

Double action controller with analogue output ¹/₄ DIN - 96 x 96



ISO 9001 Certified

Q3 line

User Manual • 03/11 • Code: ISTR_M_Q3_E_03_--





Ascon Tecnologic srl

viale Indipendenza 56, 27029 Vigevano (PV) Tel.: +39-0381 69 871 - Fax: +39-0381 69 8730

Sito internet: www.ascontecnologic.com

Indirizzo E-Mail: sales@ascontecnologic.com

Double action controller with analogue output ¹/₄ DIN - 96 x 96

Q3 line







NOTES ON ELECTRIC SAFETY AND ELECTROMAGNETIC COMPATIBILITY

Please, read carefully these instructions before proceeding with the installation of the controller. Class II instrument, for indoor use only.

This controller has been designed with compliance to:

Regulations on electrical apparatus (appliance, systems and installations) according to the European Community directive 73/23/EEC amended by the European Comunity directive 93/68/EEC and the Regulations on the essential protection requirements in electrical apparatus EN61010-1:93 + A2:95.

Regulations on Electromagnetic Compatibility according to the European Community directive n° 89/336/EEC, amended by the European Community directive n° 92/31/EEC, 93/68/EEC, 98/13/EEC

and the following regulations:

- Regulations on RF emissions:

EN61000-6-3: 2001 residential environments EN61000-6-4: 2001 industrial environments

- Regulation on RF immunity:

EN61000-6-2: 2001 industrial equipment and system

It is important to understand that it's responsibility of the installer to ensure the compliance of the regulations on safety requirements and EMC.

Repairs: this device has no user serviceable parts and requires special equipment and specialised engineers. Therefore, a repair can be hardly carried on directly by the user. For this purpose, the manufacturer provides technical assistance and the repair service for its Customers. Please, contact your nearest Agent for further information.

Table of contents

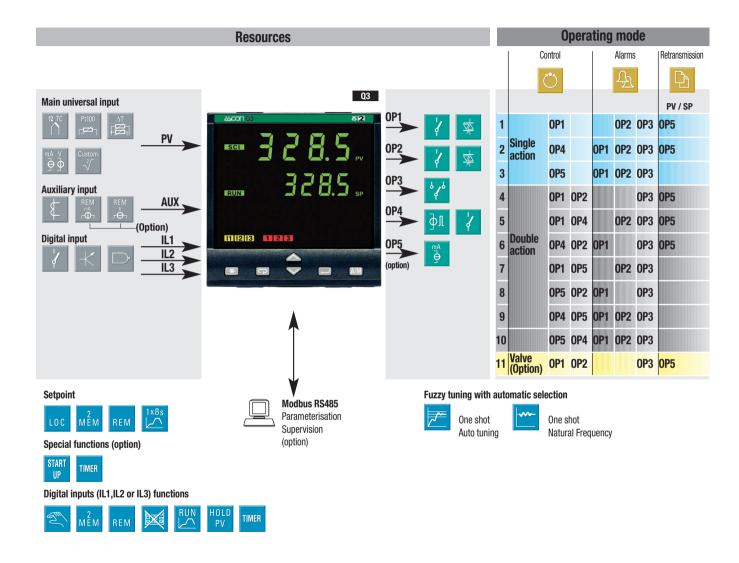


TABLE OF CONTENTS

1	Installation	Page	4
	ELECTRICAL CONNECTIONS		8
	PRODUCT CODING		
4	OPERATIONS	Page	23
	DISPLAYS		
6	COMMANDS	Page	50
	SETPOINT PROGRAMMER		
8	TECHNICAL SPECIFICATIONS	Page	61



INSTALLATION

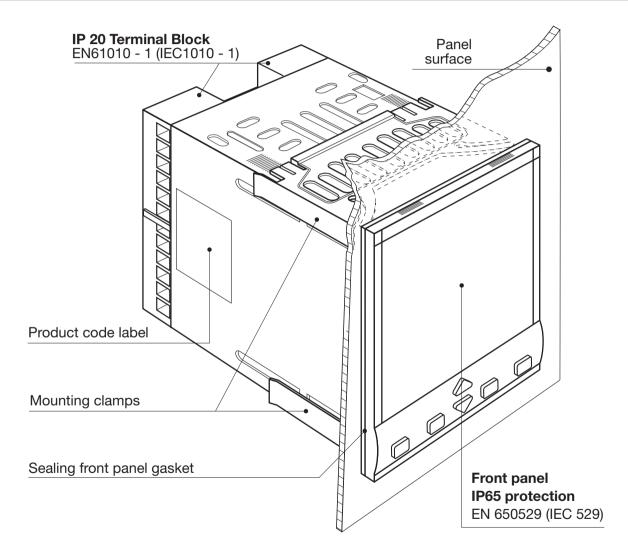
1.1 GENERAL DESCRIPTION

Installation must only be carried out by qualified personnel.

Before proceeding with the installation of this controller, follow the instructions illustrated in this manual and, particularly the installation precautions marked with the symbol, related to the European Community directive on electrical protection and electromagnetic compatibility.

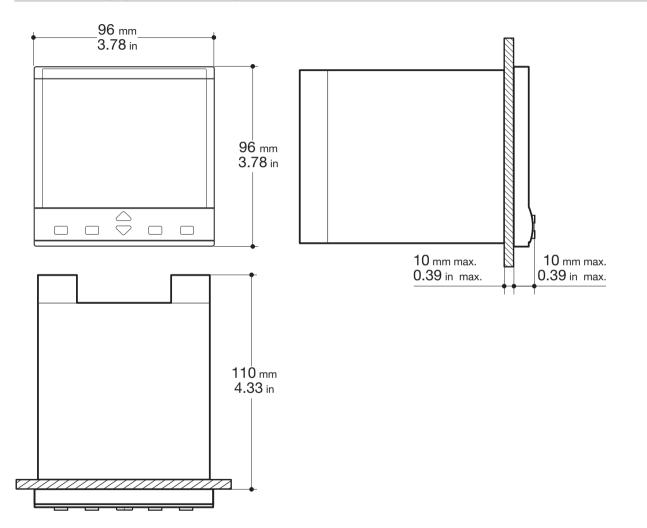


To prevent hands or metal touching parts that may be electrically live, the controllers must be installed in an enclosure and/or in a cubicle.

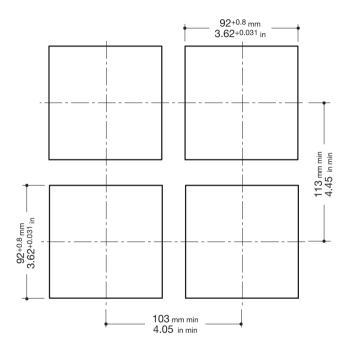


1 - Installation

1.2 DIMENSIONAL DETAILS



1.3 PANEL CUT-OUT



1 - Installation

1.4 ENVIRONMENTAL CONDITIONS

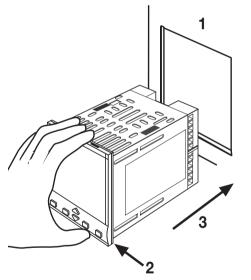


Operating cor	nditions	
2000	Altitude up to 2,000 m	
- C	Temperature 050°C	
%Rh	Relative humidity 595 % non-cor	ndensing
Special condi	tions	Suggestions
2000	Altitude > 2,000 m	Use 24V∼ supply version
- t°c	Temperature >50°C	Use forced air ventilation
%Rh	Humidity > 95 %	Warm up
the dat in a second of the sec	Conducting atmosphere	Use filter
Forbidden Co	nditions 🛇	
	Corrosive atmosphere	
	Explosive atmosphere	

1.5 PANEL MOUNTING [1]

1.5.1 INSERT THE INSTRUMENT

- 1 Prepare panel cut-out;
- **2** Check-front panel gasket position;
- **3** Insert the instrument through the cut-out.

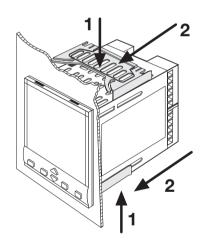


UL note

[1] For Use on a Flat Surface of a Type 2 and Type 3 'raintight' Enclosure.

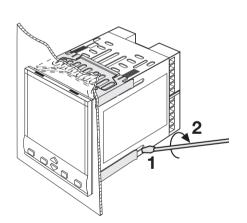
1.5.2 INSTALLATION SECURING

- 1 Fit the mounting clamps;
- **2** Push the mounting clamps towards the panel surface to secure the instrument.



1.5.3 CLAMPS REMOVING

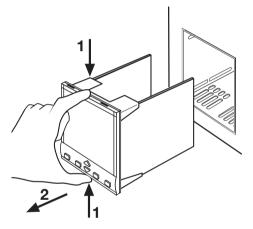
- 1 Insert the screwdriver in the clips of the clamps;
- 2 Rotate the screwdriver.



1.5.4 INSTRUMENT UNPLUGGING



- 1 Push, and
- 2 Pull to remove the instrument,



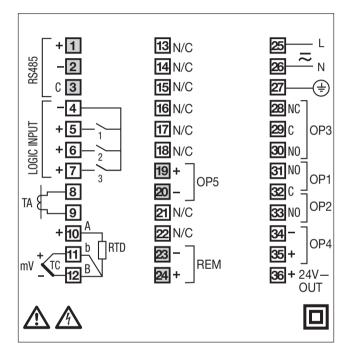
Electrostatic discharges can damage the instrument



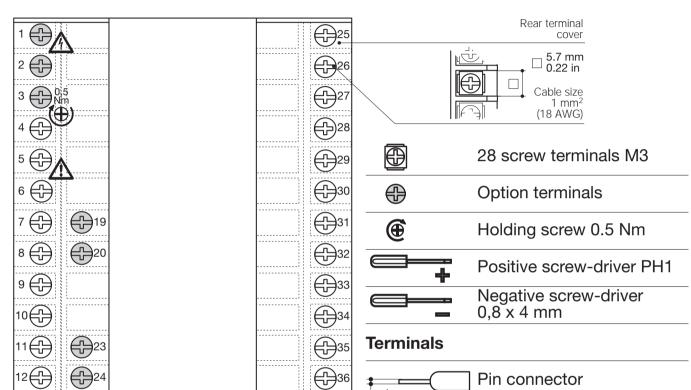
Before removing the instrument the operator must discharge himself to ground.



ELECTRICAL CONNECTIONS



2.1 TERMINATION UNIT [1]



MCE

☑ 1.4 mm 0.055 in max.

Fork-shape AMP 165004 Ø 5.5 mm - 0.21 in

Stripped wire

L 5.5 mm - 0.21 in

UL note

[1] Use 60/70 °C copper (Cu) conductor only.

PRECAUTIONS



Despite the fact that the instrument has been designed to work in an harsh and noisy environmental (level IV of the industrial standard IEC 801-4), it is recommended to follow the following suggestions.



All the wiring must comply with the local regulations.

The supply wiring should be routed away from the power cables. Avoid to use electromagnetic contactors, power Relays and high power motors nearby.

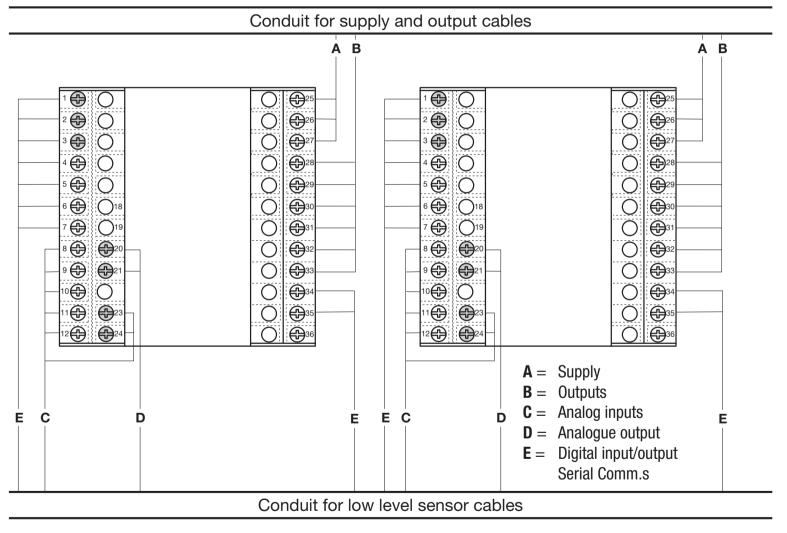
Avoid power units nearby, especially if controlled in phase angle

Keep the low level sensor input wires away from the power lines and the output cables.

If this is not achievable, use shielded cables on the sensor input, with the shield connected to earth.

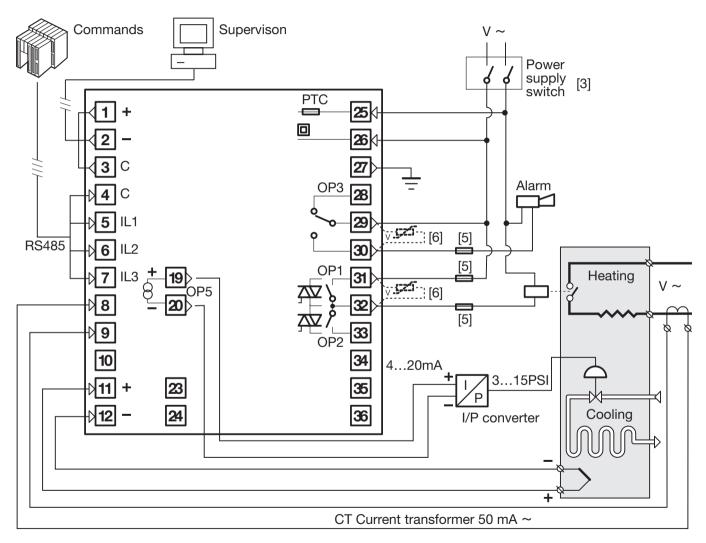
2.2 PRECAUTIONS AND ADVISED CONDUCTOR COURSE





2.3 EXAMPLE OF WIRING DIAGRAM (HEAT / COOL CONTROL)





Notes:

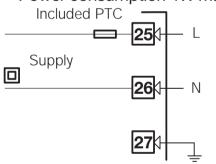
- 1] Make sure that the power supply voltage is the same indicated on the instrument.
- 2] Switch on the power supply only after that all the electrical connections have been completed.
- 3] In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument. The power supply switch shall be easily accessible from the operator.
- 4] The instrument is is PTC protected. In case of failure it is suggested to return the instrument to the manufacturer for repair.
- 5] To protect the instrument internal circuits use:
 - 2 A~ T fuse for Relay outputs (220 VAC)
 - 4 A ~ T fuse for Relay outputs (110 VAC)
 - 1 A~ T fuse for Triac outputs
- 6] Relay contacts are already protected with varistors.

Only in case of 24 V \sim inductive loads, use model A51-065-30D7 varistors (on request)

2.3.1 POWER SUPPLY ▲ 🤇

Switching power supply with multiple isolation and internal PTC

- Standard version:
 nominal voltage:
 100 240V~ (- 15% + 10%)
 Frequency 50/60Hz
- Low Voltage version:
 Nominal voltage:
 24V~ (- 25% + 12%)
 Frequency 50/60Hz
 or 24V− (- 15% + 25%)
 Power consumption 4W max.



For better protection against noise, it is recommended not to connect the earth clamp provided for civilian installations.

2.3.2 PV CONTROL INPUT

A L-J-K-S-R-T-B-N-E-W thermocouple type

- Connect the wires with the polarity as shown
- Use always compensation cable of the correct type for the thermocouple used
- The shield, if present, must be connected to a proper earth.

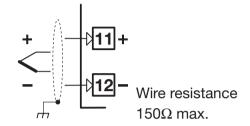
B For Pt100 resistance thermometer

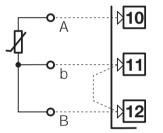
- If a 3 wires system is used, use always cables of the same diameter (1mm 2 min) (line 20 Ω /lead maximum resistance)
- When using a 2 wires system, use always cables of the same diameter (1,5mm² min) and put a jumper between terminals 11 and 12

C For Δ T (2x RTD Pt100) Special

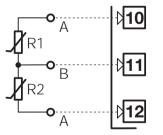
↑ When the distance between the controller and the sensor is 15 mt. using a cable of 1.5 mm² diameter, produces an error on the measure of 1°C (1°F).

R1 + R2 must be $<320\Omega$





For 3 wires only. Maximum line resistance 20Ω /line



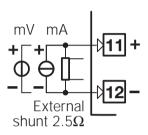
Use wires of the same length and 1.5 mm² size.

Maximum line resistance 20Ω/line

2.3.2 PV CONTROL INPUT

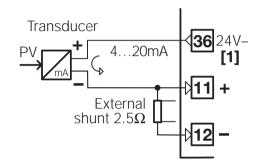


D For mA, mV

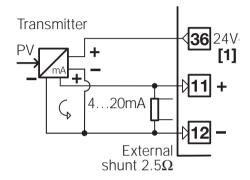


 $Rj > 10M\Omega$

D1 With 2 wires transducer



D2 With 3 wires transducer



[1] Auxiliary power supply for external transmitter 24V- ±20% /30mA max. without short circuit protection

2.3.3 AUXILIARY INPUT (OPTION)



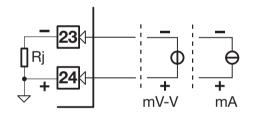
2.3.4 DIGITAL INPUT



A - From Remote Setpoint

Current 0/4...20mA Input resistance = 30Ω

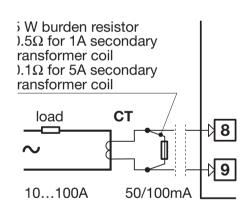
Voltage 1...5V, 0...5V, 0...10V Input resistence = $300K\Omega$

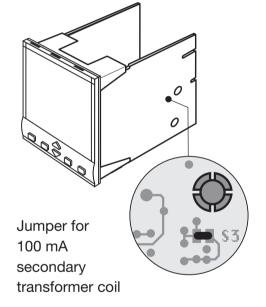


B- For current transformer CT - Not isolated

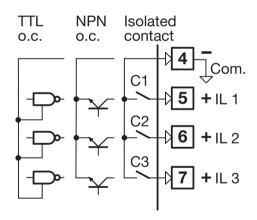
For the measure of the load current (see page 47)

- Primary coil 10A...100A
- Secondary coil 50mA default 100mA \$3 internal jumper selectable





- The input is active when the logic state is ON, corresponding to the contact closed
- The input is inactive when the logic state is OFF, corresponding to the contact open



2.3.5 OP1 - OP2 - OP3 - OP4 - OP5 OUTPUTS (OPTION)

M(€

The functionality associated to each of the OP1, OP2, OP4 and OP5 output is defined during the configuration of the instrument index **N** (see page 21).

The suggested combinations are:

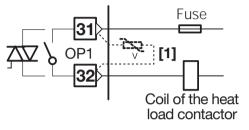
	Cor	Control outputs			Alarms	Retransmission	
		Heat	Cool	AL1	AL2	AL3	PV / SP
Α	Cinalo	0P1			0P2	0P3	0P5
В	Single action	0P4		0P1	0P2	0P3	0P5
C	action	0P5		0P1	0P2	0P3	
D		0P1	0P2			0P3	0P5
Е		0P1	OP4		0P2	0P3	0P5
F	Double	0P4	0P2	0P1		0P3	0P5
G	action	0P1	0P5		0P2	0P3	
Н		0P5	0P2	0P1		0P3	
1		0P5	0P4	0P1	0P2	0P3	
L	Valve drive	0P1 ▲	0P2 ▼			0P3	0P5

where:

0P1 - 0P2	Relay or Triac output
0P3	Relay output (for AL3 only)
0P4	SSR drive control or Relay output
0P5	Control or retransmission analogue output

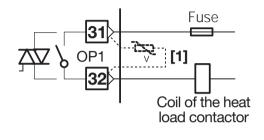
2.3.5-A SINGLE ACTION RELAY (TRIAC) CONTROL OUTPUT

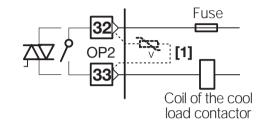




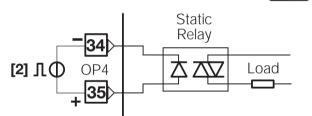
2.3.5-D DOUBLE ACTION RELAY (TRIAC)/RELAY (TRIAC) CONTROL OUTPUT







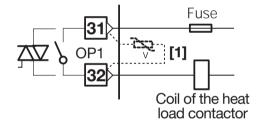
2.3.5-B SINGLE ACTION SSR DRIVE CONTROL OUTPUT

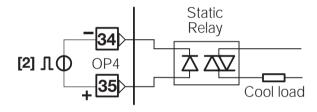


2.3.5-E DOUBLE ACTION

RELAY (TRIAC)/SSR DRIVE CONTROL OUTPUT

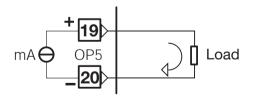






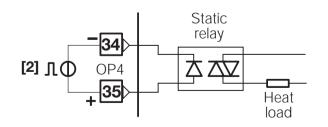
2.3.5-C SINGLE ACTION ANALOGUE OUTPUT

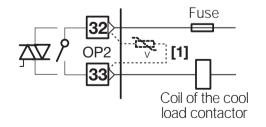




2.3.5-F DOUBLE ACTION SSR DRIVE /RELAY (TRIAC) CONTROL OUTPUT

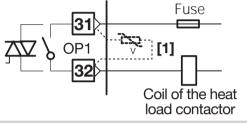


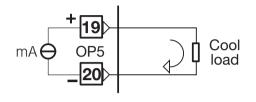




2.3.5-G HEAT/COOL CONTROL OUTPUT RELAY (TRIAC)/ANALOGUE

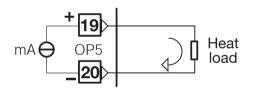


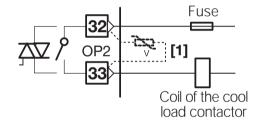




2.3.5-H HEAT/COOL CONTROL OUTPUT ANALOGUE/RELAY(TRIAC)



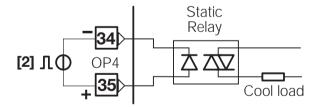




2.3.5-I HEAT/COOL CONTROL OUTPUT ANALOGUE/SSR DRIVE





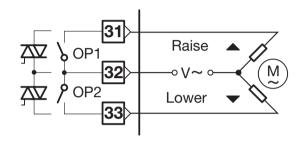


Notes:

- [1] Varistor for inductive load 24V~ only.
- [2] When basic product code B = 9, OP4 (terminals 34, 35) is a Relay output.

2.3.5-L VALVE DRIVE OUTPUT RELAY (TRIAC) / RELAY (TRIAC)

Valve drive PID **without** potentiometer 3 pole output with N.O. contacts (open, close, stop).



Notes:

OP1 - OP2 Relay output

 SPST Relay N.O., 2A/250 V~ for resistive load, fuse 2A ~ T at 250V, 4A ~ T at 110V.

OP1 - OP2 Triac output

N.O. contact for resistive load of up to 1A/250
 V~ max., fuse 1A ~ T.

OP4 not isolated SSR drive output

• 0...5V-, ±20%, 30 mA max.

OP4 Relay output

 SPST Relay N.O., 2A/250 V~ for resistive load, fuse 2A ~ T at 250V, 4A ~ T at 110V.

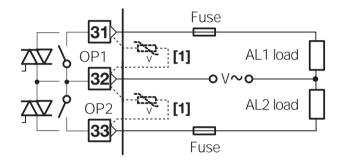
OP5 isolated analogue output

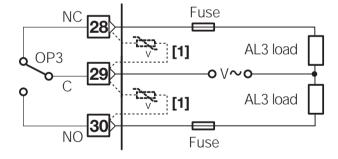
• 0/4...20mA, 750Ω / 15V max.

2.3.6 ALARM OUTPUTS



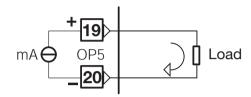
↑ The relay/triac output OP1, OP2 and OP3, can be used as alarm outputs only if they are not used as control outputs.





[1] Varistor for inductive load 24V \sim only

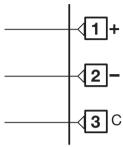
2.3.7 OP5 ANALOGUE CONTROL OUTPUT (OPTION)



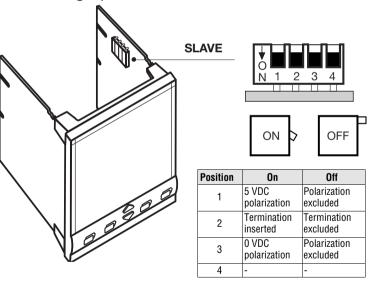
For control or PV/SP retransmission:

- Galvanic isolation 500V∼/1 min
- 0/4...20mA, (750Ω or 15V– max.)

2.3.8 SERIAL COMMUNICATIONS (OPTION)



- Galvanic isolation 500V∼/1 min
- Compliance to the EIA RS485 standard for Modbus/Jbus.
- Setting dip switches.



 Λ

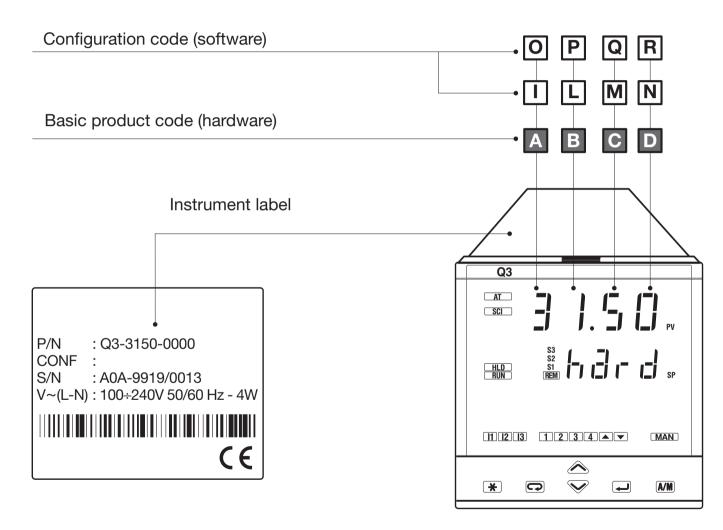
Please, read:

gammadue® and deltadue® controller series serial communication and configuration

3 - Product coding

PRODUCT CODING

The complete code is shown on the instrument label. The informations about product coding are accessible from the front panel by mean of a particular procedure described at section 5.2 page 49.



3.1 MODEL CODE

The product code indicates the specific hardware configuration of the instrument, that can be modified by specialized engineers only.

	Line	Basic	Accessories	Configura	
				1st part	2nd
Model:	Q 3	A B C D	- E F G 0	/ I L M N -	O F
Line				Q	3
_					
Power s					IA
		% + 10%)			3
24V∼ (- 2	25% + 12	%) or 24V– (- 15% + 25%)		5
Outputs	OP1 - 0	P2 - OP4			В
	Relay - SS				1
Triac - Tr	iac - SSR	Drive			5
Relav - F	Relay - Re	lav			9
	-				
Serial Co	ommunic	ations			C
None					0
RS485 M	lodbus/JI	ous SLAVE			5
Options					D
None					0
Valve driv	ve output				2
Analogue	e output +	- Remote Set	tpoint		5
Valve driv	ve output	+ Analogue	output (retr.) +	Remote Setpoint	
	•		, , ,		

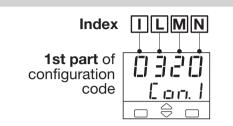
Setpoint Programmer - special function	E
Not fitted	0
Start-up + Timer	2
One "8 segments" program	3
User manual	F
Italian/English (std)	0
French/English	1
German/English	2
Spanish/English	3
Front panel colour	G
Dark (std)	0
Beige	1

3 - Product coding

3.2 CONFIGURATION CODING

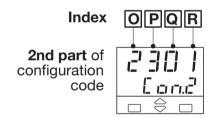
A 4+4 index code follows the model of the controller.

The code has to be set to configure the controller (see chapter 3.1 page 19).



E.g. Enter the code 0320 to choose:

- T/C type J input with range 0...600°C.
- Single PID control algorithm, reverse action.
- Relay output.



E.g. Enter the code 2301 to choose:

- AL1 absolute, active high;
- AL2 absolute, active low;
- AL3 Used by Timer;
- Local + 2 Stored Setpoints with tracking function.

Input type and range				
TR Pt100 IEC751	-99.9300.0 °C	-99.9572.0 °F	0	0
TR Pt100 IEC751	-200600 °C	-3281112 °F	0	1
TC L Fe-Const DIN43710	0600 °C	321112 °F	0	2
TC J Fe-Cu45% Ni IEC584	0600 °C	321112 °F	0	3
TC T Cu-CuNi	-200400 °C	-328752 °F	0	4
TC K Chromel-Alumel IEC584	01200 °C	322192 °F	0	5
TC S Pt10%Rh-Pt IEC584	01600 °C	322912 °F	0	6
TC R Pt13%Rh-Pt IEC584	01600 °C	322912 °F	0	7
TC B Pt30%Rh Pt6%Rh IEC584	01800 °C	323272 °F	0	8
TC N Nicrosil-Nisil IEC584	01200 °C	322192 °F	0	9
TC E Ni10%Cr-CuNi IEC584	0600 °C	321112 °F	1	0
TC NI-NiMo18%	01100 °C	322012 °F	1	1
TC W3%Re-W25%Re	02000 °C	323632 °F	1	2
TC W5%Re-W26%Re	02000 °C	323632 °F	1	3
Dc input 050mV linear	Engineering and	d units	1	4
Dc input 1050mV linear	Engineering and	d units	1	5
Custom input and range [1]		1	6

[1] For instance, other thermocouples types, ΔT (with 2 PT 100), custom linearisation etc.

Control mode		M
ON-OFF reverse action		0
ON-OFF direct action		1
PID single reverse action		2
PID single direct action		3
	Linear cool output	4
PID double action	ON-OFF cool output	5
PID double action	Water cool output [2]	6
	Oil cool output [2]	7

Output configuration		
Single action	Double action	
Relay (OP1)	Heat OP1, Cool OP2	0
SSR drive (OP4)	Heat OP1, Cool OP4	1
Analogue (OP5)	Heat OP4, Cool OP2	2
	Heat OP1, Cool OP5	3
Valve drive (OP1 and OP2)	Heat OP5, Cool OP2	4
valve drive (OP1 and OP2)	Heat OP4, Cool OP5	5
	Heat OP5, Cool OP4	6

[2] In consideration of the thermal characteristics of the different cooling liquids, 2 different correcting methods of the control output are available. One for water and the other for oil:

OP water = $100 \cdot (OP2/100)^2$ OP oil = $100 \cdot (OP2/100)^{1.5}$

[3] Only possible whether "Output configuration" $\mathbb{N} = 0$ or 1 and HE.F.5. parameter is different to $\square FF$ (see page 31).

Alarm 1 type a	nd function	0
Disabled		0
Sensor break/Lo	oop break alarm (LBA)	1
active high		2
Absolute active low active high	3	
Doviation	active high	4
Deviation	active low	5
Band	active out	6
Dariu	active in	7
Heater break	active during ON output state	8
by CT [3]	active during OFF output state	9

Alarm 2 type ar	nd function	Р
Disabled		0
Sensor break/Lo	oop break alarm (LBA)	1
active high		2
Absolute Deviation	active low	3
Doviction	active high	4
Deviation	active low	5
Band	active out	6
Danu	active in	7
Heater break	active during ON output state	8
by CT [3]	active during OFF output state	9

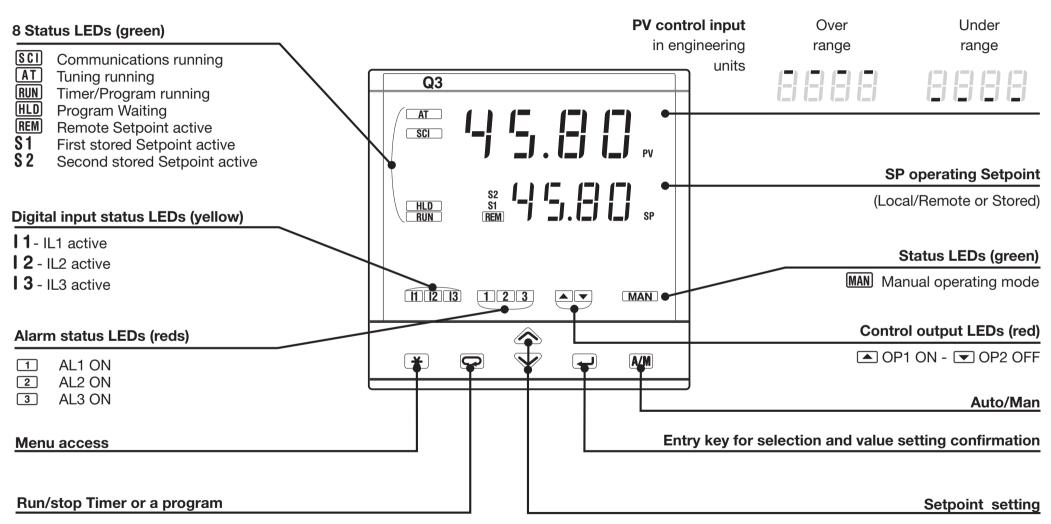
3 - Product coding

Alarm 3 type ar	nd function	Q
Disabled or used	d by Timer or related to the program	0
Sensor break/Lo	oop break alarm (LBA)	1
Absolute	active high	2
Absolute	active low	3
Deviation	active high	4
Deviation	active low	5
Band	active out	6
Danu	active in	7
Heater break	active during ON output state	8
by CT [3]	active during OFF output state	9

Setpoint type	R
Local only	0
Local and 2 tracking stored Setpoints	1
Local and 2 Stand-by stored Setpoints	2
Local and Remote (only if option is installed)	3
Local with trim (only with remote Setpoint)	4
Remote with trim (only if option is installed)	5
Time programmable (if option installed)	6

4 OPERATIONS

4.1.1 KEYS FUNCTIONS AND DISPLAY IN OPERATOR MODE



4 - Operations

4.1.2 KEYS FUNCTIONS AND DISPLAY IN PROGRAMMING MODE



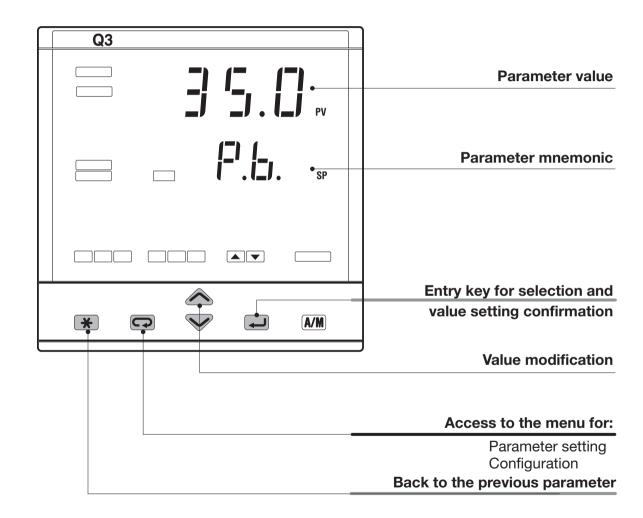
The parameter setting procedure has a timeout. If no keys are pressed for, at least, 30 seconds, the controller switches back, automatically, to the operator mode.

After having selected the parameter or the code, press and to display or modify the value (see page 25)

The value is entered when the next parameter is selected, by pressing the key.

Until the or are pressed or if you wait for 30 seconds the parameter value is not inserted

Pressing the key, the next group of parameters is presented on the display.



4.2 PARAMETER SETTING

4.2.1 NUMERIC ENTRY

(i.e. the modification of the Setpoint value from 275.0 to 240.0)

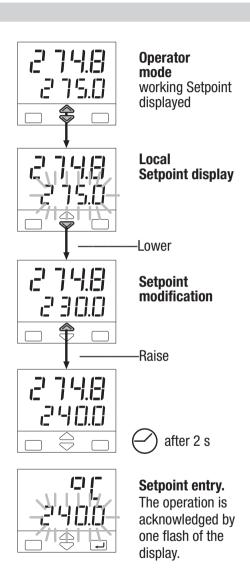
Press or momentarily to change the value of 1 unit every push

Continued pressing of or changes the value, at rate that doubles every second. Releasing the button the rate of change decreases.

In any case the change of the value stops when it has reached the max./min limit set for the parameter.

In case of Setpoint modification: press or once to display the local Setpoint instead of working Setpoint.

To evidence this change the display flashes once. Then the Setpoint can be modified



4.2.2 MNEMONIC CODES SETTING

(e.g. configuration see page 30)

Press the or to display the next or previous mnemonic for the selected parameter.

Continued pressing of or will display further mnemonics at a rate of one mnemonic every 0.5 s. The mnemonic displayed at the time the next parameter is selected, is the one stored in the

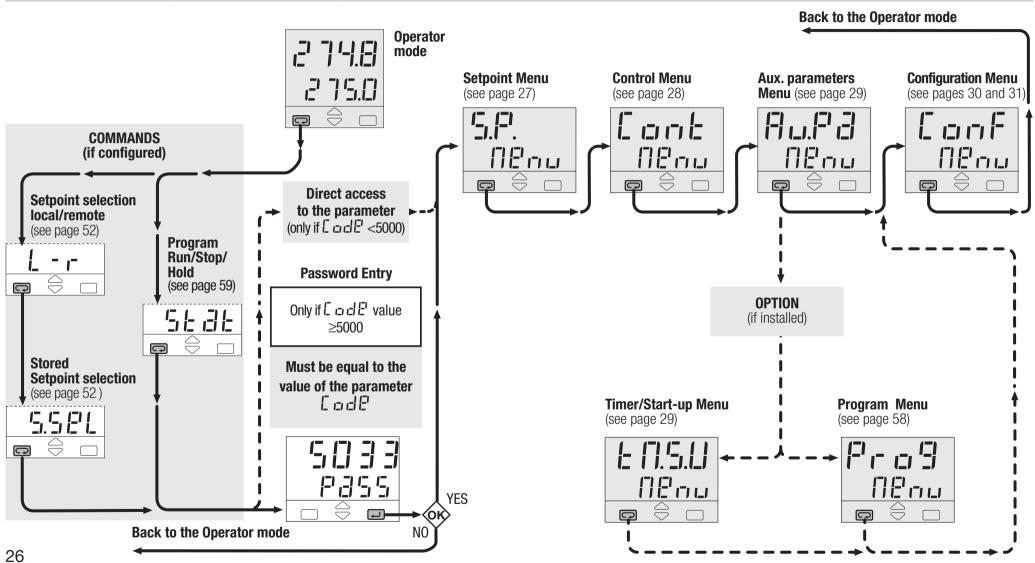
Engineering Units Degree Centigrade

Degree Fahrenheit

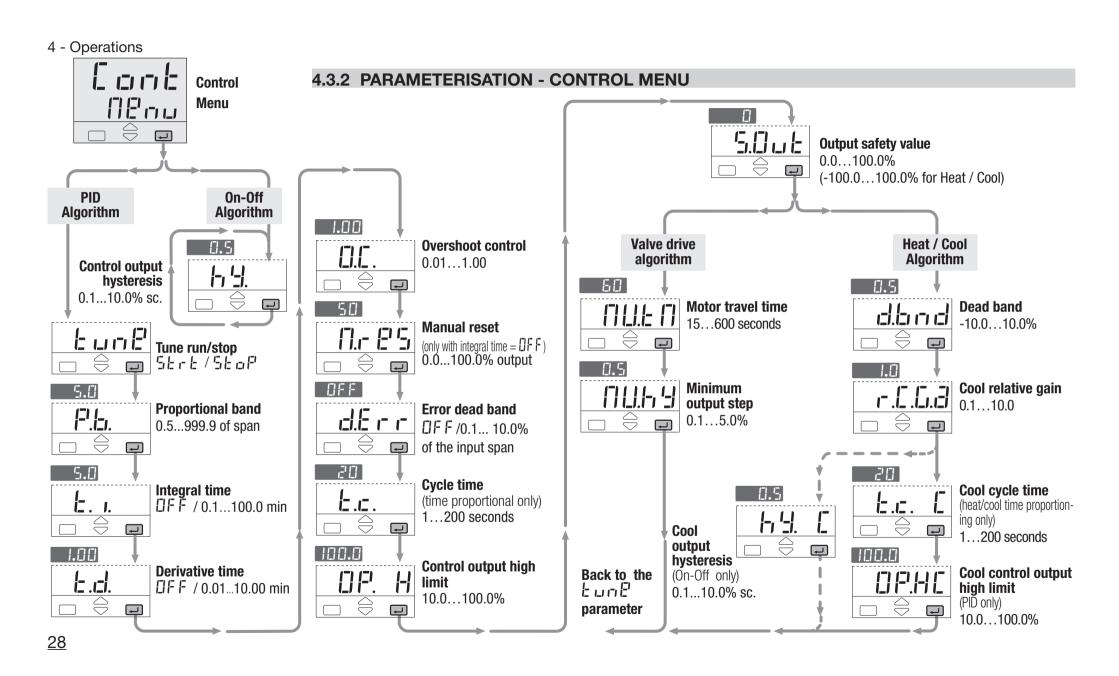
Degree Centigrade

4 - Operations

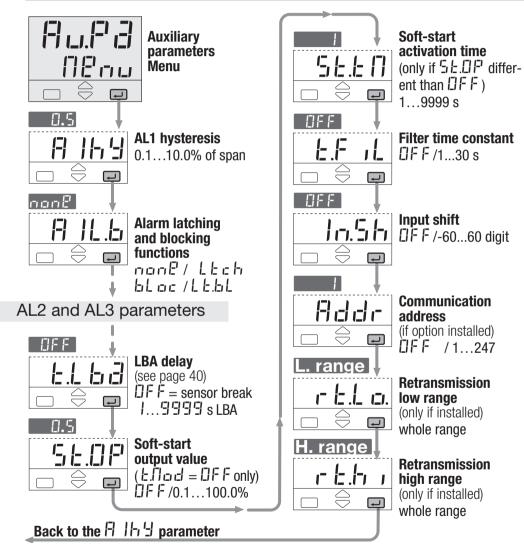
4.3 PARAMETERISATION - MAIN MENU



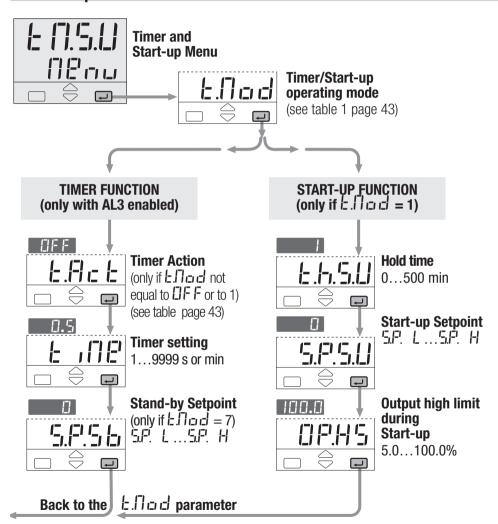
4.3.1 PARAMETERISATION - SETPOINT MENU Setpoint menu L.range **Setpoint low limit low** range...5.P. H Nenu Note [1] It is not presented if the controller H.range has been configured with alarm Setpoint high limit 5.F. L...High range n° 2 not active or of sensor break **AL1 alarm threshold** type. Digit O/P of the configura-A 15.P tion code is assigned to 0 or 1. (see page 32) 8258 AL2 alarm threshold LOCAL, PROGRAMM (see page 32) configuration index $\mathbf{R} = 0, 6$ LOCAL, + 2 STORED. **REMOTE, LOCAL/REMOTE WITH TRIM** 8358 **AL3 alarm threshold** configuration index $\mathbf{R} = 1, 2$ configuration index $\mathbf{R} = 3, 4, 5$ (see page 32) 1.00 OFF Ratio 1st stored ΙŒΙ **Setpoint ramp up** [JF F /0.1...999.9 **Setpoint Setpoint** 1_1 T) **→** digit/min OFF 1nd stored Remote 6 .35 Setpoint ramp down []FF/0.1...999.9 **Setpoint Setpoint bias** digit/min



4.3.3 PARAMETERISATION - AUXILIARY PARAMETERS MENU



4.3.4 PARAMETERISATION - TIMER AND START-UP MENU If options installed



4.3.5 CONFIGURATION MENU

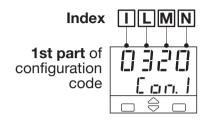
Enter the password before accessing to the configuration menu.

If a not configured controller is supplied, when powered up for the first time, the display shows:



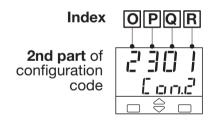
Until the configuration code is set correctly, the controller remains in stand-by with input and output deactivated.

A 4+4 index code follows the model of the controller. It has to be set to configure the controller. (see chapter 3.1 page 19)



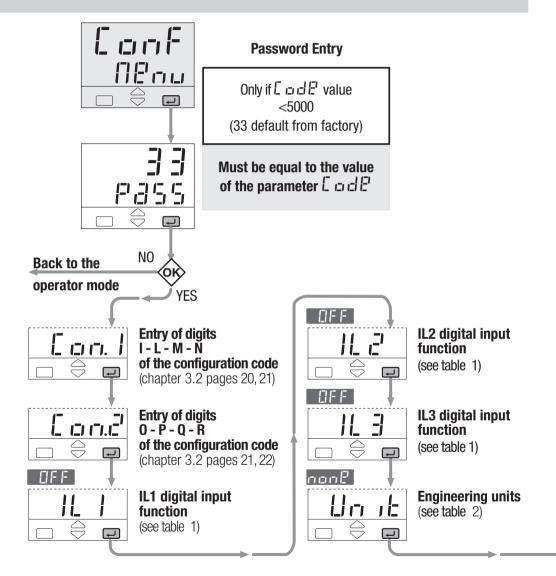
E.g. Enter the code $\square \exists \exists \square \square$ to choose:

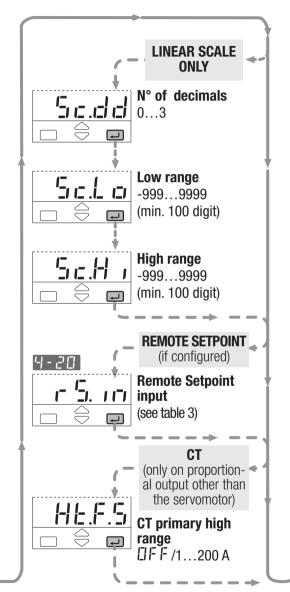
- T/C type J input with range 0...600°C;
- Single PID control algorithm, reverse action;
- Relay output.



E.g. Enter the code 2301 to choose:

- AL1 absolute, active high;
- AL2 absolute, active low;
- AL3 Used by Timer;
- Local + 2 Stored Setpoints with Tracking function.





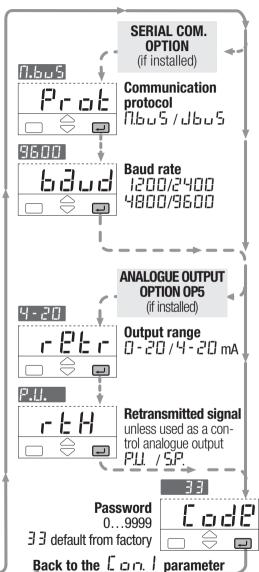


Table 1 - Digital input functions

IL I IL 2 IL 3			
Value	Description	Value	Description
non8	Not used	5.P. T	1st stored Setpoint
EE3.1	Keyboard lock	5.P. <i>2</i>	2st stored Setpoint
H.P.L	Measure Hold	56 - E	Run Timer
8.03 a	Auto/Man	r H.	Run/stop of a program
L - r	Local/Remote		

Table 2 - Engineering units

սո ւե					
Value	Description	Value	Description		
	degree centigrade	A	Ampere		
90	degree Fahrenheit	68-	Bar		
non8	none	P5	PSI		
nU	mV	r h	Rh		
Ш	Volt	Ph	рН		
n 8	mA				

Table 3 - Remote Setpoint input type

r 5. in					
Value	Description	Value	Description		
0 - 5	05 Volt	0 - 20	020 mA		
1-5	15 Volt	4-20	420 mA		
0-10	010 Volt				

4.4 PARAMETERS

For a simpler use of the controller, its parameters have been organised in groups (menu), according to their functionality area.

4.4.1 SETPOINT MENU

The OP1, OP2 or OP3 outputs, can be used for alarms if they are not used as control outputs

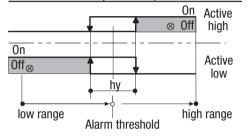
It is possible to configure up to 4 alarms: AL1, AL2, AL3, AL4 (see pages 21 and 22), selecting, for each of them:

- **A** the type and the operating condition of the alarm;
- B the functionality of the alarm acknowledgement (latching)

 Lerin (see page 39);
- **C** The blocking function is activated on start up (see p. 39);
- **D** Loop break or sensor break (see page 40).

A ALARM TYPE AND OPERATION CONDITIONS

Absolute alarm (full scale)

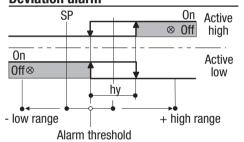


AL1 alarm threshold AL2 alarm threshold



AL3 alarm threshold

Deviation alarm

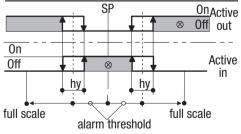


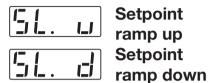
Alarm occurrences of OP1,OP2 and OP3 outputs, respectively linked to AL1, AL2 and AL3.

The range of the alarm threshold correspond to the whole span and it is not limited by the SP Setpoint span.

When the event occures, the display will shows the red leds 1, 2 or 3, respectively on.

Band alarm





This parameter specifies the maximum rate of change of the Setpoint in digit/min.

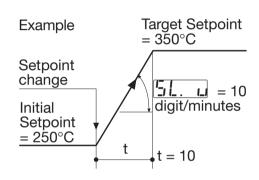
When the parameter is $\Box \vdash \vdash$, this function is disabled and the new Setpoint is reached immediately after being entered.

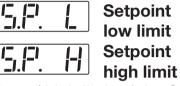
Otherwise, the Setpoint value is reached according to the configured rate of change.

The new Setpoint value is called "Target Setpoint". It can be displayed by means the parameter

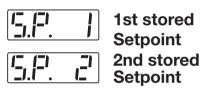
(see procedure at page 49).

When Remote Setpoint is configured, we suggest to disable 5L. and 5L. a parameters OFF.





Low / high limit of the Setpoint value.



Values of the two Setpoints, that are activated by mean of digital inputs, communication parameters, and keypad. The Setpoint active is indicated by the \$1 or \$2 green led.

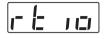
If index R = 1 (tracking), the previous Local Setpoint value will be lost, when the stored Setpoint is selected.

If index R = 2 (Stand-by), the Local Setpoint value will not be lost, when the Stand-by Setpoint is selected. It will operate again when back to Local.

See stored Setpoint selection procedure at page 52.

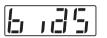
4 - Operations

4.4.1 SETPOINT MENU



Remote Setpoint Ratio

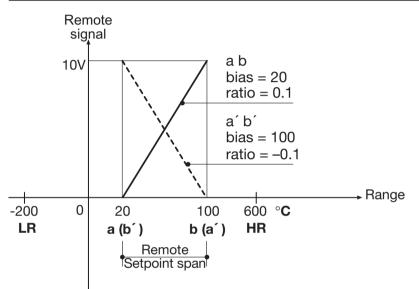
Ratio is the coeff. which defines the remote Setpoint span with respect to the input span.



Remote Setpoint

Bias defines the starting point of analogue Remote Setpoint in eng. units corresponding to the low limit (current or voltage) of the remote signal.

Remote Setpoint Bias and Ratio



PV = process variable

LR = PV low limit

HR = PV high limit

SR = Remote Setpoint

a (a') = SR starting point

b (b') = SR ending point

If SR starting point is **lower** then the ending point, both expressed in engineering units:

 $5 \cdot 35 = \text{starting point} = a$

$$r = \frac{b-a}{HR-LR}$$

Example:

$$\frac{100 - 20}{600 - (-200)} = \frac{80}{800} = 0.7$$

If SR starting point is **higher** then the ending point, both expressed in engineering units

$$\frac{1}{2}$$
 $\frac{1}{2}$ = starting point = a'

$$r \not = \frac{b' - a'}{HR - LR}$$

Example:

$$\frac{20 - 100}{600 - (-200)} = \frac{-80}{800} = -0.$$

Working Setpoint (SP) as combination of Local Setpoint (SL) and remote signal

Setpoint type
$$r P \Pi L$$

(configuration index $\mathbf{R} = 5$)
SP = REM + ($r L \square \bullet SL$)
+ $L \square \bullet SL$

$$REM = \frac{SIGN * SPAN}{100}$$

Examples:

Local Setpoint (SL) with an external Trim with multiplying coeff. of 1/10:

Remote Setpoint (SR) with an internal Trim with multiplying coeff. of 1/5: Setpoint type = r En.E

Remote Setpoint range equal to the Input range: Setpoint type = L ac.b

4.4.2 CONTROL MENU

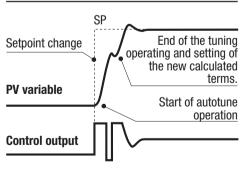


4.4.2.1 AUTOMATIC TUNE

The Fuzzy-Tuning determines automatically the best PID term with respect to the process behaviour.

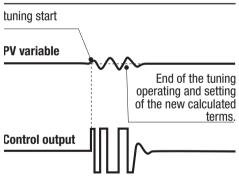
The controller provides 2 types of "one shot" tuning algorithm, that are selected automatically according to the process condition when the operation is started.

STEP response



This type is selected when, at the start of the autotune operation, the PV is far from the Setpoint of more than 5% of the span. This method has the big advantage of fast calculation, with a reasonable accuracy in the term calculation.

Natural frequency



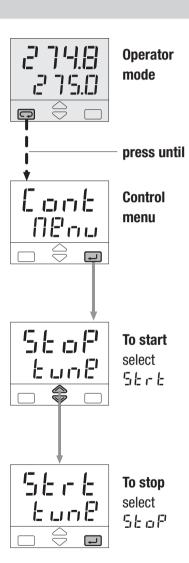
This type is selected when the PV is close to the SP Setpoint.

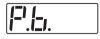
This method has the advantage of a better accuracy in the term calculation with a reasonable speed calculation. The Fuzzy Tuning determines automatically the best method to use to calculate the PID term, according the process conditions.

FUZZY-TUNING START/STOP PROCEDURE

Start/stop of the Fuzzy Tuning The Tuning operation can be started or stopped any time.

The green led AT is ON when the Fuzzy Tuning is in progress. At the end of this operation, the calculated PID terms parameter are stored and used by the control algorithm and the controller goes back to the operator mode. The green led AT becomes off.





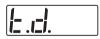
Proportional band

This parameter specifies the proportional band coefficient that multiplies the error (SP - PV).



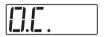
Integral time

It is the integral time value, that specifies the time required by the integral term to generate an output equivalent to the proportional term. When DFF the integral term is not included in the control algorithm.



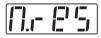
Derivative time

It is the time required by the proportional term P to repeat the output provided by the derivative term D. When $\Box F F$ the derivative term is not included in the control algorithm.



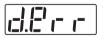
Overshoot control

This parameter specifies the span of action of the overshoot control. Setting lower values ($1.00 \rightarrow 0.01$) the overshoot generated by a Setpoint change is reduced. The overshoot control doesn't affect the effectiveness of the PID algorithm. Setting 1, the overshoot control is disabled.



Manual Reset

This specifies the control output value when PV = SP, in a PD only algorithm (lack of the integral term).



Error Dead Band

Inside this band for

(PV - SP), the control output does not change to protect the actuator (output Stand-by).



Control output cycle time



Cool cycle time

It's the cycle time of the time proportioning control output. The PID control output is provided by the pulse width modulation of the waveform.



Control output high limit



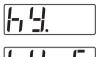
Cool output high limit

It specifies the maximum value the control output can be set. It is applied in manual mode, too.

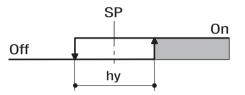


Output Safety Value

Output Value in case of input anomaly.



Control output hysteresis Cool output hysteresis



Control or alarm output hysteresis span, set in % of the full scale.



Travel time

It provides the time required to the motor positioner to go from the 0% position to 100%.



Minimum step

It specifies the minimum allowed time of activation of the output to a motor positioner that produces a sensible effect. It is related to the deadband of the positioner.

4 - Operations

4.4.2 CONTROL MENU

4.4.2.2 HEAT / COOL CONTROL

By a sole PID control algorithm, the controller handles two different outputs, one of these performs the Heat action, the other one the Cool action.

It is possible to overlap the outputs.

The dead band parameter dend, is the zone where it is possible to separate or overlap the Heat and Cool actions.

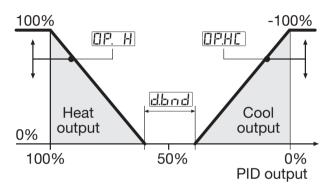
The Cool action can be adjusted using the relative cool gain parameter r.[.[.]]

To limit the Heat and Cool outputs the parameters $\square F$. H and $\square F$.H \square can be used.

When there is an overlap, the displayed output DUE shows the algebric sum of the Heat and Cool outputs.

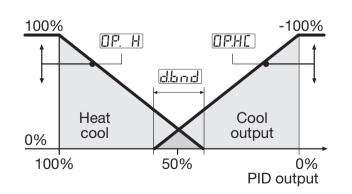
A Heat /Cool actions separated

Insert positive [1] value (0...10%)



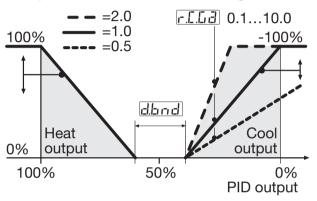
B Heat /Cool actions overlapped

Insert negative | value (-10...0%)

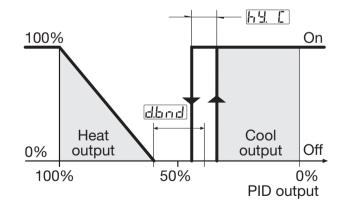


C Cool action adjusting

Example with different relative cool gains



D On-Off Cool action



4.4.3 AUXILIARY PARAMETERS MENU

AL1 alarm hysteresis AL2 alarm hysteresis



AL3 alarm hysteresis

Hysteresis of the threshold of both the alarms, that activate OP1 and OP2 control output. It is specified as a % of the full scale.



AL1, AL2, AL3 latching and blocking functions

For each alarm it is possible to select the following functions:

none;

LEch latching;

blac blocking

L E.E.L both latching and blocking.

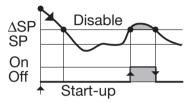
LEES ALARM ACKNOWLEDGE FUNCTION

The alarm, once occurred, is presented on the display until to the time of acknowledge. The acknowledge operation consists in pressing any key.

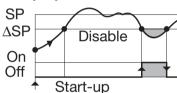
After this operation, the alarm leaves the alarm state only when the alarm condition is no longer present.

START-UP DISABLING

Ramp down



Ramp up



 Δ SP Threshold = SP \pm range

4.4.2 CONTROL MENU

ALARMS WITH LBA (LOOP BREAK ALARM) AND SENSOR BREAK OPERATION

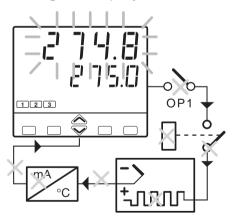
Select the code 1 on **O**, **P** or **Q** configuration indexes (see pages 21 or 22). The following parameter is then available:



LBA delay

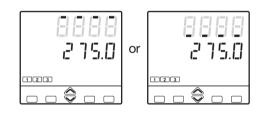
Setting a value between 1 and 9999 s the alarm works as LBA+Sensor break with delay [1].

This condition is shown by means a red led as well as the blinking PV display.



Setting OFF the alarm works as Sensor break with immediate action.

This condition is shown by means the red led of the selected alarm as well as:



Note [1] In case of sensor break, condition, the alarm action is immediate.

56.08

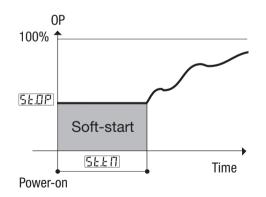
Soft-start control output value

Value of the control output during the Soft-start activation time.

56.67

Soft-start activation time

Time duration (starting from the power on) of the Soft-start function.



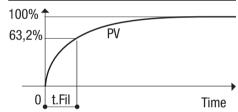
E.F ,L

Input filter time constant

Time constant, in seconds, of the RC input filter applied to the PV input.

When this parameter is set to **DFF** the filter is bypassed.

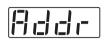
Filter response



Input shift

This value is added to the measured PV input value. Its effect is to shift the whole PV scale of up to \pm 60 digits.

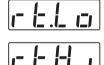
When the cause of the alarm disappears, the alarm status stops.



Controller address

the address range is from 1 to 247 and must be unique for each controller on the communication bus to the supervisor.

When set to *IFF* the controller is not communicating.



Retransmission low range Retransmission high range

4.4.4 TIMER AND START-UP MENU (OPTION)

To improve the instrument performances and to reduce the wiring and installation costs, two special functions are available:

4.4.4.1 Start-up 4.4.4.2 Timer

In order to have the above functions the product code digit **E** must be **2** (see page 19).

For example: Q3 3100-2000 To select these functions use the parameter: (see page 43).



Timer/Start-up operator mode

Selecting Timer or Startup, the Soft-start function is disabled, therefore the parameters 5 ± .0 P and 5 ± .1 Will not be shown (see page 29).

4.4.4.1 START-UP FUNCTION (OPTION)

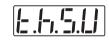
By means of this function it is possible to manipulate the control output when the controller is switched on.



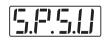
To configure Startup function the parameter

"Timer/Start-up operating mode" must be set to _____/(see page 43).

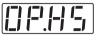
Three parameters are associated to the Start-up function.



Start-up hold time 0...500 min



Start-up Setpoint (5.F. L...5.F. H)



Control output high limit 5.0%...100.0%

The Start-up function includes three phases:

1st "L 154" - The control output is limited to the [[P.H.5]]

2nd "Hald" - The process variable is maintained to the Start-up Setpoint for the time fixed by the parameter [£.h.5.L]

3rd "DFF" - When the L.h.5.L time is elapsed the process variable is maintained to the working Setpoint.

Whether the process variable, for any reason (e.g. load change), decreases at a value lower than (5.7.51) - 40 digits), the Start-up function starts again from the "L my" phase.

4.4.4.1 START-UP FUNCTION (OPTION)

When the Start-up is in Hold phase, if the local Setpoint becomes lower than the Start-up Setpoint or if the operating mode changes to manual, the Start-up function passes to the "UFF" phase.

There are two possibilities:

A Start-up Setpoint 57.51 lower than the local Setpoint.

The "Hald" phase starts when the process variable PV achieves the 57.51 (with a tolerance of 1 digit).

B Start-up Setpoint 57.50 greater than or equal to the local Setpoint.

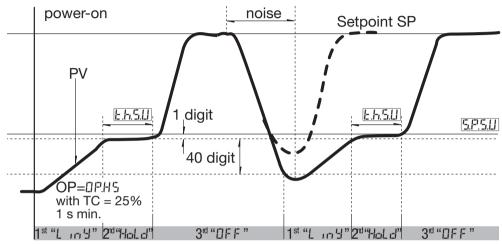
When the process variable PV achieves the local Setpoint (with a tolerance of 1 digit), the Start-up function passes directly to the "DFF" phase.

If, at the controller power-on, the process variable PV is greater than the lowest between the [5.F.5.L] and the working Setpoint, the next phase ("Hald" or "DFF") will be executed instead of the "Land" phase.

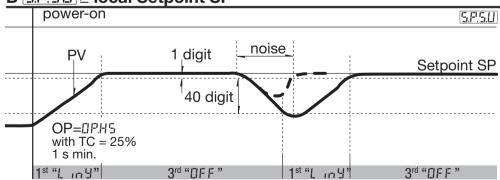


During the "L m 4" and "Hald" phases the RUN led is on.

A 5.F.5... < local Setpoint SP



B 5.P.5 U ≥ local Setpoint SP

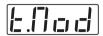


4.4.4.2 TIMER FUNCTION (OPTION)

The Timer can't be enabled with Heat / Cool control.

To enable this function do the following:

- 1 In order to use this AL3 function, index **Q** must be set to **D** in configuration (see page 22).
- 2 To select one of the 6 possible functioning modes of the Timer, set the value of the 2 following parameters in parameterisation (see p. 29).



Timer/Start-up operating mode

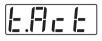
By this parameter can be defined (see table 1):

- the counting start time;
- the control output status at the end of the counting.

table 1

Timer/Start-up	Value			
Disabled	OFF			
Start-up funct	ion	1		
Counting	Fnd mode			
start time	Liid mode			
When inside the	When inside the Control mode			
band	3			
When launched	Control mode	1-}		
	Output to 0	5		
When launched. Control disabled	Control mode	6		
When launched stand-by Setpoint	Control mode	7		

Now the other parameter values can be entered:



Timer Action

By this parameter can be defined (see table 2):

- the time units;
- the starting mode;
- the OP3 status when the timer is running.

When the timer is not running, the OP3 takes the opposite status.

table 2

Time units	Starting mode	[1] OP3 status	Value
	Manual by	Off	
Seconds	keypad	On	-
	Auto at the	Off	1
	power on [2]	On	3
Minutes	Manual by	Off	1-1
	keypad	On	5
	Auto at the	Off	5
	power on [2]	On	7

- [1] If used by Timer;
- [2] Using this selection, manual starting mode is possible too.



Timer setting

(1...9999 s/min)

5.8.5

Stand-by Setpoint

(only for £.17 a a = 7) (5.5. L...5.5. H)

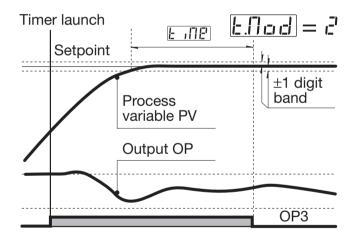
4 - Operations

4.4.4.2 TIMER FUNCTION (OPTION)

TIMER COUNTING MODES

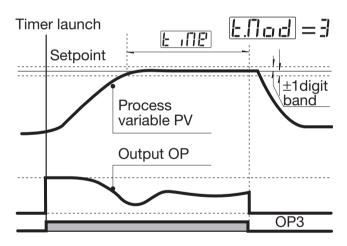
A - Counting start time inside the band, end in control mode.

The time counting starts only when the error is inside $a \pm 1$ digit band. The control action is not affected by the Timer function.



B - Counting start time inside the band, end with control output forced to zero.

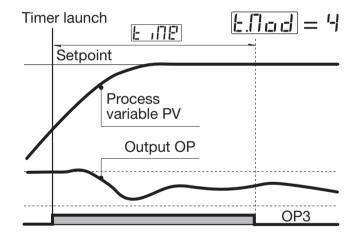
The time counting starts only when the error is inside $a \pm 1$ digit band. At the end, the control output is forced to zero. [1]



[1] When the Timer is not running the control output is forced to zero, also before the Timer launch,

C - Counting start time = timer launch time, end in control mode.

The time counting starts when the timer is launched. The control action is not affected by the Timer function.



TIMER COUNTING MODES

D - Counting start time = timer launch time, end with control output forced to zero.

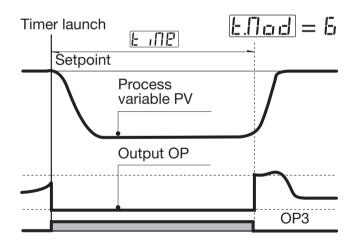
The time counting starts when the timer is launched. At the end, the control output is forced to zero [1].

Setpoint Process variable PV Output OP OP3

[1] When the Timer is not running the control output is forced to zero, also before the Timer launch.

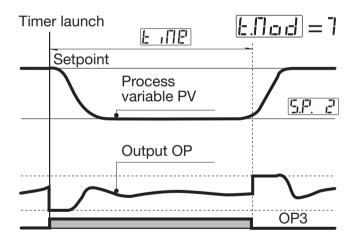
E - No control action during the counting time.

The time counting starts when the timer is launched and the control output is forced to zero. At the end, the control action starts.



F - Control action with stand-by Setpoint during the counting time

The time counting starts when the timer is launched and the control action use the Stand-by Setpoint. At the end, the control action use the working Setpoint.



4.4.4.2 TIMER FUNCTION (OPTION)

POWER FAILURE

If there is a power failure during the Timer execution, the value of the elapsed time is lost.

Depending on Timer action L.L.L selection, when the controller restarts you can have two different situations:

- with automatic mode (\(\begin{aligned} \be
- with manual mode

 (L.J.L) = [], I,4,5), the control output is forced to []

 [] if [[] =] e 5; otherwise the control action restarts using the working Setpoint.

TIMER STARTING

See the Timer starting procedure at page 50 (chapter 6.2.2).

DISPLAY



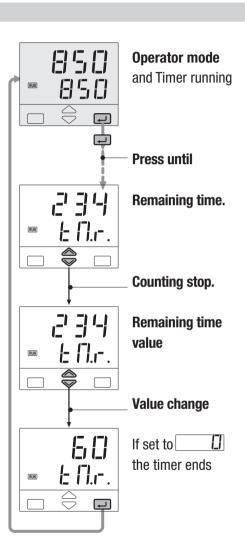
When the Timer is running, the led RUN is on.



When the Timer ends, the Setpoint display shows alternatively the message End and the Setpoint value until a key is pressed.

TIMER REMAINING TIME

When the timer is running it is always possible to see the remaining time and to modify it.

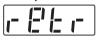


4.4.5 CONFIGURATION MENU

RETRANSMISSION

When OP5 output is present and not configured as control output, it retransmits linearised PV or SP.

On configuration (see page 31) it is possible to set



Analogue range



Retransmitted signal

none P.U. / S.P.

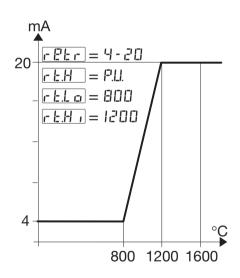
The following parameters define the low and high range of the OP5 retransmission output corresponding to 0...4mA or 20mA (see page 29):



Retransmission low range Retransmission high range

Example:

- T/C S, range 0...1600°C;
- Output range, 4...20 mA;
- Retransmitted signal PV on 800...1200°C range.



With related greater than related it is possible to obtain a reverse scale.

CURRENT TRANSFORMER INPUT

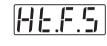
With CT option, it is possible to display the load current and set an alarm threshold.

The setting can be done by means the 8 or 9 configuration index of the codes O, P or Q (see pages 21 and 22).

It is possible to set one of the alarms (see pages 21 and 22) to have an alarm when, during the ON time of the time proportional output, the load current is less then the specified threshold (index 8), or during the OFF time there is a value > 3% of full scale load current.

The alarm condition must be longer than 120 ms to set the alarm.

By the parameter:



CT primary high range OFF / 1...200A

the load current display can be adapted to the transformer characteristics (OFF means disabled).

During the OFF time the parameter Lur latches the last on time current value.

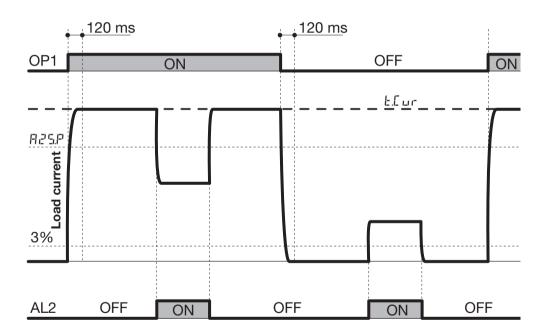
4 - Operations

4.4.5 CONFIGURATION MENU

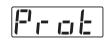
CURRENT TRANSFORMER INPUT

Example:

CT input on OP1, alarm on AL2 during on time (configuration digit $|\mathbf{P}| = 8$, see page 21)



SERIAL COMMUNICATIONS



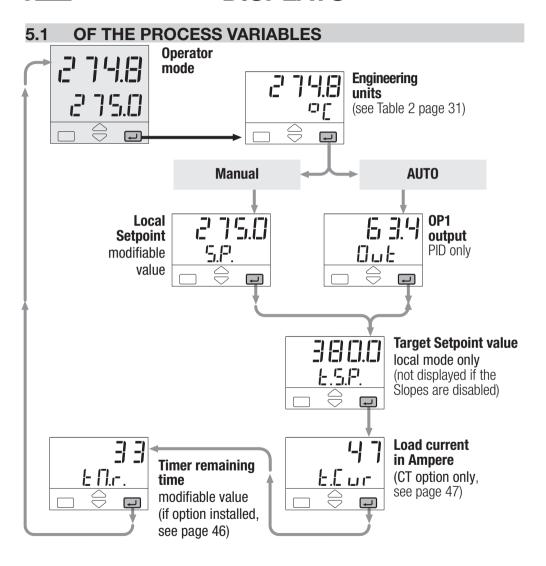
Communication protocol



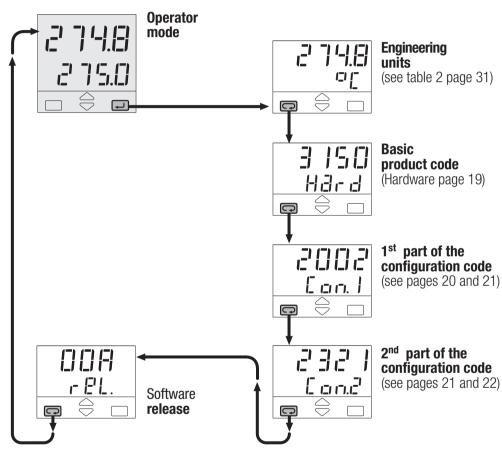
Baud rate 1200/2400 4800/9600

5

DISPLAYS



5.2 OF THE CONFIGURATION CODES

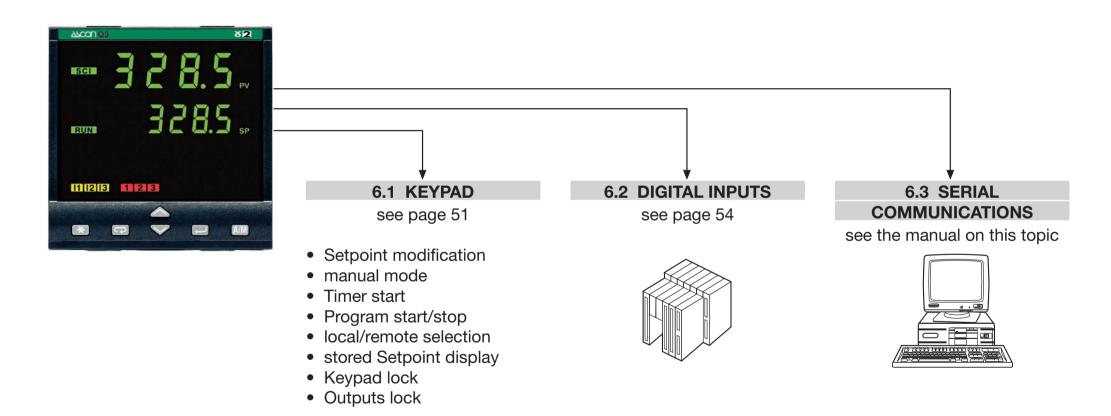


6 - Commands

6 COMMANDS

COMMANDS TO THE CONTROLLER AND OPERATING PHASES

The commands can be entered in 3 ways:

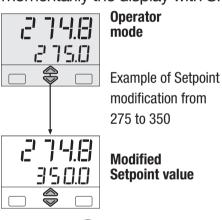


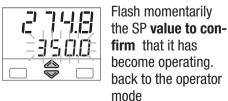
6.1 KEYPAD COMMANDS

6.1.1 SETPOINT MODIFICATION

The Setpoint is directly modified with the keys.

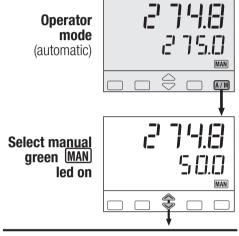
Once entered, the new value is checked and becomes operating after 2 seconds.. The end of this phase is flagged by flashing momentarily the display with SP.





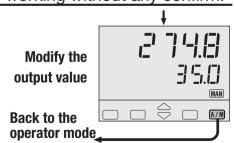
after 2 seconds

6.1.2 AUTO/MANUAL MODE



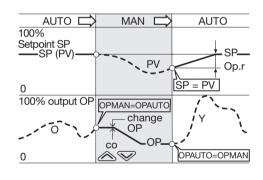
Modification of control output value

The new value is immediately working without any confirm.



For Setpoint access and modification from Manual status, see the procedure on chapter 5 (see page 49).

The bumpless action is present switching between AUTO, MAN and vice versa.



Ŵ

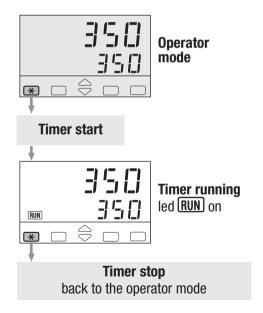
In case of power failure, the AUTO/MAN status and the output value remain stored in the controller memory.

6.1.3 TIMER STARTING (option)

Depending on the Timer action [£.3 c]: selection, there can be two different starting ways:

- Automatic at the power on
- Manual by keypad, digital inputs or serial communications.

To start/stop the Timer:



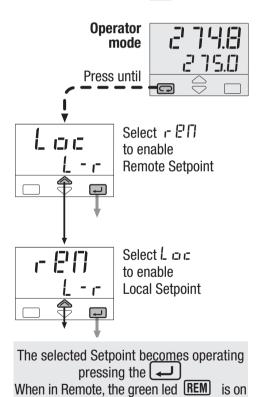
6.1 **KEYPAD COMMANDS**

6.1.4 PROGRAM STARTING

(see chapter 7, page 55)

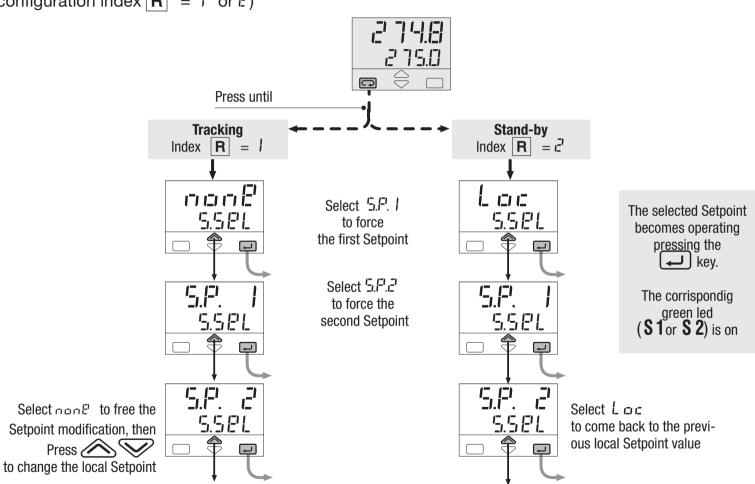
6.1.5 LOC/ REM SELECTION

configuration index $\mathbf{R} = 4$ or 5)



6.1.6 STORED SETPOINTS SELECTION

(configuration index $|\mathbf{R}| = 1$ or \mathcal{E}^{1})



6.1.7 KEYPAD LOCK

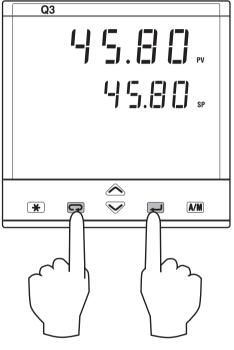
To lock/unlock the keypad press the keys and simultaneously for 2 seconds.

To confirm the keypad lock/unlock the display flashes once.

The keypad lock/unlock can be achieved by serial communications too.

The keypad lock is maintained in case of power failure.

operator mode



Press simultaneously for 2 seconds

6.1.8 OUTPUTS LOCK

The outputs are switched to the OFF status by pressing the keys and together.

When the outputs are locked, the message IFF is displayed instead of the Setpoint value.

To unlock the outputs press again the keys simultaneously (the Soft-start will be enabled).

The outputs lock/unlock can be achieved by serial communications too

The outputs lock/unlock is maintained in case of power failure.

operator mode



Press simultaneously for 2 seconds

6 - Commands

6.2 DIGITAL INPUT COMMANDS

A function is assigned, through the configuration procedure to each IL1, IL2 and IL3 digital input. (see the parameters setting at tab. 1 at page 31).

The configured function is activated when the digital input (free voltage contact or open collector output) is in the On state (closed). It is deactivated by setting the input to the Off state (open).

The activation of the function through the digital input has the highest priority than through the keypad or through the serial communication.

Func	tion	Parameter value	Performed operation Off On		Notes
None	;	OF F			Not used
Keypad lock		EE 5. 1	Unlock	Locked	With the keypad locked the commands from digital inputs and serial communications are still operating
PV meas	sure hold	HFU	Normal operation	PV is hold	The value of PV is "frozen" at the time the digital input goes to the close state
Set n	nanual mode	8.0 a	Automatic	Manual	
dard	1st stored Setpoint	5 <i>P.</i> }	Local	1st SP	The permanent closure forces the chosen stored value. Setpoint modification is not possible.
Setpoint 2nd stored Setpoint Setpoint	58.2	Local	2nd SP	The impulsive closure, selects the stored value. Setpoint modification is allowed. If more than one digital input is selecting a Setpoint, the last to be activated is the operating one.	
Set F	Remote e	[Local	Remote	
Time	r	6.5 115	_	Timer start	The impulsive closure is enough to start the Timer
Programmed Setpoint	Start/stop of a program	[-]	Hold	Run	When the input is in the On state, the program is executed up to the end. When off, the program is forced in hold.

PROGRAMMED SETPOINT

INTRODUCTION

The controller supplied with the Setpoint programmer option (mod. Q3-3... 1) offers the functionality to define, store, display and execute a program consisting in the Setpoint profile in time.

MAIN CHARACTERISTICS

- 1 program, 8 segments/program
- start, stop, hold etc, commands from the keypad
- time base in seconds, minutes or hours
- continuous or up to 1...9999 time cycling of the program
- 1 OP3 digital output with the state profile defined by the program
- setting of the maximum allowed deviation from the Setpoint

7.1 PROGRAM STRUCTURE

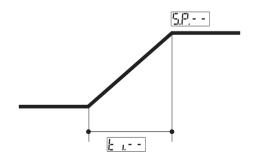
The program consists of a sequence of segments.

For each segment, it is specified:

- the Setpoint to reach
- the duration of the segment alvays
- the state of the OP3 output

The program consists of:

- 1 initial segment named []
- 1 end segment named F
- 1...6 normal segments



Initial segment - []

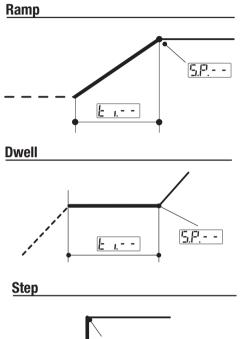
Its main purpose is to define the value the process variable has to maintain before starting the program.

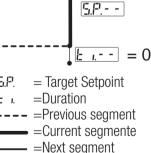
End segment - F

Its main purpose is to define the value the process variable has to maintain at the end of the program and until further changes of Setpoint.

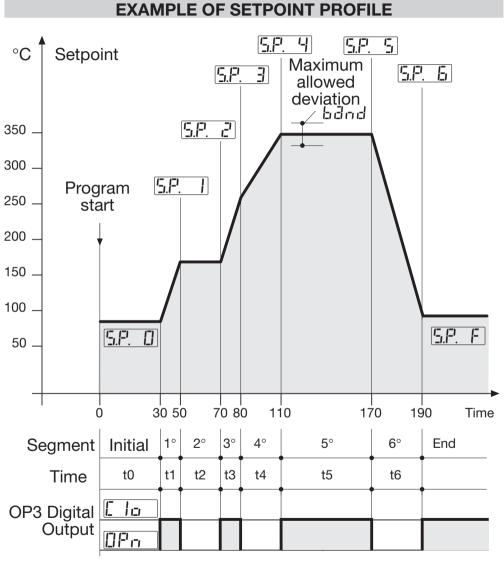
Normal segments - - - -

These segments build up the profile program. There are 3 types of segments:





7 - Programmed Setpoint



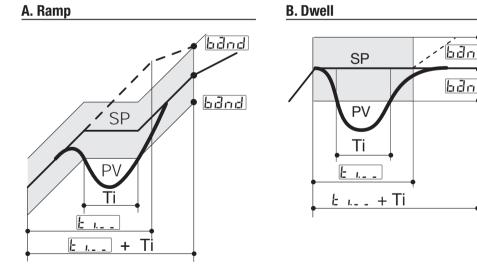
SETPOINT PROGRAMMER OPERATION

7.2.1 MAXIMUM ALLOWED DEVIATION (band)

If the PV controlled input value exceeds the band, centred around the SP, the segment time is extended of the same time the PV input stays out of the band. The band width is defined in a parameter of the program segment.

band

The actual segment period is calculated as £ 1--+Ti



56

7.2 SETPOINT PROGRAMMER OPERATION

7.2.2 RE-START OF A PROGRAM AFTER A POWER FAILURE

The parameter Fall . specifies the behaviour of the programmer at power up (see page 58). Selected between the following 3 choices:

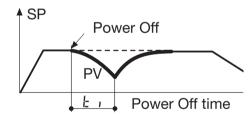
[cirit Continue

r E'E Reset

r 307 Ramp

If Line is selected, the execution of the program starts from the point reached at the power failure time.

All the parameters, like Setpoint and the remaining time are restored at the values they had at power off.

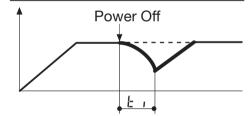


If F E is selected, at power on the program ends and goes back to local mode.

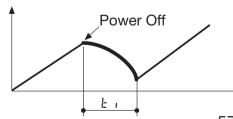
If respected, the execution of the program starts from the point reached at the power failure time.

In this case, the programs continue with PV reaching SV with a ramp, whose slope corresponds to the one of the segment running at the power off.



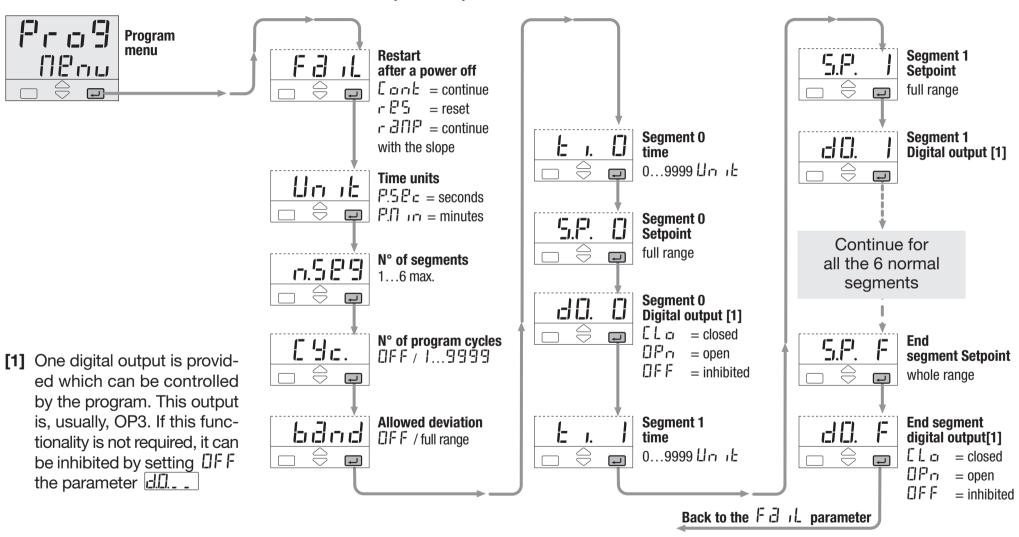


Power off during a ramp



7 - Programmed Setpoint

7.3 PARAMETERISATION - PROGRAM MENU (OPTION)



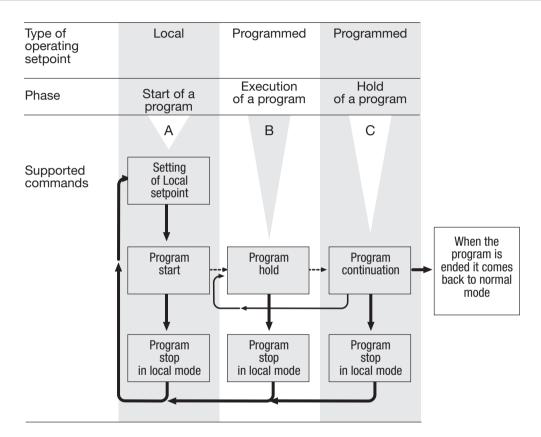
7.4 START/STOP OF A PROGRAM

The various commands, supported by the controller, are different for each of the following operating phases:

A] when in Local Setpoint mode B] during the execution of a program

C] when the program is in hold

Commands supported by the controllers

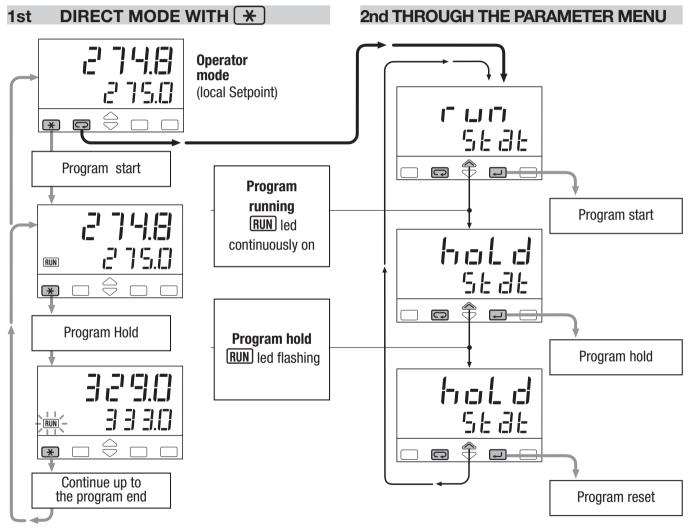


The different phase are displayed in a chained way, just for easing the understanding of the functionality.

Two different mode for starting and stopping a program are provided:

direct mode with the *\ key through the parameter menu

7 - Programmed Setpoint



The RUN green led is flashed at high rate when the controlled variable is out of the allowed deviation band

The current time of a segment is hold up to the time the variable re-enter in

the band.

TECHNICAL SPECIFICATIONS

Features (at 25°C environmental temp.)	Description						
Total configurability (see chapter 3.2 page 20 chapter 4.3.5 page 30)	- the type of input	nm -	the type and functionality of the alarms the type of Setpoint control parameter values				
PV Input (see pages 11,12 and page 20)	Common characteristics	A/D converter with resolution of 50,000 points Update measurement time: 0.2 seconds Sampling time: 0.5 seconds Input bias: - 60+ 60 digit Input filter with enable/disable: 130 seconds					
	Accuracy	$0.25\% \pm 1$ digits for temperature $0.1\% \pm 1$ digits (for mV and mA)	sensors	Between 100240V~ the error is minimal			
	Resistance thermometer (for ΔT : R1+R2 must be <320 Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wires connection Burnout (with any combination)	Max. wire Res: 20Ω max. (3 wires) Sensitivity: 0.35° C/ 10° T. _{env.} $< 0.35^{\circ}$ C / 10Ω Wire Resistance			
	Thermocouple	L,J,T,K,S, R, B, N, E, W3, W5 (IEC 584) Rj >10M Ω °C/°F selectable	Internal cold junction compensation con NTC Error 1°C/20°C ±0.5°C Burnout	Line: 150Ω max. Input drift: $<2\mu\text{V}/^{\circ}\text{C}$ T. _{env.} $<5\mu\text{V}$ / 10Ω Wire Resistance			
	DC input (current)	$\begin{array}{lll} 420\text{mA}, 0\text{-}20\text{mA} & \text{Burnout. Engineering units} \\ \text{with external shunt } 2.5\Omega & \text{Conf. decimal point position} \\ \text{Rj} > 10\text{M}\Omega & \text{Init. Scale -999}9,999 \end{array}$		Input drift: <0.1% / 20°C T. _{env.}			
	DC input (voltage)	1050mV, $0-50$ mV Rj >10 M Ω	Full Scale -9999,999 (min. range of 100 digits)	$<$ 5μV / 10 Ω Wire Resistance			

8 - Technical specification

Features (at 25°C environmental temp.)	Description								
Auxiliary inputs	Remote Setpoint (option) Not isolated accuracy 0.1%		Current $0/420$ mA Rj = 30Ω	Bias in engineering units and ± range Ratio from -9.99+99.99 Local + Remote Setpoint					
			Voltage 1-5/ 0-5/ 0-10V Rj = 300KΩ						
	CT current transformer (see pages13 and 47)		50 or 100 mA input hardware selectable	Current visualisation 10 200A With 1A resolution and Heater Break Alarm					
Digital inputs 3 logic	tact produces ar	The closure of the external conact produces any of the follow-		Auto/Man mode change, Local/Remote Setpoint mode change, Stored Setpoints activation, keypad lock, measure hold					
o logio	ing actions:		Timer activation, program run/hold (if options installed)						
		Single action	Control output		AL1 alarm	AL2 alarm	AL1 alarm	Retransmiss.	
			OP1 -Relay/Triac			OP2 -Relay/Triac	OP3 -Relay	OP5 -Analogue	
			OP4 -SSR drive-Relay		OP1 -Relay/Triac	0P2 -Relay/Triac	OP3 -Relay	OP5 -Analogue	
	1 aingle or		OP5 -Analogue		OP1 -Relay/Triac	0P2 -Relay/Triac	OP3 -Relay		
Onerating made	1 single or double action		OP1 -Relay/Triac	OP2 -Relay/Triac			OP3 -Relay	OP5 -Analogue	
Operating mode and Outputs	PID loop or		OP1 -Relay/Triac	0P4 -SSR drive-Relay		0P2 -Relay/Triac	0P3 -Relay	OP5 -Analogue	
and outputs	On/Off with 1, 2 or 3 alarms	Double action	OP4 -SSR drive-Relay	OP2 -Relay/Triac	OP1 -Relay/Triac		OP3 -Relay	OP5 -Analogue	
	1, 2 of 3 diamis	Heat / Cool	OP1 -Relay/Triac	OP5 -Analogue		0P2 -Relay/Triac	0P3 -Relay		
			OP5 -Analogue	OP2 -Relay/Triac	OP1 -Relay/Triac		OP3 -Relay		
			OP5 -Analogue	0P4 -SSR drive-Relay	OP1 -Relay/Triac	OP2 -Relay/Triac	0P3 -Relay		
		Valve drive	OP1 -Relay/Triac	OP2 -Relay/Triac			0P3 -Relay	0P5 -Analogue	

Features (at 25°C environmental temp.)	Description				
	Algorithm	PID with overshoot control or On-	porithm, for controlling motorised positioners		
	Proportional band (P)	0.5999.9%			
	Integral time (I)	0.1100.0 min			
	Derivative time (D)	0.0110.00 min	$\square FF = 0$		
	Error dead band	0.110.0 digit			
	Overshoot control	0.011.00		Single action	
	Manual reset	0.0100.0%		PID algorithm	
	Cycle time (Time proportional only)	1200 s			
	Control output high limit	10.0100.0%			
Control mode	Soft-start output value	0.1100.0%	DFF = 0		
	Output safety value	0.0100.0% (-100.0100.0% for Heat / Cool)			
	Control output hysteresis	0.110.0%	On-Off algorithm		
	Dead band	-10.010.0%			
	Relative cool gain	0.110.0			
	Cycle time (Time proportional only)	1200 s		Double action PID algorithm (Heat / Cool) with overlap	
	Control output high limit	10.0100.0%		(cour, cos), marcronap	
	Cool output hysteresis	0.110.0%			
	Motor travel time	15600 s		Valve drive PID algorithm without	
	Motor minimum step	to 0.15.0%	feedback potentiometer		

8 - Technical specification

Features (at 25°C environmental temp.)	Description								
OP1-OP2 outputs		SPST Relay N.O., 2A/250V for resistive load Triac, 1A/250V for resistive load							
OP3 output	SPDT relay N.O., 2A/250\	/∼ for resistive load							
OP4 output	Logic not isolated: 0/5V-,	±10% 30mA max SPST F	Relay N.O., 2A/250V∼ for r	esistive load					
OP5 analogue output (option)	Control or PV/SP retransmission Galvanic isolation: 500 V ~ /1 min Resolution 12bit (0.025%) Accuracy: 0.1 % In current: 0/420mA 750Ω/15V max.								
	Hysteresis 0.110.0% c.s								
	Action	Active high Active low	- Action type	Deviation threshold	±range				
A14 A10 A10				Band threshold	0range				
AL1 - AL2 - AL3 alarms				Absolute threshold	whole range				
		Special functions	Sensor break, heater break alarm						
			Acknowledge (latching), activation inhibit (blocking)						
			Connected to Timer or program (if options installed)						
	Local								
	Local plus two stored (trad	cking or STAND-BY)							
Setpoint	Local and Remote	_	Up and down ramps 0.1 Low limit: from low range	999.9 digit/min (OFF=0)					
octpolit	Local with trim	If option installed	High limit: from low limit t						
	Remote with trim	ii option motanea							
	Programmable								

Features (at 25°C environmental temp.)	Description						
Programmable Setpoint	1 program, 8 segments (1 initial and 1 end) - From 1 to 9999 cycles or continuous cycling (DFF)						
(optional)	Start, stop, hold, etc. ac	tivated fro					
	Timer (see page 43)		Automatic start at the	-		ad, Digital inputs	or serial comm.s
			Setting time: 19,999 s/min				
Special functions			Stand-by Setpoint:		point low limit to Setp		
(option)	Start-up		Start-up Setpoint:		point low limit to Setp	oint high limit	
	(see page 41)		Hold time:	050 m			
			Control output high lin	nit: 5.010			
Fuzzy-Tuning one shoot	The controller selects a				Step response		
	according to the proces				Natural frequency		
Auto/Man station	Standard with bumples						
Serial comm. (option)	RS485 isolated, Modbu			<u> </u>	bit/s 3 wires		
Auxiliary Supply	+24V- ± 20% 30mA m		<u>.</u>				
	Measure input			uit or sensor l	oreak with automatic a	ctivation of the safe	ty strategies and alerts on display
Operational	Control output	_	llue: -100%100%				
Safety	Parameters		Parameter and configuration data are stored in a non volatile memory for an unlimited time				
	Access protection	Password	assword to access the configuration and parameters data, keypad lock, outputs lock				
	Power supply		0V~ (- 15% + 10%) 5				Power consumption 4W max.
	(PTC protected)	`				•	
	Safety		,		,	500V) pollution cl	ass 2, instrument class II
General	Electromagnetic compatibility	-		s (see page 2	2)		
characteristics	UL and cUL Omologation	File 1764	52				
	Protection EN60529 (IEC 529)	IP65 front	t panel				
	Dimensions	¹ / ₄ DIN - 9	96 x 96, depth 110 mm	n, weight 47	0 g approx.		

WARRANTY

We warrant that the products will be free from defects in material and workmanship for 18 months from the date of delivery.

The warranty above shall not apply for any failure caused by the use of the product not in line with the instructions reported on this manual.

■ ICONS TABLE

