



ATR 121

Controller



User manual

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Introduction

Thank you for choosing a Pixsys controller.

Versions with three digits display are available and the device fits a wide range of applications with the most diverse sensors like temperature/humidity/pressure sensors or linear potentiometers.

Output options include both relay and SSR logic, but it is possible to configure the unit also as indicator for installations that do not require control or alarm outputs.

PID and Autotune allow to adapt the regulation algorithm to the installation, while LATCH ON function speeds up the device calibration when linear potentiometers are used.

As on the latest Pixsys instrumentation, the configuration is further simplified by the Memory cards which are provided with internal battery and therefore do not require cabling to power the controller.

1 Safety guidelines

Read carefully the safety guidelines and programming instructions contained in this manual before connecting/using the device.

Disconnect power supply before proceeding to hardware settings or electrical wirings to avoid risk of electric shock, fire, malfunction.

Do not install/operate the device in environments with flammable/explosive gases.

This device has been designed and conceived for industrial environments and applications that rely on proper safety conditions in accordance with national and international regulations on labour and personal safety. Any application that might lead to serious physical damage/ life risk or involve medical life support devices should be avoided.

Device is not conceived for applications related to nuclear power plants, weapon systems, flight control, mass transpor-

tation systems.

Only qualified personnel should be allowed to use device and/or service it and only in accordance to technical data listed in this manual.

Do not dismantle/modify/repair any internal component.

Device must be installed and can operate only within the allowed environmental conditions. Overheating may lead to risk of fire and can shorten the lifecycle of electronic components.

1.1 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding these safety guidelines and notices can be life-threatening.
Warning!	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to property.
Information!	This information is important for preventing errors.

1.2 Safety Precautions

This product is UL listed as open type process control equipment.	Danger!
If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.	Danger!

Loose screws may occasionally result in fire. For screw terminals of relays and of power supply, tighten screws to tightening torque of 0,5 Nm.	Warning!
A malfunction in the Digital Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Digital Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.	Warning!

1.3 Precautions for safe use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events. Do not handle the Digital Controller in ways that exceed the ratings.

- The product is designed for indoor use only. Do not use or store the product outdoors or in any of the following places.
 - Places directly subject to heat radiated from heating equipment.
 - Places subject to splashing liquid or oil atmosphere.
 - Places subject to direct sunlight.
 - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
 - Places subject to intense temperature change.
 - Places subject to icing and condensation.
 - Places subject to vibration and large shocks.
- Installing two or more controllers in close proximity might lead to increased internal temperature and this might shorten the life cycle of electronic components. It is strongly recommended to install cooling fans or other

air-conditioning devices inside the control cabinet.

- Always check the terminal names and polarity and be sure to wire properly. Do not wire the terminals that are not used.
- To avoid noise, keep the controller wiring away from power cables that carry high voltages or large currents. Also, do not wire power lines together with or parallel to Digital Controller wiring. Using shielded cables and using separate conduits or ducts is recommended. Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component). When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the Digital Controller. Allow as much space as possible between the Digital Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- A switch or circuit breaker must be provided close to device. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for the controller.
- The device must be protected by a fuse 1A.
- Wipe off any dirt from the Digital Controller with a soft dry cloth. Never use thinners, benzine, alcohol, or any cleaners that contain these or other organic solvents. Deformation or discoloration may occur.
- The number of non-volatile memory write operations is limited. Therefore, use EEPROM write mode when frequently overwriting data.

1.4 Environmental policy / WEEE

Do not dispose electric tools together with household waste material.

According to European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

2 Model identification

ATR121-AD	12..24Vac $\pm$ 10% 50/60Hz 12..35Vdc
ATR121-B	230 Vac $\pm$ 10% 50/60 Hz (galvanical isolation 2500V)

3 Technical features

3.1 General features

Display	3 displays (0,56 inch) on ATR121 + 3 leds (OUT1, OUT2 , L1)
Environmental conditions	Temperature 0-45 °C, Humidity 35..95 uR% (without condense) Max. altitude: 2000m
Sealing	Front panel: IP54 (IP65 with gasket) - Box: IP30 - Terminals: IP20
Material	Polycarbonate UL94V2 self-extinguishing
Weight	Approx. 100 gr.
Power consumption	ATR121-B: 3 VA max ATR121-AD: 2,4 VA max

4 Hardware features

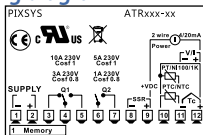
Analogue inputs	AN1. Configurable via software. Thermocouple type: K, S, R, J. Thermoresistance: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). Linear: 0-10V, 0-20 or 4-20mA, 0-40mV Potentiometers: 6KΩ, 150KΩ,	Accuracy: Ris. 16bit. For Thermocouple: @25°C $\pm 0,5\%$ (full scale) or ± 1 digit, automatic compensation of cold junction from 0°C to 50°C. For linear input: 0/4..20mA: 30000 points, 0..10V: 40000 points. For potentiometers: 40000 points Impedance: 0-10V: Ri>110KΩ 0-20mA: Ri<5Ω 4-20mA: Ri<5Ω
Relay outputs	2 relays (ATR121-AD-B) Configurable as command and/or alarm output	Contacts: Q1: 8A-250V~ for resistive loads Q2: 5A-250V~ for resistive loads
SSR output	1 SSR Configurable as command output and/or alarm output.	For ATR121-B 8Vdc/20mA For ATR121-AD 15Vdc/30mA (if 12Vac) 30Vdc/30mA (if 24Vac) - If DC supply is used, output voltage is equal to supply voltage with max 30mA.

5.1 Electrical wirings

Although this controller has been designed to resist electro-magnetic interferences in industrial environments, please observe following safety guidelines:

- Separate control line from power wires.
- Avoid proximity of remote control switches, electromagnetic contactors, powerful engines and in all instances use specific filters.
- Avoid proximity of power groups, especially those with phase control.
- Wiring of pins use crimped tube terminals or flexible/rigid copper wire with diameter 0,2 to 1,5 mm² (min. AWG24, max. AWG16, operating temperature: min. 70°C). Cable stripping lenght 7 to 8 mm.

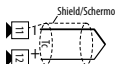
5.2 Wiring diagram



5.2.a Power supply

	ATR121-AD: Class 2 source 12..24Vac $\pm 10\%$ 50Hz/60Hz 12..35Vdc (comply with polarity) Use copper conductors only Categoria di sovratensione: II
	ATR121-B: 230Vac $\pm 10\%$ 50/60Hz Use copper conductors only Categoria di sovratensione: II

5.2.b AN1 Analogue Input

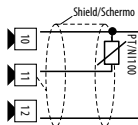


For thermocouples K, S, R, J.

- Comply with polarity
- For possible extensions, use compensated cable and terminals suitable for the thermocouples used(compensated)
- When shielded cable is used, it should be grounded at one side only

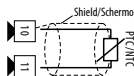
(only for models: AD)

For a correct functioning of the device, use sensors insulated from the ground. Otherwise, use a single transformer isolated for each instrument.



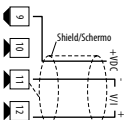
For thermoresistances PT100, NI100

- For the three-wire connection use wires with the same section
- For the two-wire connection short-circuit terminals 10 and 12
- When shielded cable is used, it should be grounded at one side only

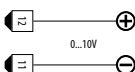
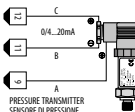
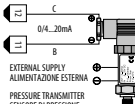


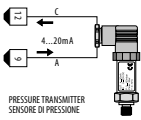
For thermoresistances NTC, PTC, PT500, PT1000 e potentiometers

- When shielded cable is used, it should be grounded at one side only to avoid ground loop currents

	For linear signals V/mA - Comply with polarity - When shielded cable is used, it should be grounded at one side only
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5.2.c Examples of connection for linear input

	For signals 0..10V Comply with polarity
 PRESSURE TRANSMITTER SENSORE DI PRESSIONE	For signals 0/4..20mA with three-wire sensor Comply with polarity C = Sensor output B = Sensor ground A = Sensor power supply (12V/30mA) Versions AD: 12..24Vdc / 30mA Versions B: 8Vdc / 20 mA
 EXTERNAL SUPPLY ALIMENTAZIONE ESTERNA PRESSURE TRANSMITTER SENSORE DI PRESSIONE	For signals 0/4..20mA with external power of sensor Comply with polarity C = Sensor output B = Sensor ground



PRESSURE TRANSMITTER
SENSORE DI PRESSIONE

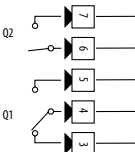
For signals 0/4...20mA with **two-wire sensor**

- Comply with polarity

C = Sensor output
A = Sensor power supply

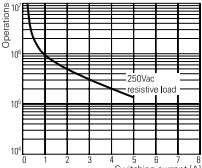
Ver. AD: 12..24Vdc / 30mA
Ver. B: 8Vdc / 20 mA

5.2.d Relay outputs



Current ratings:

- Q1:** 8A, 250Vac, resistive loads, 10^5 operations
- Q2:** 5A, 250Vac, resistive loads, 10^5 operations



Operations

250Vac resistive load

Switching current [A]

5.2.e SSR output



SSR

SSR command output 12V/30mA

Ver. AD: 12..24Vdc / 30mA

Ver. B: 8Vdc / 20 mA

6

Display and keys functions



6.1 Numeric indicators (Display)

1	1234	Normally displays the process.
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6.2 Meaning of status lights (Led)

2	OUT1	ON when command output is active. When it flashes, display shows the command output setpoint (which can be modified by arrow keys).
3	OUT2	ON when alarm output is active. When it flashes, display shows the alarm output setpoint (which can be modified by arrow keys).
4	L1	ON when the controller communicates via serial port.

6.3 Keys

5	▼	- Allows to decrease main setpoint. - During configuration it allows to scroll through parameters and to modify them together with SET. - If pressed after SET, it allows to decrease the setpoints (command with OUT1 flashing/ alarm with OUT2 flashing).
6	►	- Allows to increase main stepoint. - During configuration it allows to scroll through parameters and to modify them together with SET. - If pressed after SET, it allows to increase the setpoints (command with OUT1 flashing/ alarm with OUT2 flashing).
7	SET	- If pressed once it allows to visualize the command setpoint. - If pressed twice it allows to visualize the alarm setpoint. - Allows to modify configuration parameters.
8	FNC	- Allows to run the manual Tuning function. - Allows to enter/exit from configuration.

7 Controller functions

7.1 Modifying main setpoint and alarm setpoint values

Setpoint value can be changed by keyboard as follows:

	Press	Display	Do
1	 or SET	Display shows the command setpoint and OUT1 flashes.	Increase or decrease the main setpoint value. After 4s display shows the process.
2	Press twice SET	Display shows the alarm setpoint and OUT2 flashes.	Increase or decrease the alarm setpoint value. After 4s display shows the process.

8 Tuning

Tuning procedure allows to calculate PID parameters to obtain a optimal regulation. It means a stable control of temperature/process on setpoint without fluctuations and fast response to deviations from setpoint caused by external noises.

Tuning procedure includes calculation and setting of the following parameters:

- **Proportional band** (system inertia, in °C for temperature).
- **Integral time** (system inertia expressed in time).
- **Derivative time** (defines the intensity of the controller reaction to the variation of the measured value, normally $\frac{1}{4}$ of integral time). During Tuning procedure, it is not possible to change the setpoint.

8.1 Auto-tune

Tuning procedure calculates the controller parameters, can be manual/automatic according to selection on par. 27 **TURN**.

8.2 Manual tuning

Manual procedure allows the user greater flexibility to decide when to update PID algorithm parameters. It can be enabled selecting Man on par. 27 ϵ_{un} .

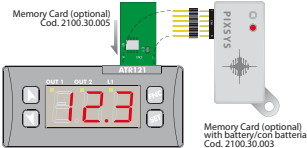
Tuning launch: press **FNC**, display shows ϵ_{oF} , pressing $\blacktriangleright$ it visualizes process value and ϵ_{un} (alternately) up to procedure completion (it can take some minutes). To cancel procedure press **FNC** and after $\blacktriangledown$ to select ϵ_{oF} .

8.3 Automatic tuning

Automatic tuning activates whenever the controller is switched on or when the setpoint is modified to a value over 35%. It can be enabled selecting $\mathcal{A}_{ut}$ on par. 27 ϵ_{un} .

To exit Tuning and keep P.I.D. values unchanged, press **FNC** then $\blacktriangledown$ to select ϵ_{oF} .

8.4 Memory card (optional)

 Memory Card (optional) Cod. 2100.30.005 ATR121 OUT 1 OUT 2 L1 12.3 FNC Memory Card (optional) with battery/con batteria Cod. 2100.30.003	Parameters and setpoint values can be duplicated from one controller to another using the Memory card.
--	---

2 modes are available:

- **With the controller connected to the power supply:**
Insert the memory card **when the controller is off**. At starting display shows (only if the correct values are saved in the memory card). Pressing $\blacktriangleright$ display shows $\Pi-Ld$. Confirming with **FNC**, the controller loads the new data and starts again. Pressing $\blacktriangledown$ display shows $\Pi-no$ and the controller starts keeping values unchanged.

- **With the controller not connected to power supply:**
The memory card is equipped with an internal battery with an autonomy of about 1000 operations (button battery 2032, replaceable). Insert the memory card and press the programming button .
When writing the parameters, the led turns red and on completing the procedure it turns green. It is possible to repeat the procedure without any particular attention.
NB: it is not possible to transfer parameters to a device with different code: red LED is ON.

Updating Memory Card

Insert memory card when controller is on, to copy parameters. Enter configuration and change at least one parameter. Exit configuration. Changes are saved automatically.

8.5 Latch ON function

For use with input P_{DI} (potentiometer $\leq 6K$) and P_{DZ} (potentiometer $\leq 150K$) and with linear inputs (0..10V, 0/4..20mA), it is possible to associate start value of the scale (par. $L_{D.n.}$) to the minimum position of the sensor and value of the scale end (par. $H_{I.n.}$) to the maximum position of the sensor.

It is also possible to fix the point in which the controller will display 0 (however keeping the scale range between $L_{D.n.}$ and $H_{I.n.}$) using the "virtual zero" option by setting u.0m or u.0s on par. 8 L_{AL} .

If u.05 is selected, the virtual zero will reset after each activation of the device; with u.0n, the virtual zero remains fixed once tuned. To use the LATCH ON function configure according to required operation the par. 8 L_{AL} . The tuning procedure starts by exiting the configuration after changing the parameter.

For the calibration procedure refer to the following table:

	Press	Display	Do
1	FNC	Exit parameters configuration. Device visualizes alternately process and $L_{0.0}$	Place the sensor on minimum operating value (associated with $L_{0.0}$)
2	▼	Set the value on minimum. Display shows $L_{0.0}$	Place the sensor on maximum operating value (associated with $H_{1.0}$)
3	►	Set the value to maximum. The display shows $H_{1.0}$	To exit standard procedure press . For "virtual zero" settings place the sensor on the zero point.
4	SET	Set the virtual zero value. Display shows 0.00 N.B.: For selection of 0.05 the procedure in point 4 should be followed on each re-activation.	To exit procedure press FNC .



8.6 Dual action Heating-Cooling

The ATR121/141 is suitable also for systems requiring a combined heating-cooling action. Command output must be configured as Heating PID (par.11 $rEG = HEA$ and par. 15 $P.b.$ greater than 0), and one of the alarm must be configured as cooling action (par. 19 $AL = COO$. Command output must be connected to the actuator responsible for heating action while the alarm output will control cooling action.

- **Parameters to configure for the Heating PID are:**

$rEG = HEA$ Command output type (Heating)

$P.b.$: Heating proportional band

$t.i.$: Integral time of heating and cooling

$t.d.$: Derivative time of heating and cooling

$t.c.$: Heating time cycle

- **Parameters to configure for the Cooling PID are:**

$AL = COO$: Alarm selection as cooling

$P.b.\Pi$: Proportional band multiplier

$ou.d$: Overlapping/Dead band

$t.c.2$: Cycle time for cooling output

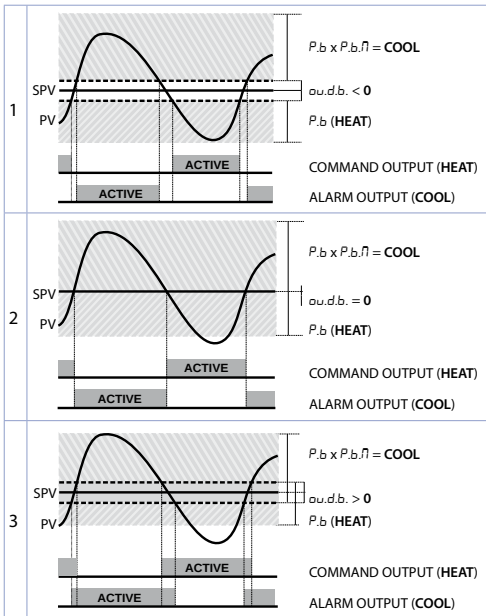
Parameter $P.b.\Pi$ (that ranges from 1.00 to 5.00) determines the proportional band of cooling basing on the formula:

Cooling proportional band = $P.b. * P.b.\Pi$

This gives a proportional band for cooling which will be the same as heating band if $P.b.\Pi = 1.00$, or 5 times greater if $P.b.\Pi = 5.00$.

Integral time and derivative time are the same for both actions.

Parameter $ou.d$ determines the overlapping percentage between the two actions. For systems in which the heating and cooling output must never be simultaneously active a dead band ($ou.d \leq 0$), can be configured, and viceversa an overlapping ($ou.d > 0$):



Parameter $t.c.\bar{c}$ has the same meaning of the cycle time $t.c.$ for heating. Parameter $co.F$ (cooling fluid) pre-selects the proportional band multiplier $P.b.\bar{n}$ and the cooling PID cycle time $t.c.\bar{c}$ basing on the type of cooling fluid:

$c_o.F$	Cooling fluid type	$P.b.\Pi$	$t.c.2$
Air	Air	1.00	10
oil	Oil	1.25	4
H_2O	Water	2.50	2

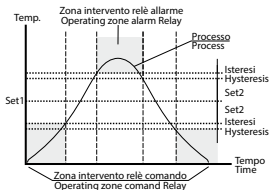
9 Dead band function

The dead band function (enabled selecting $F.b.\Pi$ on par. 28 F_{nc}) creates a band within which the relays are both open or closed.

In heating functioning (par. rEG selected on HEA), the intervention threshold of the alarm relay will be SET1 - SET2 (with hysteresis selected on par. SYC) while the intervention threshold of the command relay will be SET1 + SET2 (the hysteresis is always SYC).

A band is created within which the relays are both open and where the alarm relay operates above while the command relay operates under the band limit.

In cooling functioning (par. reG selected on co_or) the intervention thresholds of the two relays are reversed.



When this function is active, standard alarm operation (band, deviation, etc..) is inhibited.

10 Configuration

10.1 Loading default values

This procedure allows to restore factory settings of the device.

	Press	Display	Do
1	FNC for 3s	Display shows 000 with the 1st digit flashing.	
2	▶ or ▼	Change the flashing digit and move to the next one pressing SET .	Enter password 999
3	SET to confirm	Instrument loads default settings and restarts.	

10.2 Modify configuration parameters

	Press	Display	Do
1	FNC for 3s	Display shows 000 with the 1st digit flashing	
2	▶ or ▼	Change the flashing digit and move to the next one using the SET key.	Enter the configuration password "123" ("1234" on ATR141).
3	SET to confirm	Display shows the first parameter of configuration table. c.o.u for ATR121 c.o.u.t for ATR141	
4	▶ ▼	Slide up/down through parameters	

	Press	Display	Do
5	SET + ▶ and ▼	Increase or decrease the value displayed by pressing firstly SET and then an arrow key.	Enter the new data which will be saved on releasing the keys. To change another parameter return to point 4.
6	FNC	End of configuration parameter change. The controller exits from programming.	

11 Configuration parameters

01 C.O.U Command output

Selects command output type.

o1.2 > **Default** (factory defaults)

o1.5

SSr

o2.1

SEr (Alarm not available with this selection)

	Command	Alarm
o1.2	Q1	Q2
o1.5	Q1	SSR
SSr	SSR	Q1
o2.1	Q2	Q1
SEr	Q1 (open) Q2 (close), SSR (close) for -T version	-

02 **SEn** Sensor

Analogue input configuration.

For a correct functioning of the device, use sensors insulated from the ground. Otherwise, use a single transformer isolated for each instrument.

tcT Tc-K -260 °C..1360 °C **(default)**^{1 p. 40}

tc.5 Tc-S -40 °C..1760 °C^{1 p. 40}

tc.r Tc-R -40 °C..1760 °C^{1 p. 40}

tc.J Tc-J -200 °C..1760 °C^{1 p. 40}

Pt PT100 -200 °C..600 °C

Pt1 PT100 -200 °C..140 °C (restricted range)

ni Ni100 -60 °C..180 °C

ntc Ntc 10KΩ -40 °C..125 °C

Ptc Ptc 1KΩ -50 °C..150 °C

Pt5 Pt500 -100 °C..600 °C

Pt1t Pt1000 -100 °C..600 °C

0.10 0..10V

0.20 0..20mA

4.20 4..20mA

Po1 Potent. ≤ 6KΩ F.S.

Po2 Potent. ≤ 150KΩ F.S.

03 **d.P.** Decimal point

Selects number of displayed decimal points.

0 No decimal **(default)**

0.0 1 decimal

0.00 2 decimals

04 **Lo.5** Lower Limit Setpoint

-199..999

Value expressed in degrees.tenths for temperature sensors or in digits^{2 p. 40} for linear sensors and potentiometers **(default 0.0)**.

05 *H.L.* Upper Limit Setpoint

-199..999

Value expressed as degrees.tenths for temperature sensors and digits^{2 p. 40} for linear sensors and potentiometers (**default**: 999 for ATR121 and 1750 for ATR141).

06 *Lo.n* Lower Linear Input

Range AN1 lower limit only for linear signals.

Example: with input 4..20 mA this parameter takes value associated to 4 mA

-199..999

Value in digit (**default** 0)

07 *Hi.n* Upper Linear Input

Range AN1 upper limit only for linear signals.

Example: with input 4...20 mA this parameter takes value associated to 20 mA

-199..999

Value in digit (**default** 999)

08 *LAL* Latch On function

Automatic setting of limits for linear potentiometers and linear inputs.

OFF Disabled (**default**)

Std Standard

v.0n Virtual Zero Stored

v.0S Virtual Zero Initialized

09 *cR.0* Offset calibration

Number added/subtracted to the process value visualized on display (usually correcting the ambient temperature value). -19.9..99.9

Value expressed in degrees.tenths for temperature sensors and digits for linear sensors and potentiometers (**default** 0.0).

- 10** **cA.C** **Gain calibration**
 Percentage value that is multiplied for the process value (allows to calibrated the working point)
 -19.9%..99.9%. Percentage (**default 0.0**)
- 11** **rEG.** **Regulation type**
 HEA Heating (N.A.) (**Default**)
 COO Cooling (N.C.)
 A.r. Absolute alarm with manual reset
 A.r.A Absolute alarm with manual reset and relay status stored in case of power failure.
 H.O.O Heating with PID always to 0 if the process is over the setpoint.
- 12** **S.C.C.** **Command state error**
 State of contact for command output in case of error
 C.O. Open contact (**default**)
 C.C. Closed contact
- 13** **LdI** **Command led**
 State of the OUT1 led corresponding to the relevant contact
 C.O. ON with open contact
 C.C. ON with closed contact (**default**)
- 14** **HY.C** **Command hysteresis**
 Hysteresis in ON/OFF or dead band in PID
 -199..999
 Value expressed as degrees.tenths for temperature sensors and digits^{2 p. 40} for linear sensors and potentiometers (**default 0.0**)

15 *P.b.* Proportional band

Proportional band Process inertia in units (in °C if temperature) 0..999 0 = On/Off

Value degrees.tenths for temperature sensors and digit²
p. 40 for linear sensors and potentiometers (**default 0**)

16 *I.i.* Integral time

Process inertia in seconds

0..999 s (0 = integral disabled) (**default 0**)

17 *D.d.* Derivative time

Normally ¼ of integral time

0..999 s (0 = derivative disabled) (**default 0**)

18 *C.c.* Cycle time

Cycle time (for PID on remote control switch 10/15 sec, for PID on SSR 1s) or servo time (value declared by servo-motor manufacturer).

1..300 s. Selecting 0 cycle time becomes 100ms (**default 10**)

19 *AL.* Alarm

Alarm intervention is related to SET2.

A. A Absolute alarm, referring to process (threshold alarm) **default**

A. b Band alarm (*par. 12.c*)

A.d.5 Upper deviation alarm (*par. 12.d*)

A.d. i Lower deviation alarm (*par. 12.e*)

A.A.5 Absolute alarm, referring to SET1

c o o Cooling action (*par. 8.6*)

Π.r. Absolute alarm with manual reset.
After the alarm activation, the output can be released pressing **FNC**.

Π.r.Π Absolute alarm with manual reset and relay status memory in case of power failure. After the alarm activation, the output can be released pressing **FNC**.

- 20** **c.r.A** **Alarm state output**
 Output contact and intervention type
 n.o.s Normally open, active at start (**default**)
 n.c.s Normally closed, active at start
 n.o.r Normally open, active on reaching alarm^{3 p. 40}
 n.c.r Normally closed, active on
 reaching alarm^{3 p. 40}
- 21** **S.c.A** **Alarm state error**
 State of contact for alarm output in case of error (eg. broken probe)
 c.o. Open contact (**default**)
 c.c. Closed contact
- 22** **Ld2** **Alarm led**
 Defines the state of OUT2 led corresponding to the relative contact
 c.o. ON with open contact.
 c.c. ON with closed contact (**default**)
- 23** **H4.A** **Alarm Hysteresis**
 -199..999 Value degrees.tenths for temperature sensors and digit^{2 p. 40} for linear sensors and potentiometers (**default 0.0**)
- 24** **dE.A** **Alarm delay**
 -180..180 s
 Negative: delay in alarm exit phase.
 Positive: delay in alarm entry phase. (**default 0**)
- 25** **P.SE.** **Setpoint protection**
 Allows or not to modify the setpoint by keyboard.
 F.r.E Both set can be modified (**default**)
 P.r.S OUT1 command setpoint protection
 P.r.A OUT2 alarm setpoint protection
 ALL Both set protection

26 **FIL** **Conversion filter**

ADC Filter: Number of input sensor readings to calculate the mean that defines process value. **NB:** When means increase, control loop speed slows down
1..15 sample means 15Hz (**default 10**)

27 **tun** **Tune**

Autotuning type selection (*par. 8.1*)

oFF Disabled (**default**)

Aut Automatic. PID parameters are calculated at activation and at change of setpoint

MAN Manual. Autotuning launched by keyboard

28 **FNC** **Operating / visualization mode**

Select operating mode and visualization options

d.SE Double setpoint (**default**)

S.SE Single setpoint

u.I.S Only visualizer/indicator

F.b.0 Dead band function (*par. 9*)

MAN Function hide process and setpoint

1.do Domotics 1: turns off display and leds after 15" from the last keys operation.

2.do Domotics 2: turns off only the display after 15" from the last keys operation.

3.do Domotics 3: turns off the display (but not the decimal point) after 15" from the last keys operation.

S.S.u Setpoint visualizer: setpoint is always displayed. To visualize the process press **FNC**.

29 **GRA** **Degree selection**

Select degree type

oC Centigrade (**default**)

oF Fahrenheit

30 *bd.r* Baud rate

Selects baud rate for serial communication

nb.1 300 bit/s

nb.2 9600 bit/s

nb.3 19200 bit/s (**default**)

nb.4 38400 bit/s

31 *Add* Slave address

Selects slave address for serial communication

1..254 (**default** 254)

32 *dE.S* Serial delay

Selects serial delay

0..100 ms (**default** 20)

33 *co.F* Cooling fluid

Type of refrigerant fluid for heating / cooling PID (*par. 8.6*)

Air Air (**default**)

oil Oil

H₂O Water

34 *P.b.n* Proportional band multiplayer

1.00..5.00 Proportional band for cooling action is given by par. *P.b.* multiplied for this value (**default** 1.00)

35 *ou.d* Overlap / dead band

Dead band combination for heating/cooling action in heating / cooling PID.mode

-20.0..50.0% of par. *P.b.* value (**default** 0).

Negative indicates dead band value, positive means overlap.

36 **t.c.2** Cooling cycle time

Cycle time for cooling output
1..300 s (**default** 10)

37 **FL.u** Visualization filter

Slows down the refresh of display, to simplify reading

off Disabled (max. speed for
display refresh) (**default**)

on.F First order filter

S. 2 2 Samples Mean

S. 3 3 Samples Mean

S. 4 4 Samples Mean

S. 5 5 Samples Mean

S. 6 6 Samples Mean

S. 7 7 Samples Mean

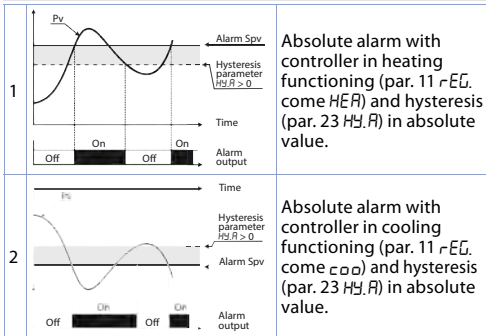
S. 8 8 Samples Mean

S. 9 9 Samples Mean

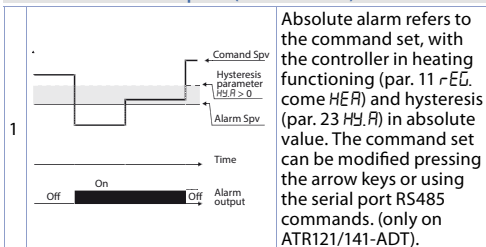
S. 10 10 Samples Mean

12 Alarm intervention modes

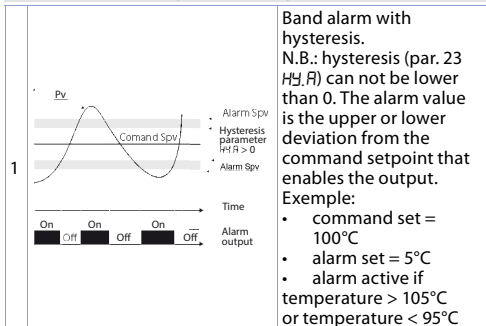
12.a Absolute alarm or threshold alarm (A, A selection)



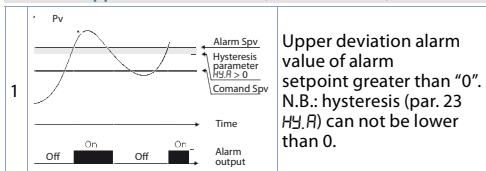
12.b Absolute alarm or threshold alarm referring to command setpoint (A, A5 selection)

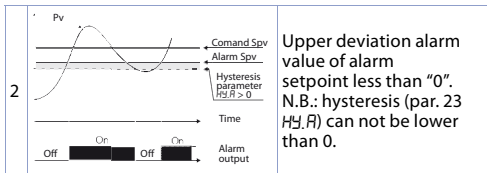


12.c Band alarm (A.b selection)

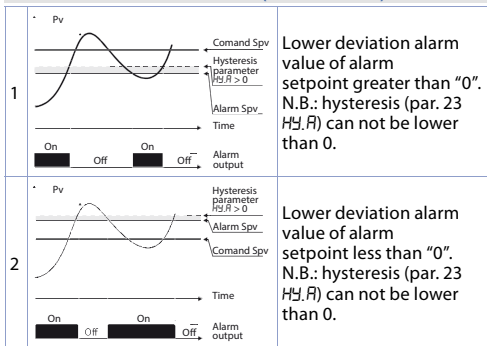


12.d Upper deviation alarm (A.d.5 selection)





12.e Lower deviation alarm (A.d. 1 selection)



13 Table of anomaly signals

If installation malfunctions, controller will switch off regulation output as selected on par. 12 5.c.c./21 5.c.A and will report the anomaly.

Example: controller will report failure of a connected thermocouple visualizing e-5 (flashing).

For other signals, see table below.

	Cause	Do
E-1	Error in EEPROM cell programming	Call Assistance
E-2	Cold junction sensor fault or room temperature outside of allowed limits	Call Assistance
E-4	Incorrect configuration data. Possible loss of calibration values	Verify configuration parameters
E-5	Thermocouple open or temperature outside of limits	Check the connection with the sensors and their integrity. Verify configuration parameters
E-8	Missing calibration data	Call Assistance

14 Qr-code



The code Qr-Code printed on the device label allows to verify the warranty or any hardware/software upgrade. It allows also to download and visualize user manuals directly on mobile devices.

Table of configuration parameters

01	c.o.u	Command output	27
02	SEn	Sensor	28
03	d.P.	Decimal point	28
04	Lo.S	Lower Limit Setpoint	28
05	Hi.S.	Upper Limit Setpoint	29
06	Lo. n	Lower Linear Input	29
07	Hi.n	Upper Linear Input	29
08	LAt	Latch On function	29
09	cA.o	Offset calibration	29
10	cA.G	Gain calibration	30
11	rEG.	Regulation type	30
12	S.c.c.	Command state error	30
13	Ld1	Command led	30
14	HY.c	Command hysteresis	30
15	P.b.	Proportional band	31
16	t.i.	Integral time	31
17	t.d.	Derivative time	31
18	t.c.	Cycle time	31
19	AL.	Alarm	31
20	c.r.A	Alarm state output	32
21	S.c.A	Alarm state error	32
22	Ld2	Alarm led	32
23	HY.A	Alarm Hysteresis	32
24	dE.A	Alarm delay	32
25	P.SE.	Setpoint protection	32
26	FiL	Conversion filter	33
27	tun	Tune	33
28	Fnc	Operating / visualization mode	33

29	<i>GrA</i>	Degree selection	33
30	<i>bd.r</i>	Baud rate	34
31	<i>Add</i>	Slave address	34
32	<i>dE.S</i>	Serial delay	34
33	<i>co.F</i>	Cooling fluid	34
34	<i>P.b.1</i>	Proportional band multiplayer	34
35	<i>ou.d</i>	Overlap / dead band	34
36	<i>t.c.2</i>	Cooling cycle time	35
37	<i>FL.u</i>	Visualization filter	35

Before using/connecting the device carefully read the safety and setting information contained in this manual.

Prima di utilizzare il dispositivo leggere con attenzione le informazioni di sicurezza e settaggio contenute in questo manuale.



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