ASCON spa

ISO 9001
Certified

Temperature Controller with Limit Switch function

1/16 DIN - 48 x 48

M4 line

SERIES

User manual • M.I.U.M4L -1/03.10 • Cod. J30-478-1AM4L IE

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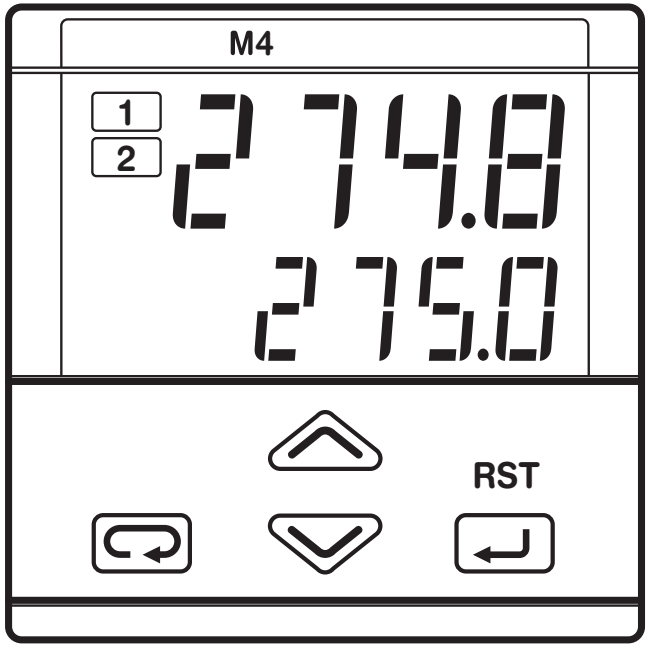
Temperature Controller with Limit Switch Function

$^{1}/_{16}$ DIN - 48 x 48

M4 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, 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.
Reapirs: 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.
All the information and warnings about safety and electromagnetic compatibility are marked with the ⚠CE sign, at the side of the note.

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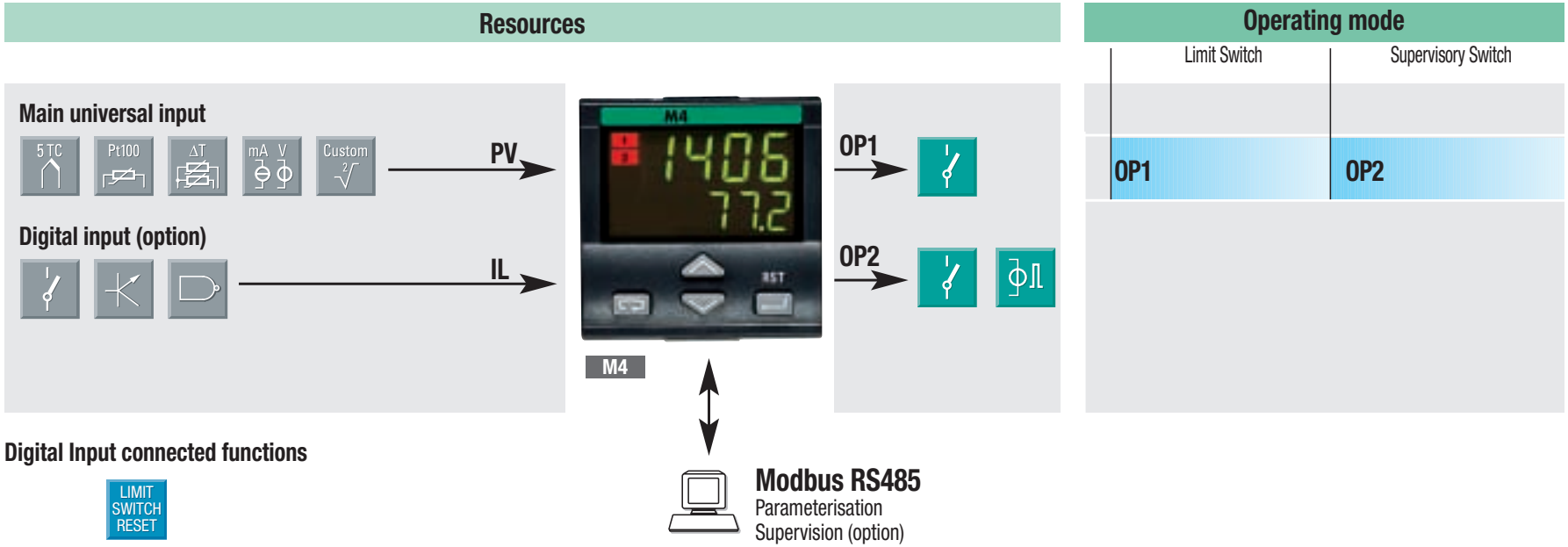


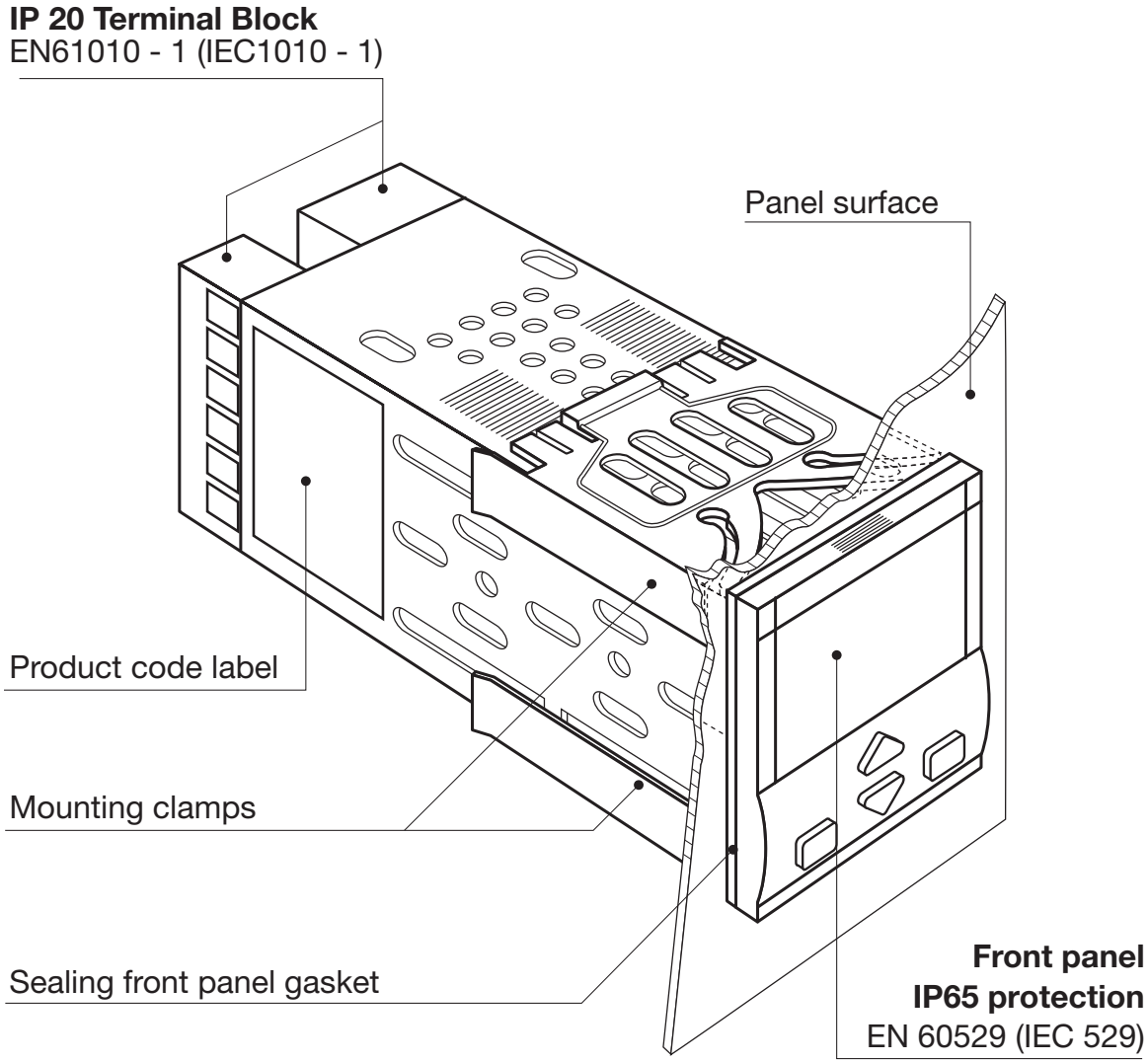
1 INSTALLATION

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 ⚠CE symbol, related to the European Community directive on electrical protection and electromagnetic compatibility.

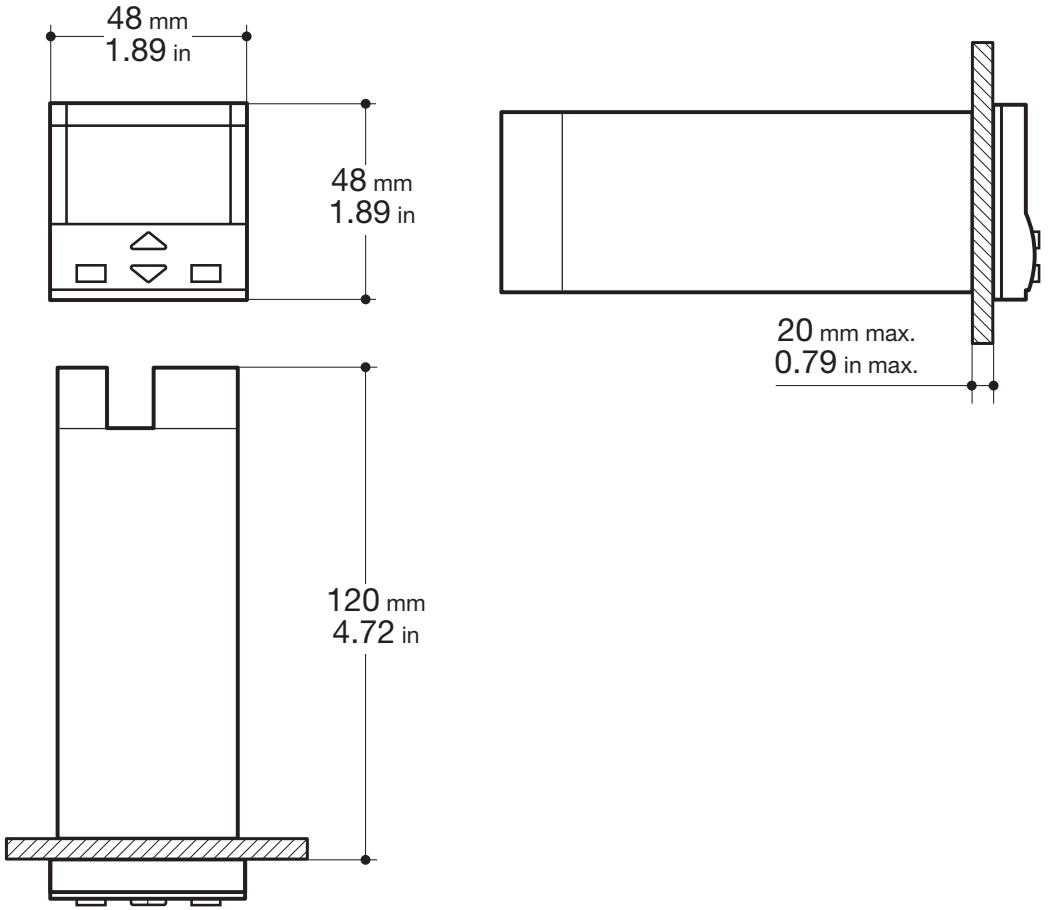
⚠CE
To prevent hands touching metal parts that may be electrically live, **the controller must be installed in an enclosure and/or in a cubicle.**



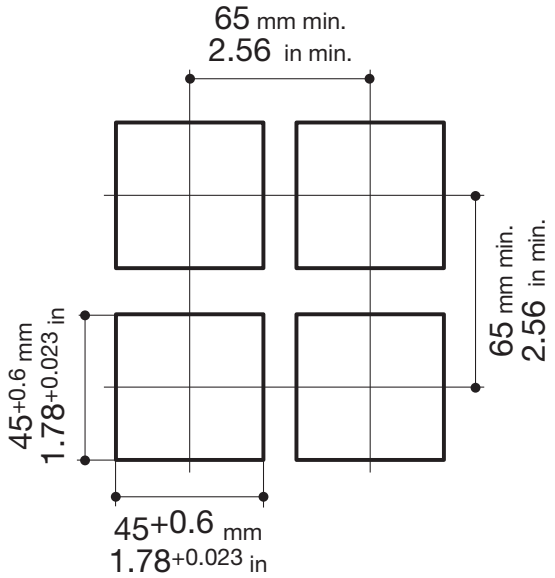
1.2 DIMENSIONAL DETAILS

1.2.1 PANEL MOUNTING MODELS

Instrument dimensions

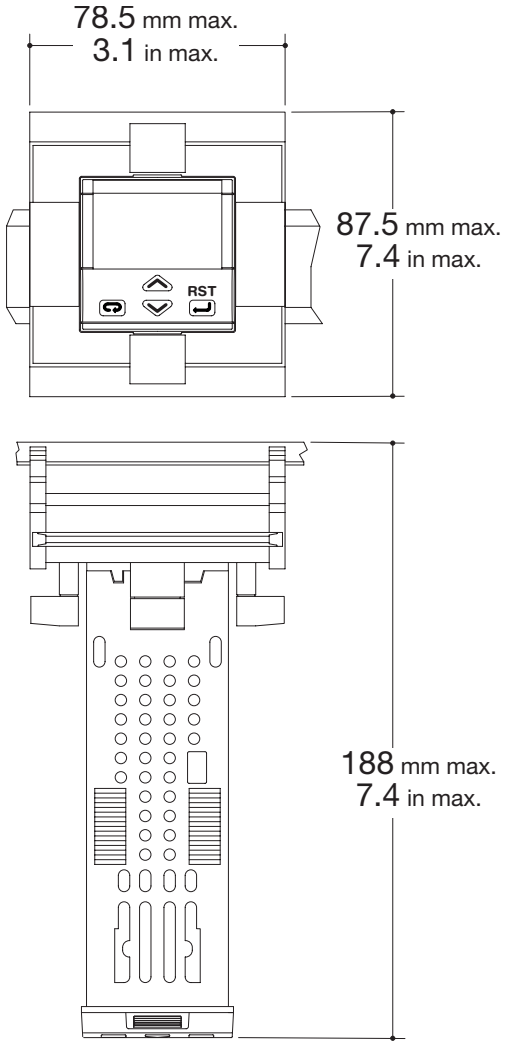


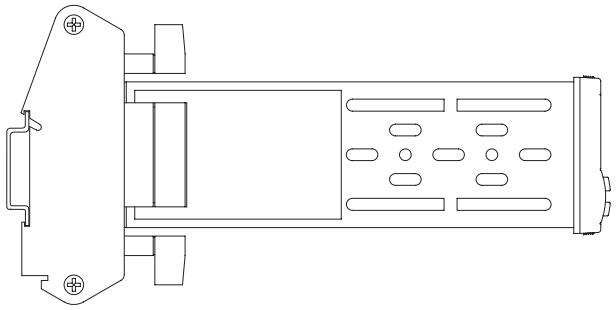
Panel cut-out



1.2.2 DIN RAIL MOUNTING MODELS

Instrument dimensions





1.4 ENVIRONMENTAL RATINGS

Operating conditions	
	Altitude up to 2000 m
	Temperature 0… 55°C
%Rh	Relative humidity 5… 95 % non-condensing

Special conditions		Suggestions
	Altitude > 2000 m	Use 24V~ supply version
	Temperature >55°C	Use forced air ventilation
%Rh	Humidity > 95%	Warm up
	Conducting atmosphere	Use filter

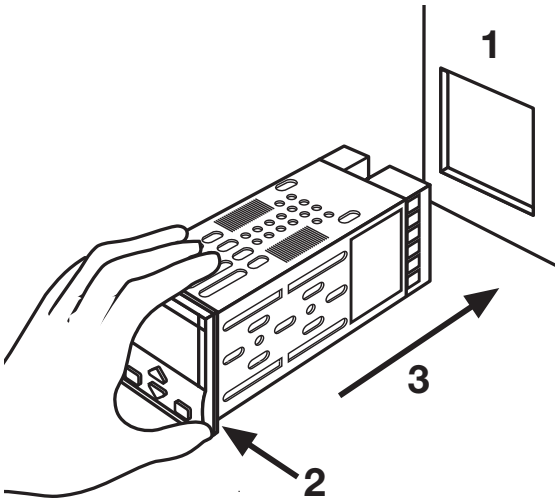
Forbidden Conditions	
	Corrosive atmosphere
	Explosive atmosphere

1.5 INSTRUMENT MOUNTING

1.5.1 PANEL MOUNTING MODELS [1]

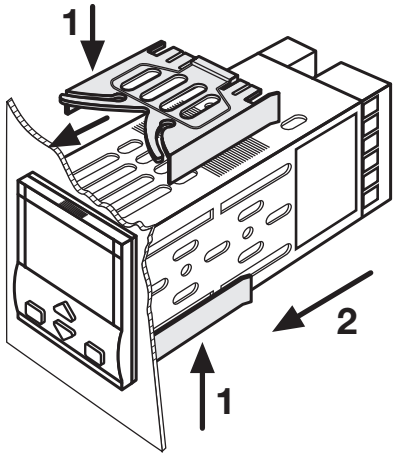
Instrument insertion

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



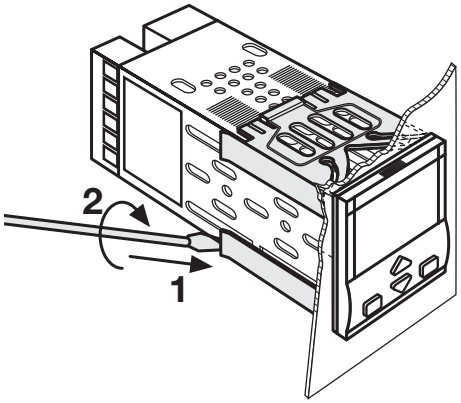
Installing the locking clamps

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



Clamps removing

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



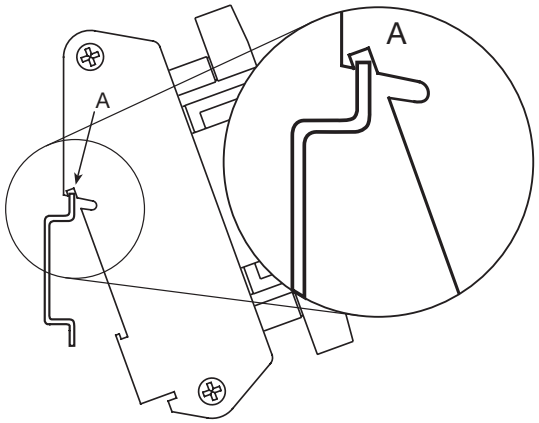
UL note

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

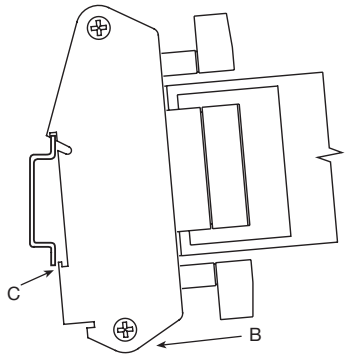
1.5.2 DIN RAIL MOUNTING MODELS

Instrument installation

1 Hook the "**A**" portion of the instrument socket to the DIN rail.

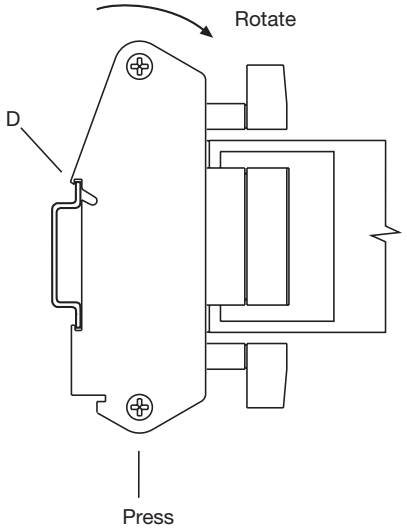


2 Press the lower part of the socket in direction "**B**". As part "**C**" is locked to the DIN rail, the instrument is correctly installed.



Instrument removal

1 Press the lower part of the DIN rail socket; when "**D**" part of the socket frees from the rail, the instrument can be removed by rotating the higher part as indicated.

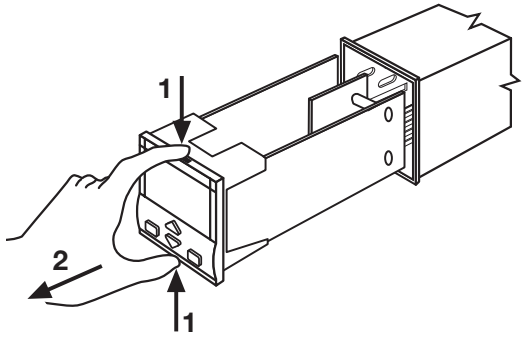


1.5.4 INSTRUMENT UNPLUGGING

The instructions that follow are valid for both the panel and DIN rail mounting models.

1 Push and

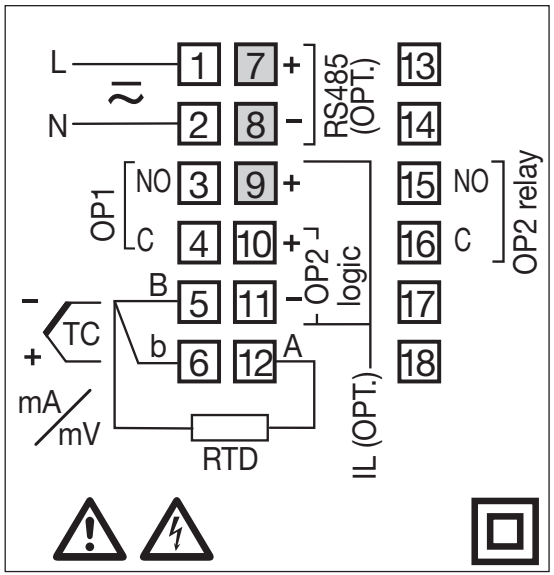
2 pull to remove the instrument.



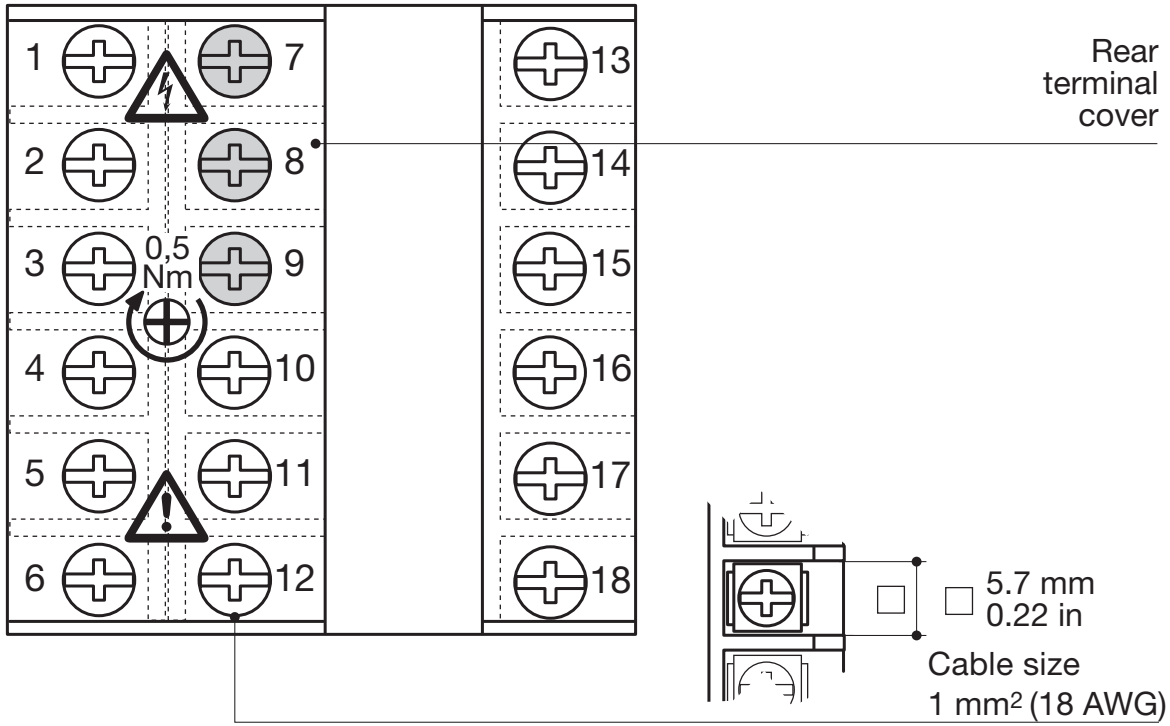
Electrostatic discharges can damage the instrument.

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

2 ELECTRICAL CONNECTIONS



2.1 TERMINAL BLOCK [1]



	18 screw terminals
	Option terminals
	Tightening torque 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 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.

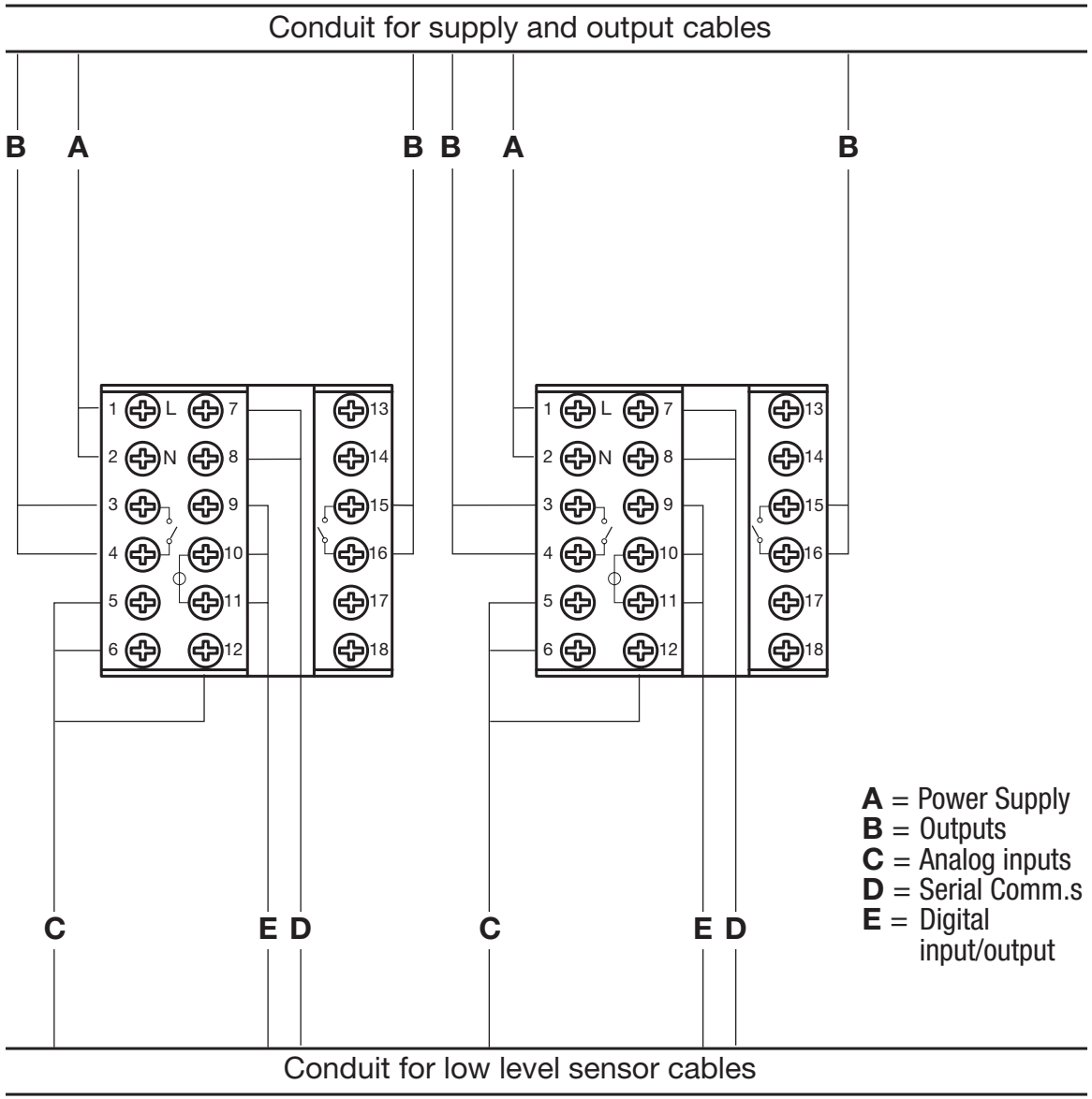
⚠

All the wiring must comply with the local regulations.

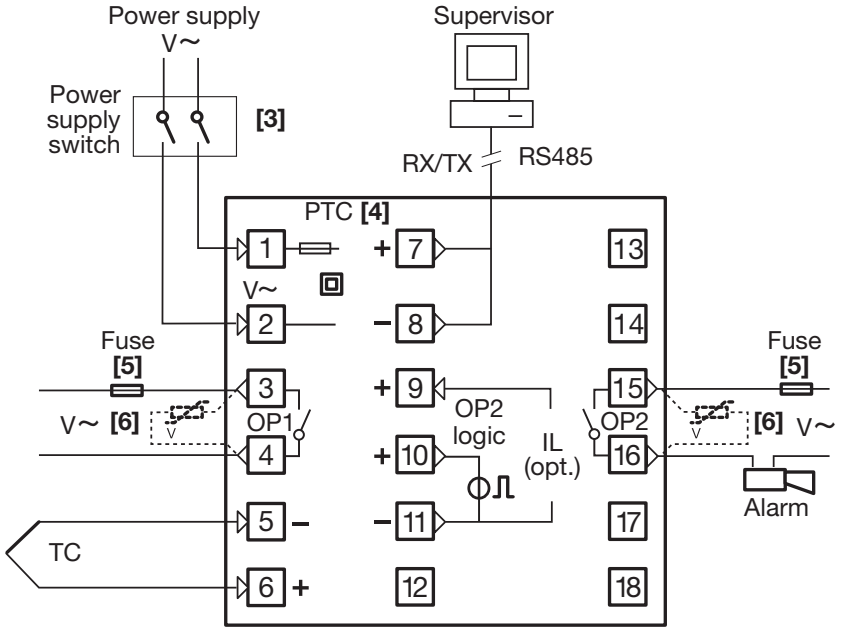
The supply wiring should be routed away from the power cables.
Avoid to use electromagnetic contactors, power Relays and high power motors nearby.
Avoid power units nearby, especially if controlled in phase angle

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 SUGGESTED WIRES ROUTING



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 PTC protected. In case of failure it is suggested to return the instrument to the manufacturer for repair.

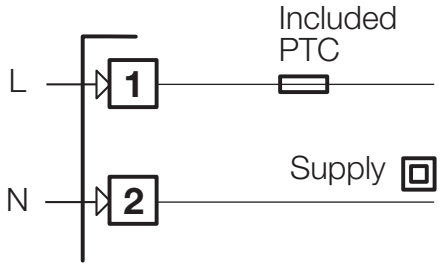
5] To protect the contacts of the relay outputs (OP1 and OP2) use a 2 A~ T (220 V~) or a 4 A~ T (120 V~) .

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 PTC protection.

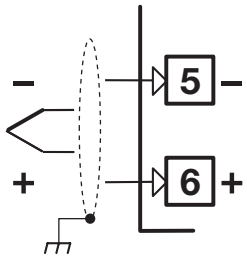
- *Standard version:*
  nominal voltage: 100... 240V~ (-15%/+10%);
  frequency: 50/60Hz.
- *Low Voltage version:*
  nominal voltage: 24V~ (-25%/+12%);
  frequency: 50/60Hz or 24V– (-15%/+25%).
- Power consumption: 2,6W max.



2.3.2 PV CONTROL INPUT

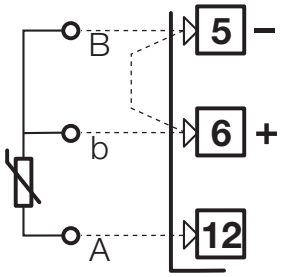
A For L-J-K-S-T thermocouple type

- 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

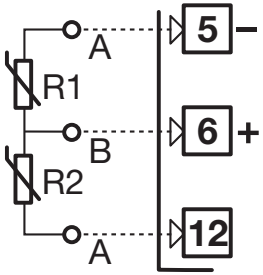
- If a 3 wires system is used, use always cables of the same section (1mm² min.) (line 20 Ω/lead maximum resistance).
- When using a 2 wires system, use always cables of the same section (1,5mm² min.) and put a jumper between terminals 5 and 6.



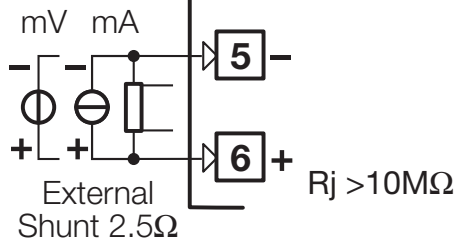
C For ΔT (2x RTD Pt100) Special

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

R1 + R2 must be <320Ω

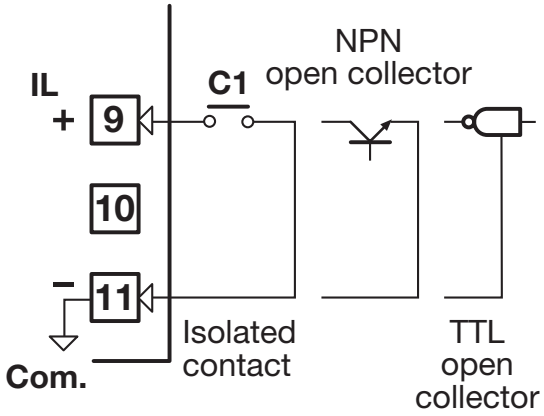


D For mA, mV



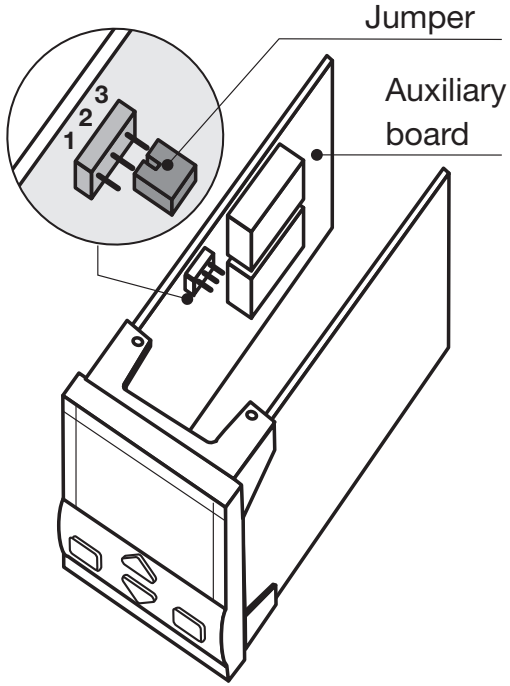
2.3.3 DIGITAL INPUT (option)

- 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.
- The digital input allows to perfom a Limit switch reset.



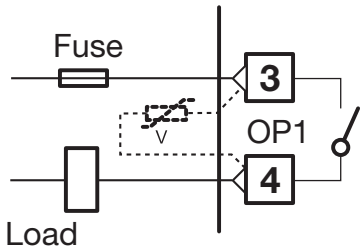
2.3.3 OP1 - OP2 OUTPUTS

OP2 output can be Relay (Std) or SSR drive.
The jumper on the auxiliary board selects the output type:
- Short Pins 1-2 for OP2-Relay;
- Short Pins 2-3 for OP2-Logic.



LIMIT SWITCH RELAY OUTPUT (OP1)

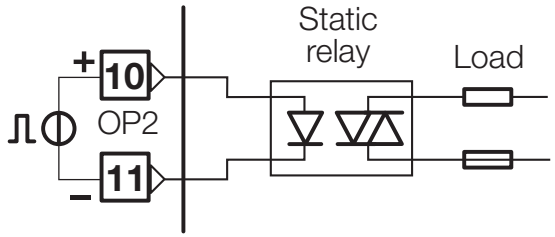
Single relay output
- NO contact for resistive load of up to 2A/250V~ max. or 4 A~ T at 120 V~;
- Fuse: 2A~ T at 250 V~ or 4 A~ T at 120 V~ (IEC 127).



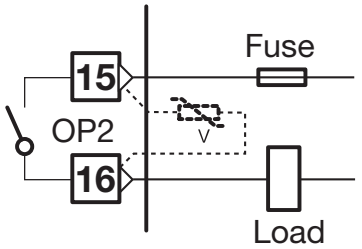
Varistor for inductive load 24V~ only

SUPERVISORY SWITCH RELAY OR LOGIC OUTPUT (OP2)

SSR drive output not isolated
- 0… 5V–, ±20%, 30 mA max.



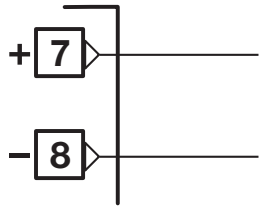
Single relay output
- NO contact for resistive load of up to 2A/250V~ max. or 4 A~ T at 120 V~;
- Fuse: 2A~ T at 250 V~ or 4 A~ T at 120 V~ (IEC 127).



Varistor for inductive load 24V~ only

2.3.8 SERIAL COMMUNICATIONS (option)

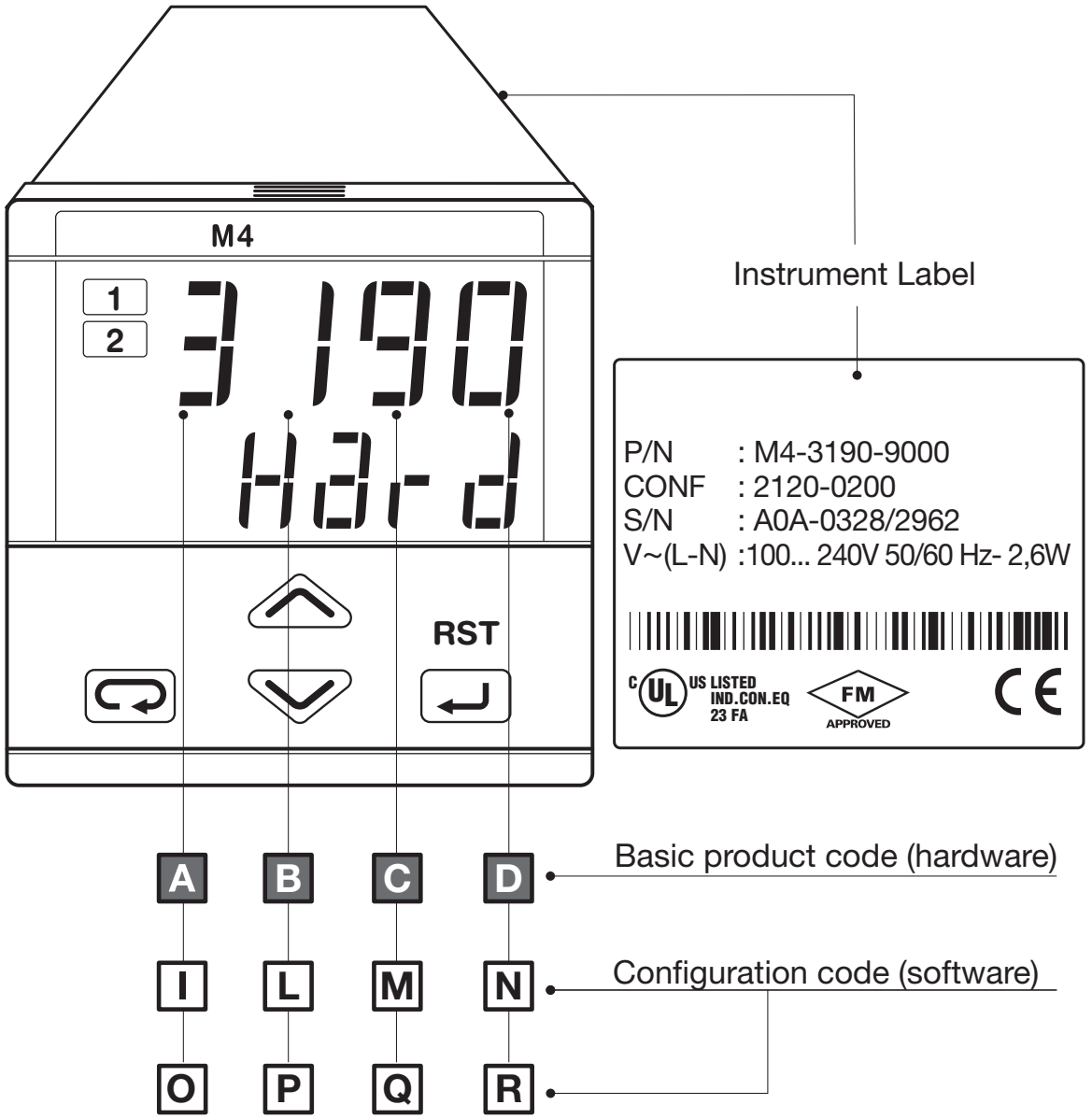
- Galvanic isolation 500V~/1 min.
- Compliance to the EIA RS485 standard for Modbus/Jbus.



⚠ Please, read the user manual: **"M4 *serial communications and configuration software*".**

3 PRODUCT CODING

The complete code is shown on the instrument label. The informations about product coding are accessible from the front panel by means of a particular procedure described at section 4.2.2 page 21



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			
Model:	M	4	A	1	C	0	-	9	F	G	H

Line	**M 4**

Power supply	**A**
100 - 240V~ (- 15% + 10%)	**3**
24V~ (- 25% + 12%) or 24V– (- 15% + 25%)	**5**

Serial Communications	**C**
Not fitted	**0**
RS485 Modbus/Jbus protocol	**5**
Digital input	**9**

User manual	**F**
Italian/English	**0**
French/English	**1**
German/English	**2**
Spanish/English	**3**

Front bezel colour	**0/4... 20 mA Input shunt resistor [1]**	**G**
Dark grey (std)	Standard resistor	**0**
Beige	Standard resistor	**1**
Dark grey (std)	High accuracy resistor	**2**
Beige	High accuracy resistor	**3**

Mounting	**H**
Panel mounting (standard)	**0**
DIN rail mounting with display	**1**

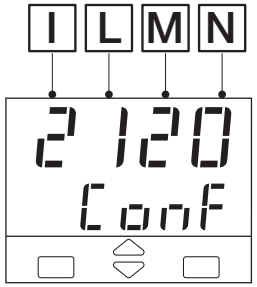
Notes:

1] Standard shunt resistor without field calibration will provide: 1.10% input accuracy for 0/4...20 mA input.
High accuracy shunt resistor without field calibration will provide: 0.20% input accuracy for 0/4... 20 mA input.
Both shunt resistors with field calibration will provide 0.10% input accuracy for 0/4... 20 mA input.

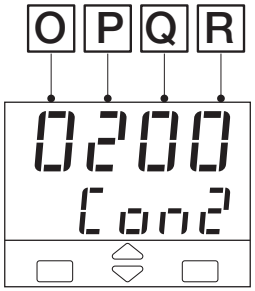
3.2 CONFIGURATION CODING

The configuration code consists of 8 digits that identify the operating characteristics of the controller, as chosen by the user.
Paragraph 4.6 at page 30 reports the instructions how to set a new configuration code.

1st part of configuration code



2nd part of configuration code



The configuration code can be displayed on the front panel, following the instructions at paragraph 4.2.2 page 22.

Input type and range			**I**
TR Pt100 IEC751	-99.9…300.0 °C	-99.9…572.0 °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 Chromel -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**

Value shown on the lower display in operator mode	**L**
Limit switch alarm (AL1) threshold	**1**
Supervisory switch alarm (AL2) threshold	**2**

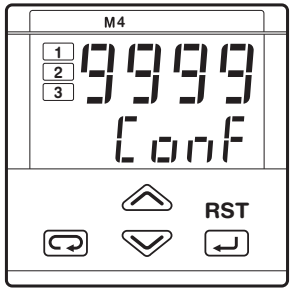
Alarm 1 (AL1) Limiter Power-ON condition	**M**
Automatic reset	**0**
Manual reset	**1**
Status retention	**2**

AL1 function	**N**
High limiter	**0**
Low limiter	**1**

Digital input [1]	**O**
AL1 Acknowledge enabled	**0**
AL1 Acknowledge disabled	**1**

Note [1] This code must be 1 when the serial communication option is not present in the istrument.

If, when the controller is powered ON 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 page 35).

Alarm 2 (AL2) type and function		**P**
Not active		**0**
Sensor break alarm		**1**
Absolute	Active high	**2**
	Active low	**3**
Deviation	Active high	**4**
	Active low	**5**
Band	Active out	**6**
	Active in	**7**

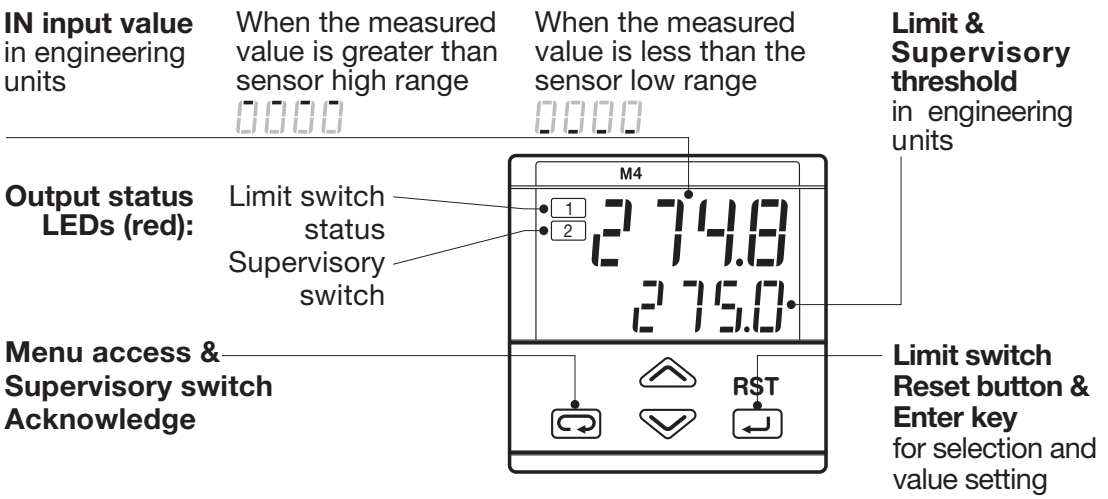
AL2 action	**Q**
Direct	**0**
Reverse	**1**

AL2 reset	**R**
Auto	**0**
Manual	**1**

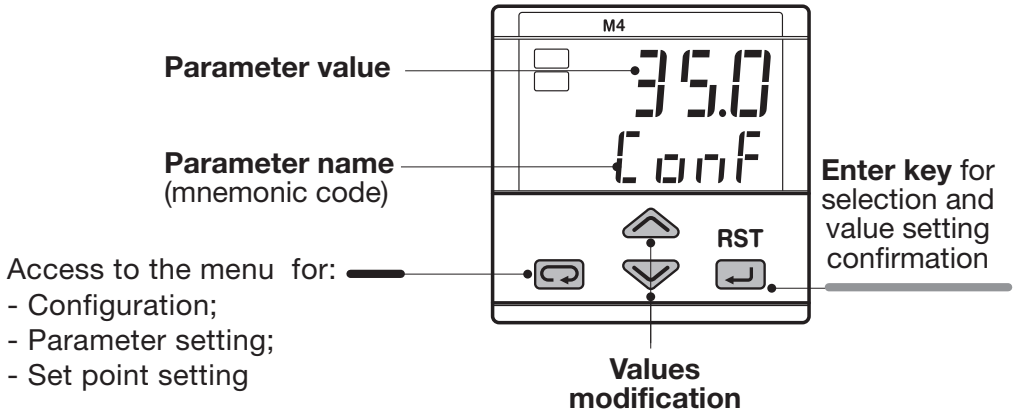
4 OPERATIONS

4.1 OPERATOR PANEL

4.1.1 KEYS FUNCTIONS AND DISPLAY IN OPERATOR MODE



4.1.2 KEYS FUNCTIONS AND DISPLAY IN PROGRAMMING MODE



4.1.3 OPERATOR INTERFACE

During normal operation the instrument is in Operator Mode: the upper display shows the Process Value (IN) in engineering units and the lower display shows the current setting for AL1 or AL2 threshold.

The limiter can be configured to show the AL1 threshold on the lower display (configuration code L=1). Pressing the up or down keys the AL2 threshold will be displayed for 5 seconds.

The limiter can be configured to show the AL2 threshold the lower display (configuration code L=2). In this case, pressing the up or down keys the AL1 threshold will be displayed for 5 seconds.

Any operator operation other than limiter AL1 acknowledge (↵ key) or auxiliary AL2 acknowledge (↻ key) when the AL2 is configured, is protected by password access.

Pressing the RESET key (↵) during normal operation has no effect.

During normal operation, pressing the menu access key (↻), and introducing the correct password value, the Operator can enter in Programming Mode to set parameters and configure the instrument.

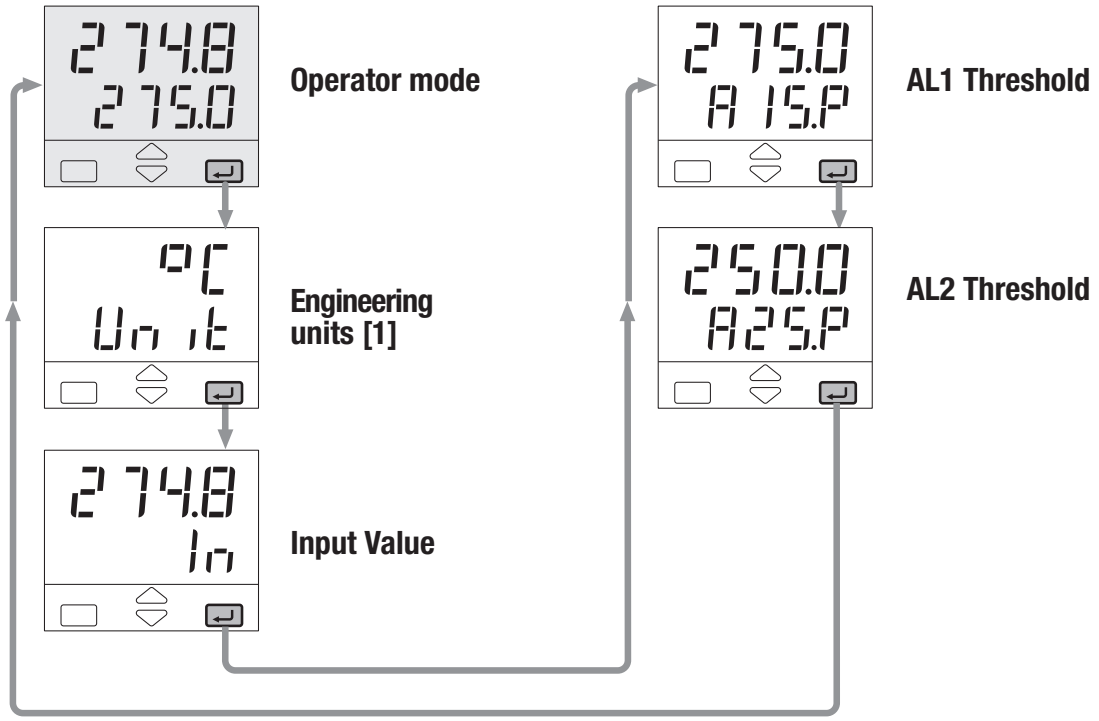
4.2 DISPLAY

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 seconds from the end of the operation, the controller returns to the normal operating conditions.

4.2.1 PROCESS DATA DISPLAY

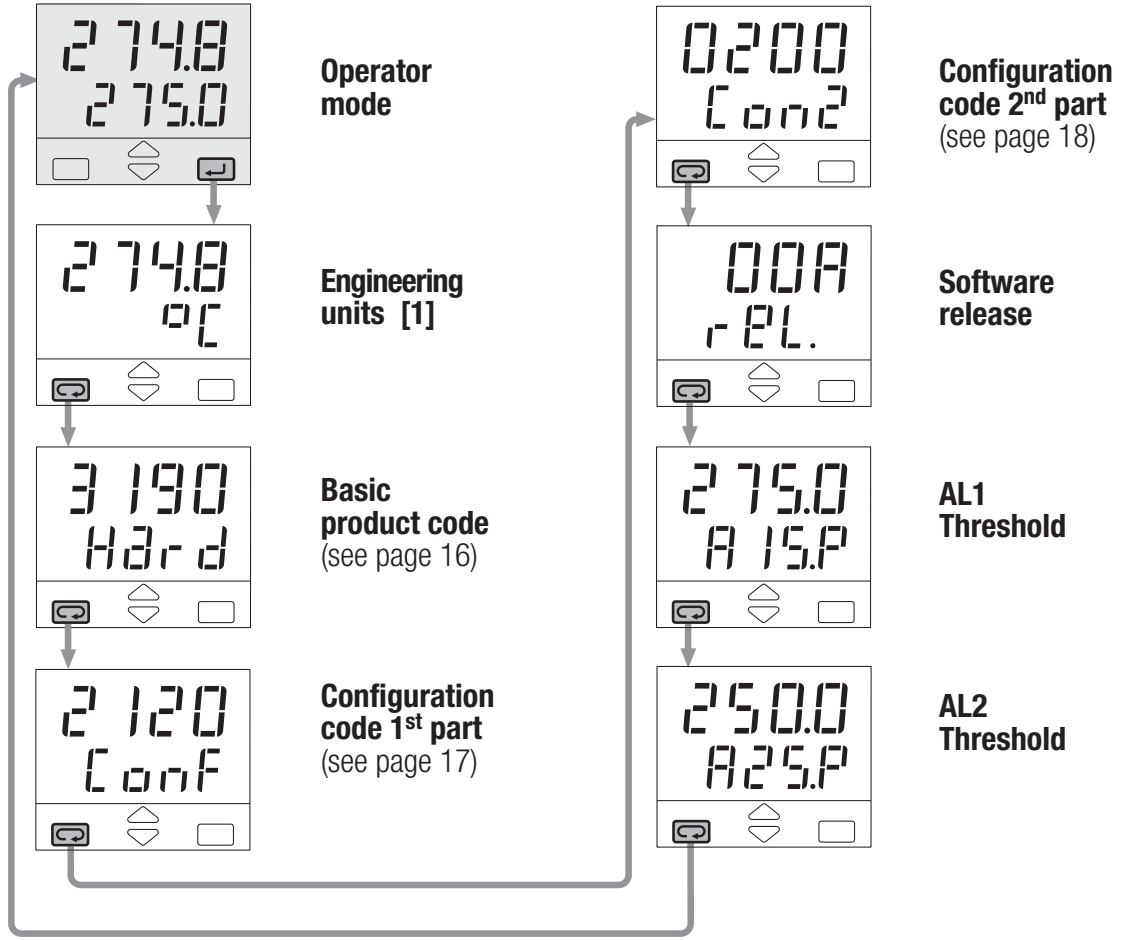


Note

[1] See table page 31

4.2.2 CONFIGURATION CODES DISPLAY

When necessary, the operator can view the instrument main data (no changes are possible with the present procedure).



Example: M4 - 3190 - 2120 / Release 00A

Note
[1] See table page 31

4.3 PARAMETER SETTING

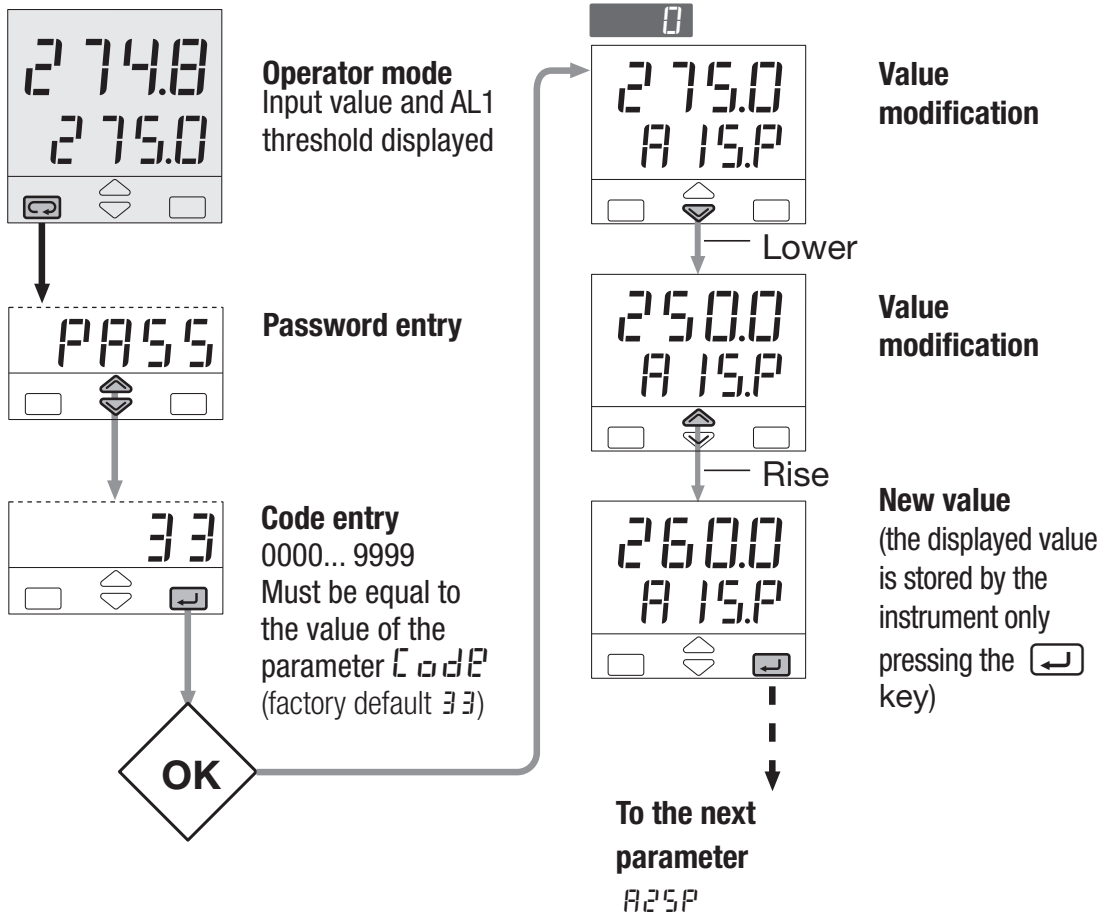
4.3.1 NUMERIC ENTRY

(e.g. the modification of the AL1 threshold from 275.0 to 240.0)

Press ∧ or ∨ momentarily to change the value of 1 unit each time the key is pressed.

Pressing the ∧ or ∨ key for a longer time changes the value, at rate that doubles every second. Releasing the button the rate of change decreases.

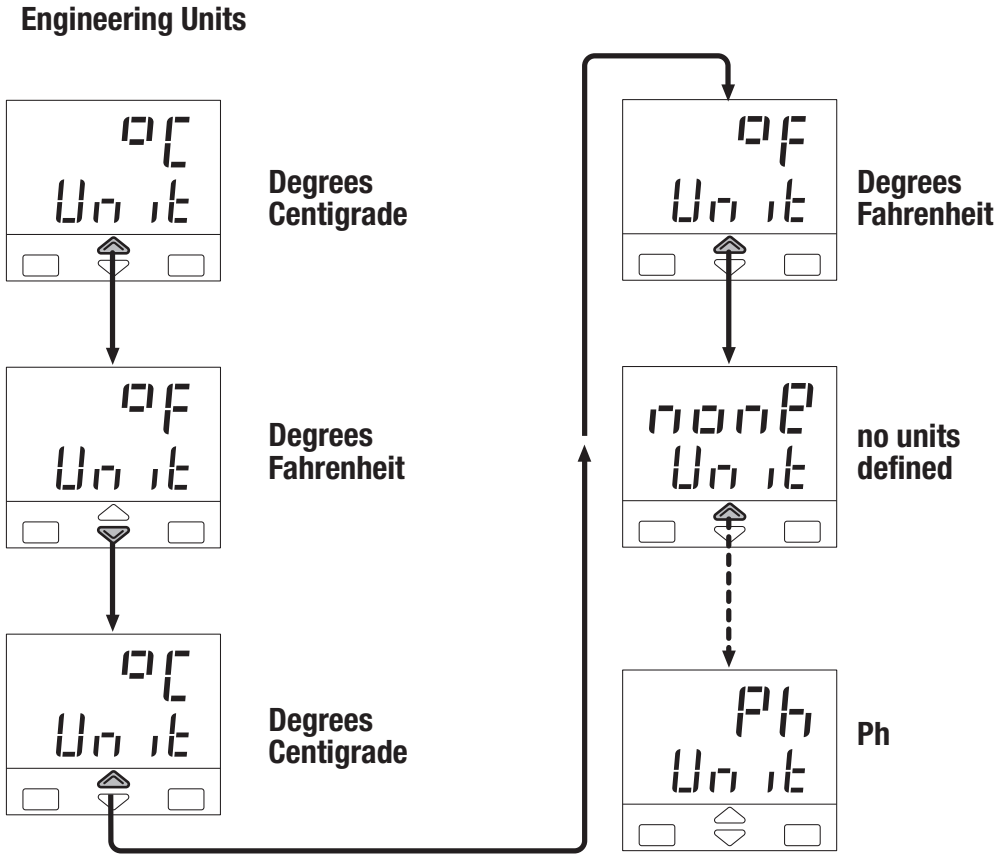
In any case the change of the value stops when it has reached the max./min. limit set for the parameter.



4.3.2 MNEMONIC CODES SETTING

(e.g. configuration see page 30)

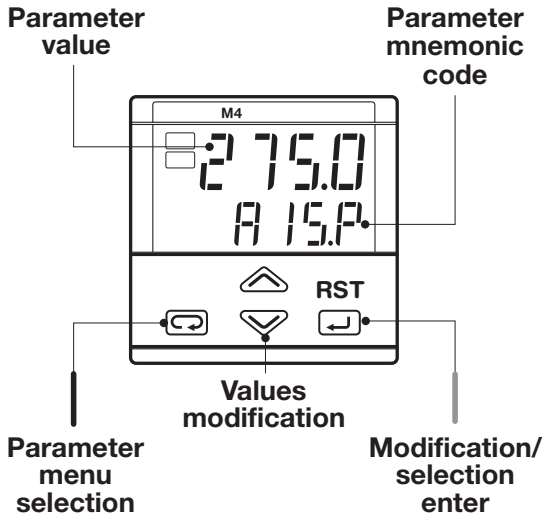
Pressing istantaneously the ∧ or ∨ key, the system shows the next or the previous mnemonic code of the selected parameter. Pressing the ∧ or ∨ keys for a longer time causes the system to show the further mnemonic codes at a rate of one every 0.5 s. The mnemonic code displayed at the time the next parameter is selected using the ↵ key, is the one stored in the parameter.

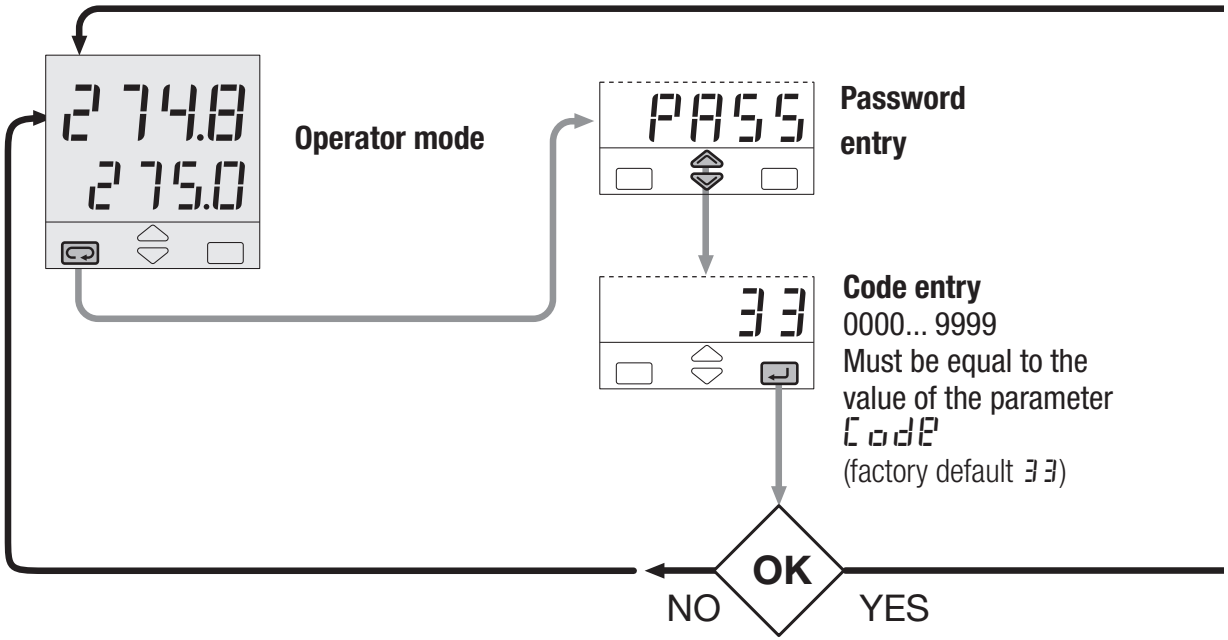


4.4 PARAMETERISATION

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

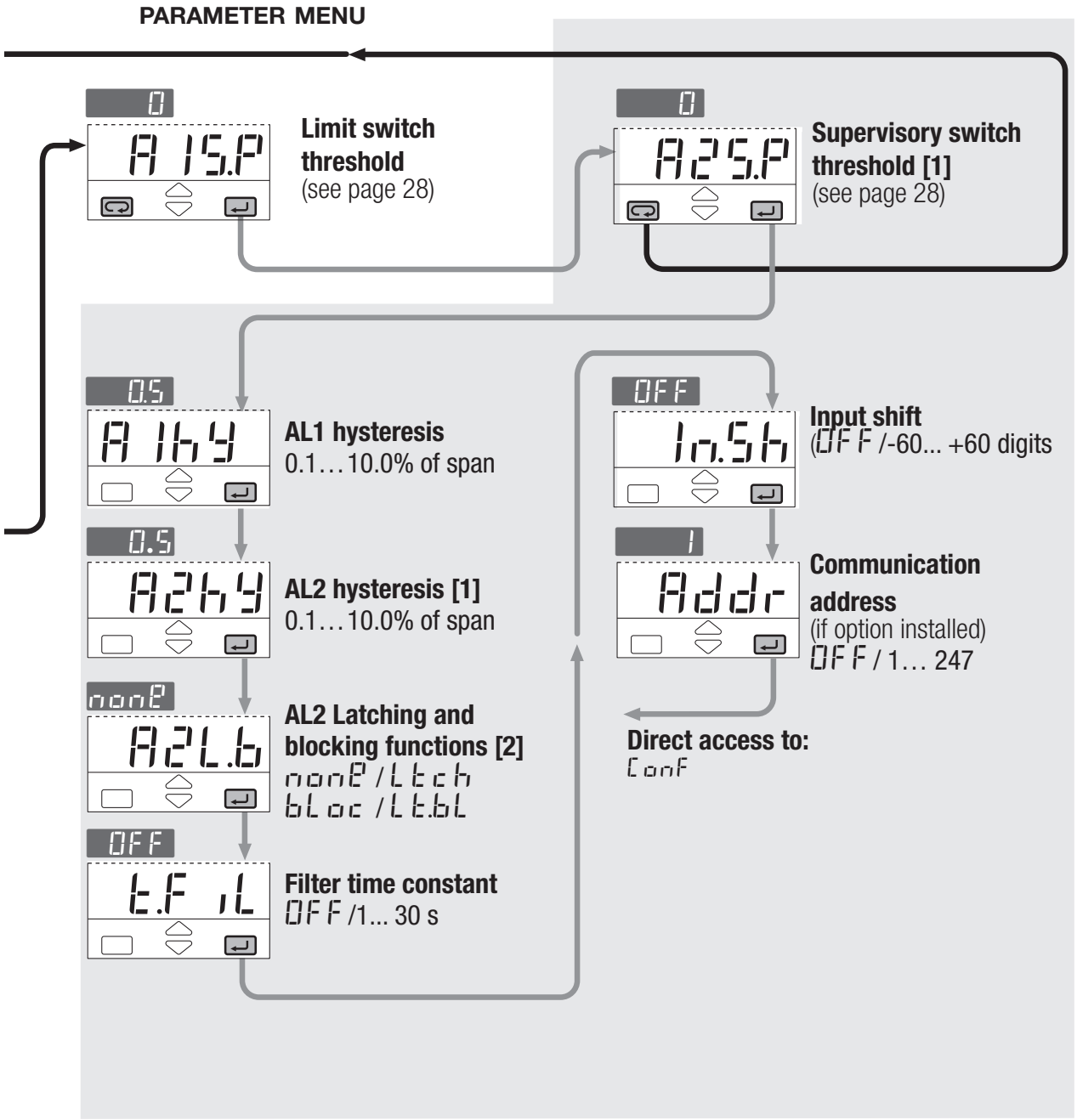




Notes

[1] Not presented if the controller has been configured as: AL2 not active or sensor break (configuration code P = 0 or 1)

[2] When the AL2 alarm is configured as "**Sensor Break**" (configuration code P = 1) the only choices available are: None and Latching.


PARAMETER MENU
0
A 1S.P
Limit switch threshold
(see page 28)
0
A2S.P
Supervisory switch threshold [1]
(see page 28)
0.5
A 1hy
AL1 hysteresis
0.1…10.0% of span
0.5
A2hy
AL2 hysteresis [1]
0.1…10.0% of span
nonE
A2L.b
AL2 Latching and blocking functions [2]
nonE / Ltch
bLoc / Lt.bL
OFF
t.F ,L
Filter time constant
OFF /1... 30 s
OFF
In.Sh
Input shift
(OFF /-60... +60 digits
1
Addr
Communication address
(if option installed)
OFF / 1… 247
Direct access to:
ConF

4.5 PARAMETERS

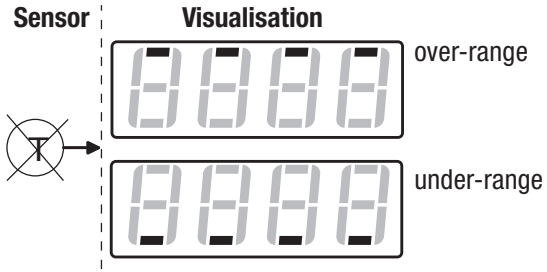
AL1 Limit Switch threshold

Threshold value that triggers the limit switch alarm condition. In engineering units.

AL2 Supervisory threshold

The alarm occurrences handle the OP2 output in different ways, according to the configured alarm types, as illustrated:

Sensor failure (break, disconnection etc.)



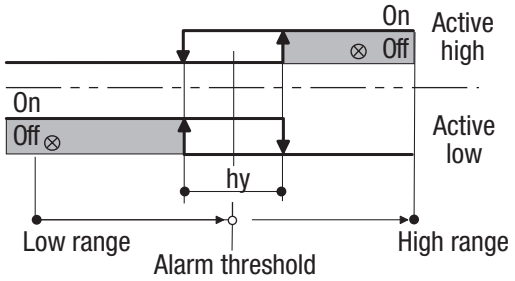
If a sensor failure occours, the instrument detects and displays an over-range or under-range input condition as specified in the following table.

PT100	
Wire **A** open	Over-range
Wires **A** and **B** in short circuit, wire **b** open	Over-range for a while, then under-range
All other conditions	Under-range

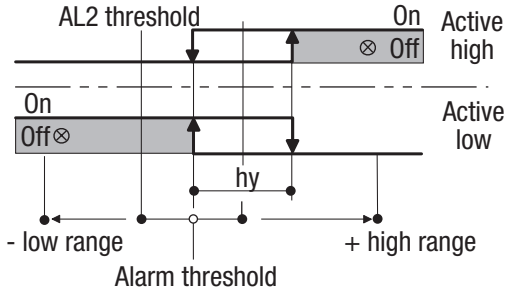
Thermocouple	
All conditions	Over-range

Analog input	
Short circuit between the wires	Under-range
All other conditions	Over-range

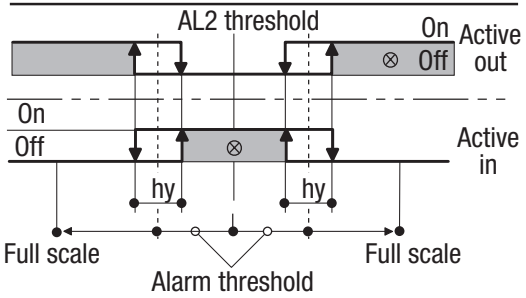
Absolute alarm (full scale)**- AL2**



Deviation alarm - AL2



Band alarm - AL2



Absolute alarm is referred to AL2 threshold, while deviation and band alarms are referred to AL1 threshold. If ***Direct action*** is selected for AL2 (configuration code **Q=0**), OP2 output will be activated during AL2 condition; if ***Reverse action*** is selected (configuration code **Q=1**), OP2 output will be released during AL2 condition. Only OP2 action can be configured, limiter function on OP1 operates only in fail safe mode.

AL2 reset function is only effective if latching has been selected for AL2 output.

If ***Auto*** is selected (configuration code **R=0**), AL2 reset will be performed after acknowledgement and exiting from the alarm condition. If ***Man*** is selected (configuration code **R=1**), acknowledgement will reset AL2 regardless to the alarm condition.

AL1 limit switch hysteresis

AL2 supervisory switch 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.

AL2, latching and blocking functions

For AL2 alarm it is possible to select the following functions:

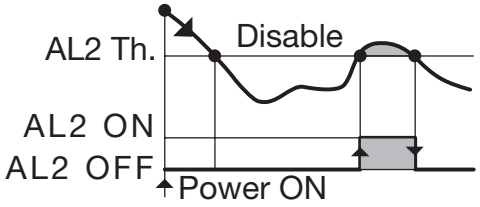
- none
- latching
- blocking
- both latching and blocking

AL2 ACKNOWLEDGE FUNCTION

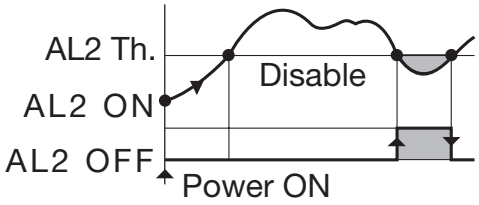
The alarm, once occurred, is presented on the display until to the time of acknowledge.
The acknowledge operation consists in pressing the key.
After this operation, the alarm leaves the alarm state only when the alarm condition is no longer present.

ALARM_2 START-UP DISABLING

Ramp down (e.g.: AL2 Abs. high)



Ramp up (e.g.: AL2 Abs. low)

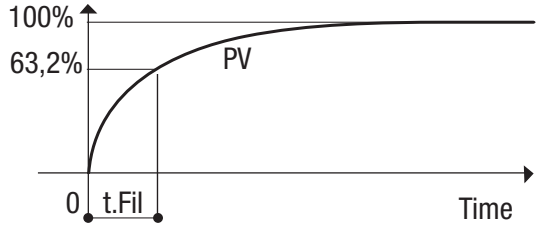


Not available when sensor break is selected for AL2.

Input filter time constant

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

Filter response



Input shift

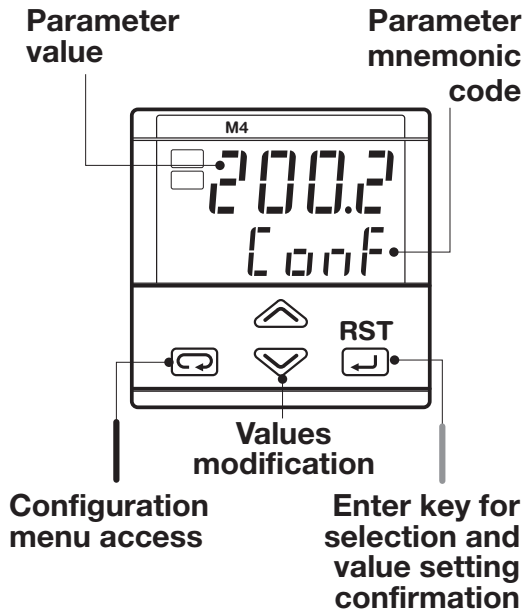
This value is added to the measured input value (IN). Its effect is to shift the whole PV scale of up to ±60 digits.

Controller address

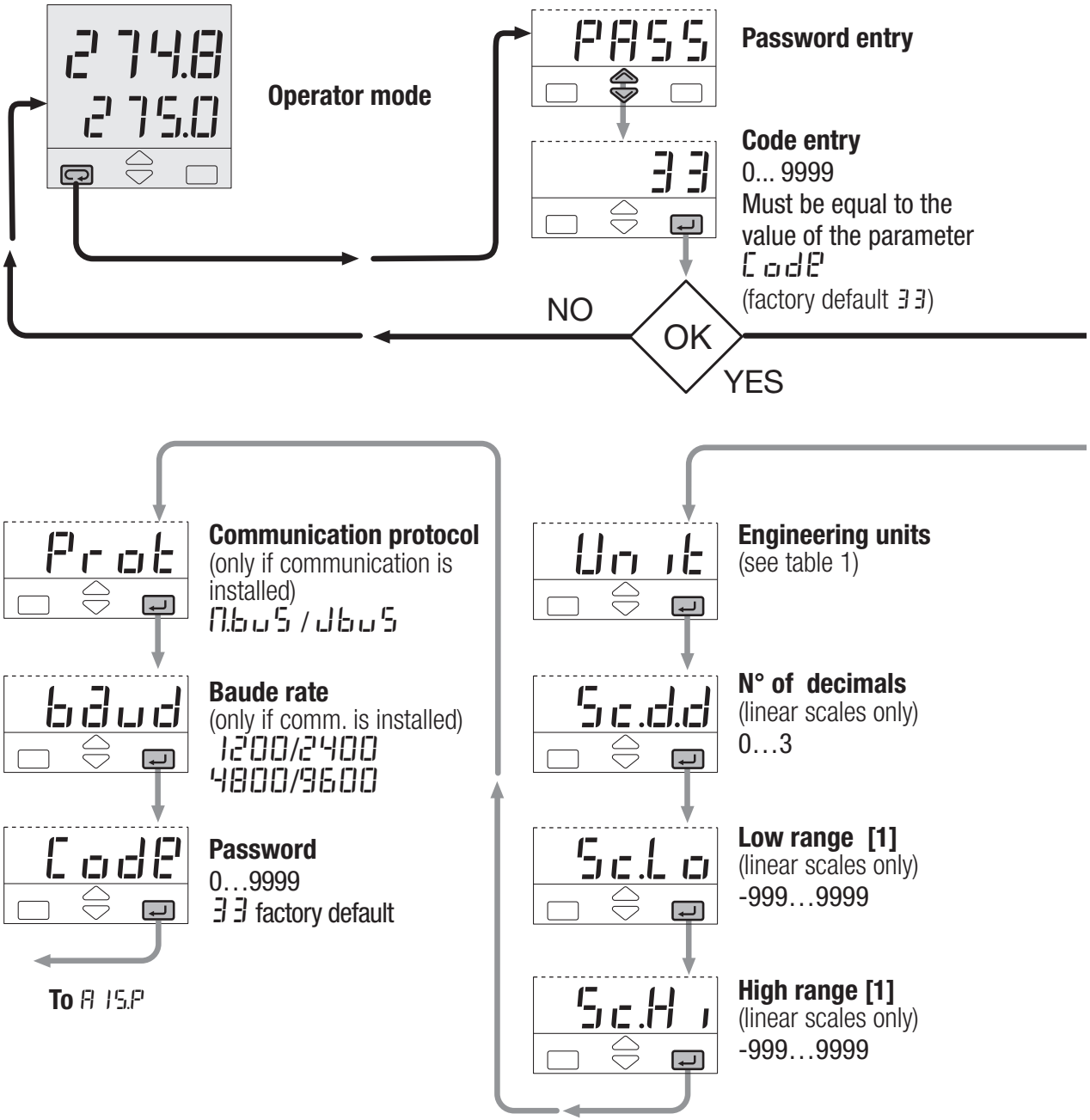
the address range is from 1 to 247 and must be unique for each controller on the communication bus to the supervisor.
When set to OFF, the controller is not communicating.

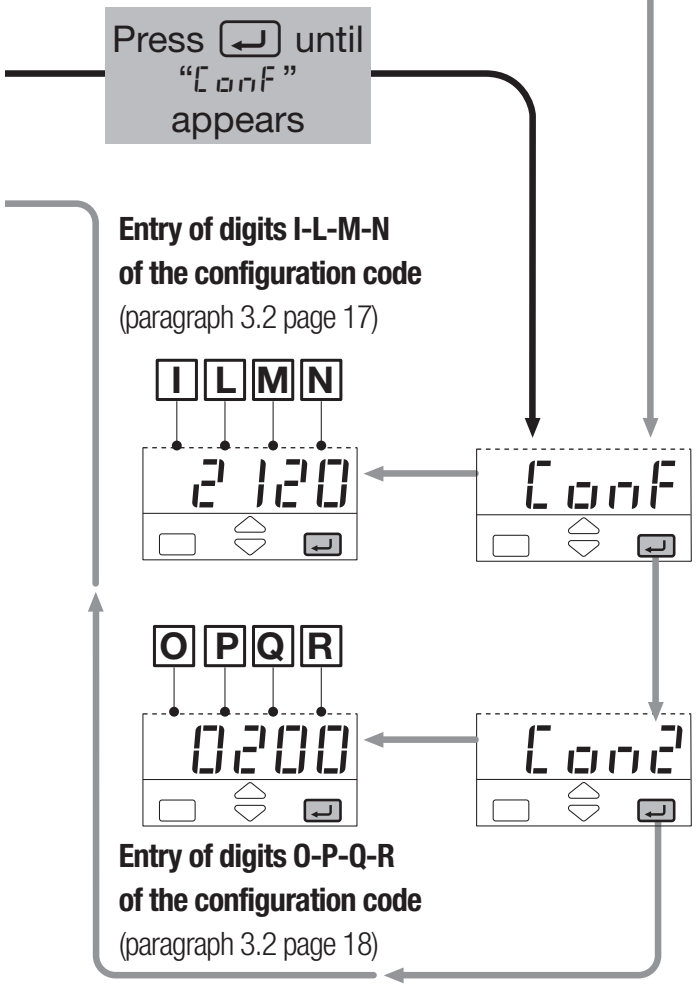
4.6 CONFIGURATION

The configuration of the controller is specified through a 8 digit code that defines the type of input and alarms. (paragraph 3.2 page 17)



Press ∧ or ∨ to display the next parameter or the next code and to change its value.
The new value entered is stored into the controller when the next parameter is selected by pressing ↵.





Direct access to the configuration

A From parameterisation (see page 28).

B At the first power on when the controller is not configured:

In this situation, the controller has its outputs and inputs not active.
This situation ends when a correct configuration code is entered.

[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.

[3] To return to the operator mode press, from any position, the ↩ key.

5 LIMIT SWITCH FUNCTION

In order to have the limit switch function the product code must be similar to te one that follows:
M4 3190-**9**000

5.1 LIMIT SWITCH FUNCTION (ALARM_1)

The limiter can operate as a high limiter or low limiter. Only output relay OP1 can be used as limit switch.

The limiter output relay OP1 is energized (contact closed) during normal operation and is de-energized (contact open) when the alarm is activated or when a power failure occurs (fail safe mode).

If "***High limiter***" is selected (configuration code N=0), the limiter will go in alarm condition when the input exceeds the alarm threshold or when a failure of the input occurs.

If "***Low limiter***" is selected (configuration code N=1), the limiter will go in alarm condition when the input drops below the alarm threshold or when a failure of the input occurs.

Then, after an alarm occurred, when the input returns to a normal value (i.e. drops below the AL1 threshold for high limit, or rises above AL1 threshold for low limit), the OP1 relay will remain de-energized with the contact open until the operator manually acknowledges the alarm by either of two methods:

- Pressing the "**Enter key**" (↵ RST) on the front panel of the limiter

or

- Closing the digital input "**IL**" (if the option is available and this function is enabled).

LED1 will:

- Flash when a new non-acknowledged alarm occurs;
- Remain steady ON when the AL1 is acknowledged but still exists.

The complete operation mode is detailed in the table that follows:

<table>
<tr><th>Limiter status</th><th>OP1 contact</th><th>Led 1</th><th colspan="3">Limiter can change status by:</th></tr>
<tr><td rowspan="3">Non alarm status</td><td rowspan="3">Energized
(contact closed)</td><td rowspan="3">OFF</td><td colspan="2">Input conditions</td><td rowspan="3"></td></tr>
<tr><td>Normal operation</td><td>AL1 condition</td></tr>
<tr><td>Stays in non alarm status</td><td>Transition to non-acknowledged status</td></tr>
<tr><td rowspan="3">Non-ackowledged status</td><td rowspan="3">De-energized
(contact open)</td><td rowspan="3">Flashing</td><td colspan="2" rowspan="3"></td><td colspan="2">Reset</td></tr>
<tr><td>Ack</td><td>Non-Ack</td></tr>
<tr><td>Transition to acknowledged status</td><td>Stays in non-acknowledged status</td></tr>
<tr><td rowspan="3">Ackowledged status</td><td rowspan="3">De-energized
(contact open)</td><td rowspan="3">Steady ON</td><td colspan="2">Input conditions</td><td rowspan="3" colspan="2"></td></tr>
<tr><td>Normal operation</td><td>AL1 condition</td></tr>
<tr><td>Returns to non alarm status</td><td>Stays in acknowledged status</td></tr>
</table>

If "***Digital Input AL1 Ack enable***" is selected (configuration code O=0), the digital input will be logic OR with the reset key (↵), for acknowledge AL1.

Selecting "***Digital Input AL1 Ack enable***" (configuration code O=1), the digital input will have no function (page 17).

The limiter has a Status Retention capability, it only applies to the Limiter AL1 and OP1 output status. If the limiter is configured for the Status Retention and the power is switched ON, the limiter will operate as detailed in the table that follows:

Limiter Status at previous power OFF	Input AL1 condition at new power ON	Limiter Status at new power ON	OP1 Relay contact	LED 1
Non alarm status (normal operation)	Normal operation	Non Alarm status	Close	Steady OFF
	Alarm condition true	Non Acknowledged alarm	Open	Flashing
Non Ancknowledged alarm	Normal operation	Non Acknowledged alarm	Open	Flashing
	Alarm condition true			
Ancknowledged alarm	Normal operation	Non Alarm status	Close	Steady OFF
	Alarm condition true	Acknowledged alarm	Open	Steady ON

If "***Automatic Reset***" is selected (configuration code M =0), at power ON, the limiter status will depend on the input value (i.e.: if at power ON the input value is in the safe operating range, the limiter automatically will enter in non-alarm status.

If "***Manual reset***" is selected (configuration code M =1), at power ON, the limiter status will be forced to Non-acknowledged Alarm.

If "***Status retention***" is selected (configuration code M=2), at power ON, the limiter status will be forced to the status of the limiter at previous power down time, as described in the table. Status retention does not apply to any condition regarding AL2 (AL2 operation at power ON depends on input value).

5.2 SUPERVISORY SWITCH (AL2)

The OP2 relay output contact is used as a normal auxiliary alarm (AL2). AL2 operation is configurable and independent from the operation of the limiter output OP1. Configuration allows an operator to choose the alarm type, OP2 action, automatic reset/latching. LED 2 indicates Alarm 2 status. For AL2 output no status retention mode is available (status data storing).

AL2 Reset = Auto **AL2L.b** = Latching or Latching + Blocking

Status		OP2 contact	AL2 LED	Status transition			
				Input		Operator acknowledgment	
#	Description			Non alarm condition	Alarm condition	No	Yes
0	Non alarm	OFF	OFF	No transition	Transition to 1		
1	Non-ackowledged alarm	ON	Flashing			No transition	Transition to 2
2	Ackowledged alarm	ON	ON	Transition to 0	No transition		

AL2 Reset = Man **AL2L.b** = Latching or Latching + Blocking

Status		OP2 contact	AL2 LED	Status transition			
				Input		Operator acknowledgment	
#	Description			Non alarm condition	Alarm condition	No	Yes
0	Non alarm	OFF	OFF	No transition	Transition to 1		
1	Alarm	ON	ON			No transition	Transition to 2
2	Silence	OFF	OFF	Transition to 0	No transition		

AL2 Reset = Man **AL2L.b** = None or Blocking

Status		OP2 contact	AL2 LED	Status transition			
				Input		Operator acknowledgment	
#	Description			Non alarm condition	Alarm condition	No	Yes
0	Non alarm	OFF	OFF	No transition	Transition to 1		
1	Alarm	ON	ON	Transition to 0	No transition	No transition	Transition to 2
2	Silence	OFF	OFF	Transition to 0	No transition		

AL2 Reset = Auto **AL2L.b** = None or Blocking

Status		OP2 contact	AL2 LED	Status transition			
				Input		Operator acknowledgment	
#	Description			Non alarm condition	Alarm condition	No	Yes
0	Non alarm	OFF	OFF	No transition	Transition to 1		
1	Alarm	ON	ON	Transition to 0	No transition		
2							

6 TECHNICAL SPECIFICATIONS

Features (at 25°C environmental temp.)	**Description**			
PV Input (see pages 11,12 and 18)	Common characteristics	A/D converter resolution: 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 digit for temperature sensors 0.1% ±1 digits for mV 0.1% ±1 digits +the accuracy of the external shunt resistor for mA		Between 100… 240V~ the error is minimal
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wires connection	Max. wire Res: 20Ω max (3 wires) Input drift: 0.35°C/10° $T_{env.}$. <0.35°C/10Ω Wire Res.
	Thermocouple	L,J,T,K,S (IEC 584) Rj >10MΩ °C/°F selectable	Internal cold junction compensation in °C/°F	Line: 150Ω max. Input drift: <2µV/°C env. temperature <5µV/Ω line resistance
	DC input (current)	4…20mA, 0... 20mA with external shunt 2.5Ω Rj >10MΩ	Engineering units Conf. decimal point position Init. Sc -999…9999 Full Sc. -999…9999 (min. range of 100 digits)	Input drift: <0.1% / 20°C Environmental Temperature
	DC input (voltage)	10… 50mV, 0... 50mV Rj >10MΩ		

Features (at 25°C environmental temp.)	**Description**	
Digital input (option)	The closure of the external contact produces the acknowledgment of AL1 (if the function is enabled)	
OP1 output	SPST Relay N.O.: 2A/250V~ for resistive load; 4A/120V~ for resistive load	
OP2 output	SPST Relay N.O.: 2A/250V~ for resistive load; 4A/120V~ for resistive load; SSR drive not isolated: 5V–, ±10%, 30 mA max.	
Serial comm. (option)	RS485 isolated, Modbus/Jbus protocol, 1200, 2400, 4800, 9600 bit/s, two wires	
Operational safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts on display
	Parameters	Parameter and configuration data are stored in a non volatile memory for an unlimited time
	Access protection	A password protects the access the instrument configuration
General characteristics	Power supply (PTC protected)	100... 240V~ (-15... +10%) 50/60 Hz or 24V~ (-25... +12%), 50/60 Hz and 24V– (-15... +25%) Power consumption 2,6 W max.
	Electrical Safety	Compliance to EN61010-1 (IEC 1010–1), installation class 2 (2500V), pollution class 2, **class II instrument**
	Electromagnetic compatibility	Compliance to the CE standards (see page 2)
	Protection	IP65 front panel EN60529 (IEC 529)
	Approvals	UL, cUL file N° 176452; Factory Mutual Class 3545 Note: The UL label on the limit switch is for regulatory use only.
	Dimensions	$^{1}/_{16}$ DIN - 48 x 48, depth 120 mm, weight 130 g approx.

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.

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