Pixsys®
ELECTRONICS

ATR243

Controller

User manual

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Introduction

Thank you for choosing a Pixsys controller.
With ATR243 model Pixsys integrates in a single device all options for sensor reading and actuators command, beside extended supply range 24…230 Vac/Vdc. With 18 selectable sensors and outputs configurable as relay, SSR command, 4…20 mA and 0…10 Volt the user or retailer can reduce stock needs.
The series includes also a model with serial communication RS485 Modbus RTU and with a loading control function via current transformer. The possibility to repeat parametrization is simplified by the Memory Cards with internal battery that do not require power supply for 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

ATR243 series includes three versions. Looking at the table here below it is possible to find the required model.

Power supply 24…230 Vac/Vdc +/-15% 50/60 Hz – 5,5 VA	
ATR243-20ABC	2 relays 5 A or 1 relay + 1 Ssr/V/mA
ATR243-21ABC-T	2 relays 5 A + 1 Ssr/V/mA + RS485 + current transformer*
ATR243-31ABC	3 relays 5 A + 1 Ssr/V/mA + current transformer*

** Models with current transformer input for "Loop Break Alarm" function.*

3 Technical Data

3.1 General data

Indicators	4x0.40 inch displays 4x0.30 inch displays
Operating temperature	Temperature 0-45 °C Humidity 35..95 uR%
Sealing	IP65 front panel (with gasket) IP20 box and terminals
Material	PC ABS UL94VO self-extinguishing
Weight	165 g (-20ABC) / 185 g (-21/31ABC)

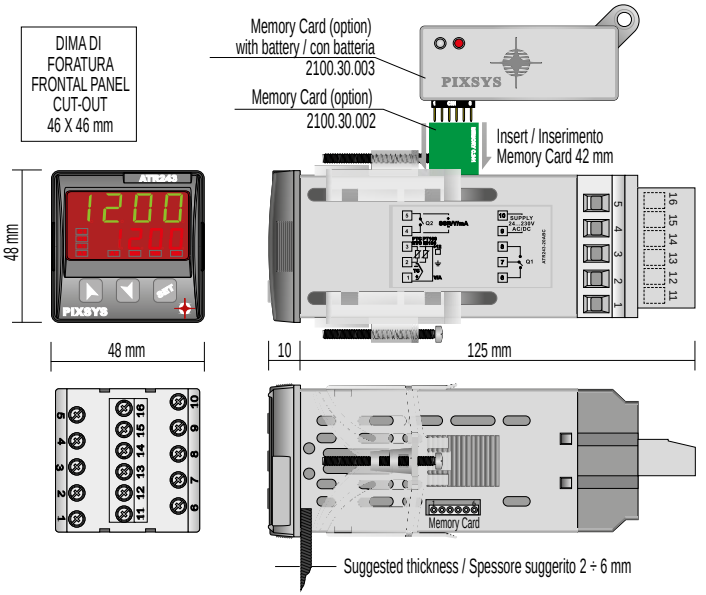
3.2 Hardware data

Power supply	Extended range 24..230 Vac/Vdc ±15% 50/60 Hz	Consumption: 5.5 VA.
Analogue imput	**1**: AN1 configurable via software. **Input**: 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: 0-10 V, 0-20 or 4-20 mA, 0-40 mV. **Current transformer**: 50 mA, 1024 points on version ATR243-21/31. **Potentiometers**: 6 KΩ, 150 KΩ.	Tolerance (25 °C) +/-0.2% ±1 digit for thermocouple input, thermo resistance and V / mA. Cold junction accuracy 0.1 °C/°C. **Impedance**: **0-10 V**: Ri>110 KΩ **0-20 mA**: Ri<5 Ω **4-20 mA**: Ri<5 Ω **0-40 mV**: Ri>1 MΩ
Relay output	2 Relays (ATR243-20..21...). 3 Relays (ATR243-31..). Configurable as command and / or alarm output.	Contacts 5 A - 250 V~. Resistive load.
SSR/V/mA output	**1** SSR Linear 0/4…20mA or 0..10 Volt. Deselecting OUT2 relay on ATR243-20... Configurable as command output or retransmission of setpoint or process.	12V / 30mA (min. 10.5 V DC). Configurable: **0-10 V** with 9500 points +/-0.2% (F.s.) **0-20 mA** with 7500 points +/-0.2% (F.s.) **4-20 mA** with 6000 points +/-0.2% (F.s.)

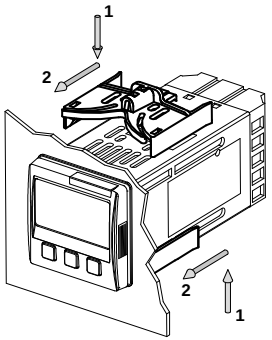
3.3 Software data

Regulation algorithms	ON - OFF with hysteresis. P, P.I., P.I.D., P.D. with proportional time.
Proportional band	0...9999 °C or °F
Integral time	0,0...999,9 sec. (0 excludes integral function)
Derivative time	0,0...999,9 sec. (0 excludes derivative function)
Controller functions	Manual or automatic Tuning, configurable alarms, protection of command and alarm setpoints, activation of functions via digital input, preset cycle with Start / Stop.

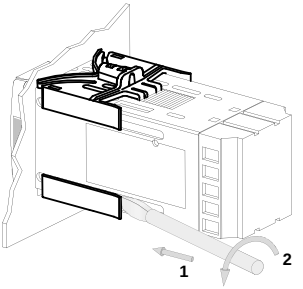
4 Dimensions and Installation



4.1 Panel Assembly



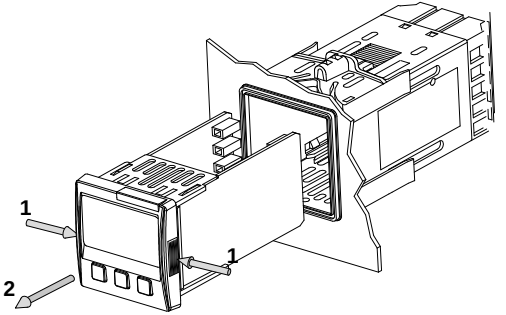
Method of panel assembly and fixing of anchorage hooks.



To dismantle, use a screwdriver and slightly force the fixing hooks to remove them from the fixing guide.

4.2 Electronics Removal

To remove the electronics, grip the front part using the two specific side ridges.



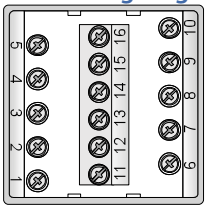
⚠ Disconnect the device from the mains before starting to configurate or service it.

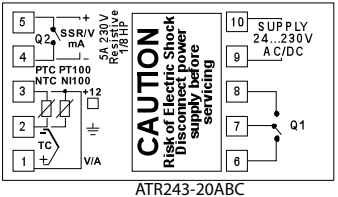
5 Electrical wirings

Although this controller has been designed to resist noises in an industrial environment, please notice the following safety guidelines:

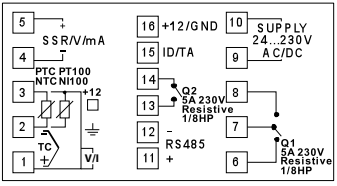
- Separate control lines from the power wires.
- Avoid the proximity of remote control switches, electromagnetic meters, powerful engines.
- Avoid the proximity of power groups, especially those with phase control.

5.1 Wiring diagram

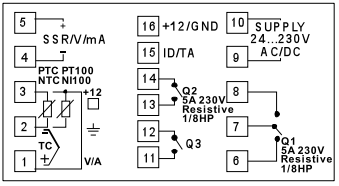




ATR243-20ABC

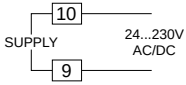


ATR243-21ABC-T



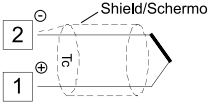
ATR243-31ABC

5.1.a Power



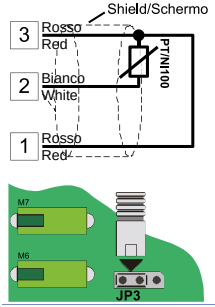
Switching power supply with extended range 24…230 Vac/dc ±15% 50/60 Hz – 5,5 VA (with galvanic isolation).

5.1.b AN1 Analogue Input



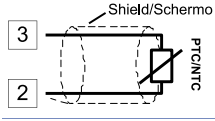
For thermocouples K, S, R, J.

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

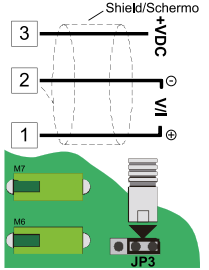


For thermoresistances PT100, NI100.

- For the three-wire connection use wires with the same section.
- For the two-wire connection short-circuit terminals 1 and 3.
- When shielded cable is used, it should be grounded at one side only.
- Select internal jumper **JP3** as in the figure.



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.

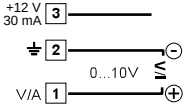


For linear signals V / mA.

- Comply with polarity.
- When shielded cable is used, it should be grounded at one side only.
- Select internal jumper JP3 as in the figure.

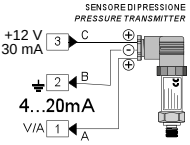
If jumpers are not properly selected, 12 Vdc / 30 mA are not available on terminal 3 to power the sensor.

5.1.c Example of Connection for linear input Volt and mA



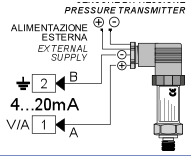
For signals 0….10 V.

Comply with polarity.



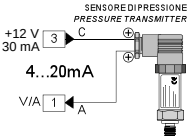
For signals 0/4….20 mA with **three-wire sensor.**

Comply with polarity:
A= Sensor output
B= Sensor ground
C= Sensor power (+12Vdc / 30mA)



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

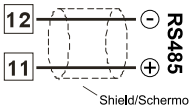
Comply with polarity:
A= Sensor output
B= Sensor ground



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

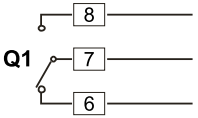
Comply with polarity:
A= Sensor output
C= Sensor power supply (+12Vdc / 30mA)

5.1.d Serial Input



RS485 Modbus RTU communication.

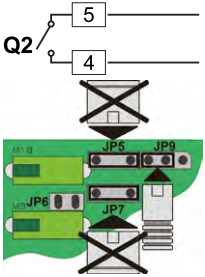
5.1.e Relay Q1 Output



Capacity 5 A / 250 V~ for resistive loads.

NB: see graphic next page.

5.1.f Relay Q2 output for ATR243-20ABC

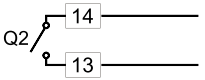


Capacity 5 A / 250 V~ for resistive loads.
To select Q2 as relay output, verify that jumpers JP5 and JP7 are not inserted.

NB: see graphic next page.

Connecting a load without removing the jumpers will permanently damage the controller.

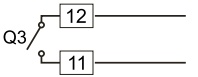
5.1.g Relay Q2 output for ATR243-21ABC and 31ABC



Capacity 5 A / 250 V~ for resistive loads.

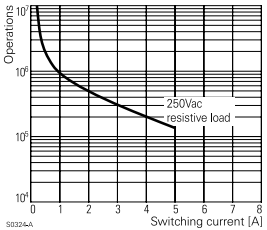
NB: see graphic.

5.1.h Relay Q3 output for ATR243-31ABC



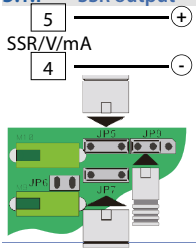
Q3 Relay Output on ATR243-31ABC.

NB: see graphic.



Electrical endurance Q1 / Q2 / Q3:
5 A, 250 Vac, resistive loads, 10^5 operations.
20/2 A, 250 Vac, cosφ = 0.3, 10^5 operations.

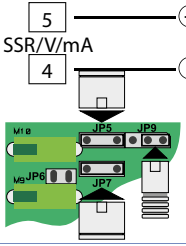
5.1.j SSR output



SSR command output 12 V / 30 mA (min. 10.5 V DC).

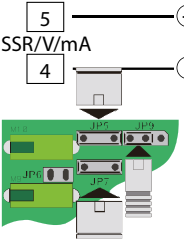
Insert JP5 and JP7 and select JP9 as in the figure to use the SSR output.

5.1.j mA / Volt output



Linear output in mA configurable using parameters as command (parameter c.out) or retransmission of process-setpoint (parameter rEtr).

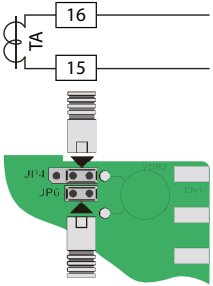
Insert JP5 and JP7 and select JP9 as in figure to use the output in mA.



Linear output in Volt configurable using parameters as command (parameter c.out) or retransmission of process-setpoint (parameter rEtr).

Insert JP5 and JP7 and select JP9 as in figure to use the linear output in Volt.

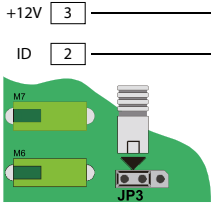
5.1.k Current Transformer Input on ATR243-21ABC-T and ATR243-31ABC



- Input 50 mA for current transformer.
- Sampling time 80 ms.
- Configurable by parameters.

Insert JP4 and JP6 as in figure to select the amperometric transformer input.

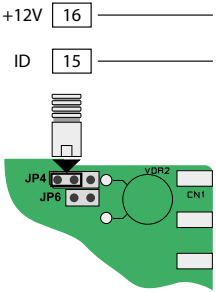
5.1.l Digital Input on ATR243-20ABC



Digital input using parameter dGt_1.
The use of digital input in this version is possible only with TC sensors, 0…10 V, 0/4…20 mA and 0…40 mV.

Select internal jumper JP3 as in figure.

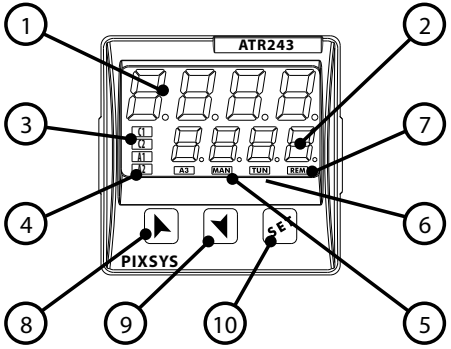
5.1.m Digital Input on ATR243-21ABC-T and ATR243-31ABC



Digital input using parameter dGt_1.

Insert JP4 as in figure to select the digital input.

6 Display and Key Functions



6.1 Numeric Indicators (Display)

1	1234	Normally displays the process. During the configuration phase, it displays the parameter being inserted.
2	1234	Normally displays the setpoint. During the configuration phase, it displays the parameter value being inserted.

6.2 Meaning of Status Lights (Led)

3	C1 C2	ON when the output command is on. C1 with relay/SSR/mA/Volt command or C1 (open) and C2 (close) for a motorised valve command.
4	A1 A2 A3	ON when the corresponding alarm is on.
5	MAN	ON when the *"Manual"* function is on.
6	TUN	ON when the controller is running an *"Autotune"* cycle.
7	REM	ON when the controller communicates via serial port.

6.3 Keys

8	▲	• Allows to increase the main setpoint. • During the configuration phase, allows to slide through parameters. Together with the SET key it modifies them. • Pressed after the SET key it allows to increase the alarm setpoint.
9	▼	• Allows to decrease the main setpoint. • During the configuration phase, allows to slide through parameters. Together with the SET key it modifies them. • Pressed after the SET key it allows to decrease the alarm setpoint.
10	SET	• Allows to display the alarm setpoint and runs the autotuning function. • Allows to vary the configuration parameters.

7 Controller Functions

7.1 Modifying Main Setpoint and Alarm Setpoint Values

The setpoint value can be changed by keyboard as follows:

	Press	Display	Do
1	▲ or ▼	Value on display 2 changes.	Increases or decreases the main setpoint.
2	SET	Visualize alarm setpoint on display 1 value being inserted.	
3	▲ or ▼	Value on display 2 changes.	Increases or decreases the alarm setpoint value.

7.2 Auto-Tuning

Tuning procedure calculates the controller parameters and can be manual or automatic according to selection on parameter 57 (tunE).

7.3 Manual Tuning

Manual procedure allows the user greater flexibility to decide when to update P.I.D. algorithm work parameters. The procedure can be activated in two ways.

- **Running Tuning by keyboard**:
  Press SET key until display 1 shows the writing tunE with display 2 showing oFF, press ▲, display 2 shows on.
  TUN led switches on and the procedure begins.

- **Running Tuning by digital input**:
  Select tunE on parameter 61 diF. i. At first activation of digital input (commutation on front panel) **TUN** led switches on and at second activation switches off.

7.4 Automatic Tuning

Automatic tuning activates when the controller is switched on or when the setpoint is modified to a value over 35%.
To avoid an overshoot, the treshold where the controller calculates new P.I.D. parameters is determined by the setpoint value minus the *"Set Deviation Tune"* (see parameter 58 S.d.tu.).

To exit Tuning and keep P.I.D. values unchanged, press SET key until display 1 shows the writing tunE and display 2 shows on. Press ▼, display 2 shows oFF. **TUN** led switches off and procedure finishes.

7.5 Soft-Start

To reach the setpoint the controller can follow a gradient expressed in units (example: Degree/Hours).
Enter the gradient on parameter 62 GrAd. with chosen Units/Hours; only on subsequent activation the controller uses Soft-Start function.
If parameter 59 oP.no. is set on cont. and parameter 63 MA.t1. is different from 0, after switch-on and elapsing of the time set on parameter 63, setpoint does not follow the gradient anymore, but it reaches final setpoint with maximum power.
Autotuning does not work when only the par. GrAd. is different from 0. If parameter 63 MA.t1. is different from 0 and parameter 57 tunE is set on Auto the autotuning starts when Soft-Start time is finished, while if parameter 57 tunE is set on MAn. the autotuning can be started only when Soft-Start finishes.

7.6 Automatic / Manual Regulation for % Output Control

This function allows to select automatic functioning or manual command of the output percentage.
With parameter 60 Au.MA. the operator can select two methods:

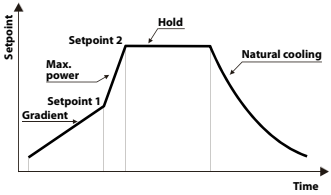
1 **First selection** (En.)
Pressing SET key display 1 shows P.---, while display 2 shows Auto.
Pressing ▲ key display shows MAn.; it is now possible to change the output percentage using ▲ and ▼. To return to automatic mode, using the same procedure, select Auto on display 2: led **MAN** switches off and functioning returns to automatic mode.

2 **Second selection** (En.St)
enables the same functioning, but with two important variants:

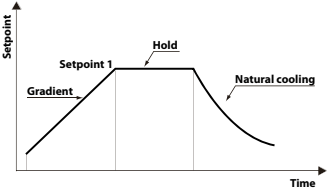
- If there is a temporary power failure or after switch-off, the manual functioning as well as the previous output percentage value will be maintained at restarting.
- If the sensor breaks during automatic functioning, the controller moves to manual mode while maintaining the output percentage command unchanged as generated by the P.I.D. immediately before breakage.

7.7 Pre-Programmed Cycle

The pre-programmed cycle function activates by setting Pr.cY or Pc.SS. on parameter 59 oP.no.



First selection (Pr.cY):
the controller reaches setpoint1 basing on the gradient set on parameter 62 GrAd., then it reaches maximum power up to setpoint 2. When the process reaches maximum power, this setpoint is maintained for the time set on parameter 63 MA.t1.
On expiry, the command output is disabled and controller displays StoP. Cycle starts at each activation of the controller, or via digital input if it is enabled for this type of functioning (see parameter 61 dGt. 1).



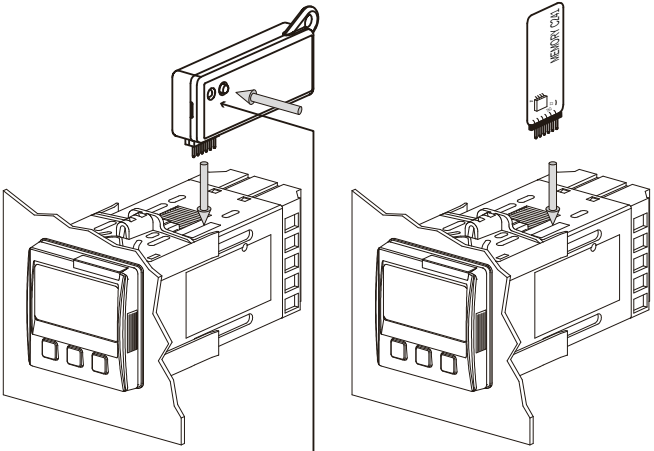
Second selection (Pr.cY):
start-up is decided only on activation of the digital input, according to the setting of parameter 61 dGt. 1. On start-up, controller reaches setpoint 1 following gradient set in parameter 62 GrAd.
When the process reaches this gradient, it is maintained for the time set on parameter 63 MA.t1. On expiry, command output is disabled and the controller displays StoP.

Variation (SS.cY):
Selecting SS.cY. (Soft Start Cycle) the controller will operate as per the first selection (Pr.cY) but with two important variations. If at starting the process is lower than SET1, the device regulates the output power according to the percentage selected on parameter 62 GrAd.
When the process is greater than SET1 or the time selected on parameter 63 MA.t1. is elapsed, it reaches maximum power up to SET2. When the process reaches SET2 the controller keeps it to infinity.
If parameter 59 oP.no. is configured as SS.cY. it is possible to select HidE on parameter 17 c. SP.: SET1 is no longer displayed and SET2 label becomes SET.
Starting the manual tune during the regulation on SET1, TUN led switches ON only when the regulation switches to SET2.
The autotuning (manual or automatic) works only if SET2 is being regulated. If the autotuning is launched during regulation on SET1 it doesn't start until the regulation switches to SET2.

7.8 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 memory card **when the controller is off**.
  On activation display 1 shows mEmo and display 2 shows --- (**only if the correct values are saved in the memory card**). By pressing [▲] key display 2 shows LoAd, then confirm using [SET] key.
  Controller loads the new value and restarts.



LED ROSSO: acceso in programmazione
Red Light: waiting for programming

LED VERDE: programmazione eseguita
Green Light: done

- With the controller not connected to power supply.
  The memory card is equipped with an internal battery with an autonomy of about 1000 uses (2032 button battery, replaceable). Insert the memory card and press the programming buttons. When writing the parameters, led turns red and on completing the procedure it changes to 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
To update the memory card values, follow the procedure described on first mode, setting display 2 to ---- so as not to load the parameters on controller[1].
Enter configuration and **change at least one parameter**.
Exit configuration. Changes are stored automatically.

7.9 Latch-on function

For use with input Pot.1 (potentiometer 6 KΩ) and Pot.2 (potentiometer 150 KΩ) and with linear input (0…10 V, 0...40 mV, 0/4…20 mA), it is possible to associate start value of the scale (parameter 6 LoL.1) to the minimum position of the sensor and value of end scale (parameter 7 uPL.1) to the maximum position of the sensor (parameter 8 LAtc. configured as Std.).
It is also possible to fix the point in which the controller will display 0 (however keeping the scale range between LoL.1 and uPL.1) using the *"virtual zero"* option by setting u.0St. or u.0 in. in parameter 8 LAtc.
If you set u.0 in. the virtual zero will reset after each activation of the tool; if you set u.0St. the virtual zero remains fixed once tuned.
Selecting "dyn.L" (dynamic limits) it is possible to surpass lower and upper limits if on input there are values out of 0/4…20mA or 0…10V .
To enable the LATCH ON function select chosen configuration for parameter LAtc[2].

For the calibration procedure refer to the following table:

	Press	Display	Do
1	▲ + ▼ simultaneously	Exit parameters configuration. Display 2 shows the writing LAtc.	Place the sensor on minimum operating value (associated with LoL.1).
2	▼	Set the value on minimum. Display shows LoU.	Place the sensor on maximum operating value (associated with uPL.1).
3	▲	Set the value to maximum. The display shows H iGH.	To exit standard procedure press SET. For *"virtual zero"* settings place the sensor on the zero point.
4	SET	Set the virtual zero value. Display shows u irt. **NB**: For selection of u.0 in. the procedure in point 4 should be followed on each re-activation.	To exit procedure press SET.

[1] *If on activation the controller does not display memo it means no data have been saved on the memory card, but it is possible to update values.*
[2] *The tuning procedure starts by exiting the configuration after changing the parameter.*

7.10 Loop Break Alarm On Current Trasformer

This function allows to measure load current and to manage an alarm during malfunctioning (with power in short circuit or always off).
The current transformer connected to terminals 15 and 16 must be 50 mA (sampling time 80 ms).

- Set end scale value of the current transformer in Amperes on parameter 47 t.A.
- Set the intervention threshold of the Loop Break Alarm in Amperes on parameter 48 L.b.A.t.
- Set the intervention delay time of the Loop Break Alarm on parameter 49 L.b.A.d.
- It is possible to associate the alarm with a relay by setting the parameter AL. 1, AL. 2 or AL. 3 as AL. 4.

If a remote control switch or SSR remains closed, controller signals the fault by showing L.b.A.c. on display 2 (alternatively with a command setpoint).

If the power stage remains open, or the load current is lower than the value set on L.b.A.t., controller shows L.b.A.o. on display. It is possible to display the current absorbed during the closure phase of the power stage.

	Press	Display	Do
1	SET	This key enables to scroll on display 2 the output percentage, auto / man selection, setpoint and alarms.	Press SET until the writing AM.t.A. appears on display 1 and display 2 shows the current in amperes (t.A. >0). The value is also maintained when no current circulates on the load.

Setting on parameter 48 L.b.A.t. the value 0 it is possible to visualize the current absorbed without generating the Loop Break Alarm.

7.11 Digital Input Functions

On ATR243 model digital input can be enabled by using parameters 59 oP.no. and 61 diF.1.

- **Parameter 59** oP.no.
  NB: When using this settings, parameter 61 diF.1. is ignored.
  2t.S.: Switch two thresholds setpoint: with open contact ATR243 regulates on SET1; with closed contact regulates on SET2;
  2t.S.1.: Switch two thresholds setpoint: setpoint selection is done by an impulse on digital input;
  3t.S.1.: Switch three thresholds setpoint by an impulse on digital input;
  4t.S.1.: Switch four thresholds setpoint by an impulse on digital input;
  t.rES.: Customized function;
  P.c.S.S.: Pre-programmed cycle (see paragraph 7.7).
  Setpoints values can be modified any time pressing SET key.

- **Parameter 61** diF.1.
  NB: Settings on this parameter are available only if cont. or Pr.cY. are selected on parameter 59 oP.no.
  St.St.: Start / Stop; operating on digital input the controller switches alternatively from start to stop;
  rn.n.o.: Run N.O. Controller is in start only with closed input;
  rn.n.c.: Run N.C. Controller is in start only with open input;
  L.c.n.o.: With closed input allows to lock the reading of sensors;
  Lc.n.c.: With open input allows to lock the reading of sensors;
  tunE: Enables / disables Tuning function if parameter 57 tunE is selected as MAn.;
  A.MA.1.: If parameter 60 Au.MA. is selected as En. or En.St. controller switch from automatic to manual functioning;
  A.MA.c.: If parameter 60 Au.MA. is selected as En. or En.St. ATR243 works in automatic mode if input is open or in manual mode if input is closed.

NB: The digital input functions **are not** available with sensors PT100 and NI100 on model ATR243-20ABC.

7.12 Dual Action Heating-Cooling

ATR243 is suitable also for systems requiring a combined heating-cooling action. Command output must be configured as Heating P.I.D. (*Act.t.* = *HEAt* and with a *P.b.* greater than 0), and one of the alarms (*AL.1*, *AL. 2* or *AL. 3*) must be configured as *cooL*. Command output must be connected to the actuator responsible for heat, while the alarm will control cooling action.

Parameters to configure for the Heating P.I.D. are:

Act.t. = *HEAt* Command output type (Heating);

P.b.: Heating proportional band;

t. i: Integral time heating and cooling;

t.d.: Derivative time heating and cooling;

t.c.: Heating time cycle.

Parameters to configure for the Cooling P.I.D. are the following (ex: action associated to alarm 1):

AL.1 = *cooL* Alarm 1 selection (Cooling);

P.b.M.: Proportional band multiplier;

ou.d.b.: Overlapping / Dead band;

co.t.c.: Cooling time cycle.

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.* x *P.b.M.*

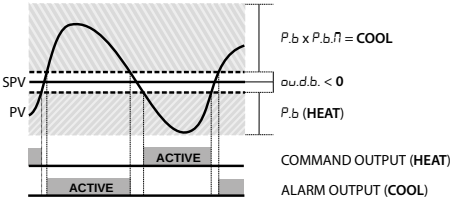
This gives a proportional band for cooling which will be the same as heating band if *P.b.M.* = 1.00, or 5 times greater if *P.b.M.* = 5.00.

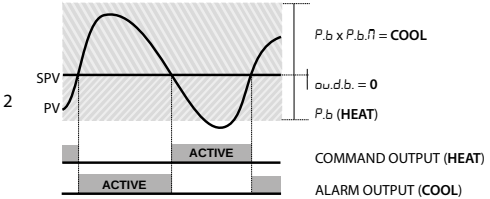
Integral and **derivative time** are the same for both actions.

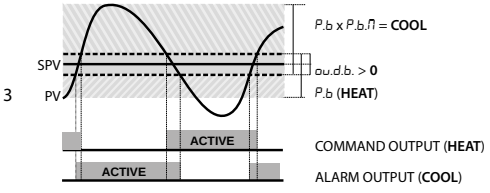
Parameter *ou.d.b.* determines the percentage overlapping between the two actions. For systems in which the heating and cooling output must never be simultaneously active a dead band (*ou.d.b.* ≤ 0) can be configured, and vice versa an overlapping (*ou.d.b.* > 0).

The following figure shows an example of dual action P.I.D. (heating-cooling) with *t. i.* = 0 and *t.d.* = 0.

1







Parameter co.t.c. has the same meaning as the heating time cycle t.c.
Parameter coo.F. (cooling fluid) pre-selects the proportional band multiplier P.b.n. and the cooling P.I.D. time cycle co.t.c. basing on the type of cooling fluid:

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

Once selected, parameter coo.F., parameters P.b.n., oud.b. and co.t.c. can however be changed.

8 Serial Communication

ATR243-21ABC-T, equipped with RS485, can receive and broadcast data via serial communication using MODBUS RTU protocol. The device can only be configured as a Slave. This function enables the control of multiple controllers connected to a supervisory system (SCADA). Each controller responds to a master query only if the query contains the same address as that in the parameter SL.Ad. The permitted addresses range from 1 to 254 and there must 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 response is expected. ATR243 can introduce a delay (in milliseconds) in the response to the master request. This delay must be set on parameter 72 SE.dE. Each parameter change is saved by the controller on EEPROM memory (100000 writing cycles), while the setpoints are saved with a delay of ten seconds after the last change.
NB: changes made to Words that are different from those reported in the following table can lead to malfunction.

Modbus RTU protocol features	
Baud-rate	Selection on parameter 70 bd.rt. : 4.8 ⊦ 4.800 bit/Sec. 9.6 ⊦ 9.600 bit/Sec. 19.2⊦ 19.200 bit/Sec. 28.8⊦ 28.800 bit/Sec. 38.4⊦ 38.400 bit/Sec. 57.6⊦ 57.600 bit/Sec.
Format	8, N, 1 (8 bit, no parity, 1 stop)
Supported functions	WORD READING (max 20 word) (0x03, 0x04) SINGLE WORD WRITING (0x06) MULTIPLE WORDS WRITING (max 20 word) (0x10)

Looking at the table here below it is possible to find all available addresses and functions:

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

Modbus Address	Description	Read Only	Reset value
0	Device type	RO	EEPROM
1	Software version	RO	EEPROM
5	Slave address	R/W	EEPROM
6	Boot version	RO	EEPROM
50	Automatic addressing	WO	-
51	System code comparison	WO	-
500	Loading default values (write 9999)	R/W	0
510	Setpoints storing time in eeprom (0-60 s)	R/W	10
999	Process subjected to the visualization filter	RO	-
1000	Process (degrees.tenths for temperature sensors; digits for linear sensors)	RO	-
1001	Setpoint 1	R/W	EEPROM
1002	Setpoint 2	R/W	EEPROM
1003	Setpoint 3	R/W	EEPROM
1004	Setpoint 4	R/W	EEPROM
1005	Alarm 1	R/W	EEPROM
1006	Alarm 2	R/W	EEPROM
1007	Alarm 3	R/W	EEPROM
1008	Setpoint gradient	RO	EEPROM
1009	Relay status (0 = Off, 1 = On): Bit 0 = Relay **Q1** Bit 1 = Relay **Q2** Bit 2 = Reserved Bit 3 = **SSR**	RO	0
1010	Heating output percentage (0-10000)	RO	0

Modbus Address	Description	Read Only	Reset value
1011	Cooling output percentage (0-10000)	RO	0
1012	Alarms status (0 = None, 1 = Active) Bit 0 = Alarm 1 Bit 1 = Alarm 2 Bit 2 = Alarm 3	RO	0
1013	Manual reset: write 0 to reset all alarms. In reading (0 = Not resettable, 1 = Resettable) Bit 0 = Alarm 1 Bit 1 = Alarm 2 Bit 2 = Alarm 3	WO	0
1014	Error flags Bit 0 = Eeprom writing error Bit 1 = Eeprom reading error Bit 2 = Cold junction error Bit 3 = Process error (sensor) Bit 4 = Generic error Bit 5 = Hardware error Bit 6 = L.B.A.O. error Bit 7 = L.B.A.C. error Bit 8 = Missing calibration data error	RO	0
1015	Cold junction temperature (degrees.tenths)	RO	-
1016	Start / Stop 0 = Controller in STOP 1 = Controller in START	R/W	0
1017	Lock conversion ON / OFF 0 = Lock conversion off 1 = Lock conversion on	R/W	0
1018	Tuning ON / OFF 0 = Tuning off 1 = Tuning on	R/W	0
1019	Automatic / manual selection 0 = Automatic 1 = Manual	R/W	0
1020	T.A. current ON (Ampere with tenths)	RO	-
1021	T.A. current OFF (Ampere with tenths)	RO	
1022	OFF LINE* time (milliseconds)	R/W	
1023	Instant Current (Ampere)	R/W	0
1024	Digital Input State	R/W	0
1025	Synchronized Tuning for multizone system 0 = Tuning OFF (Normal operating of the regulator) 1 = Output command OFF 2 = Output command ON 3 = Start Tuning 4 = End Tuning and output command OFF (Write 0 for normal operating)	R/W	0
1099	Process subjected to the visualization filter and decimal point selection	RO	
1100	Process with decimal point selection	RO	
1101	Setpoint 1 with decimal point selection	R/W	EEPROM

Modbus Address	Description	Read Only	Reset value
1102	Setpoint 2 with decimal point selection	R/W	EEPROM
1103	Setpoint 3 with decimal point selection	R/W	EEPROM
1104	Setpoint 4 with decimal point selection	R/W	EEPROM
1105	Alarm 1 with decimal point selection	R/W	EEPROM
1106	Alarm 2 with decimal point selection	R/W	EEPROM
1107	Alarm 3 with decimal point selection	R/W	EEPROM
1108	Gradient Setpoint with decimal point selection	RO	EEPROM
1109	Percentage heating output (0-1000)	R/W	0
1110	Percentage heating output (0-100)	RO	0
1111	Percentage cooling output (0-1000)	RO	0
1112	Percentage cooling output (0-100)	RO	0
2001	Parameter 1	R/W	EEPROM
2002	Parameter 2	R/W	EEPROM
2072	Parameter 72	R/W	EEPROM
3000	Disabling serial control of machine**	RO	0
3001	First word display 1 (ascii)	R/W	0
3002	Second word display 1 (ascii)	R/W	0
3003	Third word display 1 (ascii)	R/W	0
3004	Fourth word display 1 (ascii)	R/W	0
3005	Fifth word display 1 (ascii)	R/W	0
3006	Sixth word display 1 (ascii)	R/W	0
3007	Seventh word display 1 (ascii)	R/W	0
3008	Eighth word display 1 (ascii)	R/W	0
3009	First word display 2 (ascii)	R/W	0
3010	Second word display 2 (ascii)	R/W	0
3011	Third word display 2 (ascii)	R/W	0
3012	Fourth word display 2 (ascii)	R/W	0
3013	Fifth word display 2 (ascii)	R/W	0
3014	Sixth word display 2 (ascii)	R/W	0
3015	Seventh word display 2 (ascii)	R/W	0
3016	Eight word display 2 (ascii)	R/W	0
3017	Word LED Bit 0 = LED **C1** Bit 1 = LED **C2** Bit 2 = LED **A1** Bit 3 = LED **A2** Bit 4 = LED **A3** Bit 5 = LED **MAN** Bit 6 = LED **TUN** Bit 7 = LED **REM**	R/W	0

Modbus Address	Description	Read Only	Reset value
3018	Word keys (write 1 to command keys) Bit 0 = ▲ Bit 1 = ▼ Bit 2 = SET	R/W	0
3019	Word serial relay Bit 0 = Relay **Q1** Bit 1 = Relay **Q2** Bit 2 = Relay **Q3**	R/W	0
3020	Word **SSR** serial (0 = Off, 1 = On)	R/W	0
3021	Word output **0...10 V** serial (0…10000)	R/W	0
3022	Word output **4...20 mA** serial (0…10000)	R/W	0
3023	Relay state in case of off-line (only if controlled by serial) Bit 0 = Relay **Q1** Bit 1 = Relay **Q2** Bit 2 = Relay **Q3**	R/W	0
3024	Output state **SSR / 0…10 V / 4…20 mA** in case of off-line (only if controlled by serial) (0…10000)	R/W	0
3025	Serial process. Setting parameter 54 it is possible to make averages on the remote process	R/W	0
4001	Parameter 1***	R/W	EEPROM
4002	Parameter 2***	R/W	EEPROM
4072	Parameter 72***	R/W	EEPROM

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

** *By writing 1 on this word, the effects of the writing are cancelled on all the Modbus addresses from 3001 to 3022. Control therefore returns to the controller.*

*** *Parameters modified using serial address 4001 to 4072 will be stored on eeprom only after 10" since last writing of one parameter.*

9 Enter configuration

For configuration parameters see paragraph 10.

	Press	Display	Do
1	SET for 3 seconds	Display 1 shows 0.000 with the 1st digit flashing, while display 2 shows PASS.	
2	▲ or ▼	Changes flashing digit and move to the next one using SET key.	Enter password: 1234.
3	SET to confirm	Display 1 shows the first parameter and display 2 shows the value.	
4	▲ or ▼	Slide up / down through parameters.	
5	SET ▲ or ▼	Increase or decrease displayed value by keep pressing SET and after an arrow key.	Enter new data which will be saved on releasing the keys. To change another parameter return to point 4.
6	▲ + ▼ simultaneously	End of configuration parameter change. The controller exits from programming.	

9.1 Loading default values

This procedure allows to restore factory settings of the instrument.

	Press	Display	Do
1	SET for 3 seconds	Display 1 visualizes 0.000 with 1st digit blinking, while display 2 shows PASS.	
2	▲ o ▼	Change blinking digit and move to the next one with SET.	Enter password: 9999.
3	SET to confirm	Device loads default settings.	Turn off and restart the instrument.

10 Table of Configuration Parameters

The following table includes all parameters. Some of them will not be visible on the models which are not provided with relevant Hardware data.

1 C.out Command Output

Command output type selection (see tables).

- c. o1 Default (necessary for using process and setpoint retransmission function with Volt / mA output)
- c. o2 Command on relay output Q2[3]
- c.SSr Command in tension for SSR[4]
- c.uAL. Servo-valve command with open loop[3]
- c.4.20 4...20 mA command[4]
- c.0.20 0...20 mA command[4]
- c.0.10 0...10 V command[4]

ATR243-20ABC		
	COMMAND	ALARM 1
c. o1	Q1	Q2
c. o2	Q2	Q1
c.SSr	SSR	Q1
c.uAL.	Q1 (opens) / Q2 (closes)	-
c.4.20	4 ... 20 mA	Q1
c.0.20	0 ... 20 mA	Q1
c.0.10	0 ... 10 V	Q1

ATR243-21ABC-T			
	COMMAND	ALARM 1	ALARM 2
c. o1	Q1	Q2	SSR
c. o2	Q2	Q1	SSR
c.SSr	SSR	Q1	Q2
c.uAL.	Q1 (opens) / Q2 (closes)	SSR	-
c.4.20	4 ... 20 mA	Q1	Q2
c.0.20	0 ... 20 mA	Q1	Q2
c.0.10	0 ... 10 V	Q1	Q2

ATR243-31ABC				
	COMMAND	ALARM 1	ALARM 2	ALARM 3
c. o1	Q1	Q2	Q3	SSR
c. o2	Q2	Q1	SSR	SSR
c.SSr	SSR	Q1	Q2	Q3
c.uAL.	Q2 (opens) / Q3 (closes)	Q1	SSR	-
c.4.20	4 ... 20 mA	Q1	Q2	Q3
c.0.20	0 ... 20 mA	Q1	Q2	Q3
c.0.10	0 ... 10 V	Q1	Q2	Q3

[3] *Only on ATR243-20ABC do not select if process retransmission function is used.*

[4] *Do not select if process retransmission function is used.*

2 SEn. Sensor

Analogue input configuration/sensor selection

tc.K	Tc-K (**Default**)	-260 °C ... 1360 °C
tc.S	Tc-S	-40 °C ... 1760 °C
tc.r	Tc-R	-40 °C ... 1760 °C
tc.J	Tc-J	-200 °C ... 1200 °C
Pt	Pt100	-200 °C ... 600 °C
Pt1	Pt100	-200 °C ... 140 °C
ni	NI100	-60 °C ... 180 °C
ntc	NTC10K	-40 °C ... 125 °C
Ptc	PTC1K	-50 °C ... 150 °C
Pt5	Pt500	-100 °C ... 600 °C
Pt1k	Pt1000	-100 °C ... 600 °C
0.10	0 ... 10 Volt	
0.20	0 ... 20 mA	
4.20	4 ... 20 mA	
0.40	0 ... 40 mVolt	
Pot.1	Potentiometer max 6 Kohm (See paragraph 7.09)	
Pot.2	Potentiometer max 150 Kohm (See paragraph 7.09)	
t.A.	50 mA secondary Current transformer (Only ATR243-21/31ABC)	

3 d.P. Decimal Point

Select type of visualized decimal point

0	**Default**
0.0	1 Decimal
0.00	2 Decimal
0.000	3 Decimal

4 Lo.LS. Lower Limit Setpoint

Lower limit selectable for setpoint
-999…+9999 [digit[5]] (degrees.tenths for temperature sensors), **Default**: 0.

5 uP.LS. Upper Limit Setpoint

Upper limit selectable for setpoint
-999…+9999 [digit[5]] (degrees.tenths for temperature sensors),
Default: 1750.

6 LoL.1 Lower Linear Input

Range AN1 lower limit only for linear. Example: with input 4...20 mA this parameter takes value associated to 4 mA
-999 bis +9999 [digit[5]], **Default**: 0.

7 uP.L.1. Upper Linear Input

Range AN1 upper limit only for linear. Example: with input 4...20 mA this parameter takes value associated to 20 mA
-999 bis +9999 [digit[5]], **Default**: 1000.

8 LAtc. Latch On Function

Automatic setting of limits for linear inputs and potentiometers (see paragraph 7.9)

- d i S. Disabled (**Default**)
- Std. Standard
- u.0St. Virtual zero stored
- u.0 in Virtual zero initialized
- dYn.L Allows to surpass lower and upper limits if on input there are values out of 0/4…20mA or 0…10V.

9 o.cAL. Offset Calibration

Value added / subtracted to process visualization (usually correcting the value of environment temperature)

-999…+1000 [digit[5]] for linear sensors and potentiometers.

-200.0…+100.0 (degrees.tenths for temperature sensors), **Default** 0.0.

10 G.cAL. Gain Calibration

Percentage value that is multiplied for the process value (allows to calibrated the working point)

-99.9%…+100.0% (**Default** = 0.0)

ex: to correct the range from 0...1000°C showing 0...1010°C, set the parameter to -1.0.

11 Act.t. Action type

Regulation type

- HEAt Heating (N.O.) (**Default**)
- cooL Cooling (N.C.)
- H.o.o.S. Lock command above SPV. Example: command output disabled when reaching setpoint, also with P.I.D. value different from 0

12 c. rE. Command Reset

Type of reset for state of command contact (always automatic in P.I.D. functioning)

- AtE. Automatic reset (**Default**)
- MtE. Manual reset
- MtE.S. Manual reset stored (keeps relay status also after an eventual power failure)

13 c. S.E. Command State Error

State of contact for command output in case of error

- c.o. Open contact (**Default**)
- c.c. Closed contact

14 c. Ld. 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**)

15 c. HY. Command Hysteresis

Hysteresis in ON/OFF or dead band in P.I.D.
-999…+999 [digit[5]] (degrees.tenths for temperature sensors), **Default** 0.0.

16 c. dE. Command Delay

Command delay (only in ON / OFF functioning). In case of servo valve it also works in P.I.D. and represents the delay between opening and closure of the two contacts
-180…+180 seconds (tenths of second in case of servo valve).
Negative: delay in switching off phase.
Positive: delay in activation phase.
Default: 0.

17 c. S.P. Command Setpoint Protection

Allows or not to modify the command setpoint value
FrEE Modification allowed (**Default**)
Loc Protected

18 P.b. Proportional Band

Proportional band Process inertia in units (example: if temperature is in °C)
0 ON / OFF t. i. if equal to 0 (**Default**)
1-9999 [digit[5]] (degrees for temperature sensors)

19 t. i. Integral Time

Process inertia in seconds
0.0-999.9 seconds (0 = integral disabled), **Default**: 0.0

20 t.d. Derivative Time

Normally ¼ of integral time
0.0-999.9 seconds (0 = derivative disabled), **Default**: 0.0

21 t.c. Cycle Time

Cycle time (for P.I.D. on remote control switch 10 / 15 sec., for P.I.D. on SSR 1 sec.) or servo time (value declared by servo-motor manufacturer)
1-300 seconds, **Default**: 10.

22 o.PoL. Output Power Limit

Select max. value for command output percentage
0…100%, **Default**: 100%.
Es: with c.out selected as 0...10 V and o.PoL. as 90%, command output can modulate from a min. of 0 V to a max. of 9 V.

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

23 AL.1 Alarm 1

Alarm 1 selection. Alarm intervention is related to AL1. (See paragraph 11)

- d.S. Disabled (**Default**)
- A. AL. Absolute alarm, referring to process
- b. AL. Band alarm
- H.d.AL. Upper deviation alarm
- L.d.AL. Lower deviation alarm
- A.c.AL. Absolute alarm, referring to command setpoint
- St.AL. Status alarm (active in Run / Start)
- cooL Cooling action
- L.b.A. Status alarm *"load control"* (Loop Break Alarm). Example: status of contactors / SSR or heating elements

24 A1.S.O Alarm 1 State Output

Alarm 1 output contact and intervention type

- n.o. S. (N.O. Start) Normally open, active at start (**Default**)
- n.c. S. (N.C. Start) Normally closed, active at start
- n.o. t. (N.O. Threshold) Normally open, active on reaching alarm[6]
- n.c. t. (N.C. Threshold) Normally closed, active on reaching alarm[6]

25 A1.rE. Alarm 1 Reset

Alarm 1 contact reset type

- ArE. Automatic reset (**Default**)
- MrE. Manual reset (SET)
- MrE.S. Manual reset stored. (keeps relay status also after an eventual power failure)

26 A.1.S.E. Alarm 1 State Reset

State of contact for alarm 1 output in case of error

- c.o. Open contact (**Default**)
- c.c. Closed contact

27 A.1.Ld. Alarm 1 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**)

28 A.1.HY. Alarm 1 Hysteresis

-999…+999 [digit[7]] (degrees.tenths for temperature sensors), **Default**: 0.0.

---

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

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

29 A.1.dE. Alarm 1 Delay

-180…+180 seconds.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.
Default: 0.

30 A.1.SP. Alarm 1 Setpoint Protection

Alarm 1 set protection. Does not allow user to modify setpoint

- FrEE Modification allowed (**Default**)
- Loc Protected
- HidE Protected and not visualized

31 AL. 2 Alarm 2

Alarm 2 selection. Alarm intervention is related to AL2. (See paragraph 11)

- diS. Disabled (**Default**)
- A. AL. Absolute alarm, referring to process
- b. AL. Band alarm
- H.d.AL. Upper deviation alarm
- L.d.AL. Lower deviation alarm
- A.c.AL. Absolute alarm, referring to command setpoint
- St.AL. Status alarm (active in Run / Start)
- cool Cooling action
- L.b.A. Status alarm *"load control"* (Loop Break Alarm). Example: status of contactors / SSR or heating elements

32 A.2.So. Alarm 2 State Output

Alarm 2 output contact and intervention type

- n.o. S. (N.O. Start) Normally open, active at start (**Default**)
- n.c. S. (N.C. Start) Normally closed, active at start
- n.o. t. (N.O. Threshold) Normally open, active on reaching alarm[8]
- n.c. t. (N.C. Threshold) Normally closed, active on reaching alarm[8]

33 A2.rE. Alarm 2 Reset

Alarm 2 contact reset type

- ArE. Automatic reset (**Default**)
- MrE. Manual reset (reset / manual reset by keyboard) (SET)
- MrE.S. Manual reset stored. (keeps relay status also after an eventual power failure)

34 A.2.S.E. Alarm 2 State Error

State of contact for alarm 2 output in case of error

- c.o. Open contact (**Default**)
- c.c. Closed contact

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

35 A.2Ld. Alarm 2 Led

State of OUT2 led corresponding to relative contact

- c.o. ON with open contact
- c.c. ON with closed contact (**Default**)

36 A.2HY. Alarm 2 Hysteresis

-999…+999 [digit[9]] (degrees.tenths for temperature sensors), **Default**: 0.0.

37 A.2.d.E. Alarm 2 Delay

-180…+180 seconds.
Negative: delay in alarm exit phase.
Positive: delay in alarm entry phase.
Default: 0.

38 A.2S.P. Alarm 2 Setpoint Protection

Alarm 2 set protection. Does not allow operator to change value set

- FrEE Modification allowed (**Default**)
- Loch Protected
- HidE Protected and not visualized

39 AL. 3 Alarm 3

Alarm 3 selection. Alarm intervention is associated with AL3. (See par. 11)

- di5. Disabled (**Default**)
- A. AL. Absolute alarm, referring to process
- b. AL. Band alarm
- H.d.AL. Upper deviation alarm
- L.d.AL. Lower deviation alarm
- A.c.AL. Absolute alarm, referring to command setpoint
- St.AL. Status alarm (active in Run / Start)
- cooL Cooling action (see Par. 7.12)
- L.b.A. Status alarm *"load control"* (Loop Break Alarm). Example: status of contactors / SSR or heating elements

40 A.3S.o. Alarm 3 State Output

Alarm 3 output contact and intervention type

- n.o. S. (N.O. Start) Normally open, active at start (**Default**)
- n.c. S. (N.C. Start) Normally closed, active at start
- n.o. t. (N.O. Threshold) Normally open, active on reaching alarm[10]
- n.c. t. (N.C. Threshold) Normally closed, active on reaching alarm[10]

---

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

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

41 A3.rE. Alarm 3 Reset

Alarm 3 contact reset type

- ArE. Automatic reset (**Default**)
- MrE. Manual reset
- MrE. Manual reset stored. (keeps relay status also after an eventual power failure)

42 A3.S.E. Alarm 3 State Error

State of contact for alarm 3 output in case of error

- c.o. Open contact (**Default**)
- c.c. Closed contact

43 A3.Ld. Alarm 3 LED

State of OUT3 led corresponding to relative contact

- c.o. ON with open contact
- c.c. ON with closed contact (**Default**)

44 A3.HY. Alarm 3 Hysteresis

-999…+999 [digit[11]] (degrees.tenths for temperature sensors), **Default**: 0.0.

45 A3.dE. Alarm 3 Delay

-180…+180 seconds
Negative: delay in alarm exit phase.
Positive: delay in alarm entry phase.
Default: 0.

46 A3.S.P. Alarm 3 Setpoint Protection

Alarm 3 set protection. Does not allow operator to change the setpoint value

- FrEE Modification allowed (**Default**)
- Loch Protected
- HidE Protected and not visualized

47 t.A. Current Transformer

Activation and scale range of current transformer
0 Disabled
1-200 Ampere
Default: 0

48 L.b.A.t. Loop Break Alarm Threshold

Intervention threshold of Loop Break Alarm
0.0-200.0 Ampere
Default: 50.0

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

49 L.b.A.d. Loop Break Alarm Delay

Delay time for Loop break alarm intervention
00.00-60.00 mm.ss
Default: 01.00

50 coo.F. Cooling Fluid

Type of refrigerant fluid for heating / cooling P.I.D.

AIr	Air (**Default**)
oIL	Oil
H2o	Water

51 P.b.M. Proportional Band Multiplier

Proportional band multiplier. Proportional band for cooling action is given by parameter 18 multiplied for this parameter
1.00-5.00 (**Default**: 1.00)

52 oud.b. Overlap / Dead Band

Dead band combination for heating / cooling action in heating / cooling P.I.D. mode (dual action)
-20.0-50.0% of proportional band value (**Default**: 0).
Negative indicates dead band value.
Positive means overlap.

53 co.t.c. Cooling Cycle Time

Cycle time for cooling output
1-300 seconds, **Default**: 10.

54 c.FLt. 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

dIS.	Disabled
2. S.M.	2 Samples Mean
3. S.M.	3 Samples Mean
4. S.M.	4 Samples Mean
5. S.M.	5 Samples Mean
6. S.M.	6 Samples Mean
7. S.M.	7 Samples Mean
8. S.M.	8 Samples Mean
9. S.M.	9 Samples Mean
10.S.M.	10 Samples Mean (**Default**)
11.S.M.	11 Samples Mean
12.S.M.	12 Samples Mean
13.S.M.	13 Samples Mean
14.S.M.	14 Samples Mean
15.S.M.	15 Samples Mean

55 c.Frn. Conversion Frequency

Sampling frequency of analogue / digital converter.
NB: Increasing the conversion speed will slow down reading stability (example: for fast transients, as pressure, it is advisable to increase sampling frequency)

- 242H. 242 Hz (Maximum speed conversion)
- 123H. 123 Hz
- 62 H. 62 Hz
- 50 H. 50 Hz
- 39 H. 39 Hz
- 33.2H. 33.2 Hz
- 19.6H. 19.6 Hz
- 16.7H. 16.7 Hz (**Default**) Ideal for filtering noises 50 / 60 Hz
- 12.5H. 12.5 Hz
- 10 H. 10 Hz
- 8.33H. 8.33 Hz
- 6.25H. 6.25 Hz
- 4.17H. 4.17 Hz (Minimum speed conversion)

56 u.FLt. Visualization Filter

Slow down the refresh of display, to simplify reading

- dis. Disabled with pitchfork (max. speed of display update) **Default**.
- Fi.or. First order filter with pitchfork
- 2. S.M. 2 Samples Mean
- 3. S.M. 3 Samples Mean
- 4. S.M. 4 Samples Mean
- 5. S.M. 5 Samples Mean
- 6. S.M. 6 Samples Mean
- 7. S.M. 7 Samples Mean
- 8. S.M. 8 Samples Mean
- 9. S.M. 9 Samples Mean
- 10.S.M. 10 Samples Mean (Maximum slow down of display update)
- nuLL Disabled without pitchfork
- F.o. 2 First order filter

57 tunE Tune

Tuning type selection. (See paragraph 7.2)

- dis. Disabled (**Default**)
- Auto Automatic (P.I.D. parameters are calculated at activation and at change of set point)
- MAn. Manual (launch by keyboard or digital IN)
- Sync. Synchronized [see word modbus 1025 (**only ATR243-21ABC-T**)]

58 S.dtu. Setpoint Deviation Tune

Select the deviation from the command setpoint for the threshold used by autotuning to calculate the P.I.D. parameters

0-5000 [digit[12]] (degrees.tenths if temperature).
Default: 10.

59 oP.Mo. Operating Mode

Select operating mode. (See paragraphs 7.7 and 7.11)

- cont. Controller (**Default**)
- Pr.cy. Pre-programmed cycle (See paragraph 7.7)
- 2t.S. Setpoint change by digital input
- 2t.S.i. Setpoint change by digital input with impulse command
- 3t.S.i. 3 sets change by digital input with impulse command
- 4t.S.i. 4 sets change by digital input with impulse command
- t.rES. Reset time (custom function)
- P.c.S.S. Pre-programmed cycle with Start / Stop only by digital input

60 Au.MA. Automatic / Manual

Enable automatic / manual selection. (See paragraph 7.6)

- di5. Disabled (**Default**)
- En. Enabled
- En.St. Enabled with memory

61 dGt.i. Digital Input

Digital input functioning (P59 selection must be cont. or Pr.cy). (See paragraph 7.11)

- di5. Disabled (**Default**)
- St.St. Start / Stop
- rn.n.o. Run N.O. (enables regulation with N.O. contact)
- rn.n.c. Run N.C. (enables regulation with N.C. contact)
- L.c.n.o. Lock conversion N.O. (stop conversion and display value with N.O.)
- L.c.n.c. Lock conversion N.C. (stop conversion and display value with N.C.)
- tunE Manual Tune (by digital input)
- A.MA.i. Automatic / Manual Impulse (if enabled on parameter 60)
- A.MA.c. Automatic / Manual Contact (if enabled on parameter 60)

62 GrAd. Gradient

Rising gradient for Soft-Start or pre-programmed cycle

- 0 Disabled (Default)
- 1-9999 [Digit/hour[13]] (degrees/hour with display of tenth for temperature sensor)

63 MA.ti. Maintenance Time

Maintenance time for pre-programmed cycle
00.00-24.00 hh.mm. **Default**: 00.00

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

64 u.M.c.P. User Menu Cycle Programmed

Allows to modify rising gradient and maintenance time, from user menu, when pre-programmed cycle is operating

- d.S. Disabled (**Default**)
- GrAd. Gradient
- MA.t. Maintenance time
- ALL Both gradient and maintenance time

65 u.tY. Visualization Type

Select visualization for display 1 and 2

- 1.P.2.S. 1 Process, 2 Setpoint (**Default**)
- 1.P.2.H. 1 Process, 2 Hide after 3 sec.
- 1.S.2.P. 1 Setpoint, 2 Process
- 1.S.2.H. 1 Setpoint, 2 Hide after 3 sec.
- 1.P.2.A. 1 Process, 2 Ampere (T.A. input)

66 dEGr. Degree

Select degree type

- °C Centigrade (**Default**)
- °F Fahrenheit

67 rEtr. Retransmission

Retransmission for output 0-10 V or 4…20 mA (select Jumpers JP5, JP7 and JP9). Parameters 68 and 69 define the lower and upper limits of the scale.

- d.S. Disabled
- uo. P. Retransmits process in Volt
- MA. P. Retransmits process in mA
- uo. c. Retransmits command setpoint in Volt
- MA. c. Retransmits command setpoint in mA
- uo.o.P. Volt output percentage
- MA.o.P. mA output percentage
- uo.A.1 Volt alarm 1 setpoint
- MA.A.1 mA alarm 1 setpoint
- uo.A.2 Volt alarm 2 setpoint
- MA.A.2 mA alarm 2 setpoint
- uo.t.A. Volt T.A.
- MA.t.A. mA T.A.

68 Lo.L.r. Lower Limit Retransmission

Output V / mA retransmission lower limit range
-999…+9999 [digit[14]] (degrees.tenths for temperature sensors), **Default**: 0.

69 uP.L.r. Upper Limit Retransmission

Output V / mA retransmission upper limit range
-999…+9999 [digit[14]] (degrees.tenths for temperature sensors), **Default**: 1000.

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

70 bd.rt. Baud Rate

Select baud rate for serial communication

4.8	4.800 Bit/s
9.6	9.600 Bit/s
19.2	19.200 Bit/s (**Default**)
28.8	28.800 Bit/s
38.4	39.400 Bit/s
57.6	57.600 Bit/s

71 SL.Ad. Slave Address

Select slave address for serial communication

1 – 254.

Default: 254

72 SE.dE. Serial Delay

Select serial delay

0 – 100 milliseconds.

Default: 20

73 LL.o.P. Lower Limit Output Percentage

Selects min. value for command output percentage

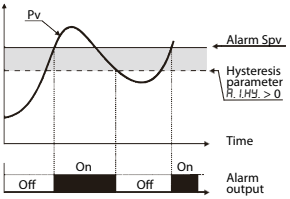
0 – 100%, **Default**: 0%.

Ex: with c.out selected as 0...10 V and LL.o.P. set at 10%, command output can change from a min. of 1 V to a max. of 10 V.

11 Alarm Intervention Modes

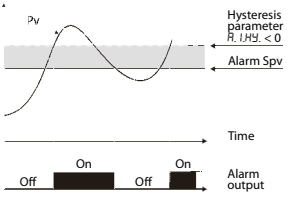
11.a Absolute Alarm or Threshold Alarm (A. AL. selection)

1



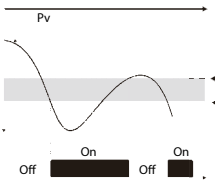
Absolute alarm with controller in heating functioning (par. 11 Act.t. selected HEAt) and hysteresis value greater than "0" (par. 28 A. I.HY. > 0). *

2



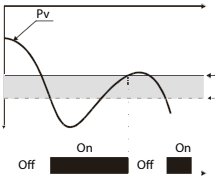
Absolute alarm with controller in heating functioning (par. 11 Act.t. selected HEAt) and hysteresis value less than "0" (par. 28 A. I.HY. < 0). *

3



Absolute alarm with controller in cooling functioning (par. 11 Act.t. selected CooL) and hysteresis value than "0" (par. 28 A. I.HY. > 0). *

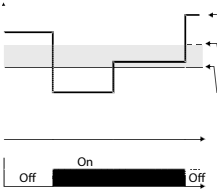
4



Absolute alarm with controller in cooling functioning (par. 11 Act.t. selected CooL) and hysteresis value less than "0" (par. 28 A. I.HY. < 0). *

11.b Absolute Alarm or Threshold Alarm Referring to Setpoint Command (A.c.AL. selection)

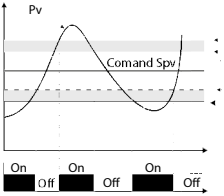
1



Absolute alarm refers to the command set, with the controller in heating functioning (par. 11 Act.t. selected HEAt) and hysteresis value greater than "0" (par. 28 A. I.HY. > 0). *
The command set can be changed by pressing the arrow keys on front panel or using serial port RS485 commands. *

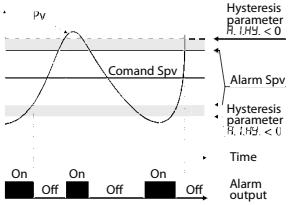
11.c Band Alarm (b. AL. selection)

1



Band alarm hysteresis value greater than "0" (par. 28 A. I.HY. > 0). *

2

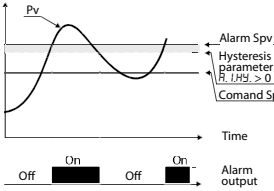


Band alarm hysteresis value less than “0” (par. 28 A. I.HY. < 0). *

* *a) The example refers to alarm 1; the function can also be enabled for alarm 2 and 3 on models that include it.*

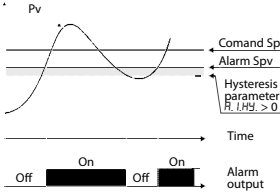
11.d Upper Deviation Alarm (H.d.AL. selection)

1



Upper deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (par. 28 A. I.HY. > 0). **

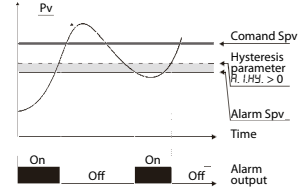
2



Upper deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (par. 28 A. I.HY. > 0). **

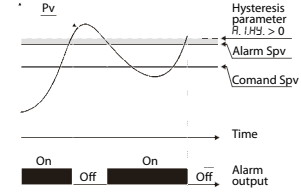
11.e Lower Deviation Alarm (L.d.AL. selection)

1



Lower deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (par. 28 A. I.HY. > 0). **

2



Lower deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (par. 28 A. I.HY. > 0). **

** *The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it. b) With hysteresis value less than “0” (A. I.HY. < 0) the broken line moves under the alarm setpoint.*

12 Table of Anomaly Signals

If installation malfunctions, controller will switch off regulation output and will report the anomaly. For example, controller will report failure of a connected thermocouple visualizing E-05 flashing on display for other signals, see table below.

	Cause	what to do
E-01 SYS.E	Error in EEPROM cell programming.	Call Assistance.
E-02 SYS.E	Cold junction sensor fault or room temperature outside of allowed limits.	Call Assistance.
E-04 SYS.E	Incorrect configuration data. Possible loss of calibration values.	Check if the configuration parameters are correct.
E-05 SYS.E	Thermocouple open or temperature outside of limits.	Check the connection with the sensors and their integrity.
E-08 SYS.E	Missing calibration data.	Call Assistance.

13 Configuration EASY-UP

To simplify the setting of parameters and the integration of the different components involved in the control system, Pixsys introduces the EASY-UP coding which allows to set sensors and/or command outputs in one single step.
By means of the code listed in the data sheet enclosed to the sensor or actuator (SSR, motorized valve, etc.) the EASY-UP coding will set the relevant main parameters on the controllers (ex. selection of PT100 on parameter *"Sensor"* and the corresponding measuring range on parameters *"Lower and Upper limits of the setpoint"*).
Different codes may be entered on the controllers in sequence to configure inputs, control output or retransmission of signal.

Password 2200			
P2	SEn.	Sensor	Pt,
P4	Lo.LS.	Lower Limit Setpoint	-100,
P5	uP.LS.	Upper Limit Setpoint	500,
Password 2201			
P2	SEn.	Sensor	Pt,
P4	Lo.LS.	Lower Limit Setpoint	-100,
P5	uP.LS.	Upper Limit Setpoint	250,
Password 2202			
P2	SEn.	Sensor	Ptc,
P4	Lo.LS.	Lower Limit Setpoint	-50,
P5	uP.LS.	Upper Limit Setpoint	150,
Password 2203			
P2	SEn.	Sensor	ntc,
P4	Lo.LS.	Lower Limit Setpoint	-40,
P5	uP.LS.	Upper Limit Setpoint	125,
Password 2301			
P2	SEn.	Sensor	tc.J,
P4	Lo.LS.	Lower Limit Setpoint	-100,
P5	uP.LS.	Upper Limit Setpoint	400,
Password 2351			
P2	SEn.	Sensor	tc.K,
P4	Lo.LS.	Lower Limit Setpoint	-100,
P5	uP.LS.	Upper Limit Setpoint	800,
Password 2352			
P2	SEn.	Sensor	tc.K,
P4	Lo.LS.	Lower Limit Setpoint	-100,
P5	uP.LS.	Upper Limit Setpoint	600,

Password 2401			
P2	SEn.	Sensor	4.20,
P4	Lo.LS.	Lower Limit Setpoint	0,
P5	uP.LS.	Upper Limit Setpoint	100,
P6	LoL. I	Lower Linear Input	0,
P7	uPL. I.	Upper Linear Input	100,
Password 4400			
P1	C.out	Command Output	c.SSr,
P21	t.c.	Cycle Time	1,
P57	tunE	Tune	Auto,
Password 4600			
P1	C.out	Command Output	c.uAL.,
P21	t.c.	Cycle Time	60,
P57	tunE	Tune	Auto,
Password 6501			
P1	C.out	Command Output	c. 0I,
P67	rEtr.	Retransmission	nA. P,
P68	Lo.L.r.	Lower Limit Retransmission	-100,
P69	uP.L.r.	Upper Limit Retransmission	250,
Password 6502			
P1	C.out	Command Output	c. 0I,
P67	rEtr.	Retransmission	uo. P,
P68	Lo.L.r.	Lower Limit Retransmission	-100,
P69	uP.L.r.	Upper Limit Retransmission	250,

Notes / Updates

Table of configuration parameters

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

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

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2300.10.081-RevG

Software Rev. 1.28

110117