicator;
P.HLd Program hold indicator;
P.uit Program wait indicator;
P.run Program run indicator;
P.Et1 Program Event 1;
P.Et2 Program Event 2;
or.bo Out-of-range or burn out indicator;
P.FAL Power failure indicator;
bo.PF Out-of-range, Burnout and Power failure indicator;
St.By Stand By status indicator;
diF1 Repeats the digital input 1 status;
diF2 Repeats the digital input 2 status;
on Out2 always ON;
riSP Inspection request.

For other details see [14] O1F parameter.

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

Available: When [24] o4F = AL.

Range: 0... 63 with the following rule:

+1 Alarm 1;
+2 Alarm 2;
+4 Alarm 3;
+8 Loop break alarm;
+16 Sensor break (burn out);
+32 Overload on Out 4 (short circuit on the Out4).

For more details see [17] o1.AL parameter.

[27] o4Ac - Out 4 action

Available: When [25] o4F is different from *nonE*.

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

For more details see [18] o1.Ac parameter.

PAL 1 Group - Alarm 1 parameters

[28] AL1t - Alarm 1 type

Available: Always.

Range: • When one or more outputs are 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;

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;

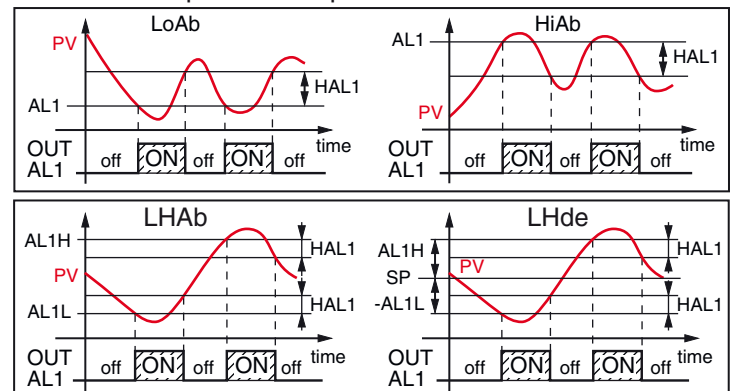
HiAb Absolute high alarm;

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.

[29] Ab1 - Alarm 1 function

Available: When [28] AL1t is different from *nonE*.

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

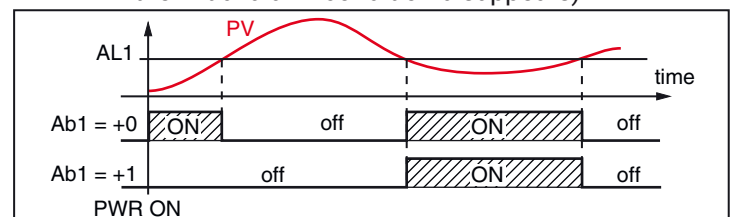
+1 Not active at power up;
+2 Latched alarm (manual reset);
+4 Acknowledgeable alarm;
+8 Relative alarm not active at set point change.

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

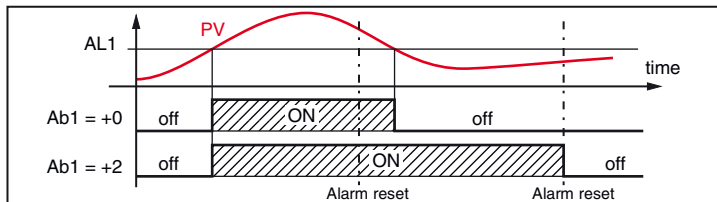
Notes: 1. The "not active at power up" selection allows to inhibit the alarm function at instrument power up or when the instrument detects a transfer from:

- Manual mode (*oPLo*) to auto mode;
- Stand-by mode to auto mode.

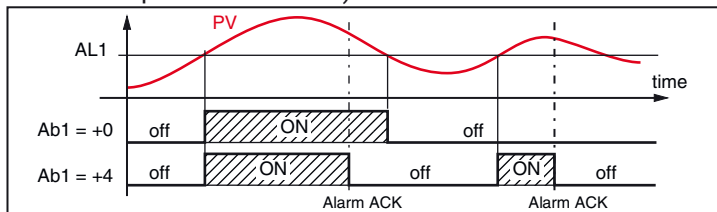
The alarm will be automatically enabled when the measured value reaches, for the first time, the alarm threshold \pm hysteresis (in other words, when the initial alarm condition disappears).



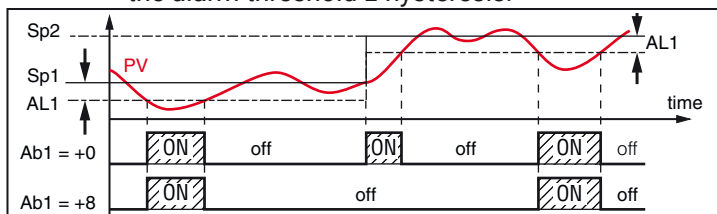
2. A "Latched alarm" (manual reset) is an alarm that will remain active even if the conditions that generated the alarm no longer persist. Alarm reset can be done only by an external command (☞ key, digital inputs or serial link).



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 (☐)key, 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 \pm 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.

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

Available: When [28] AL1t is different from *nonE* or [28] AL1t is different from *SEbr*.

Range: From -1999 to [30] AL1H engineering units.

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

Available: When [28] AL1t is different from *nonE* or [28] AL1t is different from *SEbr*.

Range: From [30] AL1L to 9999 engineering units.

[32] AL1 - Alarm 1 threshold

Available: When:

- [28] AL1t = LoAb - Absolute low alarm;
- [28] AL1t = HiAb - Absolute high alarm;
- [28] AL1t = Lode - Deviation low alarm (relative);
- [28] AL1t = Hide - Deviation high alarm (relative).

Range: From [30] AL1L to [31] AL1H engineering units.

[33] HAL1 - Alarm 1 hysteresis

Available: When [28] AL1t is different from *nonE* or [28] AL1t is different from *SEbr*.

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 generates 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).

[34] AL1d - Alarm 1 delay

Available: When [28] 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 [34] AL1d time but the reset is immediate.

[35] AL1o - Alarm 1 enabled during Stand-by mode and out of range indications

Available: When [28] 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

[36] AL2t - Alarm 2 type

Available: Always

Range: • When one or more outputs are 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;
- 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.

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

[37] Ab2 - Alarm 2 function

Available: When [36] 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 [28] Ab1 parameter.

[38] AL2L - For High and low alarms it is the low limit of the AL2 threshold

- For band alarm is low alarm threshold

Available: When [36] AL2t is different from *nonE* or [36] AL2t is different from *SE.br*.

Range: -1999 to [39] AL2H engineering units.

[39] AL2H - For High and low alarms it is the high limit of the AL2 threshold

- For band alarm is high alarm threshold

Available: When [36] AL2t is different from *nonE* or [36] AL2t is different from *SE.br*.

Range: From [38] AL2L to 9999 engineering units.

[40] AL2 - Alarm 2 threshold

Available: When:

- [36] AL2t = LoAb Absolute low alarm;
- [36] AL2t = HiAb Absolute high alarm;
- [36] AL2t = LodE Deviation low alarm (relative);
- [36] AL2t = Hide Deviation high alarm (relative);

Range: From [38] AL2L to [39] AL2H engineering units.

[41] HAL2 - Alarm 2 hysteresis

Available: When [36] AL2t is different to *nonE* or [36] AL2t is different from *SE.br*.

Range: 1... 9999 engineering units.

Note: For other details see [33] HAL1 parameter.

[42] AL2d - Alarm 2 delay

Available: When [36] AL2t different form *nonE*.

Range: From oFF (0) to 9999 seconds.

Note: The alarm goes ON only when the alarm condition persist for a time longer than [42] AL2d time but the reset is immediate.

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

Available: When [36] AL2t different from *nonE*.

Range: 0 Never;

- 1 During stand by;
- 2 During overrange and underrange;
- 3 During overrange, underrange and stand-by.

3AL3 Group - Alarm 3 parameters

[44] AL3t - Alarm 3 type

Available: Always.

Range: • When one or more outputs are 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;
- 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.

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

[45] Ab3 - Alarm 3 function

Available: When [43] AL3t 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 Ad3 equal to 5 (1+4) the alarm 3 will be “Not active at power up” and “Acknowledgeable”.

Note: For other details see [29] Ab1 parameter.

[46] AL3L - For High and low alarms it is the low limit of the AL3 threshold

- For band alarm is the low alarm threshold

Available: When [44] AL3t is different from *nonE* or [44] AL3t is different from *SE.br*.

Range: -1999 to [47] AL3H engineering units.

[47] AL3H - For High and low alarms it is the high limit of the AL3 threshold

- For band alarm is the high alarm threshold

Available: When [44] AL3t is different from *nonE* or [44] AL3t is different from *SE.br*.

Range: From [46] AL3L to 9999 engineering units.

[48] AL3 - Alarm 3 threshold

Available: When:

- [44] AL3t = LoAb Absolute low alarm;
- [44] AL3t = HiAb Absolute high alarm;
- [44] AL3t = LodE Deviation low alarm (relative);
- [44] AL3t = Hide Deviation high alarm (relative).

Range: From [46] AL3L to [47] AL3H engineering units.

[49] HAL3 - Alarm 3 hysteresis

Available: When [44] AL3t is different to *none* or [44] AL3t is different from *SEbr*.

Range: 1... 9999 engineering units.

Note: For other details see [32] HAL1 parameter.

[50] AL3d - Alarm 3 delay

Available: When [44] AL3t 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 [50] AL3d time but the reset is immediate.

[51] AL3o - Alarm 3 enabling during Stand-by mode and out of range indications

Available: When [44] AL3t is different from *none* or [44] AL3t is different from *SEbr*.

Range: 0 Never;

1 During stand by;

2 During overrange and underrange;

3 During overrange, underrange and stand-by.

PLBA 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.

3. This function is available only when the programmed control algorithm is equal to PID (Cont = PID).

[52] LbAt - LBA time

Available: When [56] Cont = PID

Range: **oFF** LBA not used;
1... 9999 seconds.

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

Available: When [52] LbAt is different from **oFF**.

Range: **oFF** Loop break alarm is inhibit during soft start
1... 9999 engineering units.

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

Available: When [52] LbAt is different from **oFF**.

Range: From 1 to 9999 engineering units.

[55] LbcA - Condition for LBA enabling

Available: When [52] 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.

PRE group - Control parameters

The REG group will be available only when at least one output is programmed as control output (H.REG or C.REG).

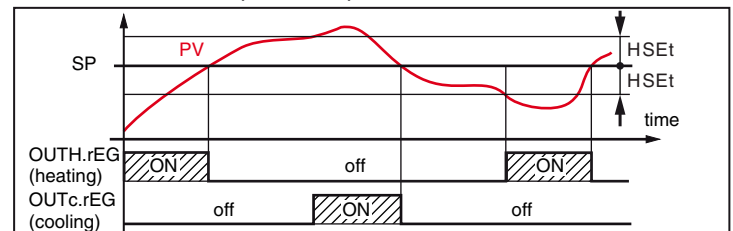
[56] cont - Control type:

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

Range: • When 2 control action (heat & cool) are programmed:

Pid PID (heat and cool);

nr Heat/Cool ON/OFF control with neutral zone.



• When 1 control action (heat or cool) is programmed:

Pid PID (heat or cool);

On.FA ON/OFF asymmetric hysteresis;

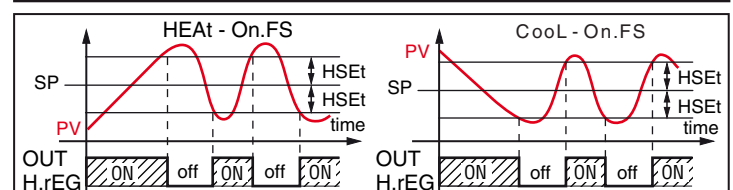
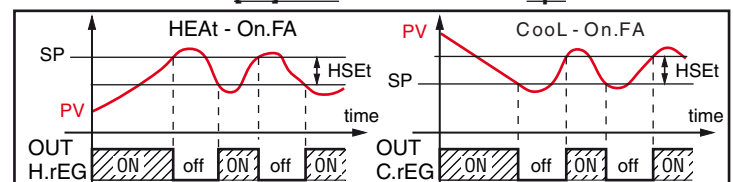
On.FS ON/OFF symmetric hysteresis;

3Pt Servomotor control (available when Output 2 and Output 3 have been ordered as "M").



When a servomotor control is desired, **both Out2** and **Out3** are to be selected as Heating or Cooling (o2F = o3F = HrEG or o2F = o3F = c REG).

Parameter **[56] cont** must be set as **3pt**.



Notes: 1. ON/OFF control (heating action) with asymmetric hysteresis:

• OFF when $PV \geq SP$;

- ON when $PV \leq (SP - \text{hysteresis})$.
2. ON/OFF control (heating action) with symmetric hysteresis:
- OFF when $PV \geq (SP + \text{hysteresis})$;
 - ON when $PV \leq (SP - \text{hysteresis})$.

[57] 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 [56] cont = PID

Range: -4... 8 where:

- 4 Oscillating auto-tune with automatic restart at all set point changes;
- 3 Oscillating auto-tune with manual start;
- 2 Oscillating auto-tune with automatic start at 1st power up only;
- 1 Oscillating auto-tune with automatic restart at all power ups;
- 0 Not used;
- 1 Fast auto tuning with automatic restart at all power ups;
- 2 Fast auto-tune with automatic start at 1st power up only;
- 3 FAST auto-tune with manual start;
- 4 FAST auto-tune with automatic restart at all set point changes;
- 5 EvoTune with automatic restart at all power up;
- 6 EvoTune with automatic start at 1st power up only;
- 7 EvoTune with manual start;
- 8 EvoTune with automatic restart at all set point changes.

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

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

Available: When [56] cont = PID.

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

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

Available: When [56] cont is different from PID.

Range: 0... 9999 engineering units.

[60] Pb - Proportional band

Available: When [56] cont = PID.

Range: 1... 9999 engineering units.

Note: Auto-tune functions calculate this value.

[61] ti - Integral time

Available: When [56] cont = PID.

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

Note: Auto-tune functions calculate this value.

[62] td - Derivative time

Available: When [56] cont = PID.

Range: **oFF** Derivative action excluded;
 1... 9999 seconds.

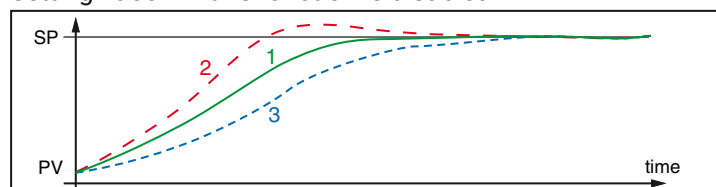
Note: Auto-tune functions calculate this value.

[63] 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 [56] cont = PID

Range: 0... 2.00.

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

[64] 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: 0.2... 130.0 seconds (**from FW r.1.1.0**).
 1.0 ... 130.0 second (**FW until r.1.0.0**).

[65] 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 is 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 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 ($\Delta T = 20^\circ\text{C}$) 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 ($\Delta T = 20^\circ\text{C}$) using 100% of the cooling power (fan), you will need 20 seconds only.

In our example the ratio is equal to $60/20 = 3$ ([65] 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 actions are programmed (H.rEG and c.rEG) and [55] cont = PID.

Range: 0.01... 99.99.

Note: Auto-tune functions calculate this value.

[66] 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: 0.2... 130.0 seconds (from FW r.1.1.0).
1.0... 130.0 seconds (FW until r.1.0.0).

[67] 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 [56] cont = PID.

Range: -100.0... +100.0%.

[68] Str.t - Servomotor stroke time

Available: When [56] cont = 3Pt.

Range: 5... 1000 seconds.

[69] db.S - Servomotor dead band

Available: When [56] cont = 3Pt.

Range: 0.0... 10.0

[70] od - Delay at power up

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

Range: oFF Function not used;
0.01... 99.59 hh.mm.

- Notes:**
1. This parameter defines the time during which (after a power up) the instrument remains in stand by mode before to start all other functions (control, alarms, program, etc.).
 2. When a program with automatic start at power up and "od" function are programmed, the instrument performs "od" function before to start the program execution.
 3. When an auto-tune with automatic start at power up and "od" function are programmed, the autotune will start at the end of "od" delay.

General notes about soft start function

The soft start function allows to limit the power output for a programmable time ([72] SSt) or up to a programmed threshold value ([73] SS.tH)(the first of the two).

When soft start function is running the lower display shows the label *SS.t* alternated to the value selected by [89] diSP parameter (from FW r.1.1.0).

Setting [72] SSt = **inF** (soft start always ON) the instrument does not display the label *SS.t* (from FW r.1.1.0).

[71] St.P - Max. power output used during soft start

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

Range: -100... +100%.

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

ment performs the soft start and then 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.

[72] SSt - Soft start time

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

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

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

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

Range: -1999... 9999 engineering units.

- Notes:**
1. When the power limiter have 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 have 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.

SP Group - Set point parameters

The SP group will be available only when at least one output is programmed as control output (H.rEG or C.rEG).

[74] nSP - Number of used set points

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

Range: 1... 4.

Note: When you change the value of this parameter, the instrument operates as follows:

- [81] A.SP parameter will be forced to SP.
- The instrument verifies that all used set point are within the limits programmed by [76] SPLL end [77] SPHL. If an SP is out of this range, the instrument forces it to the maximum acceptable value.

[75] SPLL - Minimum set point value

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

Range: From -1999 to [76] SPHL engineering units.

- Notes:**
1. When you change the [75] SPLL value, the instrument checks all local set points (SP, SP2, SP3 and SP4 parameters) and all the program set points ([95] Pr.S1, [100] Pr.S2, [105] Pr.S3, [110] Pr.S4 parameters). If an SP is out of this range, the instrument forces it to the max. acceptable value.
 2. A [75] SPLL change produces the following actions:
 - When [82] SP.rt = SP the remote set point will be forced to be equal to the active set point;
 - When [82] SP.rt = trim the remote set point will be forced to zero;
 - When [82] SP.rt = PErc the remote set point will be forced to zero.

[76] SPHL - Maximum set point value

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

Range: From [75] SPLL to 9999 engineering units.

Note: For other details see [75] SPLL parameter.

[77] SP - Set Point 1

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

Range: From [75] SPLL to [76] SPHL engineering units.

[78] SP 2 - Set Point 2

Available: When at least one output is programmed as control output and [74] nSP ≥ 2 .

Range: From [75] SPLL to [76] SPHL engineering units.

[79] SP 3 - Set Point 3

Available: When at least one output is programmed as control output and [74] nSP ≥ 3 .

Range: From [75] SPLL to [76] SPHL engineering units.

[80] SP 4 - Set Point 4

Available: When at least one output is programmed as control output and [74] nSP = 4.

Range: From [75] SPLL to [76] SPHL engineering units.

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

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

Range: From "SP" to [74] nSP.

Note: SP2, SP3 and SP4 selection will be shown only when the relative set point is enabled (see [74] nSP parameter).

[82] 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 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).

[82] SP.rt parameter defines how the slaves units must use the value coming from serial link. Parameter [100] tr.SP (selection of the value to be retransmitted (Master)) parameter allows to define the value sent by master unit.

Available: When at least one output is e programmed as control output and the 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 [82] SPrt change produces the following actions:

- When [82] SP.rt = rSP - the remote set point will be forced to be equal to the active set point;
- When [82] SP.rt = trin - the remote set point will be forced to zero;
- When [82] 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.

[83] SPLr - Local/remote set point selection

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

Range: **Loc** Local set point selected by [81] A.SP;
rEn Remote set point (coming from serial link).

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

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

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

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

Available: When at least one output is e 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 the following:
from [75] SPLL+ RSP to [76] SPHL - RSP.

3PAn group - Operator HMI

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

Available: Always.

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

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

Available: Always.

Range: 3... 200.

Note: Setting [86] PAS2 equal to [87] PAS3, the level 2 will be masked.

[88] uSrb - key function during RUN TIME

Available: Always.

Range: **nonE** No function;
tunE Auto-tune enabling.
A single press (longer than 1) starts the auto-tune;
oPLo Manual mode. The 1st pressure puts the instrument in manual mode (oPLo) while a 2nd one puts the instrument in Auto mode;
AAc Alarm reset;
ASi Alarm acknowledge;
chSP Sequential set point selection;
St.by Stand by mode. The 1st pressure puts the instrument in stand by mode while a 2nd one puts the instrument in Auto mode;
P.run Program run (see note);
Pr.ES Program reset (see note);
Pr.H.r Program run/hold/reset (see note). When "Program run" is selected, the The 1st pressure starts the program execution but a 2nd one restarts the program execution from the beginning.

- Notes:** 1. When "Program reset" is selected, a short press resets the program execution.
2. When "Program run/hold/reset" is selected, a short press starts/stop (Hold) the program execution while a long press (longer than 10 seconds) resets the program.

[89] diSP - Display management

Available: Always.

Range: **nonE** Standard display;
Pou Power output;
PoS Valve position (servomotor control);
SPF Final set point;
Spo Operative set point;
AL1 Alarm 1 threshold;
AL2 Alarm 2 threshold;
AL3 Alarm 3 threshold;
Pr.tu During a soak, the instrument shows the elapsed time of the soak;
• During a ramp the display shows the operative set point;
• At the end of the program execution, the instrument shows "P.End" messages alternately with the measured value;
• When no program is running, the instrument will show the standard display;
Pr.td During a soak, the instrument will show the remaining time of the soak (count down);
• During a ramp the display will show the operative set point;
At the end of the program execution, the instrument shows *P.End* message alternately with the measured value;
• When no program is running, the instrument will show the standard display;
P.t.tu When the programmer is running, the display shows the total elapsed time.
At the end of the program execution, the instrument show *t.End* message alternately with the measured value;
P.t.td When the programmer is running, the display shows the total remaining time (count down).

At the end of the program execution, the instrument shows *P.End* message alternately with the measured value;

PErc Percent of the power output used during soft start (when the soft start time is equal to infinite, the limit is ever active and it can be used also when ON/OFF control is selected).

[90] di.CL - Display colour

Available: Always (not available on KM5P with white display).

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).

[91] AdE - Deviation for display colour management

Available: When [90] di.CL = 0 (not available on KM5P with white display).

Range: 1... 9999 engineering units.

[92] diS.t - Display time out

Available: Always.

Range: **oFF** The display is always 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 diS.t is different from OFF and no key 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 key is pressed, the display returns to the normal operation.

[93] 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 it have no effect on the other functions of the instrument (control, alarms, etc.).

[94] bG.F - Bargraph function (KX5P only)

Available: Always.

Range: **nonE** Bargraph not lit;
Pou Output power calculated by PID (single action: 0... 100%, double action: -100... +100%);
PoS Valve position (servomotor control);
Pr.tu Elapsed time of the program in execution;
Pr.td Time to end of the program in execution;
Pr.tS Time to end of the program segment in execution;

Note: Displaying values using the bargraph is possible only if the variables involved are configured. If it has been chosen to display the time of the program, the bargraph is OFF if the option is not configured and has the first LED lit if the option is configured but not running.

[95] dSPu - Instrument Status 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.O Starts in manual mode with a power output equal to zero;

St.bY Starts in stand-by mode.

Notes: 1. When you change the value of [96] oPr.E, the instrument forces [97] oPEr parameter equal to Auto.

2. During program execution the instrument stores the segment currently in use and, by a 1 minute interval, it stores also the elapsed time of the soak.

If a power down occurs during program execution, at the next power up the instrument is able to continue the program execution starting from the segment in progress at power down and, if the segment was a soak, it is also capable to restart from the soak time minus the stored elapsed time.

In order to obtain this features, the [95] dSPu - Status of the instrument at power up" parameter must be set to *AS.Pr*.

If parameter [95] dSPu is different from *AS.Pr* the storing function is inhibited.

3. When [95] dSPu is equal to AS.Pr and the instrument has been turned OFF in manual mode, at next power up the instrument will start in manual mode with the same power it had prior to power down (from FW r.1.1.0).

[96] 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: Changing the value of [96] oPr.E, the instrument forces [97] oPEr parameter to Auto.

[97] oPEr - Operative mode selection

Available: Always.

Range: • When [96] oPr.E = ALL:

Auto Auto mode;

oPLo Manual mode;

St.bY Stand by mode.

• When [96] oPr.E = Au.oP:

Auto Auto mode;

oPLo Manual mode.

• When [96] oPr.E = Au.Sb:

Auto Auto mode;

St.bY Stand by mode.

SEr group - Serial link parameter

[98] Add - Instrument address

Available: Always.

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

[99] bAud - Baud rate

Available: When [98] Add different from oFF.

Range: **1200** 1200 baud;

2400 2400 baud;

9600 9600 baud;

19.2 19200 baud;

38.4 38400 baud.

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

Available: When [98] Add different from oFF.

Range: **nonE** Retransmission not used (the instrument is a slave);

rSP The instrument becomes a Master and retransmits the operative set point;

PErc The instrument becomes a Master and retransmits the power output.

Note: For more details see [82] SP.rt (Remote set point type) parameter.

PCAL 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.

[101] 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.

[102] ALo - Adjust Low Offset

Available: Always.

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

[103] 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.

[104] AH.o - Adjust High Offset

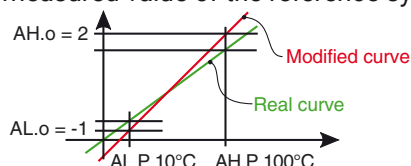
Available: Always.

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

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

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 [138] AL.P = 10 (low working point) and [139] ALo = -1 (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 [140] AH.P = 100 (low working point) and [141] AHo = +2

(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.



Note: Parameters from [105] to [125] are reserved.

Group - Programmer function parameters

These instruments are equipped with 2 pages of 4 program each (8 programs total).

Each program is composed by 6 groups of 2 steps each (12 steps total)

The first step is a ramp (used to reach the desired set point), the second is a soak (on the desired set point).

When a RUN command is detected the instrument aligns the operative set point to the measured value and starts to execute the first ramp of the selected program.

When you need a program with more than 12 segments it is possible to link the selected program with the next one.

Example: You are preparing the Page 1, Program 1 but you need 20 steps.

At the end of the 12 segments of Program 1 you will find a parameter "[164] P1.c2 – Program 1 continue on Program 2"; setting YES you will link Program 1 with Program 2.

Now you can program the 8 steps (of Program 2) necessary to complete your profile.

Running Program 1, the instrument performs the first program followed by the 8 steps of program 2.

In addition, every soak is equipped with a wait band which suspends the time count when the measured value goes out of the defined band (guaranteed soak).

Moreover, for each segment it is possible to define the status of two events. An event can drive an output and make an action during one or more specific program steps. Some additional parameters allow to define the time scale, the automatic RUN conditions, the repetition number and the instrument behaviour at the end of the program.

Notes: 1. All steps can be modified during program execution.

2. During program execution the instrument stores the segment currently in use and, by a 1 minute interval, it stores also the elapsed time of the soaks.

If a power failure occurs during program execution, at the next power up the instrument is able to continue the program execution starting from the segment in progress at power down and, if the segment was a soak, it is also capable to restart from the soak time minus the stored elapsed time. In order to obtain this features, the [95] dSPu "Status of the instrument at power up" parameter must be set to *RSPr*.

If [95] dSPu value is different from *RSPr*, the storing function will be inhibited.

The structure of the programmer parameters is based on:

- 1 group with the "global" parameters [PrG group](page selection, active program selection status of the active program, etc.).
- 1 group for every program (Page 1: Pr1, Pr2, Pr3 and Pr4 and Page 2: Pr5, Pr6, Pr7, Pr8).

5.8 How to exit the parameters configuration procedure

When all the important steps of the configuration procedure are completed, it is possible to exit from the parameters configuration procedure:

- Press key.
- Press key for more than 10 s. The instrument returns back to the "Standard display".

6 PARAMETER PROMOTION

Another important step of the instrument configuration is caused by 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 [86] 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 elements of the "limited access" parameters are programmable and can be made according to your needs.

3. The parameter list 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 created according to your requirements.

6.1 Parameter promotion procedure

The limited access parameter set is a list and it is a subset of the configuration parameters. Before to start the promotion procedure, we suggest to operate as follows:

1. Prepare the exact parameter list you want to make accessible for limited access.
2. Define which of the selected parameters must be available also at Operator level.

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







- AL1 Alarm 1 threshold;
- AL2 Alarm 2 threshold;
- SP First set point;
- SP2 Second set point;
- A.SP Set point selection;
- tunE - Manual start of the auto-tune.

But I want that the operator can manage: the SP value and the AL1 value. In this case the promotion list is:

Parameter	Promotion	Limited Access	Operator
- AL1 -	oPEr	AL1	AL1
- AL2 -	ASS	AL2	
- SP -	oPEr	SP	SP
- SP2 -	ASS	SP2	
- A.SP-	ASS	A.SP	
- tunE -	ASS	tunE	

Now, proceed as follows:

1. Push the key for more than 3 seconds.
2. The upper display shows *PASS* while the lower one shows *0*.
3. By and keys set a password equal to *-81*.

4. Press , the instrument displays the acronym of the first configuration parameter group *3 inP*.
5. Press  to select the group of the first parameter of your list.
6. Press  to select the first parameter of your list.
7. The upper display shows the acronym of the parameter while the lower one its current promotion level.
The promotion level is defined by a message.
The possible values are:
 - conf*: The parameter is **NOT** promoted and is present only in configuration.
In this case the number is forced to zero.
 - ASS*: The parameter has been promoted to the limited access level.
The number indicates the position in the limited access list.
 - oPEr*: The parameter has been promoted to the Operator level.
The number indicates the position in the limited access list.
8. By  and  keys assign to this parameter the desired level.
9. Select the second parameter that you want to add to the assistance level and repeat step 6, 7 and 8.
10. Repeat step 5, 6, 7, 8 until the list has been completed.
11. When you need to exit from promotion procedure, press  and maintain the pressure for more than 10 s.
The instrument returns to the "standard display".

Example: In the previous example, I have set for SP1 a promotion value equal to *ASS*.

If now I set for SP1 a promotion value equal to *oPEr*, the Limited Access list and the Operator list become.

Parameter	Promotion	Limited Access	Operator
- AL1 -	oPEr	AL1	AL1
- AL2 -	ASS	AL2	
- SP -	oPEr	SP	SP
- SP2 -	oPEr	SP2	SP2
- A.SP -	ASS	A.SP	
- tunE -	ASS	Tune	

7 OPERATIVE MODES

As we said at paragraph 5.1, when the instrument is powered, it starts immediately working in accordance to the stored 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 lower display shows the power output, the MAN LED is ON and the instrument allows to set manually the control output power.
No Automatic action will be made.
- In **Stand by** mode the instrument operates as an indicator. It shows on the upper display the measured value and on the lower display the set point alternately to the "St.bY" message 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 mode selected.

7.1 Modify a parameter during "Operator level"









Preliminary note: The parameters available at operator level (but also at limited access level) are divided into two parameter "families": Standard parameters (*PAR*) and programs parameters (*Pr oG*).

The standard parameters family is a list and includes the parameters usually present in a standard controller (e.g. Set point, alarm threshold, Proportional band, etc.).

Programs parameters are divided into groups (PrG, Pr1, Pr2, Pr3 and Pr4). The first one (PrG) includes the parameters necessary to manage the program running (or to select the program to run), while the other includes all editing parameters related with a specific program (Pr1 for program 1, etc.).

When the operator desires to edit a parameter, the instrument asks to select the "family" to be displayed (*U iS*) and then to choose the parameter.







The instrument is showing the "standard display".

1. Press .
2. The upper display shows *U iS* while the lower displays *PAR*.
3. By  and  keys select *PAR*.
4. Press the  key.
5. The upper display shows the acronym of the first parameter promoted to this level while the lower display shows its value.
6. By  and  keys assign to this parameter the desired value.
7. Press  in order to store the new value and go to the next parameter.
8. To return to the "standard display" press  for more than 5 seconds.

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

7.2 Enter the "Limited access level"

The instrument is showing the "standard display".







1. Press  for more than 5 seconds;
2. The upper display shows *PASS* while the lower *0*;
3. By  and  keys set the value assigned to [86] PAS2 (Level 2 password).
4. The upper display shows *U15* while the lower displays *PAR*.
5. By  and  keys select *PAR*.
6. Press .
7. The upper display will show the acronym of the first parameter promoted to this level while the lower display will show its value.

- Notes:**
1. The factory default password for configuration parameters is equal to 20.
 2. Parameter modifications are protected by a time out. If no key is pressed for more than 10 s the instrument returns automatically to the Standard display, the new value of the last selected parameter is lost and the parameter modification procedure is closed.
To remove the time out (e.g. the first time an instrument is configured), 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 produces a heavy bump to the process) it is advisable to temporarily stop the control procedure during the programming session (the control output will be Off). A password equal to 2000 + the programmed value (e.g. 2000 + 20 = 2020) switches to off the control output during the configuration procedure. The control automatically restarts when the parameter modification procedure will be manually ended.

7.3 How to see but not modify the "limited access parameters"








Sometimes 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  key for more than 5 seconds;
2. The upper display will show *PASS* while the lower display will show *0*;
3. By  and  keys set the value - 18 I;
4. Push  key;
5. The upper display will show the acronym of the first parameter promoted to the level 2 and lower display will show its value;
6. Using  key it is possible to see the value assigned to all the parameters present in level 2 but the values cannot be modified;
7. It is possible to return to the "standard display" pushing the  key for more than 3 seconds or by pushing no keys for more than 10 seconds.

7.4 Automatic Mode


7.4.1 Keyboard function when the instrument is in Auto mode

-  Performs the action programmed by [88] uSrb ( functions during RUN TIME) parameter.
-  Enters into parameter modification procedures.
-  Starts the "Direct set point modification" function (see below).
-  Displays the "additional information" (see below).
-  +  Enters the MANUAL mode (**from FW r.1.1.0**).




7.4.2 Direct set point modification

This function allows to modify rapidly the set point value selected by [81] A.SP (selection of the active Set point) or to the set point of the segment group (of the programmer) currently in progress.

The instrument is showing the "standard display".

1. Press . The upper display shows the acronym of the selected set point (e.g. SP2) and the lower display its value;








Note: When the programmer is running, the instrument shows the set point of the soak currently in execution (e.g. if the instrument is performing the soak 3 of the program 2, the instrument will show P2.S3).

2. By / keys, assign to the parameter the desired value
3. Push no keys for more than 5 s or press .

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 to see the value but not to modify it.

7.5 Manual mode

-  Performs (when possible) the action programmed by [88] uSrb ( functions during RUN TIME) parameter.
-  Allows to enter the parameters modification procedure.
-  Increases the power output.
-  Decreases the power output.
-  +  Returns in AUTO mode (**from FW r.1.1.0**).

This operative mode allows to deactivate the automatic control and manually program the percentage power output to be applied to the process.

When the instrument is in manual mode, the upper display shows the measured value while the lower display alternately shows the power output [preceded by *H* (for heating action) or *C* (for cooling action)] and the message *OPLO* (open loop).

When manual control is selected, the instrument starts to operate with the same power output as the last one supplied by automatic mode and can be modified using the / keys.

In case of ON/OFF control, 0 corresponds to the deactivated output while 100 corresponds to the activated output.

As in the case of visualization, the programmable values range from H100 (100% output power with reverse action) to C100 (100% output power with direct action).

Notes:

1. During manual mode, the alarms are operative.

2. If you set manual modes during program execution, the program will be frozen and it will restart when the instrument will come back to Auto mode.

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

4. During manual mode, all functions not related with the control (wattmeter, independent timer, "worked time", etc.) continue to operate normally.

7.6 Stand by mode

This operative mode also deactivates the automatic control but forces the control output to zero.

In this mode the instrument operates as an indicator.









When the instrument is in stand by mode the upper display shows the measured value while the lower display alternatively shows the set point and the message "St.bY".

- Notes:**
1. During stand by mode, relative alarms are disabled while absolute alarms are operative or not according to the ALx0 (Alarm x enabling during Stand-by mode) parameter setting.
 2. If you set stand by mode during program execution, the program will be aborted.
 3. Setting the stand by mode during auto-tune execution, the auto-tune function will be aborted.
 4. During stand by mode, all functions not related with the control (wattmeter, independent timer, "worked time", etc.) continue to operate normally.
 5. When the instrument is swapped from stand by to auto mode, it automatically starts the alarm masking, the soft start functions and auto-tune (if programmed).

7.6.1 Additional information

This instrument is able to show some additional information that can help managing the system.

The additional information are related to how the instrument is programmed, hence in many cases, only part of this information is available.

1. When the instrument is showing the "standard display" push  key.
The lower display shows *H* or *C* followed by a number. This value is the current power output applied to the process.
H means Heating action while
C means Cooling action.
2. Push  key again. The lower display shows the program page currently selected. Example "PAGE 2";
3. Push  key again. The lower display shows the selected program number. Example: "PrG7" = program 7;
4. Push  key again. When the programmer is running the lower display shows the program and the segment currently in execution. **NOTE:** When linked programs are running, the program selected and the program in execution can be different Example: "P7.S1" = program 7 soak 1;
5. Push  key again. When the programmer is running the lower display shows the time remaining for this program to the end of the current cycle.
Example: "12.22" = 12 minutes and 22 seconds;
6. Push  key again. When the programmer is running the lower display shows the already made executions. Example: "E . 5" = 5 executions are already made;
7. Push  key again. When the programmer is running the lower display shows the Event status.
Example: "EU.01" => event 1 = 0 - Event 2 = 1;
8. Push  key again. The instrument returns to the "standard display".

Note: The additional information visualization is subject to a time out. If no key is pressed for more than 10 seconds the instrument automatically returns to the Standard display.

7.6.2 Display management

These instruments allow to program the time out of the display (see parameter [92] diS.t).

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

When [92] diS.t is different from OFF (display always ON) and no key is pressed for more than the programmed time out, the display goes OFF and only the four 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 key is pressed, the display returns to normal operation.

7.6.3 Display Colour Shows the Deviation

These instruments (except KM5PW) allow to program the deviation (PV - SP) for colour display change (see parameter [123] AdE).

In this way the upper display colour 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 THE PROGRAM FUNCTIONS

8.1 How to Edit (create or modify) a program

Preliminary note: As already described, the parameters available at operator level (but also at limited access level) are divided into two parameter "families".

Each Program parameters family is divided in 5 groups (*PrG*, *Pr1*, *Pr2*, *Pr3* and *Pr4* or *PrG*, *Pr5*, *Pr6*, *Pr7* and *Pr8*). The first one (PrG) includes the parameter necessary to manage the program running (or to select the program to run), while the other includes all editing parameters related with a specific program (Pr1 for program 1, etc.).

These instruments are equipped with 8 programs divided into 2 pages of 4 programs each.

For this reason we have Program 1 to program 4 when page 1 is selected and Program 5 to 8 when page 2 is selected.

To select a program:

- Enter in PrG group;
- Select the desired "page";
- Select the desired "program".

3PFG Group - Programmer function parameters

[126] PAGE - Selection of the active program page

Available: Always.

Range: 1 or 2

Note: During program execution this parameter can NOT be changed.

[127] Pr.n - Active program

Available: Always.

Range: From 1 to 8.

Note: During program execution this parameter can NOT be changed.

[128] Pr.St - Status of the active program

Available: Always.

Range: rES Program reset;
run Program Start;
HoLd Program Hold;
cnt Continue (read only).

When is necessary to edit a program, proceed as follows:
The instrument is showing the "standard display".

1. Press the key.
2. The upper display shows *U* *IS* while the lower display shows *Pr*.
3. By and keys select *Pr*.
4. Press the key.
5. The upper display shows *3PFG*.
6. Press the key.
7. The upper display shows *PAGE* while the lower display shows the page number (1 or 2).
8. By and keys select the desired page.
9. Press the key and return to the *3PFG* indication.
10. Press the key until the group of the desired program is shown (*Pr 1*, *Pr 2*, *Pr 3* or *Pr 4*).
11. Press the key.

Note: In the following pages we use Program 1 as example.

3PFG1 Group - Program 1

[129] P1.F - Program 1 action at power up

Available: Always.

Range: nonE Program not used;
S.uP.d Start at power up with a first step in stand by;
S.uP.S Start at power up;
u.diG Start at RUN command detection only;
U.dG.d Start at RUN command detection with a first step in stand by.

[130] P1.u - Time unit of the soaks

Available: When [129] P1.F is different from nonE.

Range: hh.nn Hours and minutes;
nn.ss Minutes and seconds.

Note: During program execution, this parameter can not be changed.

[131] P1.E - Instrument behaviour at End of program 1 execution

Available: When [129] P1.F is different from nonE.

Range: cnt Continue (the instrument uses the set point of the last soak until a reset command is detected);
SPAt Go to the set point selected by [81] A.SP parameter;
St.bY Go in stand by mode.

Notes: 1. Setting [131] P1.E = cnt at program end the instru-

ment uses the set point of the last soak. When a reset command is detected it will go to the set point selected by [81] A.SP parameter.

2. Setting [131] P1.E = SPAt at program end the instrument goes to the set point selected by [81] A.SP parameter. The transfer will be a step transfer or a ramp according to the [84] SP.u (maximum rate of rise for positive set point change) and [85] SP.d (maximum rate of rise for negative set point change).
3. Setting [131] P1.E = St.by at program end the instrument goes immediately in Stand-by mode (control outputs go to OFF and the instrument operate as an indicator).

[132] P1.nE - Execution number

Available: When [129] P1.F is different from nonE.

Range: 1 to 99 executions;
inF Indefinitely.

Note: Setting [132] P1.nE = inF the program execution will be repeated until a reset command is detected.

[133] P1.Et - Time of the End program indication

Available: When [129] P1.F is different from nonE.

Range: oFF Function not used;
00.01... 99.59 minutes and seconds;
inF Indefinitely ON.

Note: Setting [133] P1.Et = inF the end program indication goes OFF only when a reset command or a new RUN command is detected.

[134] P1.S1 - Set point of the first soak

Available: When [129] P1.F is different from nonE or [129] P1.F is different from S.uP.d.

Range: From [75] SPLl to [76] SPHL.

[135] P1.G1 - Gradient of the first ramp

Available: When [129] P1.F is different from nonE or [129] P1.F is different from S.uP.d.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[136] P1.t1 - Time of the first soak

Available: When [129] P1.F is different from nonE.

Range: 0.00... 99.59 Time units.

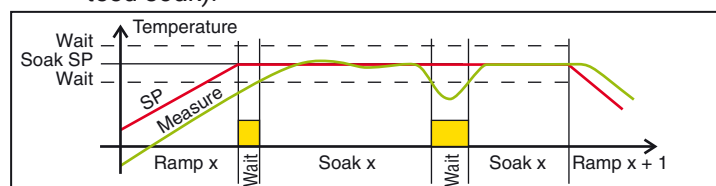
Note: Setting a time equal to zero, the instrument uses the wait band before to go to the next step.

[137] P1.b1 - Wait band of the first soak

Available: When [129] P1.F is different from nonE or [129] P1.F is different from S.uP.d.

Range: OFF... 9999 engineering units.

Note: The wait band suspends the time counting when the measured value goes out of the defined band (guaranteed soak).

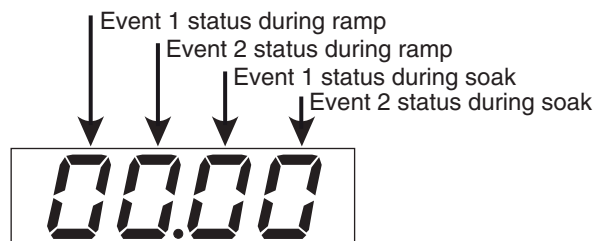


[138] P1.E1 - Events of the first group

Available: When [129] Pr.F is different from *nonE* or [129] Pr.F is different from S.UP.d.

Range: 00.00... 11.11 where:

0 event OFF;
1 event ON.



Display	Ramp		Soak	
	Event 1	Event 2	Event 1	Event 2
0000	off	off	off	off
1000	on	off	off	off
0100	off	on	off	off
1100	on	on	off	off
00.10	off	off	on	off
10.10	on	off	on	off
01.10	off	on	on	off
11.10	on	on	on	off
0001	off	off	off	on
1001	on	off	off	on
0101	off	on	off	on
1101	on	on	off	on
00.11	off	off	on	on
10.11	on	off	on	on
01.11	off	on	on	on
11.11	on	on	on	on

[139] P1.S2 - Set point of the second soak

Available: When [129] P1.F is different from *nonE*

Range: From [75] SPLL to [76] SPHL;
oFF Program end.

Note: It is not necessary to configure all steps.

Using, for example, 2 groups only, it is sufficient to set the set point of the third group equal to OFF.

The instrument will mask all the following parameters of the program in editing.

[140] P1.G2 - Gradient of the second ramp

Available: When [129] P1.F is different from *nonE* and [139] P1.S2 is different from *oFF*.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[141] P1.t2 - Time of the second soak

Available: When [129] P1.F is different from *nonE* and [139] P1.S2 is different from *oFF*.

Range: 0.00... 99.59 time units.

Note: Setting a time equal to zero, the instrument uses the wait band before to go to the next step.

[142] P1.b2 - Wait band of the second soak

Available: When [129] P1.F is different from *nonE* and [139] P1.S2 is different from *oFF*.

Range: OFF... 9999 engineering units.

Note: For more details see [137]P1.b1 parameter.

[143] P1.E2 - Events of the second group

Available: When [129] P1.F is different from *nonE* and [139] P1.S2 is different from *oFF*.

Range: 00.00... 11.11 where:

0 Event OFF;
01Event ON.

Note: For more details see [138]P1.E1 parameter.

[144] P1.S3 - Set point of the third soak

Available: When [129] P1.F is different from *nonE* and [139] P1.S2 is different from *oFF*.

Range: from [75] SPLL to [76] SPHL;
oFF Program end.

Note: For more details see [139]P1.S2 parameter.

[145] P1.G3 - Gradient of the third ramp

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF* and [144] P1.S3 is different from *oFF*.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[146] P1.t3 - Time of the third soak

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF* and [144] P1.S3 is different from *oFF*.

Range: 0.00... 99.59 time units.

Note: Setting a time equal to zero, the instrument uses the wait band before to go to the next step.

[147] P1.b3 - Wait band of the third soak

Available: When [129] P1.F is different from *nonE*, [134] P1.S2 is different from *oFF* and [139] P1.S3 is different from *oFF*.

Range: OFF... 9999 engineering units.

Note: For more details see [137]P1.b1 parameter.

[148] P1.E3 - Events of the third group

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF* and [144] P1.S3 is different from *oFF*.

Range: 00.00... 11.11 where:

0 Event OFF;
1 Event ON.

Note: For more details see [138]P1.E1 parameter.

[149] P1.S4 - Set point of the fourth soak

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF* and [144] P1.S3 is different from *oFF*.

Range: From [75] SPLL to [76] SPHL;
oFF Program end.

Note: For more details see [139]P1.S2 parameter.

[150] P1.G4 - Gradient of the fourth ramp

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF*, [144] P1.S3 is different from *oFF* and [149] P1.S4 is different from *oFF*.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[151] P1.t4 - Time of the fourth soak

Available: When [129] P1.F is different from *nonE*, [139] P1.S2 is different from *oFF*, [144] P1.S3 is different from *oFF* and [149] P1.S4 is different from *oFF*.

Range: 0.00... 99.59 time units.

[152] P1.b4 - Wait band of the fourth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF* and
[149] P1.S4 is different from *oFF*.

Range: From OFF to 9999 engineering units.

Note: For more details see [137] P1.b1 parameter.

[153] P1.E4 - Event of the fourth segment

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF* and
[149] P1.S4 is different from *oFF*.

Range: 00.00... 11.11 where:

- 0 Event OFF;
- 1 Event ON.

Note: For more details see [138] P1.E1 parameter.

[154] P1.S5 - Set point of the fifth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF* and
[149] P1.S4 is different from *oFF*.

Range: From [75] SPL to [76] SPHL;
oFF Program end.

Note: For more details see [139] P1.S2 parameter.

[155] P1.G5 - Gradient of the fifth ramp

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF* and
[154] P1.S5 is different from *oFF*.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[156] P1.t5 - Time of the fifth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF* and
[154] P1.S5 is different from *oFF*.

Range: 0.00... 99.59 time units.

[157] P1.b5 - Wait band of the fifth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF* and
[154] P1.S5 is different from *oFF*.

Range: From OFF to 9999 engineering units.

Note: For more details see [137] P1.b1 parameter.

[158] P1.E5 - Event of the fifth segment

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF* and
[154] P1.S5 is different from *oFF*.

Range: 00.00... 11.11 where:

- 0 Event OFF;
- 1 Event ON.

Note: For more details see [138] P1.E1 parameter.

[159] P1.S6 - Set point of the sixth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,

[144] P1.S3 is different from *oFF*,

[149] P1.S4 is different from *oFF* and

[154] P1.S5 is different from *oFF*.

Range: From [75] SPL to [76] SPHL;

oFF Program end.

Note: For more details see [139] P1.S2 parameter.

[160] P1.G6 - Gradient of the sixth ramp

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF*,
[154] P1.S5 is different from *oFF* and
[159] P1.S6 is different from *oFF*.

Range: 0.1... 999.9 engineering units per minute;
inF Step transfer.

[161] P1.t6 - Time of the sixth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF*,
[154] P1.S5 is different from *oFF* and
[159] P1.S6 is different from *oFF*.

Range: 0.00... 99.59 time units.

[162] P1.b6 - Wait band of the sixth soak

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF*,
[154] P1.S5 is different from *oFF* and
[159] P1.S6 is different from *oFF*.

Range: From OFF to 9999 engineering units.

Note: For more details see [137] P1.b1 parameter.

[163] P1.E6 - Event of the sixth segment

Available: When [129] P1.F is different from *nonE*,
[139] P1.S2 is different from *oFF*,
[144] P1.S3 is different from *oFF*,
[149] P1.S4 is different from *oFF*,
[154] P1.S5 is different from *oFF* and
[159] P1.S6 is different from *oFF*.

Range: 00.00... 11.11 where:

- 0 Event OFF;
- 1 Event ON.

Note: For more details see [138] P1.E1 parameter.

[164] P1.c2 - Program 1 continue on program 2

Available: When [129] P1.F is different from *nonE*.

Range: no Program 1 is ended
YES Program 1 will continue on program 2

$\supset P_r 2$ Group - Program 2

The same descriptions made for Pr1 (Program 1) parameters can be applied to the Pr2 parameters with the exception of the prefix that changes from P1.xx to P2.xx (Program 2).

For more details see $\supset P_r 1$ group.

Pr3 Group - Program 3

The same descriptions made for Pr1 (Program 1) parameters can be applied to the Pr3 parameters with the exception of the prefix that changes from P1.xx to P3.xx (Program 3).

For more details see *Pr1* group.

Pr4 Group - Program 4

The same descriptions made for Pr1 (program 1) can be applied to the Pr4 with the exception of:

- a) The prefix that changes from P1.xx to P4.xx (Program 4).
- b) The last program of each page could NOT continue on the next program (because we do not have a fifth program).

For more details see *Pr1* group.

Pr5 Group - Program 5

The same descriptions made for Pr1 (Program 1) parameters can be applied to the Pr5 parameters with the exception of the prefix that changes from P1.xx to P5.xx (Program 5).

For more details see *Pr1* group.

Pr6 Group - Program 6

The same descriptions made for Pr1 (Program 1) parameters can be applied to the Pr6 parameters with the exception of the prefix that changes from P1.xx to P6.xx (Program 6).

For more details see *Pr1* group.

Pr7 Group - Program 7

The same descriptions made for Pr1 (Program 1) parameters can be applied to the Pr7 parameters with the exception of the prefix that changes from P1.xx to P7.xx (Program 7).

For more details see *Pr1* group.


Pr8 Group - Program 8

The same descriptions made for Pr1 (program 1) can be applied to the Pr8 with the exception of:

- a) The prefix that changes from P1.xx to P8.xx (Program 8).
- b) The last program of each page could NOT continue on the next program (because we do not have a ninth program).

For more details see *Pr1* group.

8.2 How to exit from program editing

When you want to come back to the "Standard display" push the  key for more than 5 seconds.

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

8.3 How to link two (or more) programs

Program linking can give you more advantages:

- A) When you need a program with more than 12 segments you can link the selected program with the next one. In this way it is possible to obtain "profile" with 24, 36 or 48 steps.
- B) Another reason is the possibility to use different time bases in the same "profile".
- C) When you link more programs you can start the execution from the desired one.

E.g.: To link Pr1 (pre-heat with 1 execution only), Pr2 (first part of a heat treatment with 4 executions) and Pr3 (second

part of the heat treatment with 2 executions), you can:




- I) RUN program 1; the instrument performs in sequence Pr1, Pr2 and Pr3; One time only.
- II) RUN program 2; the instrument performs Pr2 and Pr3 Pr4 times before ending.
- III) RUN program 3; the instrument will perform Pr3 2 times before ending.

In a realistic application example the pre-heat phase is important at power up only (aimed to reduce the thermal stress of the oven during start up). For this reason you can program Pr1 for start at power up (at power up the instrument will perform all phases) and then all next treatments of the day will be made running Pr2 (with 1 execution only).

In the following example we create a profile using a 4 segments Pre-heat and a 18 segments treatment phase. Now we can build the profile proceeding as follows:

1. Select Page 1;
2. Select the Program 1;
3. Set the desired RUN type (P1.F = S.UP.S);
4. Set the first time base (P1.u = mm.SS);
5. Set the desired program end (e.g. P1.E = A.SP);
6. Set the desired execution number (P1.nE = 1);
7. Set the first 2 groups of parameters (2 ramps and 2 soaks). Now, the pre-heat phase is finished.
8. End this phase by setting the next parameter (P1.S3) equal to OFF (P1.S3 = OFF);

The instrument will mask all parameters of Pr1 after P1.S3 exception made for the parameter P1.c2 (program 1 continue on program 2).


9. Set P1.C2 equal to YES;
10. Press the  key until Pr2 is shown;
11. Enter in Pr2;
12. Set the specific RUN type (P2.F = U.diG);
13. Set the time base (P2.u = hh.nn);
14. Set the program end (P2.E = A.SP);
15. Set the execution number (P2.nE = 1);
16. Set the all segments (6 ramps and 6 soaks);
17. Set P2.C3 equal to YES (continue on Pr3);
18. Press the  key until Pr3 is shown;
19. Enter in Pr3;
20. Set the specific RUN type (e.g. P3.F = U.diG);
21. Set the time base (P3.u = hh.nn);
22. Set the desired program end (P3.E = A.SP);
23. Set the execution number (P3.nE = 1);
24. Set all necessary segments (3 ramps and 3 soaks). Now, the treatment phases is finished.
25. End this phase by setting the next parameter (P3.S4) equal to OFF (P3.S4 = OFF);
26. Set P3.C4 equal to no (do NOT continue on Pr4);
27. Set USrb (function of the  key) equal to P.run.

Now you can set Page = 1, set Pr.n = 1 (Program 1), turn off the ovens and load it with the first set of objects to be treated during the next day.

The next day you can turn on the oven; the instrument will perform the pre-heat and the complete treatment of the material.


At the end of the treatment the oven operates according to *P3E* setting (in our example it maintains the temperature set by SP).

Remove the material already treated, load a new set.

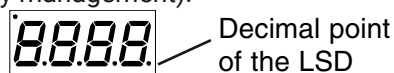
Set *Pr.n* = 2 (Program 2), push the  key. The instrument will perform only the complete treatment (Pr2 followed by Pr3) of the material.

8.4 How to Run a program

The Run command can be sent to the instrument by:

- [128] Pr.St parameter (= run);
-  key (when [88] U.Srb = P.run or P.r.H.r);
- Digital input (when [10] diF1 = 6, 9, 10 or [11] diF2 = 6,9,10).
- By serial link,

Note: The decimal point of the LSD of the lower display is used to show the programmer status independently from the displayed value selected by [121] diSP (Display management).



The relation between the programmer status and the LED are the following:


- Program in RUN - the LED is ON;
- Program in Hold - The LED is flashing fast;
- Program in wait - The LED is flashing slow;
- Program in end or reset - The LED is OFF.

8.5 How to Hold a program

This function temporarily stops a running program by a manual action.

When the program is in hold, the set point updating and time count are stopped and the instrument operates as controller with fixed set point.

The HOLD mode may be activated:

- Setting [128] Pr.St parameter (= HoLd);
- A short pressure of the  key (when USrb = P.r.H.r);
- By digital input (when [10] diF1 = 8, 9 or [11] diF2 = 8, 9);
- By serial link.

When a program is in Hold, the decimal point of the LSD of the lower display flashes fast.

When the lower display is programmed to show informations related with program running (diSP = Pr.tu, Pr.td, P.t.td or P.t.tu) the lower display will flash at the same "speed" of the decimal point of the LSD.

One of the actions described for Hold activation can be used to come back to the RUN mode.

8.5.1 Differences between HOLD and WAIT mode

Both functions temporarily stop a running program but the Hold function requires a manual action (when you want to start and to stop it) while the Wait function is an automatic function (and it can be start and stop automatically only).


The WAIT mode starts automatically when, during a soak, the measured value is out of the wait band programmed for it and it will be stopped when the measured value reaches the wait band.

When a program is in Hold, the decimal point of the LSD of the lower display flashes fast and the [128] Pr.St parameter shows "HoLd".

When a program is in Wait, the decimal point of the LSD of the lower display will flash slow and the [128] Pr.St parameter shows "run".

8.6 How to Abort/Reset a running program

To permanently stop a running profile, it is sufficient to:

- Set [128] Pr.St parameter = rES;
- Press the  key for more than 5 seconds (when [88] U.Srb = P.r.H.r);
- By digital input (when [10] diF1 = 7, 10 or [11] diF2 = 7, 10);
- By serial link.

Note: When a program is aborted, the instrument operates as follows:

- If the "Program end" (Px.E) has been programmed as A.SP or cnt, the instrument returns to Automatic mode using the SP selected by A.SP.
- If the "Program end" (Px.E) has been programmed as St.bY, the instrument returns to Stand by mode.

8.6.1 Manual mode during program execution

The manual mode HOLD the program execution.

When the instrument returns to the Auto mode, the program execution will automatically continue.

8.6.2 Stand-by mode during program execution

The Stand-by mode Aborts the program execution.

8.6.3 Program behaviour when a power off occurs during program execution

During program execution the instrument stores the segment currently in use and, by a 1 minute interval, it stores also the elapsed time of the soaks and the remaining repetition(s).

If a power down occurs during program execution, at the next power up the instrument is able to continue the program execution and make all remaining repetitions starting from the segment in progress at power down and, if the segment was a soak, it is also capable to restart from the soak time minus the elapsed time memorized.

In order to obtain this features, the "[95] dSPu - (Status of the instrument at power up") parameter must be set to "AS.Pr".

If the "[95] dSPu" parameter is different from "AS.Pr" The memorization function is inhibited.

9.1 Out of range Indications

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

Over-range

0000

Under-range

U.U.U.U.

The sensor break is 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

Error	Cause/Corrective action
Errt	Fast Auto-tune cannot start. The measure value is too close to the set point. Push the  key 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.
ErrP	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 Firmware Revision Level and Instrument Serial number

Sometimes it may be necessary to provide to the technical assistance the Serial number of the instrument or the Firmware Revision level. To obtain these 2 information proceed as follows:

1. Power ON the instrument;
2. The controller performs the "Lamp test" turning ON all the LEDs on the display;
3. Once the "Lamp test" has been completed, the instrument displays the word "tEst" on the upper display, while the lower one shows a 3-digit code (x.y.z) preceded by "r." (revision). E.g.: "r.435" where 435 indicates the Firmware revision of the instrument;
4. To obtain the Serial number of the instrument, press the  key while the instrument displays the word "tEst";
5. At this point the instrument shows on both displays the serial number composed as follows:
 - On the upper display appears "r." (number), followed by XXX (e.g.: r.246),
 - YYYY on the lower one (e.g.: 8795);
 the serial number is: XXXYYYY (e.g.: 2468795).

10.2 Proper use

Every possible use not described in this manual must be considered 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.

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 features.



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.

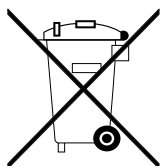
11 MAINTENANCE

This instrument does not require 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/cm²) 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) [C₂H₅OH] or
 - Isopropyl Alcohol (pure or denatured) [(CH₃)₂CHOH] or
 - Water (H₂O).
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.

11.1 Disposal



The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

12 WARRANTY AND REPAIRS

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's 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.

13 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 and the instrument can show the *oULd* (Out 4 Overload) indication.

Appendix A

GROUP - Main and auxiliary input configuration

no.	Param.	Description	Dec. Point	Values	Default
1	SENS	Sensor selection (according to the HW)			
		Model C	0	J TC J (-50... +1000°C/-58... +1832°F); crAL TC K (-50... +1370°C/-58... +2498°F); S TC S (-50... 1760°C/-58... +3200°F); r TC R (-50... +1760°C/-58... +3200); t TC T (-70... +400°C/-94... +752°F); n TC N (-50... +1300°C/-58... +2372); Ir.J Exergen IRS J (-46... +785°C/-50... 1445°F); Ir.cA Exergen IRS K (-46... +785°C/-50... 1445°F); Pt1 RTD Pt 100 (-200... 850°C/-328... 1562°F); Pt10 RTD Pt 1000 (-200... 850°C/-328... 1562°F); 0.60 0... 60 mV; 12.60 12... 60 mV; 0.20 0... 20 mA; 4.20 4... 20 mA; 0.5 0... 5 V; 1.5 1... 5 V; 0.10 0... 10 V; 2.10 2... 10 V.	J
2	dP	Decimal Point Position (linear inputs)	0	0... 3	0
		Decimal Point Position (different than linear inputs)	0	0/1	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	Engineering 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	0
9	I/O 4F	I/O 4 function		on Output used as PWS for TX; out4 Output 4 (digital output 4); dG2c Digital input 2 driven by contact; dG2U Digital input 2 driven by voltage.	out4
10	dIF1	Digital Input 1 function		oFF No function; 1 Alarm reset [status]; 2 Alarm acknowledge (ACK) [status]; 3 Hold of the measured value [status]; 4 Stand by mode [status]; 5 Manual mode; 6 Program RUN [transition]; 7 Program Reset [transition]; 8 Program Hold [transition]; 9 Program Run/Hold [status]; 10 Program Run/Reset [status]; 11 SP1 - SP2 selection [status]; 12 SP1... SP4 binary selection [status]; 13 Digital inputs in parallel to ▲ and ▼ keys; 14 Program to be run (1 and 2 or 5 and 6) [status] (from FW r.1.1.0); 15 Program to be run binary selection [status](from FW r.1.1.0).	oFF
11	dIF2	Digital Input 2 function			oFF

no.	Param.	Description	Dec. Point	Values	Default
12	<i>d r</i>	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

Output Group - Outputs Parameters

no.	Param.	Description	Dec. Point	Values	Default
13	<i>o 1t</i>	Output 1 type (when Out 1 is an analogue output)		0-20 0... 20 mA; 4-20 4... 20 mA; 0-10 0... 10 V; 2-10 2... 10 V.	0-20
14	<i>o 1F</i>	Out 1 function (when Out 1 is a linear output)	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; r.inP Measure retransmission; r.Err Error (sp - PV) retransmission; r.SP Set point retransmission ; r.SEr Serial value retransmission.	H.rEG
		Out 1 function (when Out1 is a digital output)	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; AL Alarm output; P.End Program end indicator; P.HLd Program hold indicator; P.uit Program wait indicator; P.run Program run indicator; P.Et1 Program Event 1; P.Et2 Program Event 2; or.bo Out-of-range or Burnout indicator; P.FAL Power failure indicator; bo.PF Out-of-range, Burnout and Power failure indicator; St.bY Stand by status indicator; diF.1 Out1 repeats the digital input 1 status; diF.2 Out1 repeats the digital input 2 status; on Out1 always ON; riSP Inspection request.	
15	<i>Ro 1L</i>	Initial scale value of the analog retransmission	dP	-1999 ... Ao1H	-1999
16	<i>Ro 1H</i>	Full scale value of the analog retransmission	dP	Ao1L ... 9999	9999
17	<i>o 1RL</i>	Alarms linked up with the out 1	0	0... 63: +1 Alarm 1; +2 Alarm 2; +4 Alarm 3; +8 Loop break alarm; +16 Sensor Break; +32 Overload on output 4.	AL1
18	<i>o 1Rc</i>	Out 1 action	0	dir Direct action; rEU Reverse action; dir.r Direct with reversed LED; ReU.r Reverse with reversed LED.	dir
19	<i>o 2F</i>	Out 2 function	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; AL Alarm output; P.End Program end indicator; P.HLd Program hold indicator; P.uit Program wait indicator; P.run Program run indicator; P.Et1 Program Event 1; P.Et2 Program Event 2; or.bo Out-of-range or Burnout indicator; P.FAL Power failure indicator; bo.PF Out-of-range, Burnout and Power failure indicator; St.bY Stand by status indicator; diF.1 Out2 repeats the digital input 1 status; diF.2 Out2 repeats the digital input 2 status; on Out2 always ON; riSP Inspection request.	AL
20	<i>o 2RL</i>	Alarms linked up with the out 2	0	0... 63: +1 Alarm 1; +2 Alarm 2; +4 Alarm 3; +8 Loop break alarm; +16 Sensor Break; +32 Overload on output 4.	AL1

no.	Param.	Description	Dec. Point	Values	Default
21	$\alpha 2Pc$	Out 2 action	0	dir Direct action; rEU Reverse action; dir.r Direct with reversed LED; ReU.r Reverse with reversed LED.	dir
22	$\alpha 3F$	Out 3 function	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; AL Alarm output; P.End Program end indicator; P.HLd Program hold indicator; P.uit Program wait indicator; P.run Program run indicator; P.Et1 Program Event 1; P.Et2 Program Event 2; or.bo Out-of-range or Burnout indicator; P.FAL Power failure indicator; bo.PF Out-of-range, Burnout and Power failure indicator; St.bY Stand by status indicator; diF.1 Out3 repeats the digital input 1 status; diF.2 Out3 repeats the digital input 2 status; on Out3 always ON; riSP Inspection request.	AL
23	$\alpha 3AL$	Alarms linked up with the out 3	0	0... 63: +1 Alarm 1; +2 Alarm 2; +4 Alarm 3; +8 Loop break alarm; +16 Sensor Break; +32 Overload on output 4.	AL2
24	$\alpha 3Pc$	Out 3 action	0	dir Direct action; rEU Reverse action; dir.r Direct with reversed LED; ReU.r Reverse with reversed LED.	dir
25	$\alpha 4F$	Out 4 function	0	NonE Output not used; H.rEG Heating output; c.rEG Cooling output; AL Alarm output; P.End Program end indicator; P.HLd Program hold indicator; P.uit Program wait indicator; P.run Program run indicator; P.Et1 Program Event 1; P.Et2 Program Event 2; or.bo Out-of-range or Burnout indicator; P.FAL Power failure indicator; bo.PF Out-of-range, Burnout and Power failure indicator; St.bY Stand by status indicator.	AL
26	$\alpha 4AL$	Alarms linked up with the out 4	0	0... 63: +1 Alarm 1; +2 Alarm 2; +4 Alarm 3; +8 Loop break alarm; +16 Sensor Break; +32 Overload on output 4.	AL1 + L2
27	$\alpha 4Pc$	Out 4 action	0	dir Direct action; rEU Reverse action; dir.r Direct with reversed LED; ReU.r Reverse with reversed LED.	dir

αAL 1 Group - Alarm 1 Parameters

no.	Param.	Description	Dec. Point	Values	Default
28	$AL 1L$	Alarm 1 type	0	nonE Alarm not used; LoAb Absolute low alarm; HiAb Absolute high alarm; LHAo Absolute band alarm, alarm ON outside the band; LHAi Absolute band alarm, alarm ON inside the band; SE.br Sensor Break; LodE Deviation low alarm (relative); HidE Deviation high alarm (relative); LHdo Relative band alarm, alarm ON outside the band; LHdi Relative band alarm, alarm ON inside the band.	HiAb

no.	Param.	Description	Dec. Point	Values	Default
29	<i>Ab1</i>	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
30	<i>AL1L</i>	- For High and low alarms AL1L is the low limit of the AL1 threshold; - For band alarm AL1L is the low alarm threshold	dp	From -1999 to AL1H (E.U.)	-1999
31	<i>AL1H</i>	- For High and low alarms, AL1H is the high limit of the AL1 threshold; - For band alarm AL1H is the high alarm threshold	dp	From AL1L to 9999 (E.U.)	9999
32	<i>AL1</i>	AL1 threshold	dp	From AL1L to AL1H (E.U.)	0
33	<i>HAR1</i>	AL1 hysteresis	dp	1... 9999 (E.U.)	1
34	<i>AL1d</i>	AL1 delay	0	From 0 (oFF) to 9999 (s)	oFF
35	<i>AL1o</i>	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 overrange condition.	0

AL2 Group - Alarm 2 Parameters

no.	Param.	Description	Dec. Point	Values	Default
36	<i>AL2t</i>	Alarm 2 type	0	nonE Alarm not used; LoAb Absolute low alarm; HiAb Absolute high alarm; LHAo Absolute band alarm, alarm ON outside the band; LHAi Absolute band alarm, alarm ON inside the band; SE.br Sensor Break; LodE Deviation low alarm (relative); HidE Deviation high alarm (relative); LHdo Relative band alarm, alarm ON outside the band; LHdi Relative band alarm, alarm ON inside the band.	Loab
37	<i>Ab2</i>	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
38	<i>AL2L</i>	- For High and low alarms AL2L is the low limit of the AL2 threshold; - For band alarm AL2L is the low alarm threshold	dp	From -1999 to AL2H (E.U.)	-1999
39	<i>AL2H</i>	- For High and low alarms, AL2H is the high limit of the AL2 threshold; - For band alarm AL2H is the high alarm threshold	dp	From AL2L to 9999 (E.U.)	9999
40	<i>AL2</i>	AL2 threshold	dp	From AL2L to AL2H (E.U.)	0
41	<i>HAR2</i>	AL2 hysteresis	dp	1... 9999 (E.U.)	1
42	<i>AL2d</i>	AL2 delay	0	From 0 (oFF) to 9999 (s)	oFF
43	<i>AL2o</i>	Alarm 2 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 overrange condition.	0

AL3 Group - Alarm 3 Parameters

no.	Param.	Description	Dec. Point	Values	Default
44	<i>AL3t</i>	Alarm 3 type	0	nonE Alarm not used; LoAb Absolute low alarm; HiAb Absolute high alarm; LHAo Absolute band alarm, alarm ON outside the band; LHAi Absolute band alarm, alarm ON inside the band; SE.br Sensor Break; LodE Deviation low alarm (relative); HidE Deviation high alarm (relative); LHdo Relative band alarm, alarm ON outside the band; LHdi Relative band alarm, alarm ON inside the band.	nonE

no.	Param.	Description	Dec. Point	Values	Default
45	<i>Ab3</i>	Alarm 3 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
46	<i>AL3L</i>	- For High and low alarms AL3L is the low limit of the AL3 threshold; - For band alarm AL3L is the low alarm threshold	dp	From -1999 to AL3H (E.U.)	-1999
47	<i>AL3H</i>	- For High and low alarms, AL3H is the high limit of the AL3 threshold; - For band alarm AL3H is the high alarm threshold	dp	From AL3L to 9999 (E.U.)	9999
48	<i>AL3</i>	AL3 threshold	dp	From AL3L to AL3H (E.U.)	0
49	<i>HRL3</i>	AL3 hysteresis	dp	1... 9999 (E.U.)	1
50	<i>AL3d</i>	AL3 delay	0	From 0 (oFF) to 9999 (s)	oFF
51	<i>AL3o</i>	Alarm 3 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 overrange condition.	0

Group - Loop Break Alarm Parameters

no.	Param.	Description	Dec. Point	Values	Default
52	<i>LbALt</i>	LBA time	0	From 0 (oFF) to 9999 (s)	oFF
53	<i>LbSt</i>	Delta measure used by LBA during Soft start	dP	0 (oFF)/1... 9999 (E.U.)	10
54	<i>LbRS</i>	Delta measure used by LBA	dP	1... 9999 (E.U.)	20
55	<i>LbCR</i>	Condition for LBA enabling	0	uP Active when Pout = 100%; dn Active when Pout = -100%; both Active in both cases.	both

Group - Control Parameters


no.	Param.	Description	Dec. Point	Values	Default
56	<i>cont</i>	Control type	0	Pid PID (heat and/or); On.FA ON/OFF asymmetric hysteresis; On.FS ON/OFF symmetric hysteresis; nr Heat/Cool ON/OFF control with neutral zone; 3Pt Servomotor control (available only when Output 2 and Output 3 have been ordered as "M").	Pid
57	<i>Auto</i>	Autotuning selection	0	-4 Oscillating auto-tune with automatic restart at power up and after set 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 all power ups; 0 Not used; 1 Fast auto tuning with automatic restart at all power ups; 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 set point change; 5 Evo-tune with automatic restart at all power ups; 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
58	<i>tunE</i>	Manual start of the Autotuning	0	oFF Not active; on Active.	oFF
59	<i>HSEt</i>	Hysteresis of the ON/OFF control	dP	0... 9999 (E.U.)	1
60	<i>Pb</i>	Proportional band	dP	1... 9999 (E.U.)	50
61	<i>tI</i>	Integral time	0	0 (oFF)/1... 9999 (s)/inF (integral time excluded)	200
62	<i>tD</i>	Derivative time	0	0 (oFF)/1... 9999 (s)	50
63	<i>Fuoc</i>	Fuzzy overshoot control	2	0.00... 2.00	0.50
64	<i>tCH</i>	Heating output cycle time	1	0.2... 130.0 seconds (from FW r.1.1.0); 1.0... 130.0 second (FW until r.1.0.0).	20.0
65	<i>rcG</i>	Power ratio between heating and cooling action	2	0.01... 99.99	1.00
66	<i>tCC</i>	Cooling output cycle time	1	0.2... 130.0 seconds (from FW r.1.1.0); 1.0... 130.0 second (FW until r.1.0.0).	20.0
67	<i>rS</i>	Manual reset (Integral pre-load)	1	-100.0... +100.0 (%)	0.0

no.	Param.	Description	Dec. Point	Values	Default
68	<i>StL</i>	Servomotor stroke time	0	5... 1000 (s)	60
69	<i>dbS</i>	Servomotor dead band	1	0.0... 10.0	0.5
70	<i>oD</i>	Delay at power up	2	0.000 (oFF)/00.01... 99.59 (hh.mm)	oFF
71	<i>SLP</i>	Maximum power output used during soft start	0	-100... 100 (%)	0
72	<i>SSt</i>	Soft start time	2	0.00 oFF; 0.01... 7.59 (hh.mm); inF Always ON.	oFF
73	<i>SStH</i>	Threshold for soft start disabling	dP	-1999... +9999 (E.U.)	9999

3SP Group - Set Point Parameters

no.	Param.	Description	Dec. Point	Values	Default
74	<i>nSP</i>	Number of used set points	0	1... 4	1
75	<i>SPLL</i>	Minimum set point value	dP	From -1999 to SPLH	-1999
76	<i>SPLH</i>	Maximum set point value	dP	From SPLL to 9999	9999
77	<i>SP</i>	Set point 1	dP	From SPLL to SPLH	0
78	<i>SP 2</i>	Set point 2	dP	From SPLL to SPLH	0
79	<i>SP 3</i>	Set point 3	dP	From SPLL to SPLH	0
80	<i>SP 4</i>	Set point 4	dP	From SPLL to SPLH	0
81	<i>RSP</i>	Selection of the active set point	0	From 1 (SP 1) to nSP	1
82	<i>SPrt</i>	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
83	<i>SPLr</i>	Local/remote set point selection	0	Loc Local; rEn Remote.	Loc
84	<i>SPu</i>	Rate of rise for POSITIVE set point change (ramp UP)	2	0.01... 99.99 Eng. units per minute/inF (ramp disabeld)	inF
85	<i>SPd</i>	Rate of rise for NEGATIVE set point change (ramp DOWN)	2	0.01... 99.99 Eng. units per minute/inF (ramp disabeld)	inF

3PARn Group - Operator HMI Parameters

no.	Param.	Description	Dec. Point	Values	Default
86	<i>PAS2</i>	Level 2 password (limited access level)	0	oFF (Level 2 not protected by password); 1... 200.	20
87	<i>PAS3</i>	Level 3 password (complete configuration level)	0	3... 200	30
88	<i>uSrb</i>	 button function during RUN TIME		nonE No function; tunE Auto-tune/self-tune enabling. A press (longer than 1 s) 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; chSP Sequential set point selection; 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.; P.run Program run; P.rES Program reset; P.r.H.r Program run/hold/reset.	P.r.H.r

no.	Param.	Description	Dec. Point	Values	Default
89	d,SP	Display management		nonE Standard display; Pou Output Power; PoS Valve position (servomotor control); SpF Final set point; Spo Operative set point; AL1 Alarm 1 threshold; AL2 Alarm 2 threshold; AL3 Alarm 3 threshold; Pr.tu - During a soak, the instrument shows the soak elapsed time; - During a ramp the display shows the operative set point. At the end of the program execution, the instrument will show "PEnd" messages alternately with the measured value; - When no program is running, the instrument shows the standard display; Pr.td - During a soak, the instrument shows the soak remaining time (countdown); - During a ramp the display shows the operative set point. At the end of the program execution, the instrument shows "PEnd" messages alternately with the measured value; - When no program is running, the instrument shows the standard display; P.t.tu When the programmer is running, the display shows the total elapsed time. At the end of the program execution, the instrument shows "PEnd" messages alternately with the measured value; P.t.td When the programmer is running, the display shows the total remaining time (count down). At the end of the program execution, the instrument shows "PEnd" messages alternately with the measured value; PErc Percent of the power output used during soft start (when the soft start time is equal to infinite, the limit is ever active and it can be used also when ON/OFF control is selected).	Pr.tu
90	d,CL	Display colour (except KM5W)		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).	0
91	AdE	Deviation for display colour management (except KM5PW)		1... 9999 (E.U.)	5
92	d,St	Display Timeout	2	oFF (display always ON); 0.1... 99.59 (mm.ss).	oFF
93	F,LD	Filter on the displayed value	1	oFF (filter disabled); 0.1... 20.0 (E.U.).	oFF
94	bGF	Bar graph Function (KX5P only)	0	nonE Bargraph not lit; Pou PID Output power; PoS Valve position (servomotor control); Pr.tu Elapsed time of the program in execution; Pr.td Time to end of the program in execution; Pr.tS Time to end of the program segment in execution.	Pou
95	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
96	oPr.E	Operative modes enabling		ALL All modes will be selectable by the next parameter; Au.oP Auto and manual 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
97	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

35Er Group - Serial Link Parameters

no.	Param.	Description	Dec. Point	Values	Default
98	Add	Instrument address		0 oFF; 1... 254.	1
99	bAud	baud rate		1200 1200 baud; 2400 2400 baud; 9600 9600 baud; 19.2 19200 baud; 38.4 38400 baud.	9600
100	ErSP	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

PCAL Group - User Calibration Parameters

no.	Param.	Description	Dec. Point	Values	Default
101	ALP	Adjust Low Point		From -1999 to (AH.P - 10) in engineering units	0
102	ALO	Adjust Low Offset		-300... +300 (E.U.)	0
103	AHP	Adjust High Point		From (AL.P + 10) to 9999 (E.U.)	9999
104	AHO	Adjust High Offset		-300... +300	0

PPC Group - Programmer Function Parameters

no.	Param.	Description	Dec. Point	Values	Default
126	PRGE	Active program page election		1... 2	
127	Prn	Active program		1... 8	
128	PrSt	Active program Status		rES Program reset; run Program Start; HoLd Program Hold; cnt Continue (read only).	

PP1 Group - Program 1 Parameters

no.	Param.	Description	Dec. Point	Values	Default
129	P1F	Program 1 - Action at power up	0	nonE Programmer not used; S.uP.d Start at power up with a first step in stand-by; S.uP.S Start at power up; u.dIG Start at Run command detection only; u.dG.d Start at Run command with a 1 st step in stand-by.	nonE
130	P1U	Program 1 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
131	P1E	Program 1 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
132	P1nE	Program 1 - Number of executions	0	1... 99 times/inF indefinitely	
133	P1Et	Program 1 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
134	P1S1	Program 1 - Set point of the first soak	dP	From SPLL to SPHL	0
135	P1G1	Program 1 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
136	P1t1	Program 1 - Time of the 1 st soak	2	0.00... 99.59 Soaks time units	0.10
137	P1b1	Program 1 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
138	P1E1	Program 1 - Events of the 1 st group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
139	P1S2	Program 1 - Set point of the 2 nd soak	dP	OFF or from SPLL to SPHL	0
140	P1G2	Program 1 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
141	P1t2	Program 1 - Time of the 2 nd soak	2	0.00... 99.59 Soaks time units	0.10
142	P1b2	Program 1 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
143	P1E2	Program 1 - Events of the 2 nd group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
144	P1S3	Program 1 - Set point of the 3 rd soak	dP	OFF or from SPLL to SPHL	0
145	P1G3	Program 1 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
146	P1t3	Program 1 - Time of the 3 rd soak	2	0.00... 99.59 Soaks time units	0.10
147	P1b3	Program 1 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
148	P1E3	Program 1 - Events of the 3 rd group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
149	P1S4	Program 1 - Set point of the 4 th soak	dP	OFF or from SPLL to SPHL	0
150	P1G4	Program 1 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
151	P1t4	Program 1 - Time of the 4 th soak	2	0.00... 99.59 Soaks time units	0.10
152	P1b4	Program 1 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
153	P1E4	Program 1 - Events of the 4 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
154	P1S5	Program 1 - Set point of the 5 th soak	dP	OFF or from SPLL to SPHL	0
155	P1G5	Program 1 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
156	P1t5	Program 1 - Time of the 5 th soak	2	0.00... 99.59 Soaks time units	0.10
157	P1b5	Program 1 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
158	P1E5	Program 1 - Events of the 5 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
159	P1S6	Program 1 - Set point of the 6 th soak	dP	OFF or from SPLL to SPHL	0
160	P1G6	Program 1 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
161	P1t6	Program 1 - Time of the 6 th soak	2	0.00... 99.59 Soaks time units	0.10
162	P1b6	Program 1 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
163	P1E6	Program 1 - Events of the 6 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
164	P1c2	Program 1 - Continues on program 2	0	no Program 1 is ended; YES Program 1 continues on program 2.	

3P-2 Group - Program 2 Parameters

no.	Param.	Description	Dec. Point	Values	Default
165	P2F	Program 2 - Action at power up	0	nonE Programmer not used; S.uPd Start at power up with a first step in stand-by; S.uPS Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with a 1 st step in stand-by.	nonE
166	P2u	Program 2 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
167	P2E	Program 2 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
168	P2nE	Program 2 - Number of executions	0	1... 99 times/inF indefinitely	
169	P2Et	Program 2 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
170	P2S 1	Program 2 - Set point of the first soak	dP	From SPLL to SPHL	0
171	P2G 1	Program 2 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
172	P2t 1	Program 2 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
173	P2b 1	Program 2 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
174	P2E 1	Program 2 - Events of the 1 st group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
175	P2S2	Program 2 - Set point of the 2 nd soak	dP	OFF or from SPLL to SPHL	0
176	P2G2	Program 2 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
177	P2t2	Program 2 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
178	P2b2	Program 2 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
179	P2E2	Program 2 - Events of the 2 nd group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
180	P2S3	Program 2 - Set point of the 3 rd soak	dP	OFF or from SPLL to SPHL	0
181	P2G3	Program 2 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
182	P2t3	Program 2 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
183	P2b3	Program 2 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
184	P2E3	Program 2 - Events of the 3 rd group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
185	P2S4	Program 2 - Set point of the 4 th soak	dP	OFF or from SPLL to SPHL	0
186	P2G4	Program 2 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
187	P2t4	Program 2 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
188	P2b4	Program 2 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
189	P2E4	Program 2 - Events of the 4 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
190	P2S5	Program 2 - Set point of the 5 th soak	dP	OFF or from SPLL to SPHL	0
191	P2G5	Program 2 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
192	P2t5	Program 2 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
193	P2b5	Program 2 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
194	P2E5	Program 2 - Events of the 5 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
195	P2S6	Program 2 - Set point of the 6 th soak	dP	OFF or from SPLL to SPHL	0
196	P2G6	Program 2 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/inF = Step transfer	inF
197	P2t6	Program 2 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
198	P2b6	Program 2 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
199	P2E6	Program 2 - Events of the 6 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
200	P2c 3	Program 2 - Continues on program 3	0	no Program 2 is ended; YES Program 2 continues on program 3.	

3P-3 Group - Program 3 Parameters

no.	Param.	Description	Dec. Point	Values	Default
201	P3F	Program 3 - Action at power up	0	nonE Programmer not used; S.uPd Start at power up with a first step in stand-by; S.uPS Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with a first step in stand-by.	nonE
202	P3u	Program 3 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
203	P3E	Program 3 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
204	P3nE	Program 3 - Number of executions	0	1... 99 times/inF indefinitely	
205	P3Et	Program 3 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
206	P3S 1	Program 3 - Set point of the first soak	dP	From SPLL to SPHL	0

no.	Param.	Description	Dec. Point	Values	Default
207	P3G1	Program 3 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
208	P3t1	Program 3 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
209	P3b1	Program 3 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
210	P3E1	Program 3 - Events of the 1 st group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
211	P3S2	Program 3 - Set point of the 2 nd soak	dP	OFF or from SPL to SPHL	0
212	P3G2	Program 3 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
213	P3t2	Program 3 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
214	P3b2	Program 3 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
215	P3E2	Program 3 - Events of the 2 nd group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
216	P3S3	Program 3 - Set point of the 3 rd soak	dP	OFF or from SPL to SPHL	0
217	P3G3	Program 3 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
218	P3t3	Program 3 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
219	P3b3	Program 3 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
220	P3E3	Program 3 - Events of the 3 rd group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
221	P3S4	Program 3 - Set point of the 4 th soak	dP	OFF or from SPL to SPHL	0
222	P3G4	Program 3 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
223	P3t4	Program 3 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
224	P3b4	Program 3 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
225	P3E4	Program 3 - Events of the 4 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
226	P3S5	Program 3 - Set point of the 5 th soak	dP	OFF or from SPL to SPHL	0
227	P3G5	Program 3 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
228	P3t5	Program 3 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
229	P3b5	Program 3 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
230	P3E5	Program 3 - Events of the 5 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
231	P3S5	Program 3 - Set point of the 6 th soak	dP	OFF or from SPL to SPHL	0
232	P3G5	Program 3 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
233	P3t5	Program 3 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
234	P3b5	Program 3 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
235	P3E5	Program 3 - Events of the 6 th group	0	00.00... 11.11 (G = event OFF; I = event ON)	00.00
236	P3c4	Program 3 - Continues on program 4	0	no Program 3 is ended; YES Program 3 continues on program 4.	

3P-4 Group - Program 4 Parameters

no.	Param.	Description	Dec. Point	Values	Default
237	P4F	Program 4 - Action at power up	0	nonE Programmer not used; S.uP.d Start at power up with a 1 st step in stand-by; S.uP.S Start at power up; u.dIG Start at Run command detection only; u.dG.d Start at Run command with a 1 st step in stand-by.	nonE
238	P4u	Program 4 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
239	P4E	Program 4 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
240	P4nE	Program 4 - Number of executions	0	1... 99 times/inF indefinitely	
241	P4Et	Program 4 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
242	P4S1	Program 4 - Set point of the first soak	dP	From SPL to SPHL	0
243	P4G1	Program 4 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
244	P4t1	Program 4 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
245	P4b1	Program 4 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
246	P4E1	Program 4 - Events of the 1 st group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
247	P4S2	Program 4 - Set point of the 2 nd soak	dP	OFF or from SPL to SPHL	0
248	P4G2	Program 4 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
249	P4t2	Program 4 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
250	P4b2	Program 4 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
251	P4E2	Program 4 - Events of the 2 nd group	2	00.00... 11.11 (G = event OFF; I = event ON)	00.00
252	P4S3	Program 4 - Set point of the 3 rd soak	dP	OFF or from SPL to SPHL	0
253	P4G3	Program 4 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
254	P4t3	Program 4 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
255	P4b3	Program 4 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF

no.	Param.	Description	Dec. Point	Values	Default
256	P4E3	Program 4 - Events of the 3 rd group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
257	P4S4	Program 4 - Set point of the 4 th soak	dP	OFF or from SPLL to SPHL	0
258	P4G4	Program 4 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
259	P4t4	Program 4 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
260	P4b4	Program 4 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
261	P4E4	Program 4 - Events of the 4 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
262	P4S5	Program 4 - Set point of the 5 th soak	dP	OFF or from SPLL to SPHL	0
263	P4G5	Program 4 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
264	P4t5	Program 4 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
265	P4b5	Program 4 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
266	P4E5	Program 4 - Events of the 5 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
267	P4S6	Program 4 - Set point of the 6 th soak	dP	OFF or from SPLL to SPHL	0
268	P4G6	Program 4 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
269	P4t6	Program 4 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
270	P4b6	Program 4 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
271	P4E6	Program 4 - Events of the 6 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00

Program 5 - Program 5 Parameters

no.	Param.	Description	Dec. Point	Values	Default
272	P5F	Program 5 - Action at power up	0	nonE Programmer not used; S.u.P.d Start at power up with 1 st step in stand-by; S.u.P.S Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with 1 st step in stand-by.	nonE
273	P5u	Program 5 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
274	P5E	Program 5 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
275	P5nE	Program 5 - Number of executions	0	1... 99 times/inF indefinitely	
276	P5Et	Program 5 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
277	P5S1	Program 5 - Set point of the first soak	dP	From SPLL to SPHL	0
278	P5G1	Program 5 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
279	P5t1	Program 5 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
280	P5b1	Program 5 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
281	P5E1	Program 5 - Events of the 1 st group	2	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
282	P5S2	Program 5 - Set point of the 2 nd soak	dP	OFF or from SPLL to SPHL	0
283	P5G2	Program 5 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
284	P5t2	Program 5 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
285	P5b2	Program 5 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
286	P5E2	Program 5 - Events of the 2 nd group	2	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
287	P5S3	Program 5 - Set point of the 3 rd soak	dP	OFF or from SPLL to SPHL	0
288	P5G3	Program 5 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
289	P5t3	Program 5 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
290	P5b3	Program 5 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
291	P5E3	Program 5 - Events of the 3 rd group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
292	P5S4	Program 5 - Set point of the 4 th soak	dP	OFF or from SPLL to SPHL	0
293	P5G4	Program 5 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
294	P5t4	Program 5 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
295	P5b4	Program 5 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
296	P5E4	Program 5 - Events of the 4 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
297	P5S5	Program 5 - Set point of the 5 th soak	dP	OFF or from SPLL to SPHL	0
298	P5G5	Program 5 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
299	P5t5	Program 5 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
300	P5b5	Program 5 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
301	P5E5	Program 5 - Events of the 5 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
302	P5S6	Program 5 - Set point of the 6 th soak	dP	OFF or from SPLL to SPHL	0
303	P5G6	Program 5 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
304	P5t6	Program 5 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
305	P5b6	Program 5 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
306	P5E6	Program 5 - Events of the 6 th group	0	00.00... 11.11 (0 = event OFF; 1 = event ON)	00.00
307	P5c6	Program 5 - Continues on program 6	0	no Program 5 is ended; YES Program 5 continues on program 6.	

3P-6 Group - Program 6 Parameters

no.	Param.	Description	Dec. Point	Values	Default
308	<i>P6F</i>	Program 6 - Action at power up	0	nonE Programmer not used; S.uP.d Start at power up with 1 st step in stand-by; S.uP.S Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with 1 st step in stand-by.	nonE
309	<i>P6u</i>	Program 6 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
310	<i>P6E</i>	Program 6 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPAt Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
311	<i>P6nE</i>	Program 6 - Number of executions	0	1... 99 times/inF indefinitely	
312	<i>P6Et</i>	Program 6 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
313	<i>P6S 1</i>	Program 6 - Set point of the first soak	dP	From SPLL to SPHL	0
314	<i>P6G 1</i>	Program 6 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
315	<i>P6t 1</i>	Program 6 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
316	<i>P6b 1</i>	Program 6 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
317	<i>P6E 1</i>	Program 6 - Events of the 1 st group	2	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
318	<i>P6S2</i>	Program 6 - Set point of the 2 nd soak	dP	OFF or from SPLL to SPHL	0
319	<i>P6G2</i>	Program 6 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
320	<i>P6t2</i>	Program 6 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
321	<i>P6b2</i>	Program 6 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
322	<i>P6E2</i>	Program 6 - Events of the 2 nd group	2	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
323	<i>P6S</i>	Program 6 - Set point of the 3 rd soak	dP	OFF or from SPLL to SPHL	0
324	<i>P6G3</i>	Program 6 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
325	<i>P6t3</i>	Program 6 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
326	<i>P6b3</i>	Program 6 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
327	<i>P6E3</i>	Program 6 - Events of the 3 rd group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
328	<i>P6S4</i>	Program 6 - Set point of the 4 th soak	dP	OFF or from SPLL to SPHL	0
329	<i>P6G4</i>	Program 6 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
330	<i>P6t4</i>	Program 6 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
331	<i>P6b4</i>	Program 6 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
332	<i>P6E4</i>	Program 6 - Events of the 4 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
333	<i>P6S5</i>	Program 6 - Set point of the 5 th soak	dP	OFF or from SPLL to SPHL	0
334	<i>P6G5</i>	Program 6 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
335	<i>P6t5</i>	Program 6 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
336	<i>P6b5</i>	Program 6 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
337	<i>P6E5</i>	Program 6 - Events of the 5 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
338	<i>P6S6</i>	Program 6 - Set point of the 6 th soak	dP	OFF or from SPLL to SPHL	0
339	<i>P6G6</i>	Program 6 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
340	<i>P6t6</i>	Program 6 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
341	<i>P6b6</i>	Program 6 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
342	<i>P6E6</i>	Program 6 - Events of the 6 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
343	<i>P6c 3</i>	Program 6 - Continues on program 7	0	no Program 6 is ended; YES Program 6 continues on program 7.	

Group - Program 7 Parameters

no.	Param.	Description	Dec. Point	Values	Default
344	P7F	Program 7 - Action at power up	0	nonE Programmer not used; S.uP.d Start at power up with 1 st step in stand-by; S.uP.S Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with 1 st step in stand-by.	nonE
345	P7W	Program 7 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
346	P7E	Program 7 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPA.t Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
347	P7nE	Program 7 - Number of executions	0	1... 99 times/inF indefinitely	
348	P7Et	Program 7 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
349	P7S1	Program 7 - Set point of the first soak	dP	From SPLl to SPHL	0
350	P7G1	Program 7 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
351	P7t1	Program 7 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
352	P7b1	Program 7 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
353	P7E1	Program 7 - Events of the 1 st group	2	00.00... 11.11 (E = event OFF; I = event ON)	00.00
354	P7S2	Program 7 - Set point of the 2 nd soak	dP	OFF or from SPLl to SPHL	0
355	P7G2	Program 7 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
356	P7t2	Program 7 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
357	P7b2	Program 7 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
358	P7E2	Program 7 - Events of the 2 nd group	2	00.00... 11.11 (E = event OFF; I = event ON)	00.00
359	P7S3	Program 7 - Set point of the 3 rd soak	dP	OFF or from SPLl to SPHL	0
360	P7G3	Program 7 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
361	P7t3	Program 7 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
362	P7b3	Program 7 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
363	P7E3	Program 7 - Events of the 3 rd group	0	00.00... 11.11 (E = event OFF; I = event ON)	00.00
364	P7S4	Program 7 - Set point of the 4 th soak	dP	OFF or from SPLl to SPHL	0
365	P7G4	Program 7 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
366	P7t4	Program 7 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
367	P7b4	Program 7 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
368	P7E4	Program 7 - Events of the 4 th group	0	00.00... 11.11 (E = event OFF; I = event ON)	00.00
369	P7S5	Program 7 - Set point of the 5 th soak	dP	OFF or from SPLl to SPHL	0
370	P7G5	Program 7 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
371	P7t5	Program 7 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
372	P7b5	Program 7 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
373	P7E5	Program 7 - Events of the 5 th group	0	00.00... 11.11 (E = event OFF; I = event ON)	00.00
374	P7S6	Program 7 - Set point of the 6 th soak	dP	OFF or from SPLl to SPHL	0
375	P7G6	Program 7 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
376	P7t6	Program 7 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
377	P7b6	Program 7 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
378	P7E6	Program 7 - Events of the 6 th group	0	00.00... 11.11 (E = event OFF; I = event ON)	00.00
379	P7c3	Program 7 - Continues on program 8	0	no Program 7 is ended; YES Program 7 continues on program 8.	

3P-8 Group - Program 8 Parameters

no.	Param.	Description	Dec. Point	Values	Default
380	PBF	Program 8 - Action at power up	0	nonE Programmer not used; S.uP.d Start at power up with 1 st step in stand-by; S.uP.S Start at power up; u.diG Start at Run command detection only; u.dG.d Start at Run command with 1 st step in stand-by.	nonE
381	PBL	Program 8 - Time unit of the soaks	2	hh.nn Hours and minutes; nn.ss Minutes and seconds.	hh.nn
382	PBE	Program 8 - Instrument behaviour at the end of the program execution	0	cnt Continue; SPA.t Go to the set point selected by A.SP; St.by Go to stand-by mode.	A.SP
383	PBnE	Program 8 - Number of executions	0	1... 99 times/inF indefinitely	
384	PBEt	Program 8 - Time of the end program indication	2	0.00 (oFF)/0.01... 99.59 nn.ss/inF (steady ON)	oFF
385	PBS 1	Program 8 - Set point of the first soak	dP	From SPLl to SPHL	0
386	PBG 1	Program 8 - Gradient of the first ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
387	PBt 1	Program 8 - Time of the 1 st soak	2	0.00... 99.59 time units	0.10
388	PBb 1	Program 8 - Wait band of the 1 st soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
389	PBE 1	Program 8 - Events of the 1 st group	2	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
390	PBS2	Program 8 - Set point of the 2 nd soak	dP	OFF or from SPLl to SPHL	0
391	PBG2	Program 8 - Gradient of the 2 nd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
392	PBt2	Program 8 - Time of the 2 nd soak	2	0.00... 99.59 time units	0.10
393	PBb2	Program 8 - Wait band of the 2 nd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
394	PBE2	Program 8 - Events of the 2 nd group	2	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
395	PBS3	Program 8 - Set point of the 3 rd soak	dP	OFF or from SPLl to SPHL	0
396	PBG3	Program 8 - Gradient of the 3 rd ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
397	PBt3	Program 8 - Time of the 3 rd soak	2	0.00... 99.59 time units	0.10
398	PBb3	Program 8 - Wait band of the 3 rd soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
399	PBE3	Program 8 - Events of the 3 rd group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
400	PBS4	Program 8 - Set point of the 4 th soak	dP	OFF or from SPLl to SPHL	0
401	PBG4	Program 8 - Gradient of the 4 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
402	PBt4	Program 8 - Time of the 4 th soak	2	0.00... 99.59 time units	0.10
403	PBb4	Program 8 - Wait band of the 4 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
404	PBE4	Program 8 - Events of the 4 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
405	PBS5	Program 8 - Set point of the 5 th soak	dP	OFF or from SPLl to SPHL	0
406	PBG5	Program 8 - Gradient of the 5 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
407	PBt5	Program 8 - Time of the 5 th soak	2	0.00... 99.59 time units	0.10
408	PBb5	Program 8 - Wait band of the 5 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
409	PBE5	Program 8 - Events of the 5 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00
410	PBS6	Program 8 - Set point of the 6 th soak	dP	OFF or from SPLl to SPHL	0
411	PBG6	Program 8 - Gradient of the 6 th ramp	1	0.1... 999.9 (E.U./minute)/ inF = Step transfer	inF
412	PBt6	Program 8 - Time of the 6 th soak	2	0.00... 99.59 time units	0.10
413	PBb6	Program 8 - Wait band of the 6 th soak	dP	0 (oFF)/1... 9999 (E.U.)	oFF
414	PBE6	Program 8 - Events of the 6 th group	0	00.00... 11.11 (□ = event OFF; / = event ON)	00.00

