

HC Hays Cleveland
Div. of UniControl Inc.

Series M1
Temperature Controller
1/16 DIN - 48 x 48



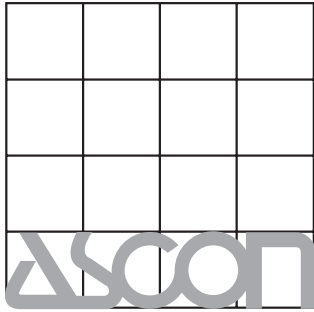
Instruction Manual
MIU.M1 - 1/98.04 Cod. J30-478-1AM1 IE

SAFETY WARNINGS

(Safety symbols and terminology per ANSI Z21.)

Failure to comply in full with the following safety requirements can result in equipment damage and personal injury/death.

1. Read the entire manual to become familiar with the use and operation of this device.
2. Only qualified personnel should attempt to install, wire, commission, startup, service or operate this device.
3. This device is not suitable for use in an explosive ambient atmosphere.
4. Before working on this device, be sure that you understand the processes affected by this device completely.
5. Before working on this device, be sure that any process affected by this device is secure and safe for ser-vicing.
6. Take appropriate precautions to avoid electric shock when working with this device near water.
7. Exercise caution while wiring or working on this device. Multiple voltage sources may be present: take appropriate precautions to avoid electric shock.



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**Temperature
Controller**
1/16 DIN - 48 x 48



M1 line

User manual • M.I.U.M1-2/99.11 • Cod. J30-478-1AM1 IE

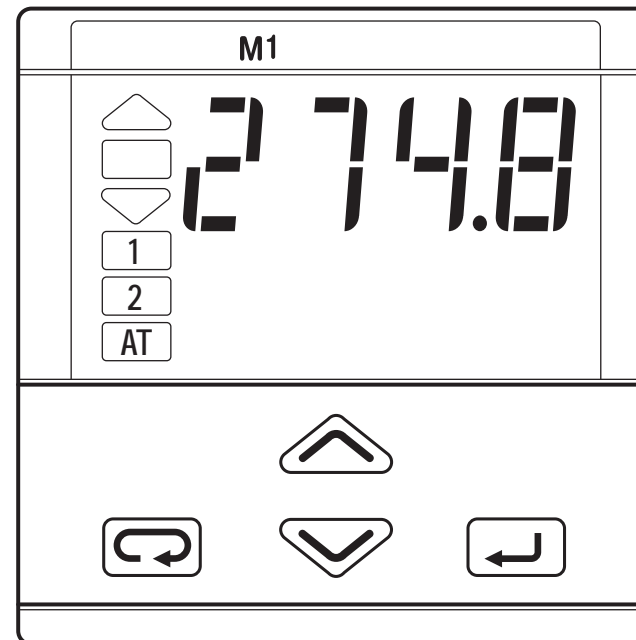


Temperature Controller

$1/16$ DIN - 48 x 48

M1 line

CE





NOTES

ON ELECTRIC SAFETY AND ELECTROMAGNETIC COMPATIBILITY.

Please, read carefully these instructions before proceeding with the installation of the controller.

Class II instrument, real panel mounting.

This controller has been designed with compliance to:

Regulations on electrical apparatus (appliance, systems and installations) according to the European Community directive 73/23 CEE amended by the European Community directive 93/68 CEE and the Regulations on the essential protection requirements in electrical apparatus EN 61010-1 (IEC 1010 - 1) : 90 +A1:92 + A2:95.

Regulations on Electromagnetic Compatibility according to the European Community directive n089/336/CEE, amended by the European Community directive n° 92/31/CEE and the following regulations:

Regulations on RF emissions

EN50081 - 1 residential environments

EN50081 - 2 for industrial environments

Regulation on RF immunity

EN500082-2 for industrial equipment and system

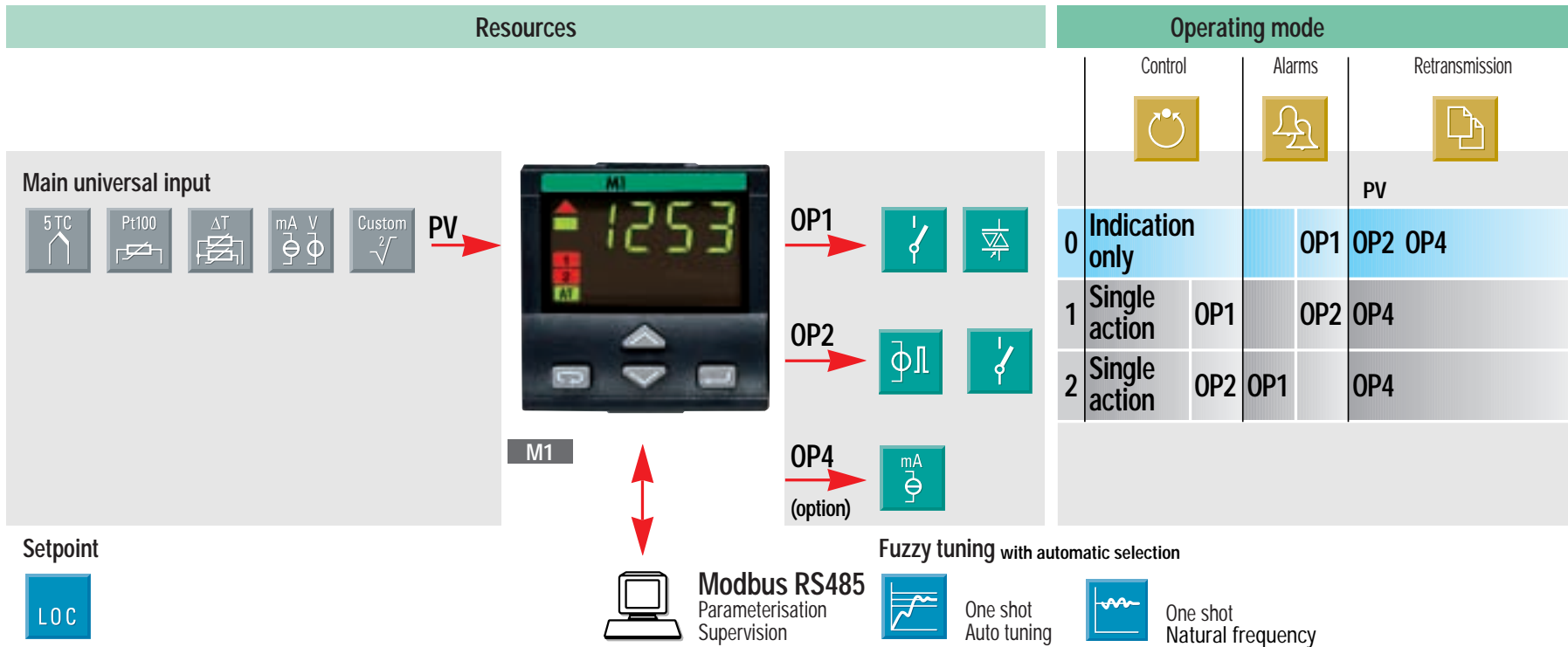
It is important to understand that it's responsibility of the installer to ensure the compliance of the regulations on safety requirements and EMC.

The repair of this controller 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.

All the information and warnings about safety and electromagnetic compatibility are marked with the  sign, at the side of the note.


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4	OPERATIONS	Page	18
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1 INSTALLATION

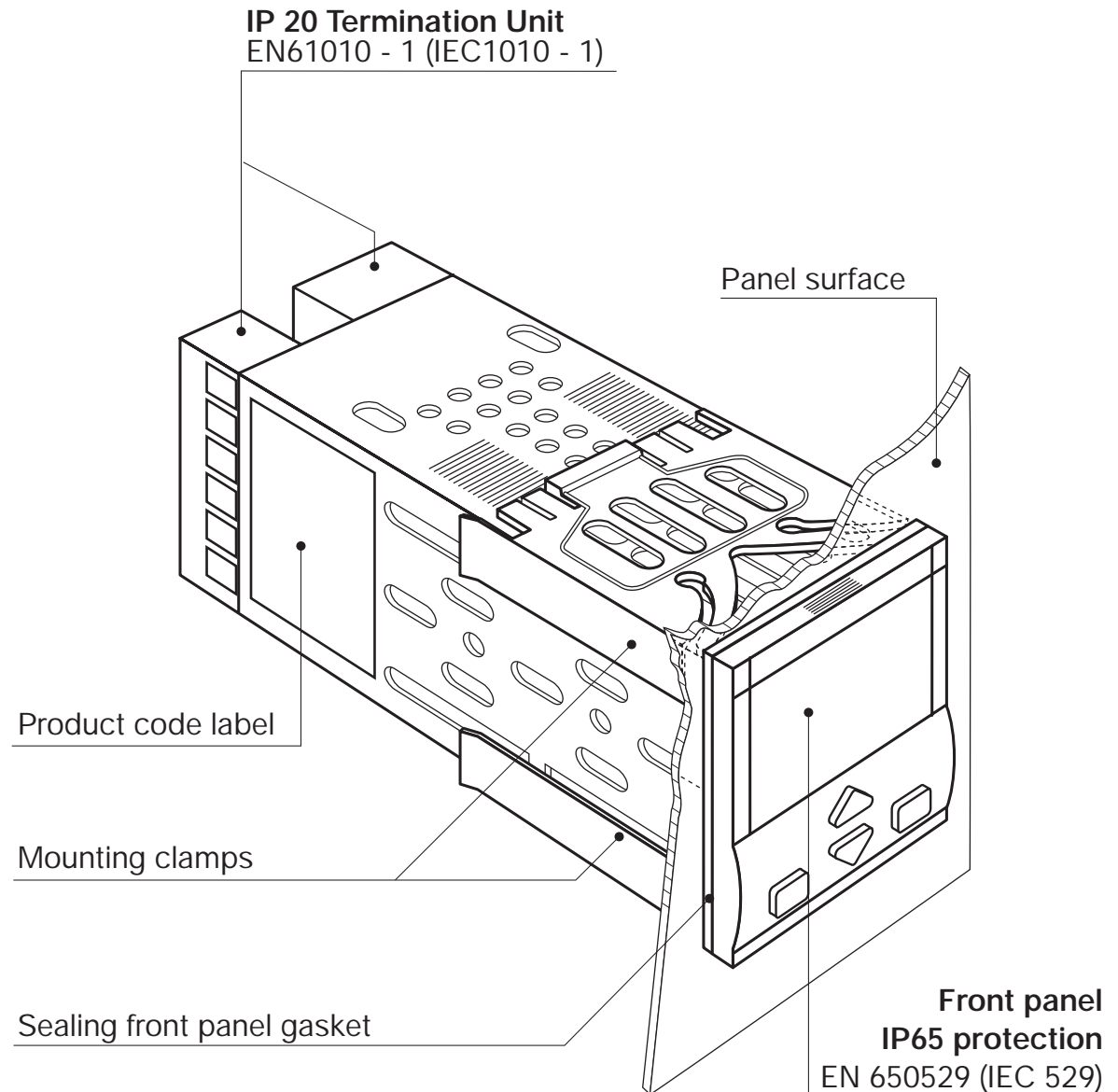
Installation must only be carried out by qualified personnel.

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.

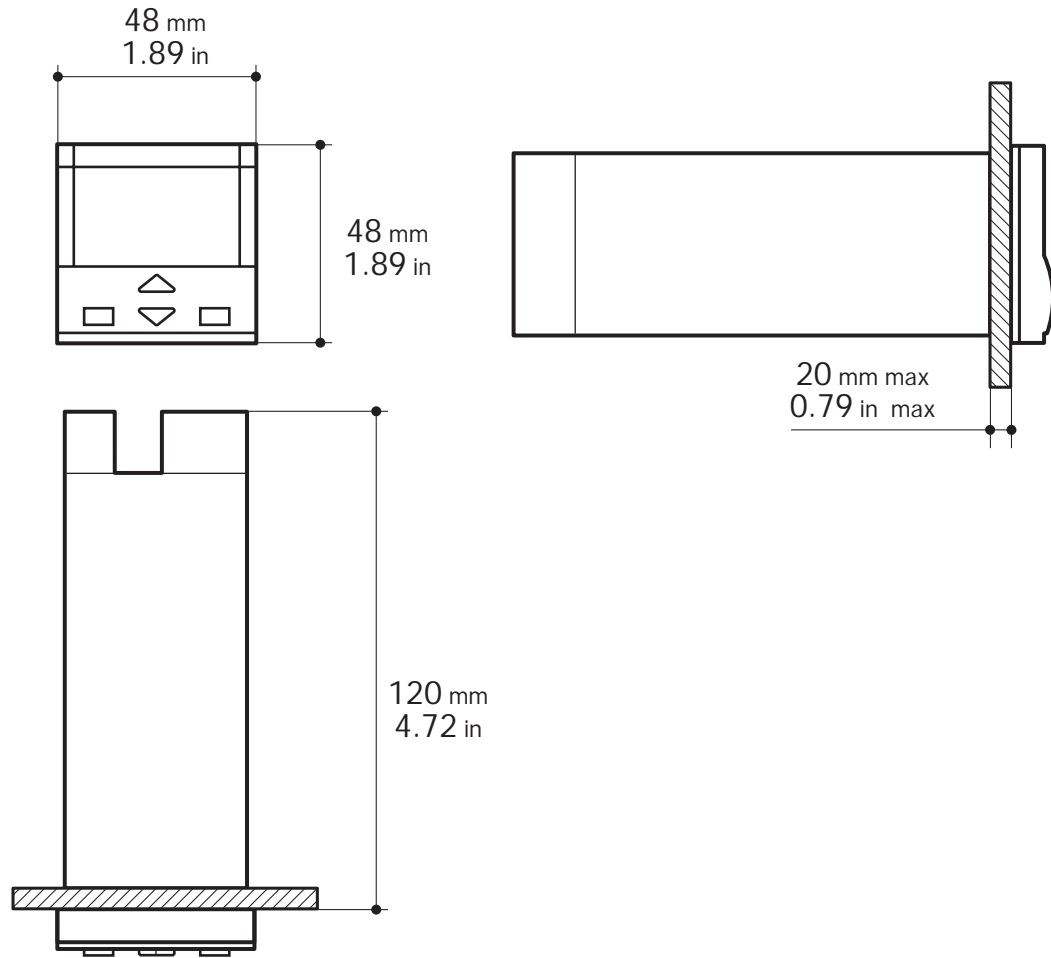


To prevent hands or metal touching parts that may be electrically live, the controllers must be installed in an enclosure and/or in a cubicle.

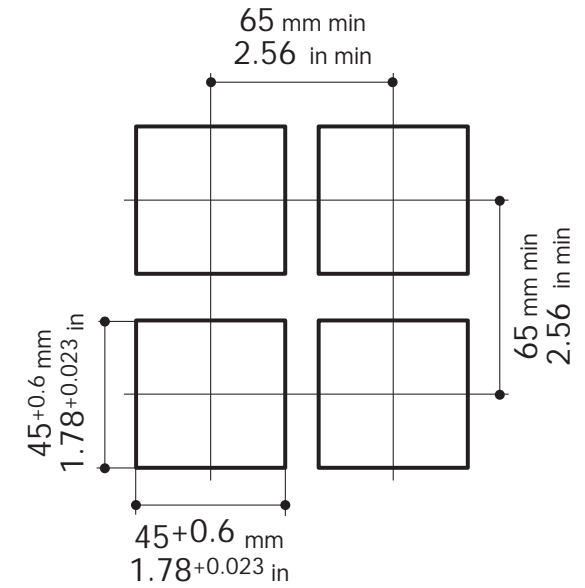
1.1 GENERAL DESCRIPTION



1.2 DIMENSIONAL DETAILS





1.3 PANEL CUT-OUT






1.4 ENVIRONMENTAL RATINGS





Operating conditions

	Altitude up to 2000 m
	Temperature 0...50°C
%Rh	Relative humidity 5...95 % non-condensing

Special conditions		Suggestions
	Altitude > 2000 m	Use 24V~ supply version
	Temperature >50°C	Use forced air ventilation
%Rh	Humidity > 95 %	Warm up
	Conducting atmosphere	Use filter

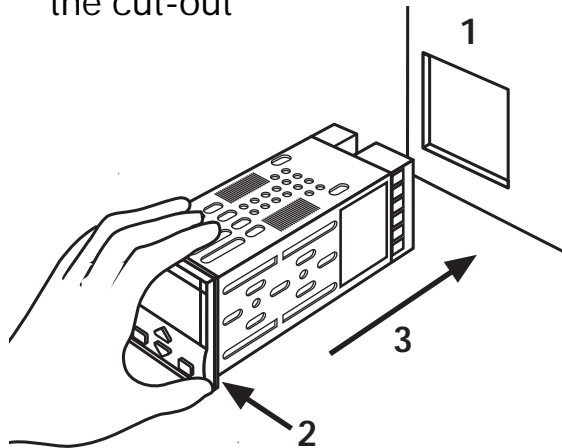
Forbidden Conditions 

	Corrosive atmosphere
	Explosive atmosphere

1.5 PANEL MOUNTING

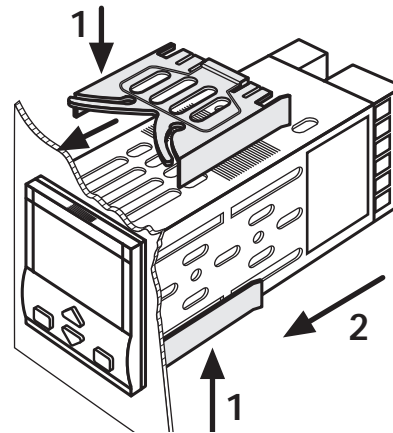
1.5.1 INSERT THE INSTRUMENT

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



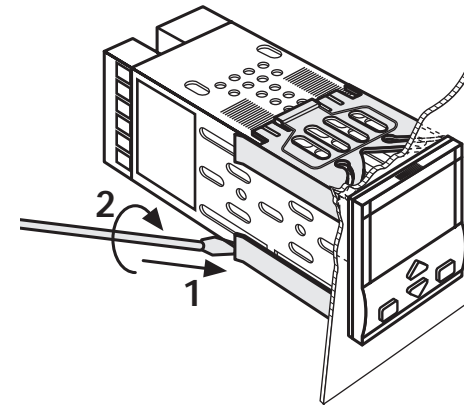
1.5.2 INSTALLATION SECURING

- 1 Position 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

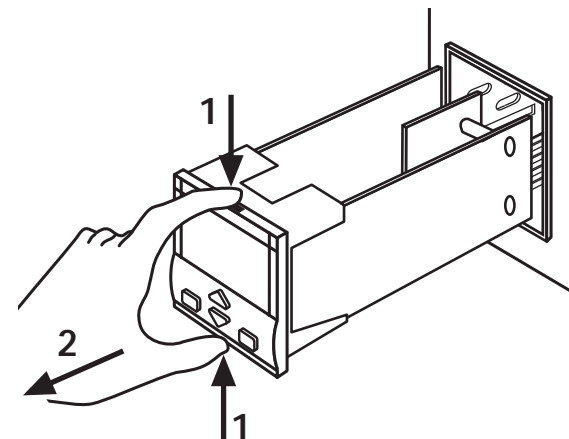


1.5.4 INSTRUMENT UNPLUGGING

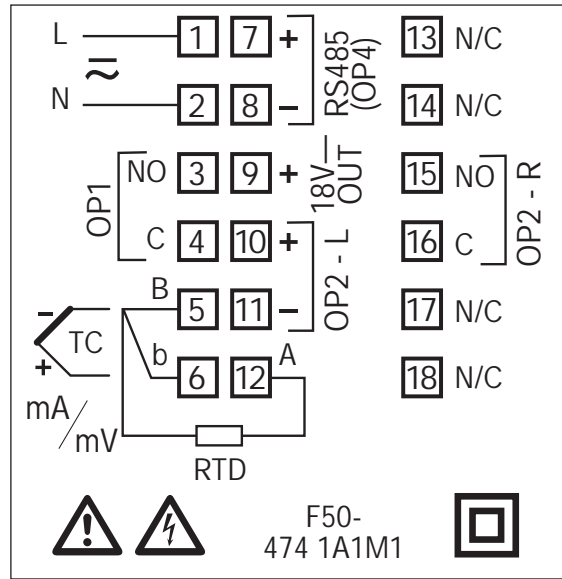


- 1 Push and
- 2 pull to remove the instrument

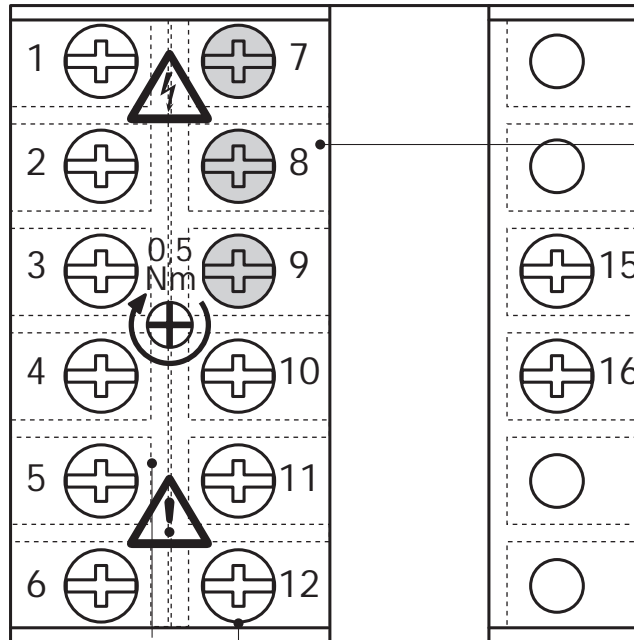
Electrostatic discharges can damage the instrument
Before removing the instrument the operator must discharge himself to ground



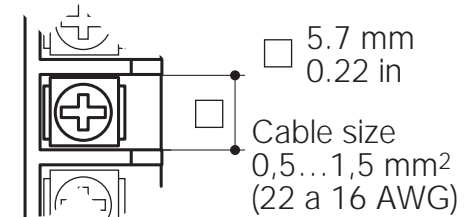
2 ELECTRICAL CONNECTIONS



2.1 TERMINATION UNIT



Rear terminal cover



- 14 screw terminals
- Option terminals
- Holding screw 0.5 Nm
- Positive screw driver PH1
- Negative screw driver 0,8 x 4 mm

Terminals

- Pin connector
∅ 1.4 mm
0.055 in max
- Fork-shape AMP 165004
∅ 5.5 mm - 0.21 in
- Stripped wire
L 5.5 mm - 0.21 in

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 strongly recommended to follow the following suggestions.



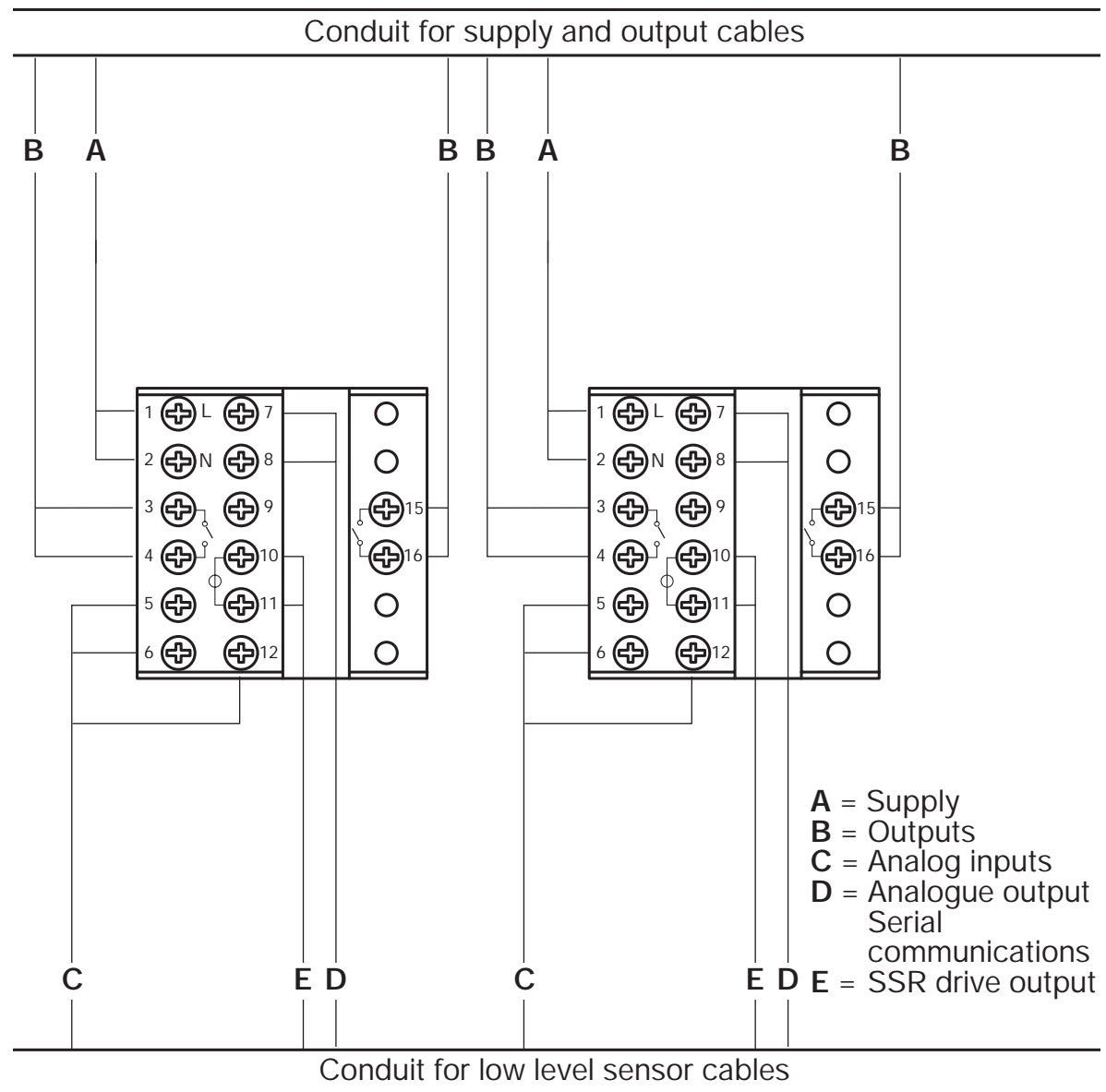
All the wiring must comply with the local regulations.

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

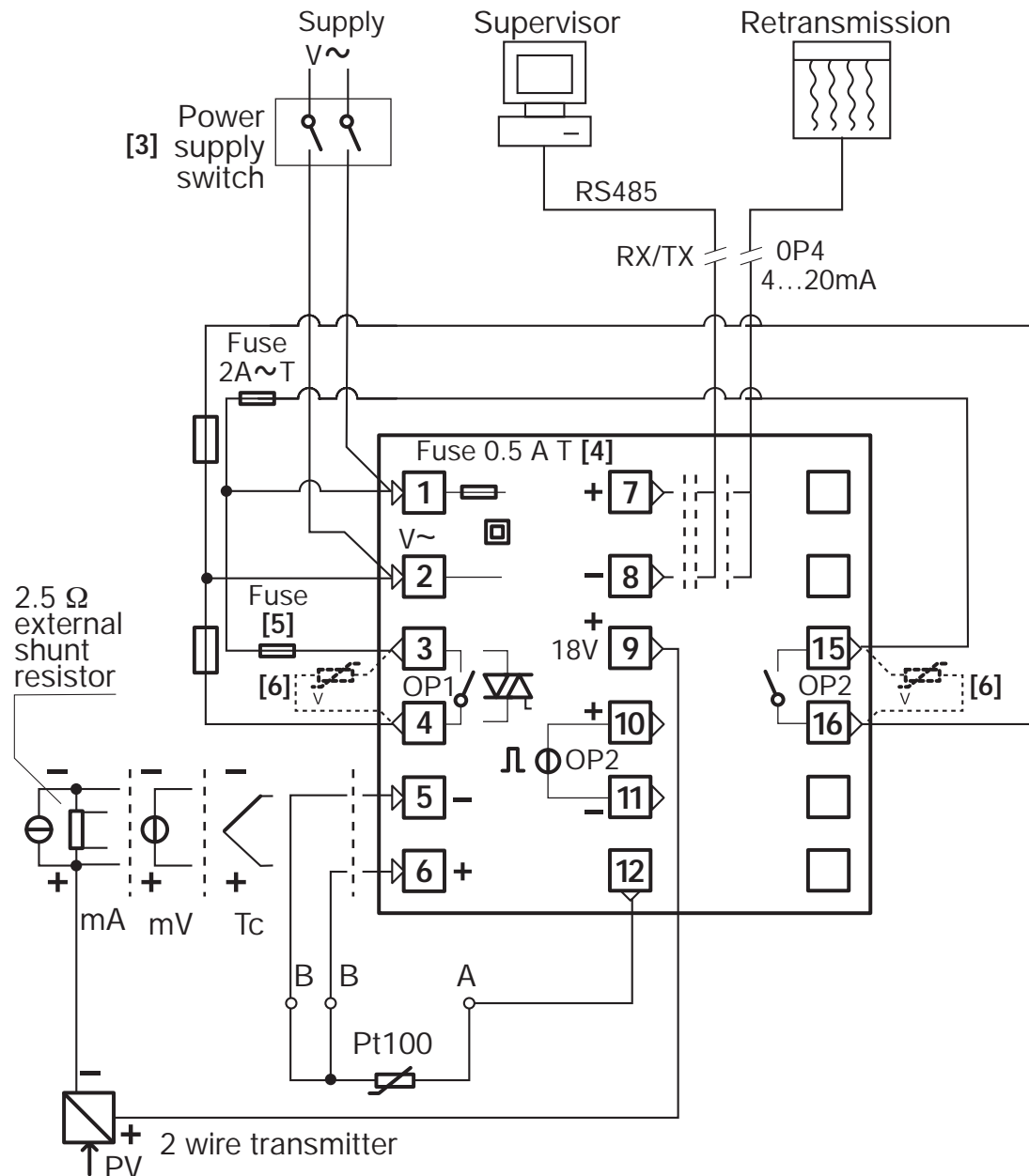
Avoid power units nearby, especially if controlled in phase angle

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



Notes:

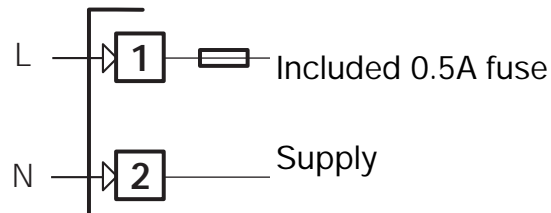
- 1) Make sure that the power supply voltage is the same indicated on the instrument.
- 2) Switch on the power supply only after that all the electrical connections have been completed.
- 3) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument. The power supply switch shall be easily accessible from the operator.
- 4) The instrument is protected with a 0.5 A ~ T fuse. 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 fuses for Relay outputs
 - 1 A ~ T fuses for Triac outputs
- 6) Relay contacts are already protected with varistors.
Only in case of 24 V ~ inductive loads, use model A51-065-30D7 varistors (on request)

2.3.1 POWER SUPPLY



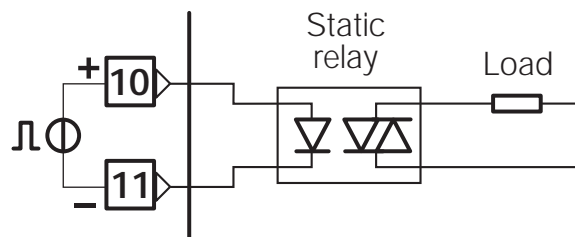
Switching power supply with multiple isolation and internal fuse

- Standard version:
nominal voltage:
100 - 240V \sim (- 15% + 10%)
Frequency 50/60Hz
- Low Voltage version:
Nominal voltage:
24V \sim (- 25% + 12%)
Frequency 50/60Hz
or 24V- (- 15% + 25%)
- Power consumption 1.6W max



2.3.3 0P2 OUTPUT

A) SSR drive output, not isolated
0...5V-, \pm 20%, 30mA max

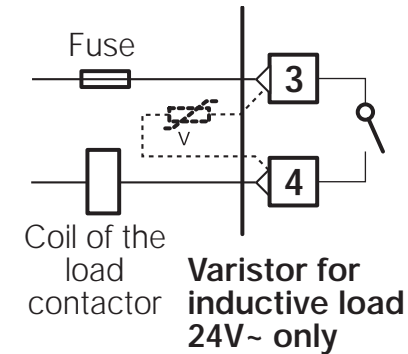


2.3.2 OP1 OUTPUT



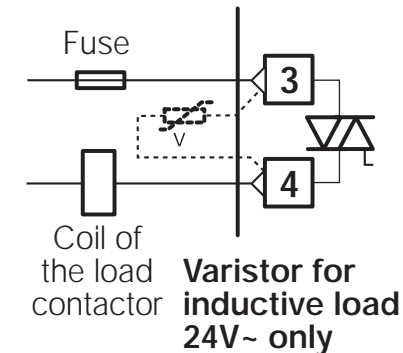
A) Single relay output

- NO contact for resistive load of up to 2A / 250V \sim max.
- Fuse 2A \sim T (IEC 127)



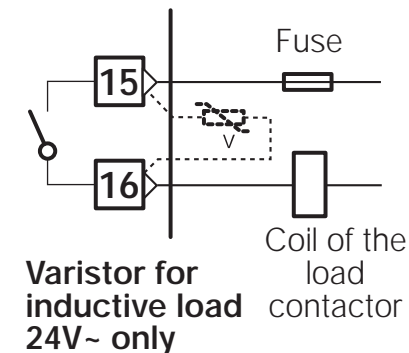
B) Triac Output

- NO contact for resistive load of up to 1A / 250V \sim max.
- Fuse 1A \sim T (IEC 127)



B) Single relay output

- NO contact for resistive load of up to 2A / 250V \sim max.
- Fuse 2A \sim T (IEC 127)



OP2 OUTPUT

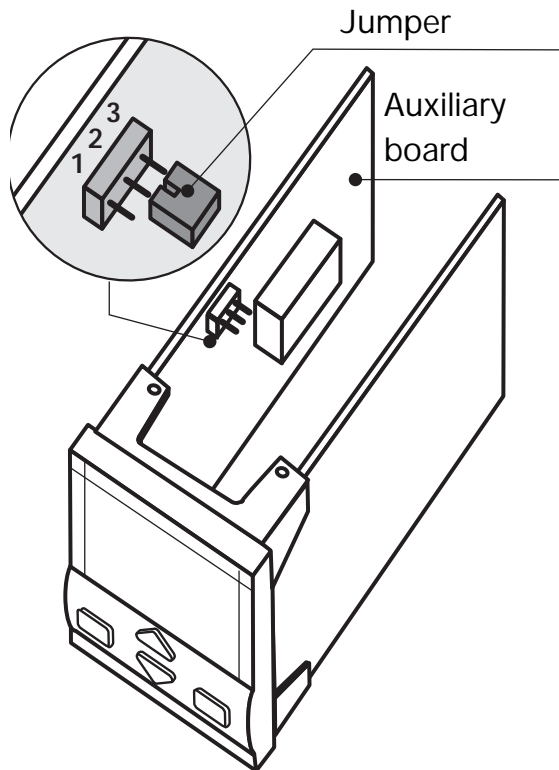


OP2 output can be SSR drive (Std) or Relay.

The “jumper” on the auxiliary board selects the output type:

Link Pins 1-2 for OP2-Relay

Link Pins 2-3 for OP2-SSR drive

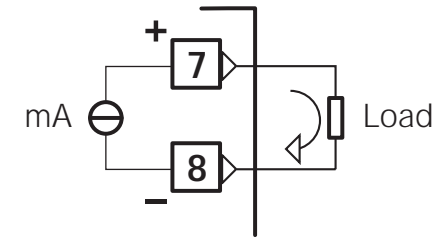


2.3.4 OP4 OUTPUT (option)



PV retransmission

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

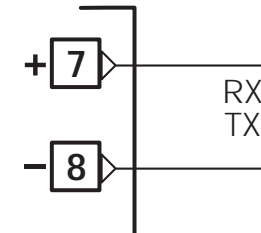


2.3.5 SERIAL COMMUNICATIONS (option)



- Galvanic isolation 500V \sim /1 min
- Compliance to the EIA RS485 standard for Modbus/Jbus

⚠ Please, read the user instructions on the “M1 controller MODBUS/JBUS protocol”

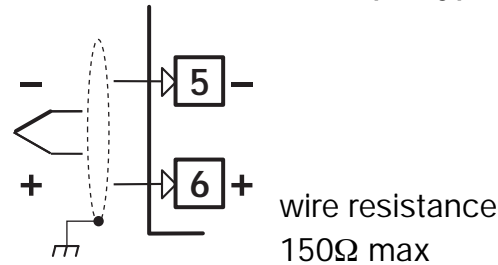




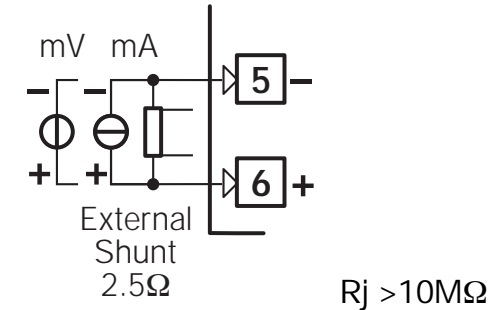
2.3.6 PV CONTROL INPUT

- 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.

For L J K S T thermocouple type

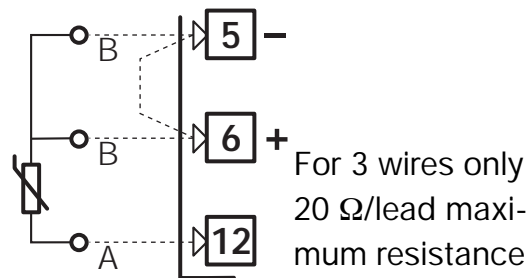


For mA, mV and V

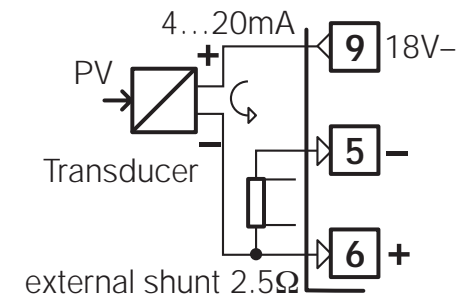


- If a 3 wires system is used, use always cables of the same diameter (1mm² min.) (line 20 Ω/lead maximum resistance)
- When using a 2 wires system, use always cables of the same diameter (1,5mm² min.) and put a jumper between terminals 5 and 6

For PT100 resistance thermometer

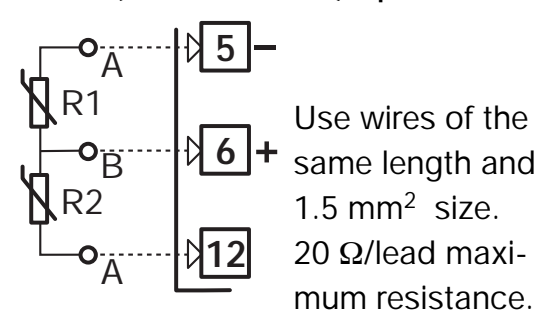


With 2 wire transducer

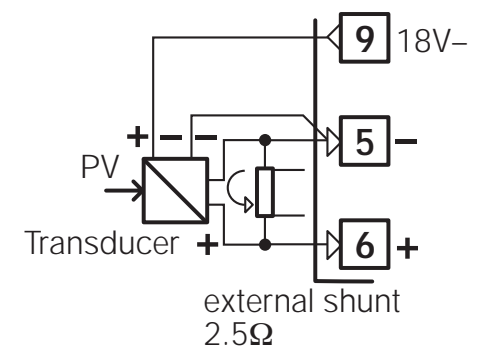


⚠ When the distance between the controller and the sensor is 15 mt. using a cable of 1.5 mm² diameter, produces an error on the measure of 1°C.

For ΔT (2 x RTD Pt100) Special



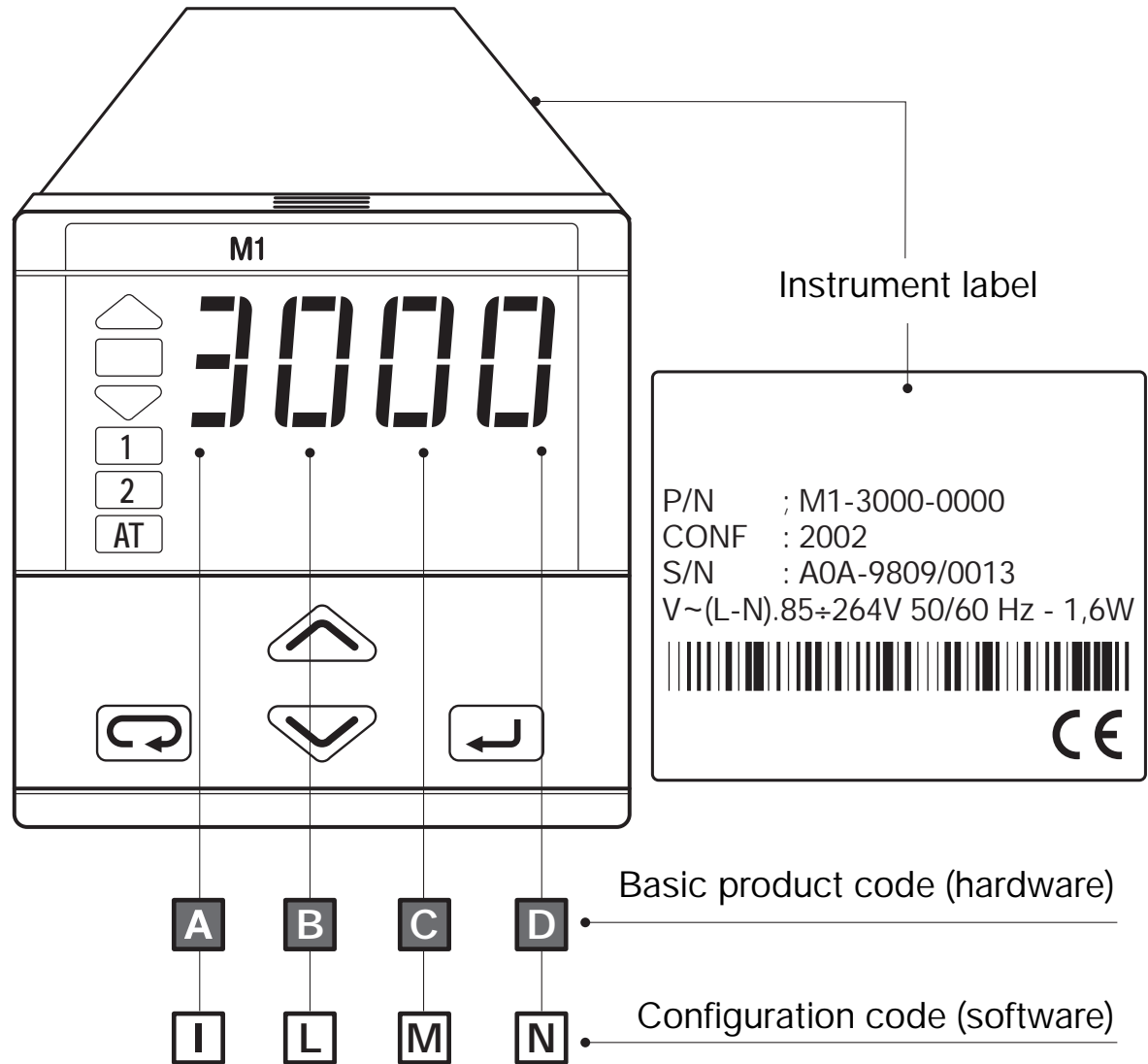
With 3 wire transducer



R1 + R2 must be < 320Ω

3 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 4.2.2 page 19



3.1 MODEL CODE

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

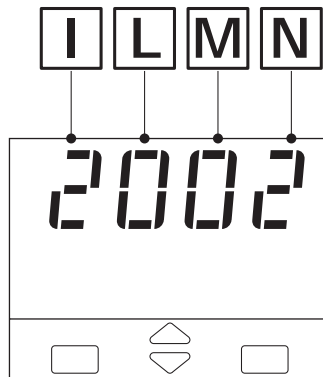
Model: **Line** **Basic** **Accessories** **Configur.**
M 1 **A B C D** - **0 F G 0** / **I L M N**

Line		M	1
Power supply		A	
100 - 240V~ (- 15% + 10%)		3	
24V~ (- 25% + 12%) or 24V- (- 15% + 25%)		5	
OP1 Output		B	
Relay		0	
Triac		3	
Serial Communications	Options	C	D
Not fitted	None	0	0
	Transmitter Power Supply (P.S.)	0	6
	Transmitter P.S. + Retransmission	0	7
RS485	None	5	0
Modbus/Jbus protocol	Transmitter Power Supply	5	6
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	

3.2 CONFIGURATION CODING

The configuration code consists of 4 digits that identify the operating characteristic of the controller, as chosen by the user.

Section 4.5 at pag. 26 reports the instructions how to set a new configuration code.



The configuration code can be displayed on the front panel, following the instructions at pag 19 section 4.2.2.

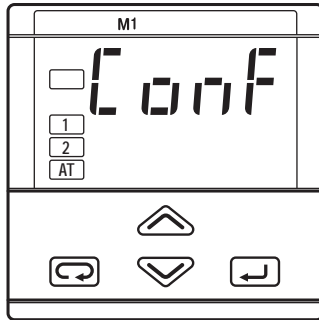
Input type and range			I
TR Pt100 IEC751	-99.9...300.0 °C	-99.9...572.9 °F	0
TR Pt100 IEC751	-200...600 °C	-328...1112 °F	1
TC L Fe-Const DIN43710	0...600 °C	32...1112 °F	2
TC J Fe-Cu45% Ni IEC584	0...600 °C	32...1112 °F	3
TC T Cu-CuNi	-200 ...400 °C	-328...752 °F	4
TC K Cromel -Alumel IEC584	0...1200 °C	32...2192 °F	5
TC S Pt10%Rh-Pt IEC584	0...1600 °C	32...2912 °F	6
DC input 0...50 mV, linear	engineering units		7
DC input 10...50 mV, linear	engineering units		8
Custom input and range			9

Control mode	Output configuration	L
P.I.D.	Control OP1 / alarm AL2 on OP2	0
	Control OP2 / alarm AL2 on OP1	1
On - Off	Control OP1 / alarm AL2 on OP2	2
	Control OP2 / alarm AL2 on OP1	3
2 alarms indicator	Alarm AL1 on OP1/ alarm AL2 on OP2	4
	Alarm AL1 on OP2/ alarm AL2 on OP1	5

Type of control and safety		M
Reverse (AL1 active low)	Safety 0%	0
Direct (AL1 active high)	Safety 0%	1
Reverse (AL1 active low)	Safety 100%	2
Direct (AL1 active high)	Safety 100%	3



If, when the controller is powered up for the first time, the display shows the following message



it means that the controller has not been configured yet. The controller remains in stand-by until the configuration code is set correctly (see chapter 4.6 pag 26).

Alarm 2 type and function		N
Not active		0
Sensor break alarm		1
Absolute	active high	2
	active low	3
Deviation [1]	active high	4
	active low	5
Deviation band [1]	active out (of the band)	6
	active in (the band)	7




Note

[1] Choice not available when the controller has been configured as 2 alarms indicator (L digit assigned to 4 or 5)

4 OPERATIONS

4.1 KEYPAD COMMANDS AND DISPLAY

• Deviation indicator (SP-PV)

	Green led ON OK	±1%
	Green led ON + 1 red led ON	±2%
	Only red led ON	>2%

OP1 output ON (red)

OP2 output ON (red)

Tune running (green)

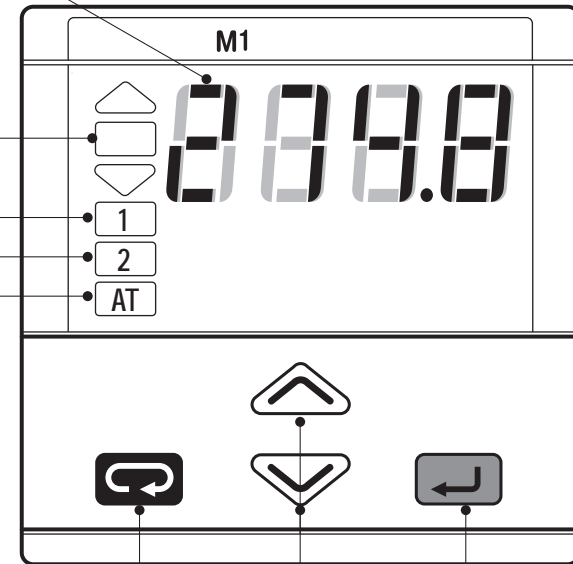
• PV control input (operator mode)
(in engineering units)
when the measured value is greater
than sensor high range

0000

when the measured value is less than
the sensor low range

0000

• Code and/or value of the
Parameter (programming mode)



Menu
access

Values
modification

Enter key for
selection and
value setting
confirmation

4.2 DISPLAY

When the display operation is selected, the controller presents automatically all the most important parameters and configuration information.

During the operation, the parameters values cannot be modified by the user

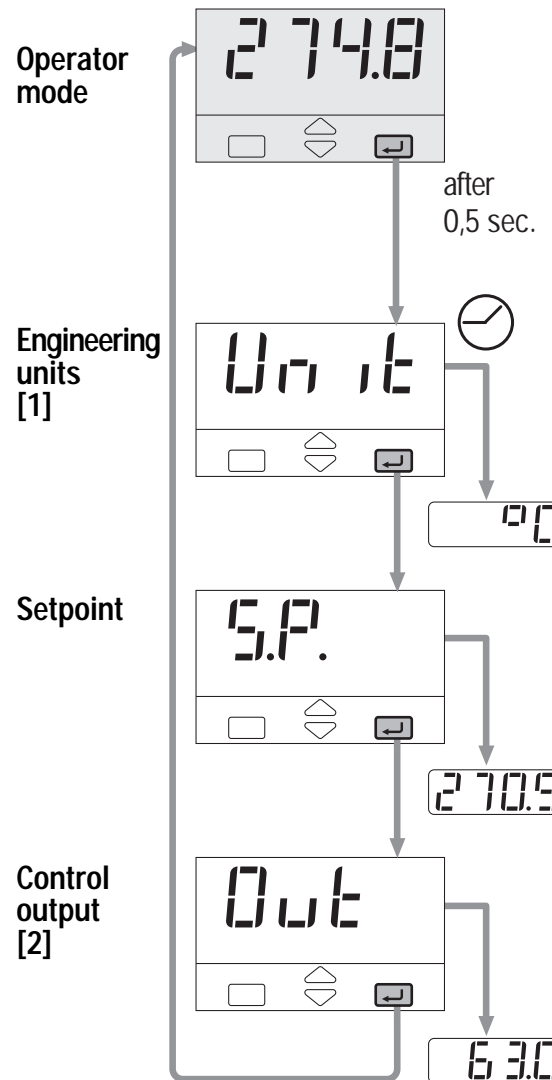
After 2 sec from the end of the operation, the controller flashes the display and returns to the normal operating conditions.

Note

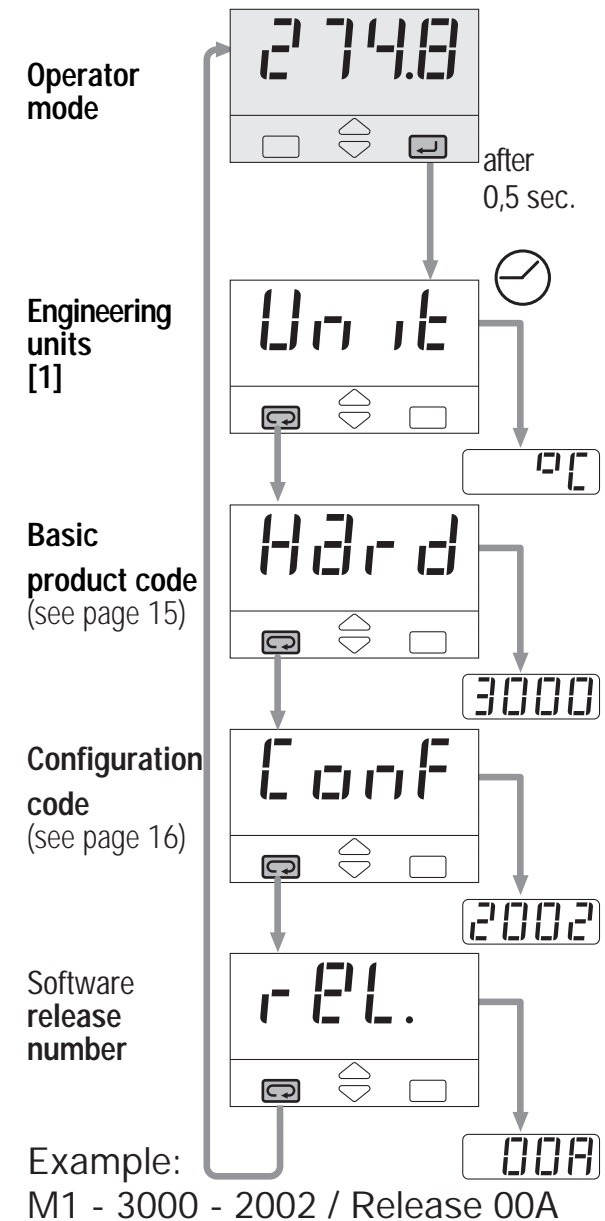
[1] See page 27

[2] This display is not presented if the instrument has been configured as an On - Off controller

4.2.1 OF THE PROCESS VARIABLES





4.2.2 OF THE CONFIGURATION CODES





4.3 PARAMETER SETTING

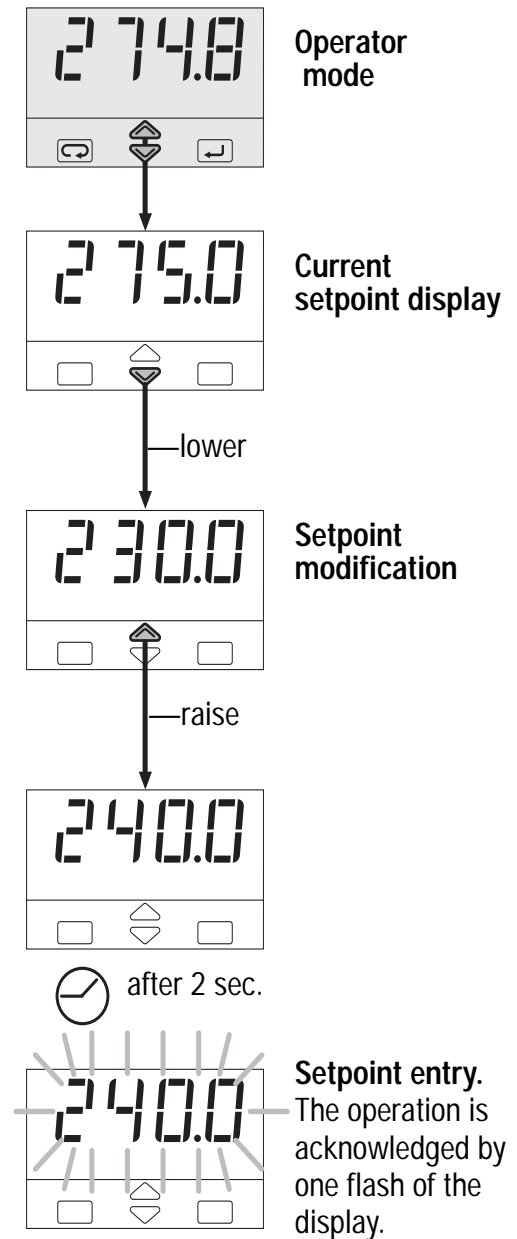
4.3.1 NUMERIC ENTRY

(i.e. the modification of the value of a stored Setpoint 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.

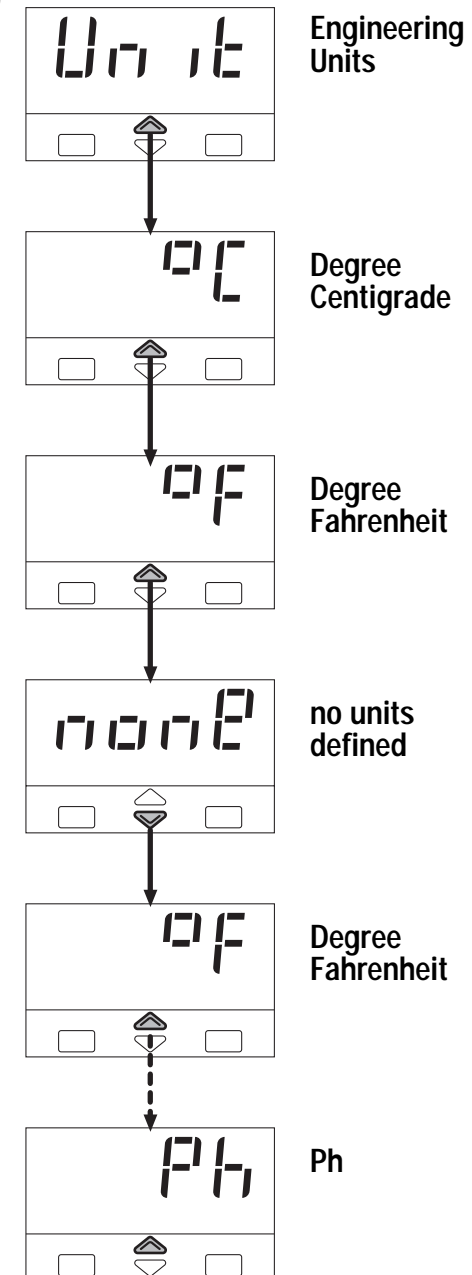


4.3.2 MNEMONIC CODES SETTING

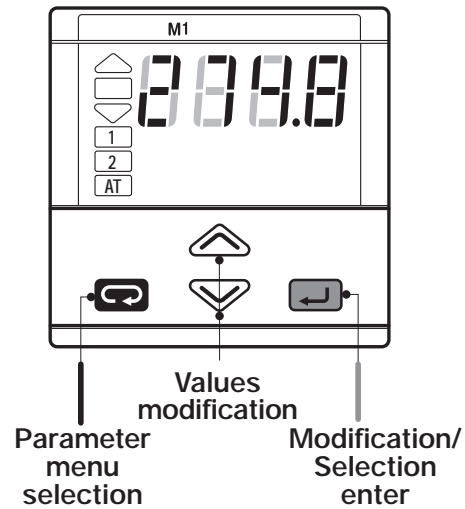
(e.g. configuration see pages 26, 27)

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 sec. The mnemonic displayed at the time the next parameter is selected, is the one stored in the parameter.



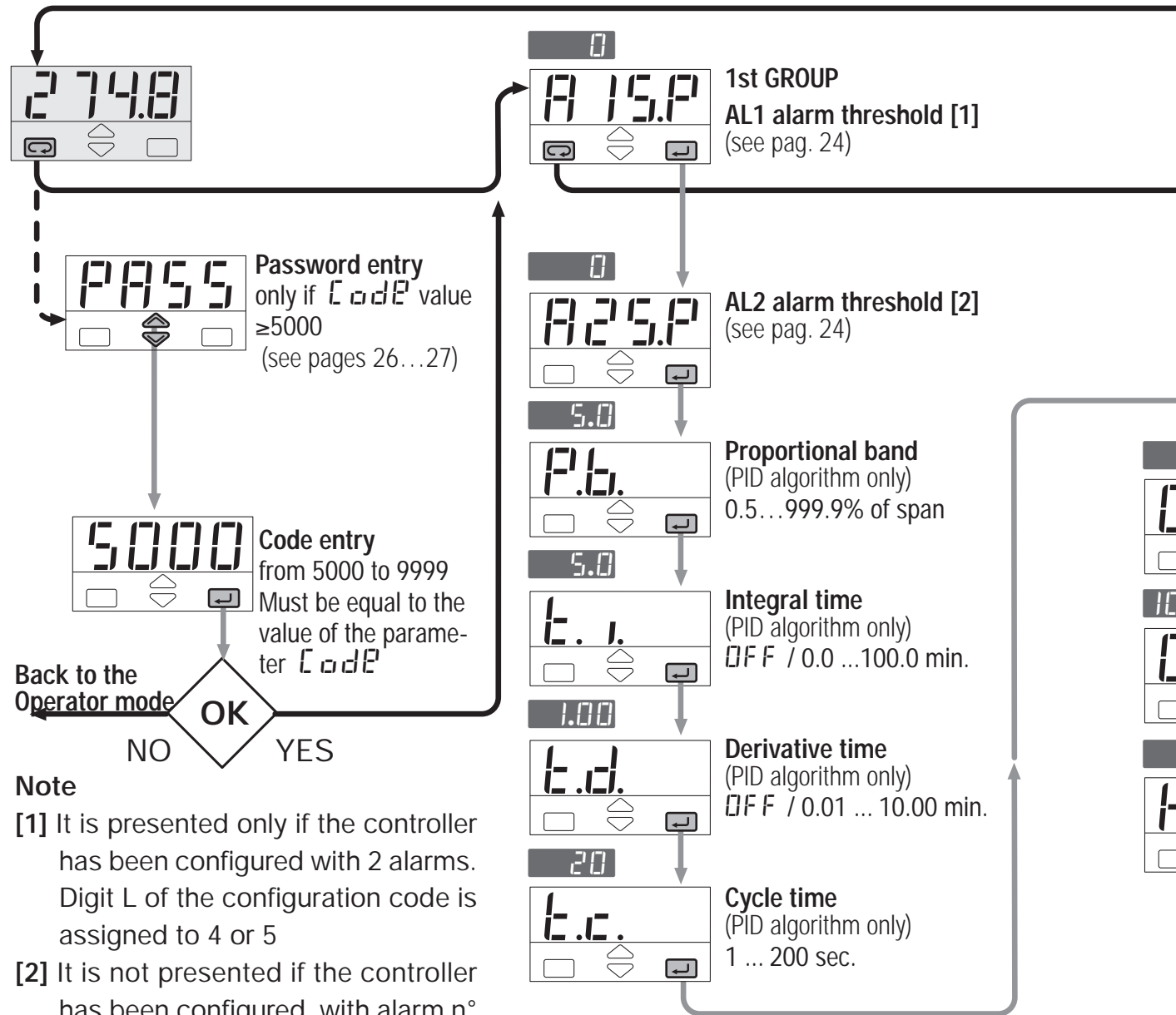
4.4 PARAMETERIZATION



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 pag. 20) The value is entered when the next parameter is selected, by pressing the key.

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



Note

- [1] It is presented only if the controller has been configured with 2 alarms. Digit L of the configuration code is assigned to 4 or 5
- [2] It is not presented if the controller has been configured with alarm n° 2 not active or of sensor break type. Digit N of the configuration code is assigned to 0 or 1.

PARAMETER MENU

tune 2nd GROUP
Tune run/stop
(PID algorithm only)

PASS Password entry
only if Code
value <5000
(see pages 26...27)

Direct access
to the configuration
(pages 26 ... 27)

OFF
SL. u Setpoint ramp up
(not available with 2 alarms)
OFF/0.1...999.9 digit/min

OFF
SL. d Setpoint ramp down
(not available with 2 alarms)
OFF/0.1...999.9 digit/min

L. range
S.P. L Setpoint low limit
(not available with 2 alarms)
low range ..S.P. H

H. range
S.P. H Setpoint high limit
(not available with 2 alarms)
S.P. L...high range

0.5
AL1 AL1 hysteresis
0.1...10.0% of the span
[1]

0.5
AL2 AL2 hysteresis
0.1...10.0% of the span
[2]

OFF
t.F. IL Filter time constant
1...30 sec. or OFF

0
In.Sh Input shift
-60 ... 60 digits

1
Addr Communication address
(if option installed)
OFF / 1...247

L. range
rt.Lo Retransmission
low range
(if option installed)
full scale

H. range
rt.H Retransmission
high range
(if option installed)
full scale

1.00
OC. Overshoot control
(PID algorithm only)
0.01...1.00

100.0
OP. H Control output high limit
(PID algorithm only)
10.0...100.0%

0.5
hyst. Control output
hysteresis
(On-Off control only)
0.1... 10.0% of span

Back to the
1st parameter
group

Back to the
1st parameter of
the 2nd group

4.5 PARAMETER

1st GROUP

The controller parameters have been organized in group, according to their functionality area.

A 15.P AL1 alarm threshold

The threshold is presented only if the controller have been configured with 2 alarms. (Digit L of the configuration code assigned to 4 or 5)

A 25.P AL2 alarm threshold

The alarm occurrences handle the OP1 and OP2 outputs, in different ways, according to the configured types of alarms, as illustrated.

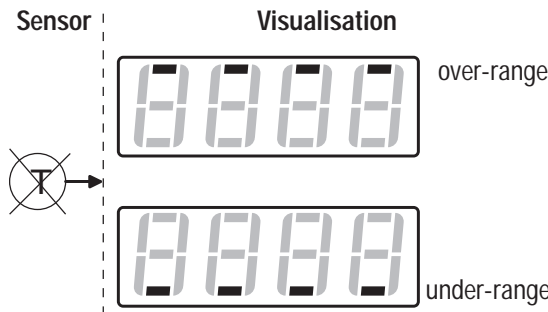
P.b. Proportional band

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

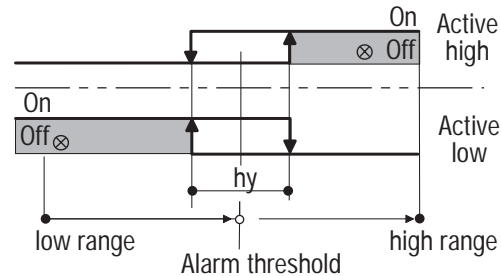
I. I. Integral time

It is the integral time value, that

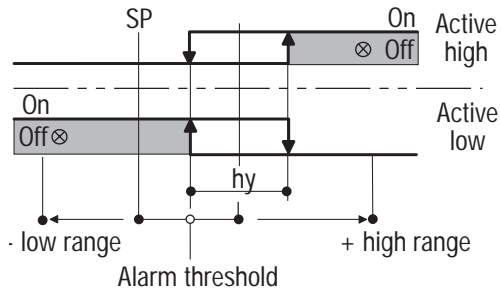
Sensor break or input disconnection



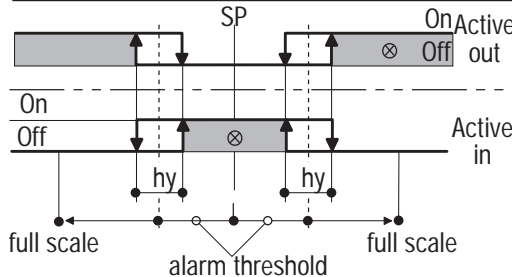
Absolute alarm (full scale)



Deviation alarm



Band alarm



specifies the time required by the integral term to generate an output equivalent to the proportional term. When **OFF** the integral term is not included in the control algorithm.

I.d. Derivative time

It is the derivative term coefficient that specifies the time required by the proportional term P to reach the level of D. When **OFF** the derivative term is not included in the control algorithm.

I.c. Control output cycle time

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

O.C. Overshoot control

This parameter specifies the span of action of the overshoot control. Setting lower values (0.99 → 0.01) the overshoot generated by a Setpoint change is reduced. The overshoot control doesn't affect the

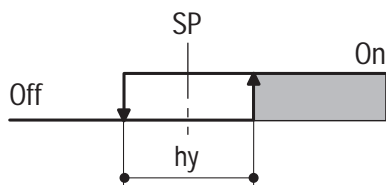
effectiveness of the PID algorithm. Setting 1, the overshoot control is disabled.

OP. H Control output high limit

It specifies the maximum value the control output can be set

hy. Control output hysteresis

Hysteresis of the threshold



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

2nd GROUP

SL. u Setpoint ramp up

SL. d Setpoint ramp down

This parameter specifies the maximum rate of change of the Setpoint in digit/min. When the parameter is `FFF`, this function is disabled.

S.P. L Setpoint low limit

Low limit of the setpoint value. When the parameter is `FFF`, this function is disabled.

S.P. H Setpoint high limit

High limit of the setpoint value. When the parameter is `FFF`, this function is disabled.

A1hy AL1 alarm hysteresis

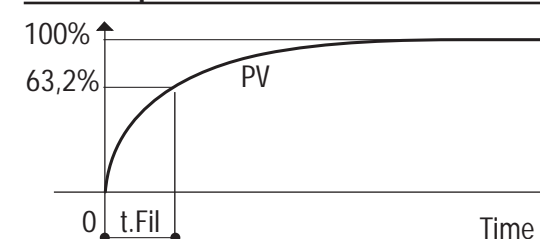
A2hy AL2 alarm hysteresis

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

t.F il Input filter time constant

Time constant, in seconds, of the RC input filter applied to the PV input. When this parameter is set to `FFF` the filter is bypassed.

Filter response



In.Sh Input shift

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

Addr 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 `FFF` the controller is not communicating

rt.Lo Retransmission low range

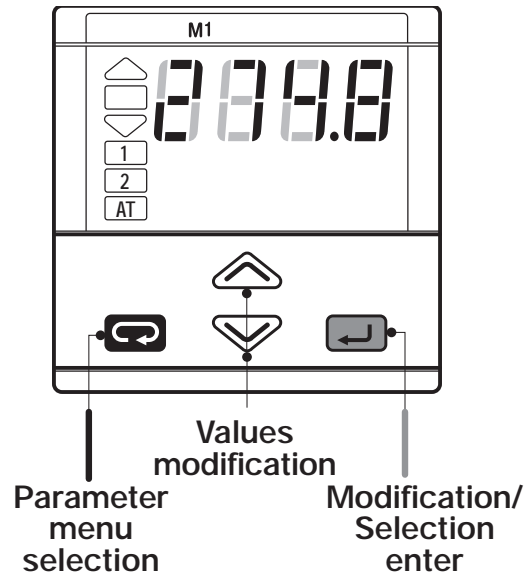
rt.H Retransmission high range

These parameters define the range of the OP4 retransmission output. Example: 4..20 mA output corresponding to 20...120°C.

4.6 CONFIGURATION

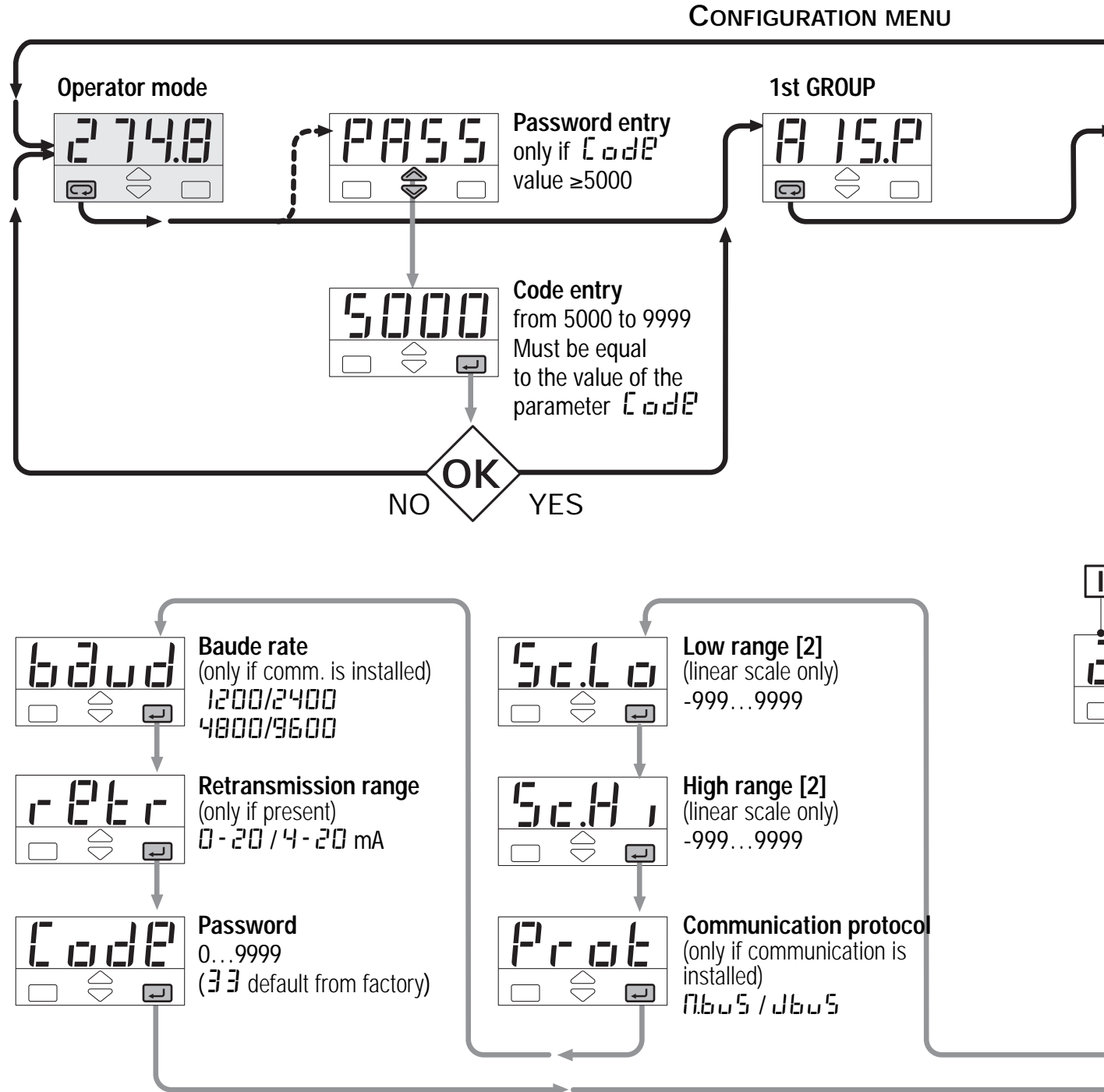
The configuration of the controller is specified through a 4 digit code that defines the type of input, of control output and of the alarms. (sect. 3.2 pag16)

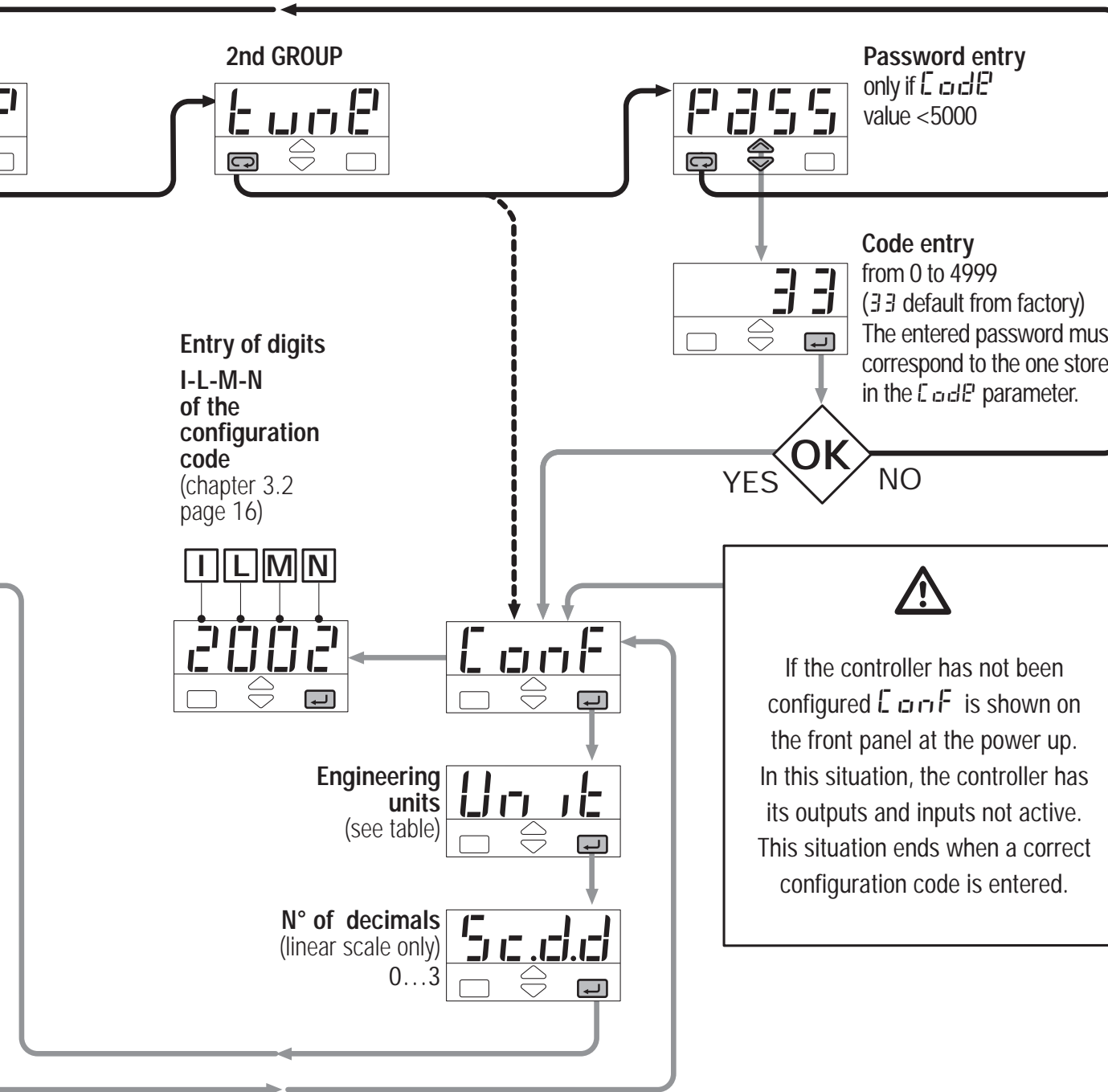
Other parameters specify the type of auxiliary functions.



Press or to display the next parameter or the next code and change its value.

The new value entered is stored into the controller when the next parameter is selected by pressing .





Note

Pressing the the next group of parameters is displayed.

[1] Table of the supported Engineering Units.

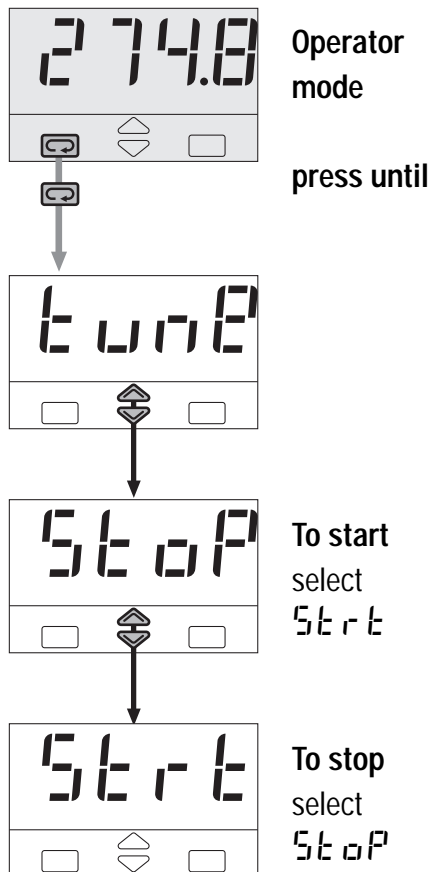
Centigrade degrees *	°C
Fahrenheit degrees *	°F
none	none
mV	mV
Volt	V
mA	mA
Ampere	A
Bar	bar
PSI	PSI
Rh	rh
pH	pH

* For inputs from thermocouple or resistance thermometer, the choice is between °C and °F only.

[2] Range of min 100 digits.

5 AUTOMATIC TUNE

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



The green led **AT** goes 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.

This function allows the calculation of the optimal PID terms parameters, monitoring the response of the process to disturbances.

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.

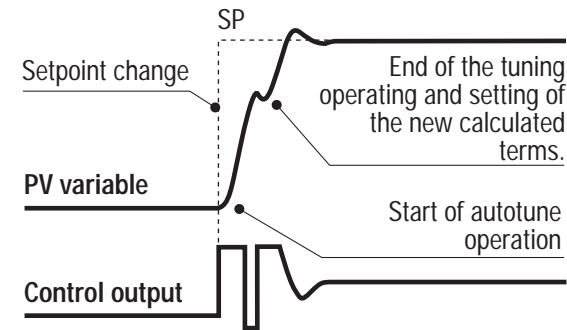
Natural frequency

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

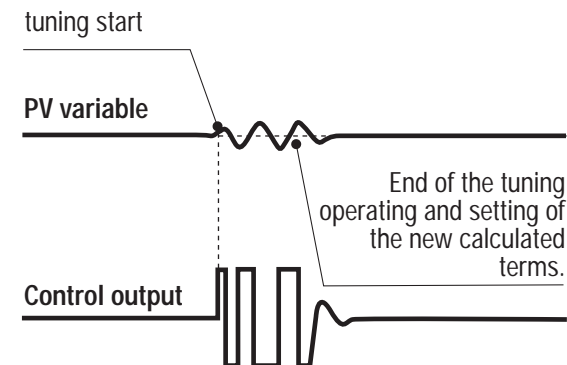
This method has the advantage of a better accuracy in the term calculation with a reasonable speed calculation.

The Fuzzy Tuning determines automatically the best method to use to calculate the PID term, according the process conditions.

Step response



Natural frequency



6 TECHNICAL SPECIFICATIONS

Features (at 25°C enviromental temp.)	Description			
Total configurability see par. 3.2 pag. 16 par. 4.6 pag. 26	From keypad or serial communication the user selects: the type of input - the associated functions and the corresponding outputs - the type of control algorithm - the type of output and the safe conditions - the type and functionality of the alarms - the values of all the control parameters.			
PV Input (see pag.13 and pag. 16)	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: 1...30 seconds		
	Accuracy	0.25% ± 1 digits for temperature sensors 0.1% ± 1 digits (for mV and mA)	Between 100...240V~ the error is minimal	
	Resistance thermometer	Pt100Ω at 0°C (IEC 751) °C/°Fselectable	2 or 3 wires connection	Max. wire Res: 20Ω max (3 wires) Sensitivity: 0.1°C/10°C Env. Temp. <0.1°C / 10Ω Wire Res.
	Thermocouple	L,J,T,K,S (IEC 548) °C/°F selectable	Internal cold junction compensation in °C/°F	Max. wire Res.: 150Ω max Sensitivity: <2μV/°C Env. Temp. <0.5μV / 10Ω Wire Res.
	DC input (current)	4...20mA, 0-20mA with external shunt 2.5Ω Rj >10MΩ	Engineering units Conf. decimal point position Init. Sc. -999...9999	Input drift: <0.1% / 20°C Env. Temp.
DC input (voltage)	10...50mV, 0-50mV Rj >10MΩ	Full Sc. -999...9999 (min. range of 100 digits)		
Error indicator	By led with green led when error <1% (see page 18)			

6 - Technical specification

Features (at 25°C enviromental temp.)	Description					
Operating mode and Outputs	Indicator with 2 alarms	AL1 alarm		AL2 alarm		
		OP1 - Relay or Triac	OP2 - SSR drive or Relay			
	OP2 - SSR drive or Relay	OP1 - Relay or Triac				
	1 PID loop or 1 ON-OFF loop with 1 Alarm	Control output		AL2 alarm		
OP1 - Relay or Triac		OP2 - SSR drive or Relay				
OP2 - SSR drive or Relay		OP1 - Relay or Triac				
Control mode	Algorithm		PID with overshoot control or ON OFF			
	Proportional band (P)		0.5...999.9%			
	Integral time (I)		0.1...100.0 min	OFF = 0 PID algorithm		
	Derivative time (D)		0.01...10.00 min			
	Cycle time		1...200 sec			
	Overshoot control		0.01...1.00			
	High limit		100.0...10.0%			
Hysteresis		0.1...10.0%		ON-OFF algorithm		
OP1 output	SPST Relay N.O., 2A/250V~ for resistive load Triac, 1A/250V~ for resistive load					
OP2 output	SSR drive, not isolated: 5V-, ± 10%, 30mA max SPST Relay N.O., 2A/250V~ for resistive load					
AL1 alarm (indicator with 2 alarms)	Hysteresis 0.1...10,0% full scale					
	Active high		Absolute threshold: full scale			
	Active low					
AL2 alarm	Hysteresis 0.1...10,0% c.s.					
	Action	Active high	Action type	Deviation threshold ±range		
		Active low		band threshold 0...range		
		Special function		Absolute threshold whole range		
	Special function	Sensor break				

Features (at 25°C environmental temp.)	Description	
Setpoint	Ramp up and down. User inhibited	0.1...999.9 digit/min (OFF = 0)
	Low limit	From low range to the high limit
	High limit	From low limit to the high range
OP4 PV retransmission (option)	Galvanic isolation: 500 V \sim /1 min Resolution 12bit (0.025%) Accuracy: 0.1 %	Current output: 0/4...20mA 750 Ω /15V max
One shot Fuzzy-Tuning with automatic selection	The controller selects automatically the best method according to the process conditions	Step method
		Natural frequency method
Serial comm. (option)	RS485 isolated, Modbus/Jbus protocol, 1200, 2400, 4800, 9600 bit/sec 2 wires	
Auxiliary Supply	+18V \pm 20%, 30mA max for an external transmitter supply	
Operation alarm safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts on display
	Control output	Safety value: 0...+100%. (user enabled/disabled)
	Parameters	parameter and configuration data are stored in a non volatile memory for an unlimited time
	Access protection	Password to access the configuration and parameters data
General characteristics	Power supply	100 - 240V \sim (- 15% + 10%) 50/60Hz or 24V \sim (- 25% + 12%) 50/60Hz and 24V \pm (- 15% + 25%) Power consumption 1.6W max
	Electric safety	Compliance to EN61010, installation class 2 (2500V) pollution class 2
	Electromagnetic compatibility	Compliance to the CE standards for industrial system and equipment
	Protection EN650529	IP20 termination unit IP65 front panel
	Dimensions	$\frac{1}{16}$ DIN - 48 x 48, depth 120 mm, weight 130 gr. apx.

■ WARRANTY

We warrant that the products will be free from defects in material and workmanship for 3 years 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.

Customer Service Information

Hays Cleveland Customer Service Department

1111 Brookpark Road

Cleveland OH 44109

Telephone: 216.398.4414

Fax: 216.398.8558

email: customerservice@unicontrolinc.com

<http://www.hayscleveland.com>

Repairs

Damaged or defective units may be returned to the factory for repair. However, factory authorization must be obtained before shipping whether warranty or non-warranty service is required, and all units must be shipped prepaid. Please follow this procedure. It expedites handling of the returned item, and avoids unnecessary additional charges for inspection and testing to determine the problem before repairing it.

A letter of transmittal that includes the following information should accompany the returned instrument:

1. Location, type of service, and length of time in service of the unit.
2. Description of the faulty operation of the device and the circumstances of the failure.
3. Name and telephone number of the person to contact if there are questions about the unit.
4. Indicate whether warranty or non-warranty service is requested.
5. Attach Purchase Order for all out-of-warranty repairs.
6. Complete shipping instructions for the return of the repaired instrument.
7. Original purchase order number and date of purchase.
8. Return Goods Authorization number provided by the factory when you called.
9. Clearly label the shipping container:

RETURN FOR REPAIR

Model _____

RG # _____

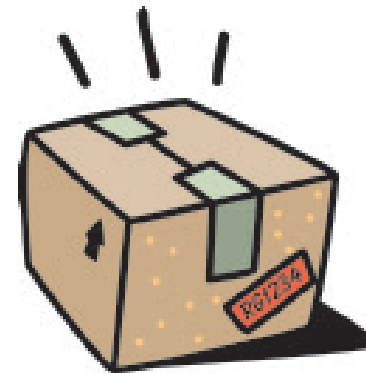
10. Ship prepaid to:

HAYS CLEVELAND

1111 Brookpark Road

Cleveland OH 44109-5869

Tel. 216.398.4414



Standard Terms and Conditions of Sale

TERMS OF SALE: 1% discount if paid in ten (10) days, net amount due and payable in thirty (30) days.

AGREEMENT OF SALE: Acceptance by Seller of any order placed for goods whether submitted on Buyer's purchase order form or on seller's Sales Order Acknowledgment form, shall be subject to Seller's Standard Terms and Conditions of Sale and is conditioned upon the Buyer's acceptance of these Standard Terms and Conditions.

TERMS OF CONTRACT: Any terms or conditions of the buyer's order which are inconsistent with these terms and conditions shall not be binding on the Seller and shall not be considered applicable to the sale or shipment of goods or materials. Unless buyer shall notify Seller in writing to the contrary within ten (10) days after the mailing of the Sales Contract by Seller, acceptance of the terms and conditions hereof by Buyer shall be indicated and, in the absence of such notification, the sale and shipment by Seller of the goods and materials covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.

PRICES: All prices and specifications and applicable discounts are subject to change without notice. Sales contracts which call for delivery in the future will be billed at prices in effect at the time of shipment. Shipping weights shown are approximate and subject to change without notice.

SHIPMENT AND PAYMENTS: All prices contained on the Sales Contract are F.O.B. factory in Cleveland, Ohio. No freight is allowed on any shipments. Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department, and at any time seller may require payment in advance or satisfactory security or guarantee that invoices will be promptly paid when due. If buyer fails to comply with any terms of payment, seller, in addition to its other rights and remedies, but not in limitation thereof, reserves the right to withhold further deliveries or terminate the Agreement, and any unpaid amount thereon shall become due immediately. Terms of payment shall be as set forth on the Sales Contract.

DELAYS AND DEFAULTS: Delays or defaults in delivery by Seller of the goods and materials covered by the Sales Contract shall be excused so far as the same is caused by fire, strikes, accident, governmental regulation, or any delays unavoidable or beyond reasonable control of Seller. In no event shall Seller be liable for any consequential, special, or contingent damages on account of any default or delay in delivery.

NON-CANCELLATION: Orders are not subject to suspension, reduction, or cancellation, except on terms that will indemnify Seller against loss.

SPECIFICATIONS: Seller relies on specifications and other data furnished by the Buyer, an architect, contractor, or consulting engineer in all phases of the work covered by the Sales Contract. Seller shall be responsible to check quantities only. Alterations to or changes in specifications, approval of samples, changes in delivery instructions and all other instructions must be submitted in writing to Seller.

In the event Seller performs design or engineering work at the request of Buyer, an architect, contractor, consulting engineer, or representative in any phase of the work covered by the Sales Contract, Seller shall not be responsible for any damages claimed by Buyer as a result of alleged errors or defects in such design or engineering work.

WARRANTY AND LIMITATION OF LIABILITY: Seller warrants that the goods supplied by it have been manufactured in accordance with its standard manufacturing practices and conform to the contract or catalog description set forth in the order. Seller further warrants that the goods supplied by it are fit for the ordinary purpose or purposes specified in its catalog for which such goods are used when installed in accordance with Seller's recommended installation procedures. Except as stated herein, Seller makes no express warranty with respect to goods supplied by it and Seller makes no warranty that the goods are fit for any particular purpose.

When the use of materials not manufactured by Seller is suggested by Seller's recommended installation procedures or otherwise, Seller makes no express warranty with respect to such materials nor that such materials are merchantable or fit for any particular purpose.

Seller will, at its sole option, credit, repair or replace, any goods supplied by it which its examination shall disclose to its satisfaction are defective in

workmanship or material and are returned to it within one year from the date of shipment and any claim not made within this period shall conclusively be deemed waived by Buyer. Credit, repair or replacement will be preconditioned upon examination of the goods by Seller, and, if requested by Seller, return of the goods to Seller at its direction and expense. No goods are to be returned to Seller without its written consent. Seller shall not be liable for any expense incurred by Buyer in order to remedy any defect in its goods. Seller shall not be liable for any consequential, special, or contingent damage or expense, arising directly or indirectly from any defect in its goods or from the use of any defective goods. The remedies set forth herein shall constitute the exclusive remedies available to Buyer and are in lieu of all other remedies.

CLAIMS: Claims for shortage of goods or for mistakes or errors in billing must be presented within forty-five (45) days from the date of shipment of goods and must state the packing slip number and container number applicable to the claim. Any claim not so presented will be conclusively deemed waived.

TAXES: Any federal taxes or other government charges on the sale, shipment, or installation of the goods or equipment covered by the Sales Contract shall be added to the price and paid by Buyer, or, in lieu thereof, the Buyer shall furnish the Seller with tax-exemption certificates acceptable to the taxing authority. The procedure also applies to duty and other similar charges on export sales. Seller is not responsible for sales and/or use tax in any state other than Ohio. The purchase made under this Sales Contract must be exempt or paid directly by Buyer. If Seller is required to pay any such tax, there shall be added to the prices quoted herein all such state and local taxes. Buyer agrees to reimburse and save Seller harmless from all such state and local taxes, including interest and penalties thereon, which may at any time be payable to any state or local government unit with respect to the sale of any goods or materials covered by the Sales Contract.

CORRECTIONS: Typographical or clerical errors contained in the Sales Contract, including prices, are subject to correction by the Seller.


FAIR LABOR STANDARDS: All goods covered by the Sales Contract have been produced in conformity with all applicable provisions of the Fair Labor Standards Act of 1938 as amended.

RENEGOTIATION: Unless advised by Buyer in writing, Seller assumes that Buyer's order and the Sales Contract are not renegotiable under the Renegotiation Act of 1951.

APPLICABLE LAW: All questions arising out of the Sales Contract, which shall be deemed an Ohio contract, shall be governed by the laws of the state of Ohio.

EXCLUSIVE TERMS: The Sales Contract shall constitute the complete contract between the parties, and no one has authority to depart from the terms and conditions set forth therein, nor to make any representations or arrangements other than those printed thereon whether in the execution or in the performance of the Sales Contract, unless the same are written on the face of the Sales Contract or are given in writing with it or in pursuance of it, and are fully approved in writing by an officer or authorized employee of the Seller.

LIMITATION FOR SUITS: Any controversy or claim arising out of or relating to this Sales Contract or the breach thereof, must be commenced within one (1) year after the cause of action accrued.

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***HC* Hays Cleveland**
Div. of UniControl Inc.
1111 Brookpark Road
Cleveland OH 44109