Pixsys
ELECTRONICS

ATR 121-141

Controller / Regolatore

User manual / Manuale d'uso

Summary

Sommario

Introduction

Thank you for choosing a Pixsys controller.

Versions with three/four 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 ouputs.

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 guide lines

Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device. Disconnect power supply before proceeding to hardware settings or electrical wirings.

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

Do not dispose electric tools together with household waste material. In observance European Directive 2002/96/EC 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

ATR121-141	AD	12..24Vac ±10% 50/60Hz 12..35Vdc
ATR121-141	A	24 Vac ±10% 50/60 Hz
ATR121-141	B	230 Vac ±10% 50/60 Hz
ATR121-141	C	115 Vac ±10% 50/60 Hz
ATR121-141	ADT	12..35Vdc + RS485 Relay Q2 not available, alarm function available on SSR output.

3 Technical features

3.1 General features

Display	3 displays (0,56 inch) on ATR121 4 displays (0,40 inch) on ATR141 + 3 leds (**OUT1** , **OUT2** , **FNC**)
Operating temperature	0-40°C Humidity 35..95uR%
Sealing	IP65 (front panel) with gasket - IP30 (box) IP20 (terminals)
Material	Polycarbonate UL94V2 self-extinguishing
Weight	Approx. 100 gr.
Power consumption	ATR121/141-A: 2,6VA max ATR121/141-B: 4,4VA max ATR121/141-C: 5,7VA max ATR121/141-AD: 2,4VA max ATR121/141-ADT: 2,6VA max

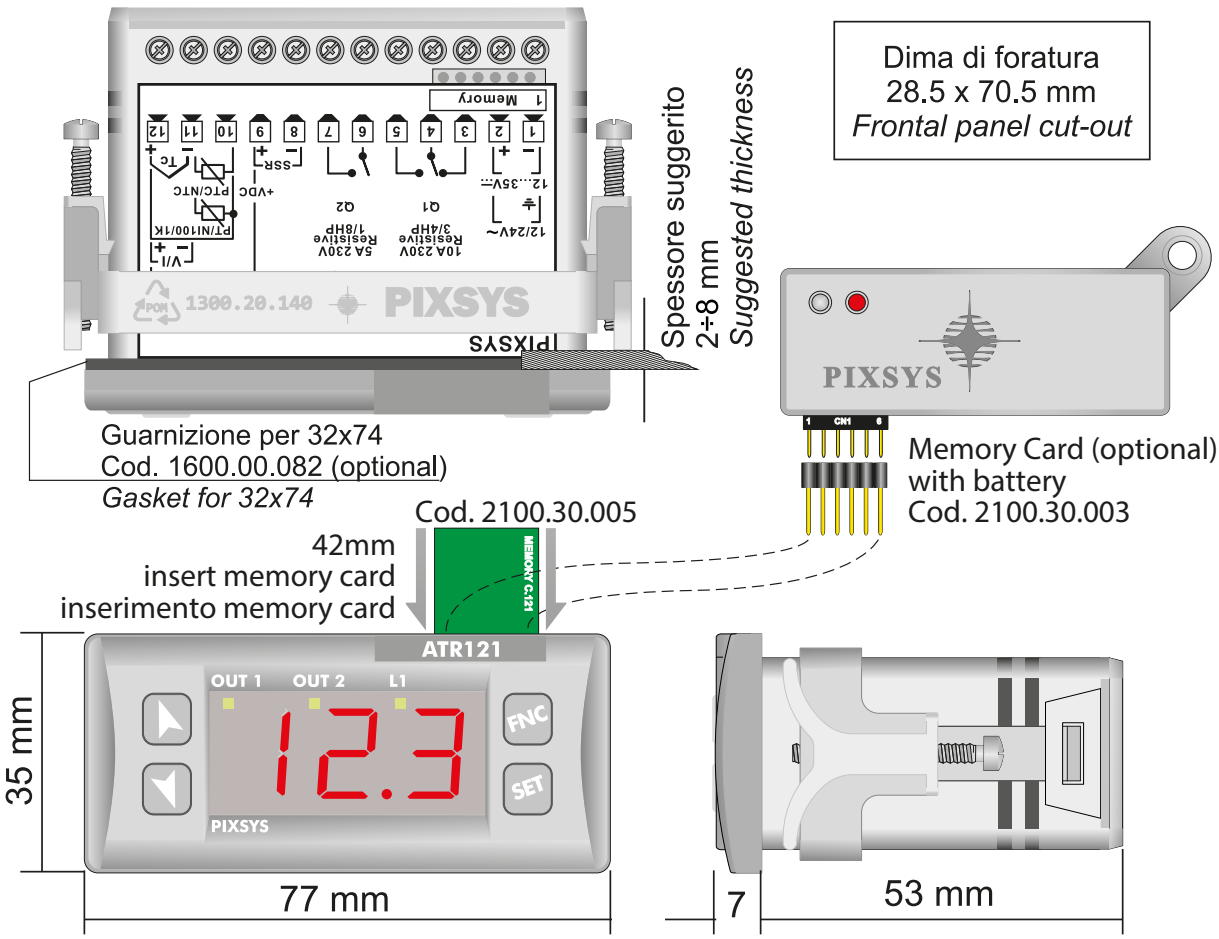
4 Hardware features

Analogue inputs	**AN1**. Configurable via software. **Thermocouple type**: K, S, R, J. Automatic compensation of cold junction from 0°C to 50°C. **Thermoresistance**: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). **Linear**: 0-10V, 0-20 or 4-20mA, 0-40mV **Potentiometers**: 6KΩ, 150KΩ,	Tolerance (25°C) +/-0.5 % ± 1 digit (full scale) for thermocouple input, thermo-resistance and V/mA. Cold junction accuracy 0.2°C/°C **Impedance**: **0-10V**: Ri>110KΩ **0-20mA**: Ri<5Ω **4-20mA**: Ri<5Ω
Relay outputs	**2** relays (ATR121/141-AD-A-B-C) **1** relay (ATR121/141-ADT) Configurable as command and/or alarm output	Contacts: **Q1**: 8A-250V~ (10A mod. AD and ADT) for resistive loads **Q2**: 5A-250V~ for resistive loads
SSR output	1 SSR Configurable as command output and/or alarm output.	Mod. ATR121/141 A-B-C • 8Vdc/20mA Mod. ATR121/141 AD - ADT • 15Vdc/30mA (if 12Vac) • 30Vdc/30mA (if 24Vac) • If DC supply is used, output voltage is equal to supply voltage with max 30mA.

4.1 Software features

Regulation algorithms	ON-OFF with hysteresis. P, PI, PID, PD with proportional time
Proportional band	0..999°C or °F
Integral time	0..999s (0 excludes integral function)
Derivative time	0..999s (0 excludes derivative function)
Controller functions	Manual or automatic Tuning, configurable alarm, protection of command and alarm setpoints, heating/cooling PID function.

5 Dimensions and installation

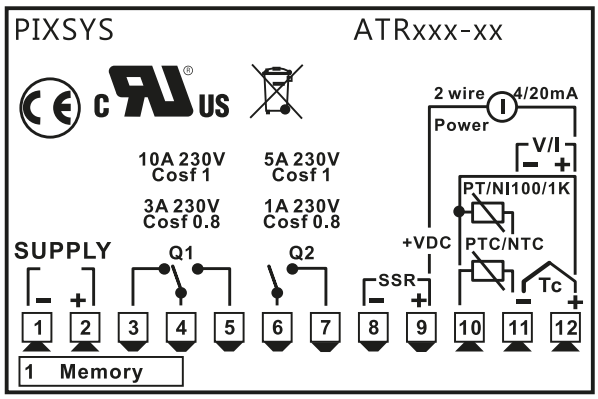


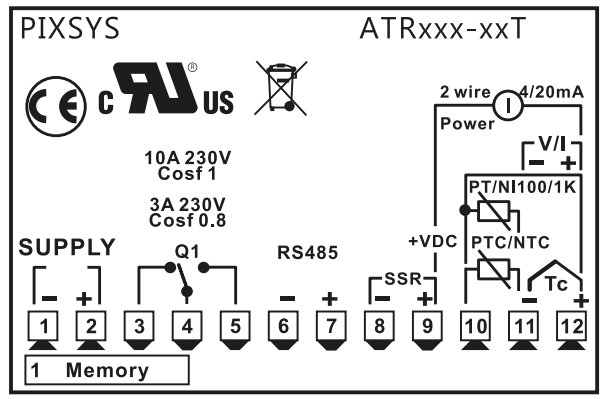
6 Electrical wirings

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

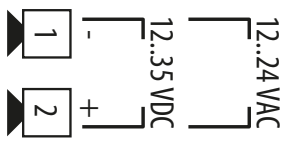
- Separate control line from power wires.
- Avoid proximity of remote control switches, electromagnetic contactors, powerful engines and in all instances use specific filters.
- Avoid proximity of power groups, especially those with phase control

6.1 Wiring diagram



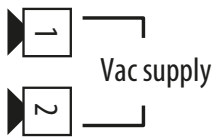


Models: ATR121-AD / ADT and ATR141-AD / ADT



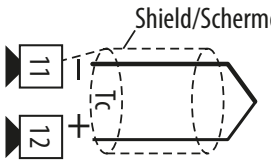
ATR121/141 - AD: Class 2 source
12..24Vac ±10% 50Hz/60Hz
12..35Vdc (comply with polarity)
NB: version "T" with RS485 only 12..35Vdc
Use copper conductors only

Models: ATR121 - A - B - C and ATR141 - A - B - C



ATR121/141 - A: 24Vac ±10% 50/60Hz Class 2 source
ATR121/141 - B: 230Vac ±10% 50/60Hz
ATR121/141 - C: 115Vac ±10% 50/60Hz
Use copper conductors only

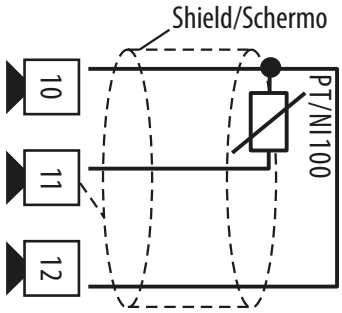
AN1 Analogue Input



For thermocouples K, S, R, J.

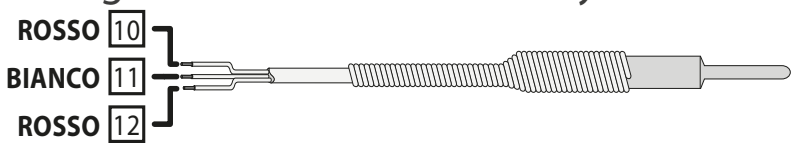
- Comply with polarity
- For possible extensions, use compensated cable and terminals suitable for the thermocouples used(compensated)
- When shielded cable is used, it should be grounded at one side only

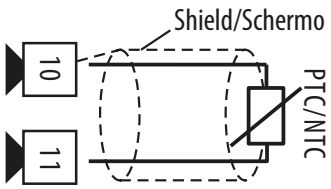
⚠ (**only for models: AD / ADT**)
For a correct functioning of the device, use sensors insulated from the ground. Otherwise, use a single transformer isolated for each instrument.



For thermoresistances PT100, NI100

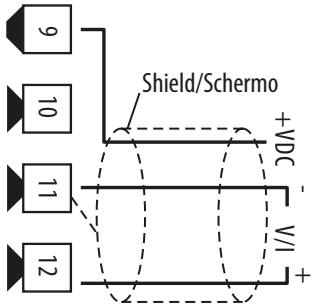
- For the three-wire connection use wires with the same section
- For the two-wire connection short-circuit terminals 10 and 12
- When shielded cable is used, it should be grounded at one side only





For thermoresistances NTC, PTC, PT500, PT1000 e potentiometers

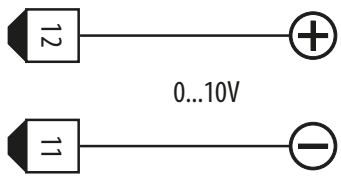
- When shielded cable is used, it should be grounded at one side only to avoid ground loop currents



For linear signals V/mA

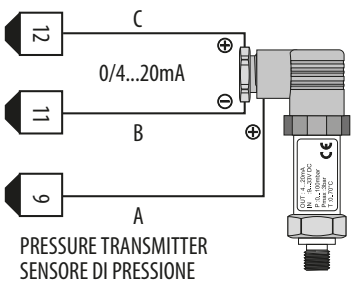
- Comply with polarity
- When shielded cable is used, it should be grounded at one side only

Examples of connection for linear input



For signals 0….10V

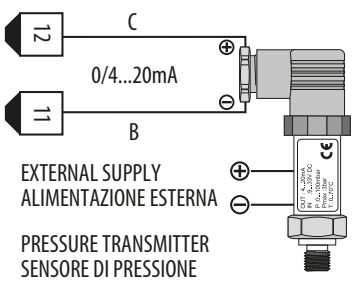
- Comply with polarity



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

- Comply with polarity

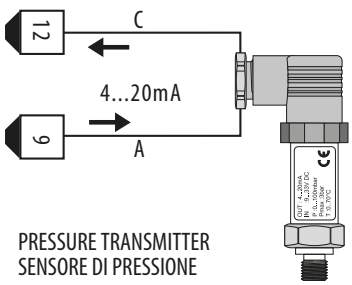
C = Sensor output
B = Sensor ground
A = Sensor power supply (12V/30mA)
Versions AD / ADT: 12..24Vdc / 30mA
Versions A-B-C: 8Vdc / 20 mA



For signals 0/4..20mA with **external power of sensor**

- Comply with polarity

C = Sensor output
B = Sensor ground

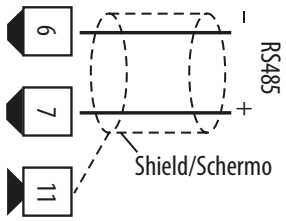


For signals 0/4...20mA with **two-wire sensor**

- Comply with polarity

C = Sensor output
A = Sensor power supply
Versions AD / ADT: 12..24Vdc / 30mA
Versions A-B-C: 8Vdc / 20 mA

Serial input

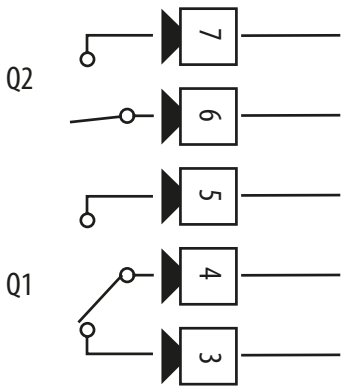


RS485 Modbus RTU communication

Do not use LT (line termination) resistors

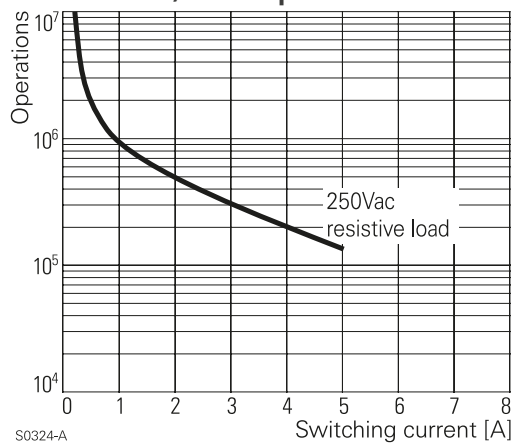
- For networks with more than five instruments supply in low voltage

Relay outputs

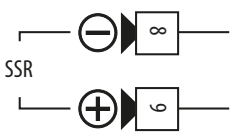


Capacity:

- **Q1** (**ATR121/141 A-B-C**): 8A, 250Vac, resistive loads, 10^5 operations
- **Q1** (**ATR121/141 AD/ADT**): 10A, 250Vac, resistive loads, 10^5 operations
- **Q2** (**not on ATR121/141 ADT**): 5A, 250Vac, resistive loads, 10^5 operations

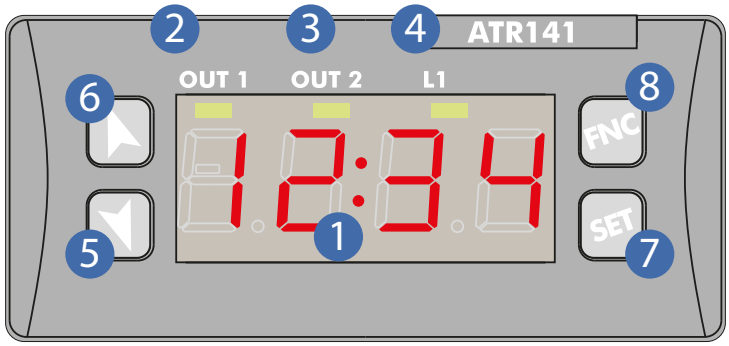


SSR output



SSR command output 12V/30mA
Versions AD / ADT: 12..24Vdc / 30mA
Versions A-B-C: 8Vdc / 20 mA

7 Display and keys functions



7.1 Numeric indicators (Display)

1	1234	Normally displays the process.

7.2 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.

7.3 Keys

5		• Allows to decrease main setpoint. • During configuration it allows to scroll through parameters and to modify them togheter 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 togheter 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.

8 Controller functions

8.1 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. Afer 4s display shows the process.
2	2 volte SET	Display shows the alarm setpoint and OUT2 flashes.	Increase or decrease the alarm setpoint value. After 4s display shows the process.

9 Tuning

Tuning procedure allows to calculate PID parameters to obtain a good 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 if 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 ¼ of integral time).

During Tuning procedure, it is not possible to change the setpoint.

9.1 Auto-tune

Tuning procedure calculates the controller parameters and can be manual or automatic according to selection on par. 27 tun | tune.

9.2 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 tun | tunE.

•Tuning launch:

Press FNC, display shows t.oF, pressing ▲ it visualizes process value and tun | tunE (alternately) up to procedure completion (it can take some minutes). To cancel procedure press FNC and after ▼ to select t.oF.

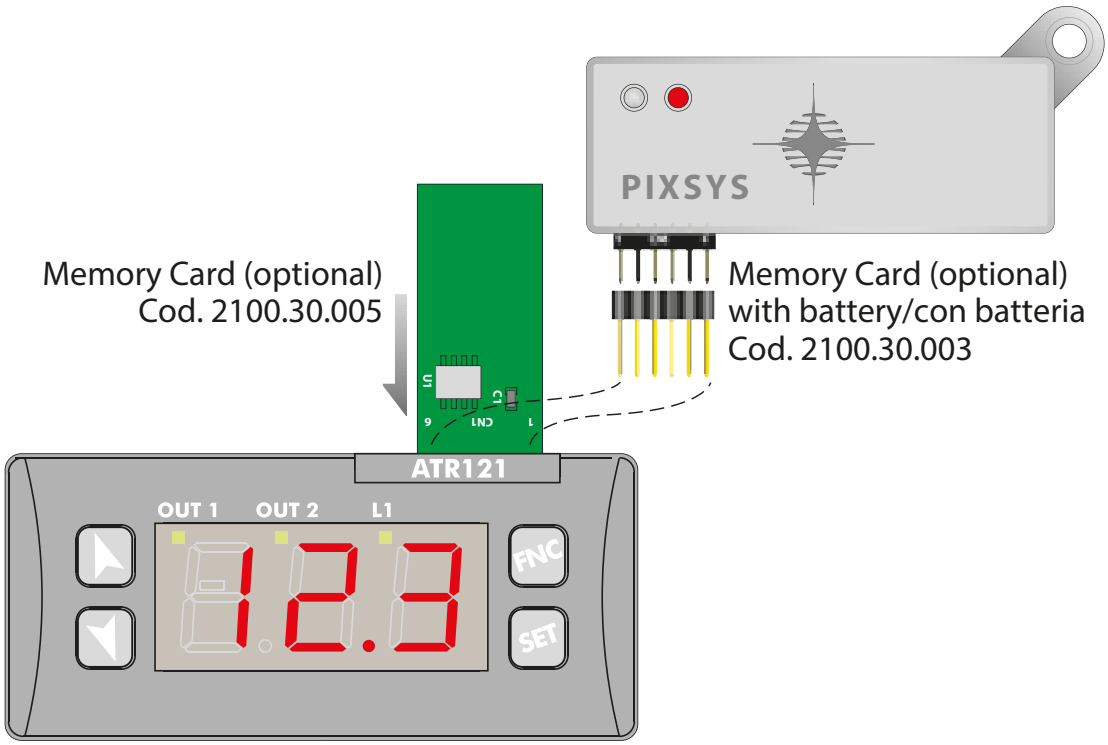
9.3 Automatic tuning

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 AUt | AUto on par. 27 tun | tunE.
To exit Tuning and keep P.I.D. values unchanged, press FNC then ▼ to select t.oF.

9.4 Memory card (optional)

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 ▲ display shows 0-Ld. Confirming with FNC, the controller loads the new data and starts again. Pressing ▼ display shows 0-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.

9.5 Latch On function

For use with input Po1 (potentiometer ≤ 6K) and Po2 (potentiometer ≤150K) and with linear inputs (0..10Volt, 0/4..20mA), it is possible to associate start value of the scale (par. Lo. n.) to the minimum position of the sensor and value of the scale end (par. Hi. 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 Lo. n. and Hi. n.) using the “virtual zero” option by setting u.0m or u.0s on par. 8 Lat | Latc.
If u.0S is SELECTED, lthe virtual zero will reset after each activation of the device; with u.ON, the virtual zero remains fixed once tuned. To use the LATCH ON function configure according to required operation the par. 8 LAt | LAtc[1].
For the calibration procedure refer to the following table:

[1] *The tuning procedure starts by exiting the configuration after changing the parameter.*

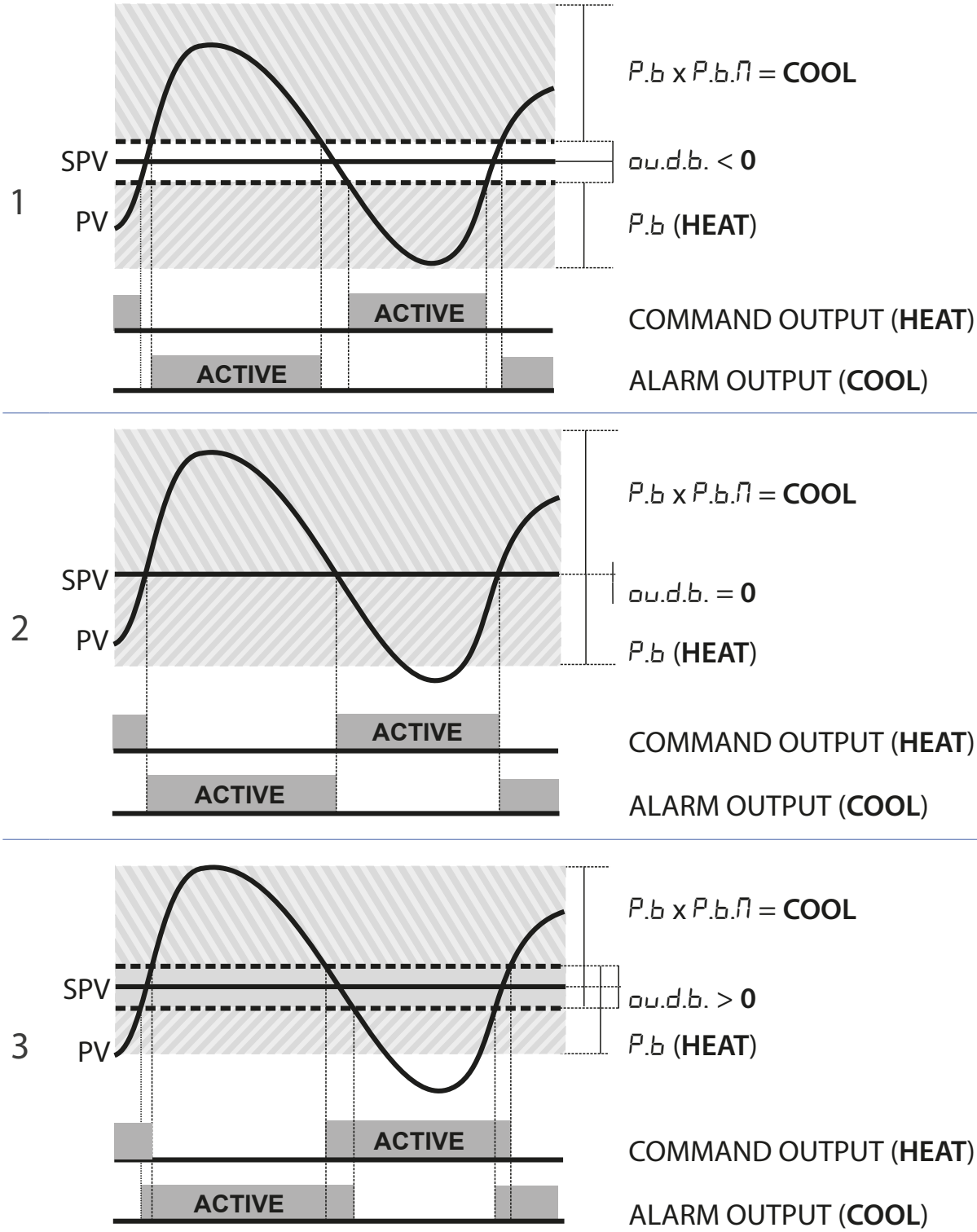
	Press	Display	Do
1	FNC	Exit parameters configuration. Device visualizes alternately process and LAt	Place the sensor on minimum operating value (associated with Lo. n)
2	➤	Set the value on minimum. Display shows LoU	Place the sensor on maximum operating value (associated with Hi. n)
3	➤	Set the value to maximum. The display shows HiG	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 u ir N.B.: For selection of u.05 the procedure in point 4 should be followed on each re-activation.	To exit procedure press FNC.

9.6 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 | HEAt and par. 15 P.b. greater than 0), and one of the alarm must be configured as cooling action (par. 19 AL. = coo | cooL. 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 | HEAt Command output type (Heating)
P.b.: Heating proportional band
t. r. : 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 | cooL. Alarm selection as cooling
P.b.M : Proportional band multiplier
ou.d | ou.d.b.: Overlapping/Dead band
t.c.2: Cycle time for cooling output
Parameter P.b.M (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.M
This gives a proportional band for cooling which will be the same as heating band if P.b.M = 1.00, or 5 times greater if P.b.M = 5.00.
Integral time and derivative time are the same for both actions.
Parameter ou.d | ou.d.b. 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 | ou.d.b. ≤ 0), can be configured, and viceversa an overlapping (ou.d | ou.d.b. > 0):



Parameter t.c.2 has the same meaning of the cycle time t.c. for heating.

Parameter co.F | coo.F (cooling fluid) pre-selects the proportional band multiplier P.b.M and the cooling PID cycle

time t.c.2 basing on the type of cooling fluid:

co.F | coo.F	Cooling fluid type	P.b.n	t.c.2
Air	Air	1.00	10
oil	Oil	1.25	4
H2o	Water	2.50	2

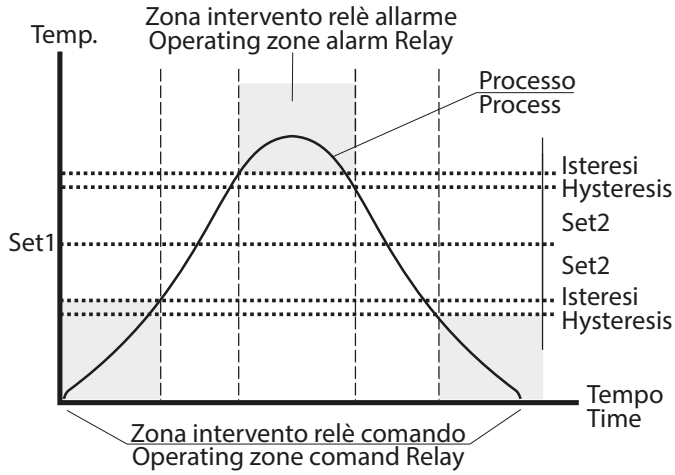
10 Dead band function

The dead band function (enabled selecting F.b.n on par. 28 Fnc | Func.) creates a band within which the relays are both open or closed.

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

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 | co oL) the intervention thresholds of the two relays are reversed.



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

11 Serial communication

ATR121/141 is equipped with RS485, it can receive and broadcast data via serial communication using MODBUS RTU protocol. **The device can be configured only as Slave.** This function enables the control of multiple devices connected to a supervisory system. The RS485 line must be free of LT termination resistances to avoid malfunctions.

Each controller will answer to a master query only if the query contains same address as on parameter Add | Addr..

The allowed addresses range from 1 to 254, and there should not be controllers with the same address on the same line.

Address 255 can be used by the master to communicate with all the connected equipment (broadcast mode), while with 0 all the devices receive the command, but no answer is expected.

ATR121/141 can introduce an answer delay (in milliseconds) to master request. This delay has to be set on parameter. dE.S | dL.Sr. (default 20ms).

At each parameter configuration, the device stores changed values in the EEPROM memory (100000 writing cycles), while setpoints are stored with a delay of 10 seconds after last modification. **NB**: modifications made to words different from those described in the following table can lead to instrument malfunction.

Baud-rate	Selectable on parameter on par. 30 bd.r | bd.rt. Nd.1 | Ndb.1 = 300bit/s Nd.2 | Ndb.2 = 9600bit/s Nd.3 | Ndb.3 = 19200bit/s (**default**) Nd.4 | Ndb.4 = 38400bit/s	
Format	8, N, 1 (8bit, no parity, 1 stop)	
Supported functions	WORD READING (max 20 words) SINGLE WORD WRITING MULTIPLE WORDS WRITING (max 20 words)	(0x03, 0x04) (0x06) (0x10)

The list below includes all available addresses:

RO = Read Only R/W = Read/Write WO = Write Only

MODBUS Address	Description	Read Write	Reset value
0	Device type	R	101/102
1	Software version	R	?
2	Reserved	R	?
3	Reserved	R	?
4	Reserved	R	0
5	Slave Address	R	EEPR
6	Reserved	R	?
500	Loading default values (write 9999)	R/W	0
1000	Process	R	0
1001	Cold junction	R	0
1002	Setpoint 1	R/W	EEPR
1003	Setpoint 2	R/W	EEPR
1004	Heating output percentage (0-10000)	R	0
1005	Cooling output percentage (0-10000)	R	0
1006	Relays status (0=off, 1=on) Bit 0 = **Q1 relay** Bit 1 = **Q2 relay** Bit 2 = **SSR**	R/W	0
1007	Manual reset. Write 1 to reset all the alarms	R/W	0
1008	Error flags Bit0 = Eeprom writing error Bit1 = Eeprom reading error Bit2 = Cold junction error Bit3 = Process error (sensor) Bit4 = Generic error Bit5 = Missing calibration data	R	0

1009	Start/Stop 0 = controller in STOP 1 = controller in START	R/W	0
1010	OFF LINE[2] time (milliseconds)	R/W	0
2001	Par. 1 c.ou - c.out	R/W	EEPR
2002	Par. 2 SEn - SEn.	R/W	EEPR
2003	Par. 3 d.P. - d.P	R/W	EEPR
2004	Par. 4 Lo.S. - Lo. S.	R/W	EEPR
2005	Par. 5 HY.S. - HY. S.	R/W	EEPR
2006	Par. 6 Lo.n. - Lo. n.	R/W	EEPR
2007	Par. 7 Hi.n. - Hi. n.	R/W	EEPR
2008	Par. 8 LAt - LAtc	R/W	EEPR
2009	Par. 9 cA.o - cAL.o.	R/W	EEPR
2010	Par. 10 cA.G - cAL.G.	R/W	EEPR
2011	Par. 11 rEG - rEG.	R/W	EEPR
2012	Par. 12 S.c.c. - S.c.c.	R/W	EEPR
2013	Par. 13 Ld1 - LEd1	R/W	EEPR
2014	Par. 14 HY.c - HYS.c	R/W	EEPR
2015	Par. 15 P.b. - P.b.	R/W	EEPR
2016	Par. 16 t.i. - t.i.	R/W	EEPR
2017	Par. 17 t.d. - t.d.	R/W	EEPR
2018	Par. 18 t.c. - t.c.	R/W	EEPR
2019	Par. 19 AL. - AL.	R/W	EEPR
2020	Par. 20 c.r.A - c.r. A.	R/W	EEPR
2021	Par. 21 S.c.A - S.c.A.	R/W	EEPR
2022	Par. 22 Ld2 - LEd2	R/W	EEPR
2023	Par. 23 HY.A - HYS.A	R/W	EEPR
2024	Par. 24 dE.A - dEL.A	R/W	EEPR
2025	Par. 25 P.SE. - P.SE.	R/W	EEPR
2026	Par. 26 FiL. - FiLt.	R/W	EEPR
2027	Par. 27 tun - tunE	R/W	EEPR

[2] *If value is 0, the control is disabled. If different from 0, it is the max. time which can elapse between two pollings before the controller goes off-line. If it goes off-line, the controller returns to Stop mode, the control output is disabled but the alarms are active.*

2028	Par. 28 Fnc - Func.	R/W	EEPR
2029	Par. 29 GrA - GrAd.	R/W	EEPR
2030	Par. 30 bd.r - bd.rt.	R/W	EEPR
2031	Par. 31 Add - Addr.	R/W	EEPR
2032	Par. 32 dE.S - dL.Sr.	R/W	EEPR
2033	Par. 33 co.F - coo.F.	R/W	EEPR
2034	Par. 34 P.b.M - P.b.M.	R/W	EEPR
2035	Par. 35 ou.d - ou.db.	R/W	EEPR
2036	Par. 36 t.c.2 - t.c. 2	R/W	EEPR
2037	Par. 37 FL.u - FLt.u	R/W	EEPR

12 Configuration

12.1 Modify configuration parameters

	Press	Display	Do
1	FNC	After 5'' display shows 000 with the 1st digit flashing (00500 on ATR141).	
2		Increases the 1st digit to "1".	Press SET to pass to the next digit and enter the configuration password "123" ("1234" on ATR141).
3	SET	Display shows the first parameter of configuration table. c.ou for ATR121 c.out for ATR141	
4		With the arrow keys it is possible to slide up/down through parameters.	Select parameter to be modified, press SET to visualize it and the arrow keys to increase or decrease it.

12.2 Loading default values

This procedure allows to restore factory settings of the device.

	Press	Display	Do
1	FNC for 3s	Display shows 000 | 0000 with the 1st digit flashing.	
2	▼ or ▲	Change the flashing digit and move to the next one pressing SET.	Enter password 999 | 9999
3	SET to confirm	Instrument loads default settings and restarts.	

12.3 Configuration parameters

ATR121 | ATR141

01 c.ou | c.out Command output

Selects command output type.

o1.2 | o1.o2	• Command on relay output Q1 (**default**) • Alarm on relay output Q2
o1.5 | o1.o2	• Command on relay output Q1 • Alarm in tension for SSR
55r | 55r	• Command in tension for SSR • Alarm on relay output Q1
o2.1 | o2.o1.	• Command on relay output Q2 • Alarm on relay output Q1
5Er | 5Eru.	• Valve opening on relay output Q1 • Valve closing on relay output Q2 (SSR with serial 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.

tcH	tc H	Tc-K	-260 °C .. 1360 °C (**default**)[3]
tc.S	tc. S	Tc-S	-40 °C .. 1760 °C[3]
tc.r	tc. r	Tc-R	-40 °C .. 1760 °C[3]
tc.J	tc. J	Tc-J	-200 °C .. 1760 °C[3]
Pt	Pt	PT100	-200 °C .. 600 °C
Pt1	Pt 1	PT100	-200 °C .. 140 °C (restricted range)
ni	ni	Ni100	-60 °C .. 180 °C
ntc	ntc	NTC 10KΩ	-40 °C .. 125 °C
Ptc	Ptc	PTC 1KΩ	-50 °C .. 150 °C
Pt5	Pt5	PT500	-100 °C .. 600 °C
PtH	PtH	PT1000	-100 °C .. 600 °C
0.10	0.10	0..10V	
0.20	0.20	0..20mA	
4.20	4.20	4..20mA	
Po1	Pot1	Potent. ≤ 6KΩ F.S.	
Po2	Pot2	Potent. ≤ 150KΩ F.S.	

03 d.P. Decimal point

Selects number of displayed decimal points.

0	0	No decimal (**default**)
0.0	0.0	1 decimal
0.00	0.00	2 decimals
-	0.000	3 decimals (only ATR141)

04 Lo.S Lower Limit Setpoint

-199 .. 999 | -999 .. 9999

Value expressed in degrees.tenths for temperature sensors or in digits[4] for linear sensors and potentiometers (**default** 0.0).

[3] *On ATR121 version the upper limit is 999.*

05 H.S. Upper Limit Setpoint

-199 .. 999 | -999 .. 9999

Value expressed as degrees.tenths for temperature sensors and digits[3] 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 | -999 .. 9999

Value in digit (**default** 0)

07 H.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 | -999 .. 9999

Value in digit (**default** 999)

08 LAt | LAtc Latch On function

Automatic setting of limits for linear potentiometers and linear inputs.

OFF	OFF	Disabled (**default**)
Std	Std	Standard
u.On	u.On	Virtual Zero Stored
u.OS	u.OS	Virtual Zero Initialized

09 cA.o | cAL.o. Offset calibration

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

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

10 cA.G | cAL.G Gain calibration

Percentage value that is multiplied for the process value (allows to calibrated the working point)
-19.9% .. 99.9% | -99.9% .. 99.9%
Percentage (**default** 0.0)

11 rEG. Regulation type

HEA	HEAt	Heating (N.A.) (Default)
coo	cooL	Cooling (N.C.)
n.r.	n.r.	Absolute alarm with manual reset
n.r.n	n.r.n.	Absolute alarm with manual reset and relay status stored in case of power failure.
H.o.o	H.o.o	Heating with PID always to 0 if the process is over the setpoint.

12 S.c.c.| S.c.c. Command state error

State of contact for command output in case of error

c.o.	c.o.	Open contact (**default**)
c.c.	c.c.	Closed contact

13 Ld1 | LEd1 Command led

State of the OUT1 led corresponding to the relevant contact

c.o.	c.o.	ON with open contact
c.c.	c.c.	ON with closed contact (**default**)

14 14 HY.c | HYS.c Command hysteresis

Hysteresis in ON/OFF or dead band in PID
-199 .. 999 | -999 .. 999
Value expressed as degrees.tenths for temperature sensors and digits[4] for linear sensors and potentiometers (**default** 0.0)

[4] *The display of decimal point depends on the setting of parameter SEn. and the parameter d.P.*

15 P.b. Proportional band

Proportional band Process inertia in units (in °C if temperature) 0 .. 999 | 0 .. 9999 0 = On/Off
Value degrees.tenths for temperature sensors and digit[4] for linear sensors and potentiometers (**default** 0)

16 t.i. Integral time

Process inertia in seconds
0 .. 999 | 0 .. 9999 s (0 = integral disabled) (**default** 0)

17 t.d. Derivative time

Normally ¼ of integral time
0..999 | 0..9999 s (0 = derivative disabled) (**default** 0)

18 t.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	AL. A.	Absolute alarm, referring to process (threshold alarm) **default**
A. b	AL. b.	Band alarm *(par. 13)*
A.d.S	AL.d.S	Upper deviation alarm *(par. 13)*
A.d.i	AL.d.i	Lower deviation alarm *(par. 13)*
A.A.S	AL.A.S.	Absolute alarm, referring to SET1
coo	cooL	Cooling action *(par. 9.6)*
M.r.	M.r.	Absolute alarm with manual reset. After the alarm activation, the output can be released pressing FNC.
M.r.M	M.r.M.	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[5]
n.c.r	Normally closed, active on reaching alarm[5]

21 S.c.A Alarm state error

State of contact for alarm output in case of error

c.o.	Open contact (**default**)
c.c.	Closed contact

22 Ld2 | LEd2 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 HY.A | HYS.A Alarm Hysteresis

-199 .. 999 | -999 .. 9999 Value degrees.tenths for temperature sensors and digit[6] for linear sensors and potentiometers (**default** 0.0)

24 dE.A | dEL.A Alarm delay

-180 .. 180 s

Negative: delay in alarm exit phase.

Positive: delay in alarm entry phase. (**default** 0)

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[5] *On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappears, after that it was restored.*

[6] *Display of decimal point depends on setting of parameter SEn. e and parameter d.P.*

25 P.SE. Setpoint protection

Allows or not to modify the setpoint by keyboard.

FrE	FrEE	Both set can be modified (**default**)
Pr.S	Pro.S	OUT1 command setpoint protection
Pr.A	Pro.A	OUT2 alarm setpoint protection
ALL	ALL	Both set protection

26 FiL | FiLt. 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 Tune

Autotuning type selection *(par. 9.1)*

oFF	oFF	Disabled (**default**)
Aut	Auto	Automatic. PID parameters are calculated at activation and at change of setpoint
MAn	MAn.	Manual. Autotuning launched by keyboard

28 Fnc | Func. Operating / visualization mode

Select operating mode and visualization options

d.SE	d.SEt	Double setpoint (**default**)
S.SE	S.SEt	Single setpoint
uiS	uiS	Only visualizer/indicator
F.b.M	F.b.M.	Dead band function *(par. 10))*
MAi	MAin	Function hide process and setpoint
1.do	1.doM.	Domotics 1: turns off display and leds after 15” from the last keys operation.
2.do	2.doM.	Domotics 2: turns off only the display after 15” from the last keys operation.
3.do	3.doM.	Domotics 3: turns off the display (but not the decimal point) after 15” from the last keys operation.
S.S.u	S.S.ui	Setpoint visualizer: setpoint is always displayed. To visualize the process press FNC.

29 GrA | GrAd. Degree selection

Select degree type

°C Centigrade (**default**)
°F Fahrenheit

30 bd.r | bd.rt. Baud rate

Selects baud rate for serial communication

Nb.1 | Ndb.1 300 bit/s
Nb.2 | Ndb.2 9600 bit/s
Nb.3 | Ndb.3 19200 bit/s (**default**)
Nb.4 | Ndb.4 38400 bit/s

31 Add | Addr. Slave address

Selects slave address for serial communication

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

32 dE.S | dL.Sr. Serial delay

Selects serial delay

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

33 co.F | coo.F. Cooling fluid

Type of refrigerant fluid for heating / cooling PID *(par. 9.6)*

Air Air (**default**)
oil Oil
H2o Water

34 P.b.M 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) *(par. 12)*

35 ou.d | ou.d.b. Overlap / dead band

Dead band combination for heating/cooling action in heating / cooling PID.mode *(par. 12)*
-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 *(par. 12)*
1..300 s (**default** 10)

37 FL.u Visualization filter

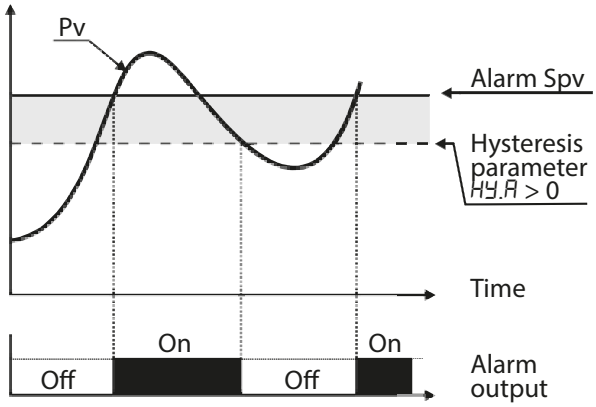
Slows down the refresh of display, to simplify reading

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

13 Alarm intervention modes

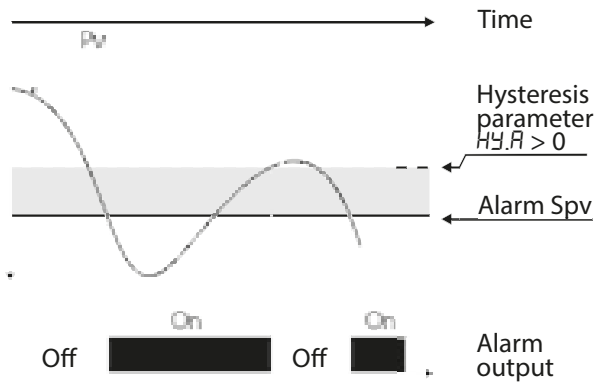
Absolute alarm or threshold alarm (A. A | AL.A. selection)

1



Absolute alarm with controller in heating functioning (par. 11 rEG. come HEA | HEAt) and hysteresis (par. 23 HY.A | HYS.A) in absolute value.

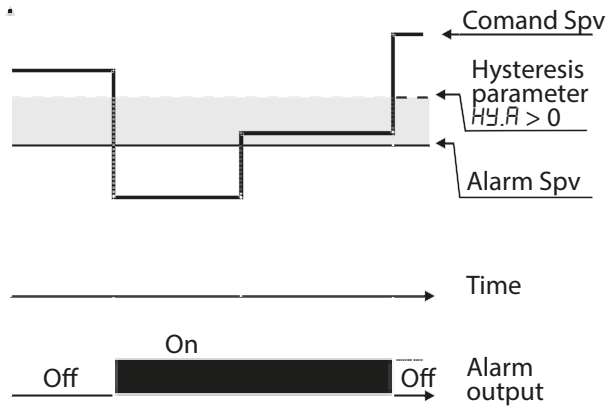
2



Absolute alarm with controller in cooling functioning (par. 11 rEG. come coo | cooL) and hysteresis (par. 23 HY.A | HYS.A) in absolute value.

Absolute alarm or threshold alarm referring to command setpoint (A.A.S | AL.A.S. selection)

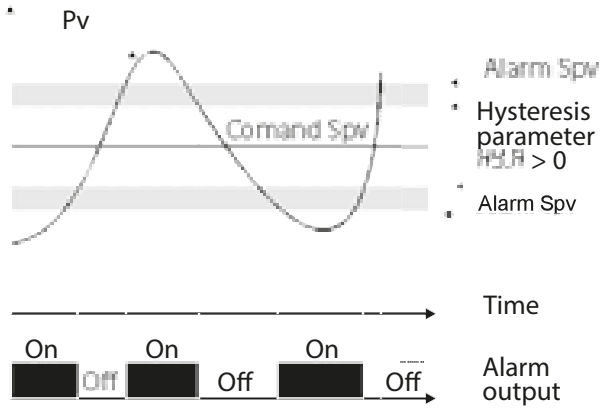
1



Absolute alarm refers to the command set, with the controller in heating functioning (par. 11 rEG. come HEA | HEAt) and hysteresis (par. 23 HY.A | HYS.A) in absolute value. The command set can be modified pressing the arrow keys or using the serial port RS485 commands.
(only on ATR121/141-ADT).

Band alarm (A. b | AL.b. selection)

1



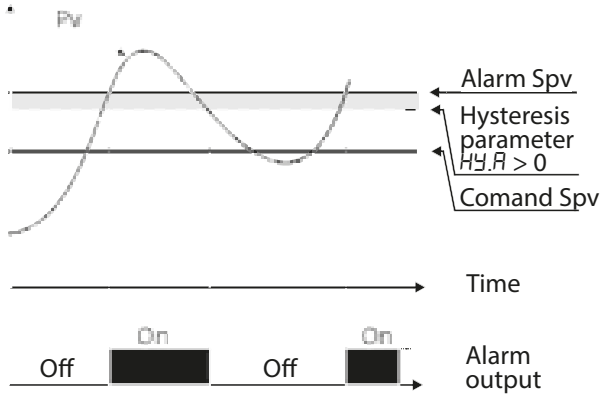
Band alarm with hysteresis.
N.B.: hysteresis (par. 23 HY.A | HYS.A) can not be lower than 0.
The alarm value is the upper or lower deviation from the command setpoint that enables the output.
Exemple:

- command set = 100°C
- alarm set = 5°C
- alarm active if

temperature > 105°C
or temperature < 95°C

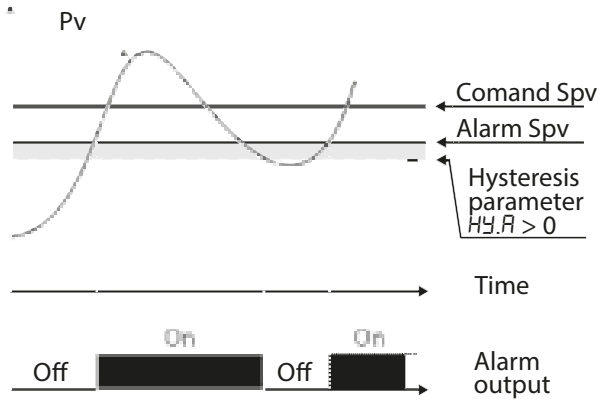
Upper deviation alarm (A.d.S | AL.d.S. selection)

1



Upper deviation alarm value of alarm setpoint greater than “0”.
N.B.: hysteresis (par. 23 HY.A | HYS.A) can not be lower than 0.

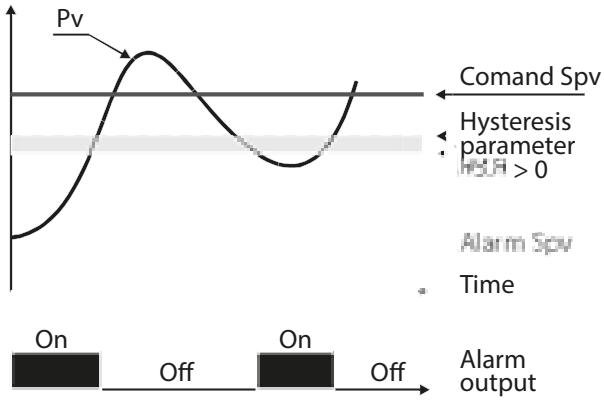
2



Upper deviation alarm value of alarm setpoint less than “0”. N.B.: hysteresis (par. 23 HY.A | HYS.A) can not be lower than 0.

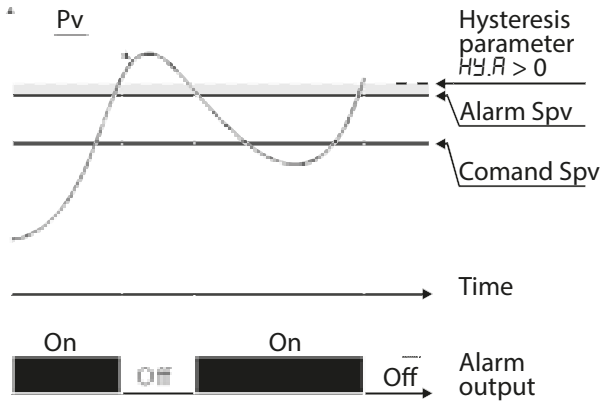
Lower deviation alarm (A.d.1 | AL.d.1 selection)

1



Lower deviation alarm value of alarm setpoint greater than “0”. N.B.: hysteresis (par. 23 HY.A | HYS.A) can not be lower than 0.

2



Lower deviation alarm value of alarm setpoint less than “0”. N.B.: hysteresis (par. 23 HY.A | HYS.A) can not be lower than 0.

14 Table of anomaly signals

If installation malfunctions, controller will switch off regulation output as selected on par. 12 S.c.c./21 S.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 | E-01	Error in EEPROM cell programming	Call Assistance
E-2 | E-02	Cold junction sensor fault or room temperature outside of allowed limits	Call Assistance
E-4 | E-04	Incorrect configuration data. Possible loss of calibration values	Verify configuration parameters
E-5 | E-05	Thermocouple open or temperature outside of limits	Check the connection with the sensors and their integrity. Verify configuration parameters
E-8 | E-08	Missing calibration data	Call Assistance

15 Summary of configuration parameters

Date: Model ATR121/141:
Installer: System:
Notes:

	Par.	Description	Setting
1	c.out	Command output type selection	
2	SEn.	Analogue input configuration	
3	d.P.	Number of decimal points	
4	Lo. S.	Lower limit setpoint	
5	Hi. S.	Upper limit setpoint	
6	Lo. n.	Lower limit range AN1 only for linear	
7	Hi. n.	Upper limit range AN1 only for linear	
8	LAtc	Latch On function	
9	cAL.o.	Offset calibration	
10	cAL.G.	Gain calibration	
11	rEG.	Regulation Type	
12	S.c.c.	Contact state for command output in case of error	
13	LEd1	Led OUT1 state	
14	HYS.c	Hysteresis/ Dead band	
15	P.b.	Proportional band	
16	t. i.	Integral time	
17	t.d.	Derivative time	
18	t.c.	Proportional cycle time	
19	AL.	Alarm selection	
20	c.r. A.	Alarm output contact	
21	S.c.A.	Alarm state in case of error	
22	LEd2	Led state	
23	HYS.A	Alarms hysteresis	
24	dEL.A	Alarm delay	
25	P.SE.	Set protection	
26	FiLt.	Software filter	
27	tunE	Auto-tuning selection	

28	Func.	Functioning
29	GrAd.	Degree selection
30	bd.rt.	Baud rate
31	Addr.	Slave address
32	dL.Sr.	Serial delay
33	coo.F.	Cooling fluid
34	P.b.M.	Proportional band multiplier
35	ou.db.	Overlap / Dead band
36	t.c. 2	Cycle time 2
37	FLt.u	Visualization filter

Notes / updates