PIXSYS
elettronica

ATR 171

ATR171

[display reading 1200 / 1200]

PIXSYS

- Regolatore
- Controller

Manuale Installatore
User manual

Summary	**Page**

Look! Pay attention at the section marked with this symbol

Presta attenzione alla sezione contrassegnata da questo simbolo

Sommario	**Pag.**

1   Introduction

Thanks for choosing a Pixsys controller.
With ATR171 model, Pixsys integrates in a single device all options for
sensors reading and actuators control, beside an useful supply with
extended range 24…230 Vac/Vdc. Thanks to 17 selectable probes and
outputs configurable as relay or SSR, the user or the retailer can reduce
stock needs. The series includes also a model with double analogue
input, serial communication RS485 ModbusRTU and linear output 0-10
V, 0/4-20 mA. The possibility to repeat parameterization is simplified by
the Memory Cards with internal battery that do not require power supply
for the controller.

2   Model identification

ATR171 series includes four versions. Looking at the following table it is
possible to find the required model.

Power supply 24…230 Vac/Vdc +/-15% 50/60 Hz – 5,5 VA

ATR171-11 ABC	1 Analogue input + 1 Relay 8 A + 1 SSR
ATR171-12 ABC	1 Analogue input + 2 Relays 8 A + 1 SSR
ATR171-14 ABC	1 Analogue input + 3 Relays 8 A + 1 Relay 5 A (30 V)
ATR171-23 ABC-T	2 Analogue input + 3 Relays 8 A 1 Output SSR/V/mA+ RS485

3 Technical data

3.1 General data

Indicators	4 display 0,50 inches
	4 display 0,30 inches
Operating Temperature	Temperature 0-45 °C
	Humidity 35..95 uR%
Sealing	IP54 front panel, box IP30, terminal block IP20
Material	Box: Noryl UL94V1 self-exstinguish
	Front panel: PC ABS UL94V0 self-exstinguish
Weight	Approx 250 g.

3.2 Hardware data

Analogue imput	**AI1 - AI2:** Configurable via software. **Input:** Thermocouple type K, S, R, J. Automatic compensation of cold junction from 0…50 °C. **Thermoresistances:** PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). **- ONLY AI1** **Input V/mA:** 0-10 V, 0-20 or 4-20 mA, 0-40 mV. **Input Potentiometer:** 6 KΩ, 150 KΩ.	Tolerance (25 °C) +/-0.2% ±1 digit for thermocouple, thermoresistance 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	Configurable as control and alarm output.	Contacts: **Q1, Q2, Q3:** 8 A - 250 V~ for resistive charges; **Q4:** 5 A - 30 V for resistive charges.
SSR/V/mA output	**1** SSR - V/mA Configurable as control output, alarm, retransmission of process or setpoint.	12 Vdc / 30 mA. Configurable: • 0…10 V (9500 points); • 0…20 mA (7500 points); • 4…20 mA (6000 points).
Supply	Extended range 24…230 Vac/Vdc ±15 % 50/60 Hz.	Consumption: 5.5 VA

3.3 Software data

Control algorithm	ON - OFF with hysteresis. P., P.I., P.I.D., P.D. proportional time.
Proportional band	0...9999 °C or °F
Integral time	0,0...999,9 sec (0 excludes)
Derivative time	0,0...999,9 sec (0 excludes)
Controller functions	Manual or automatic tuning, selectable alarms, protection of control and alarm setpoints, function selection from digital input, start/stop preprogrammed cycle.

4 Dimensions and installation

Memory Card (optional) with battery Cod. MEMORY C243

Memory Card (optional) Cod. MEMORY C241

42mm inserimento Memory Card

42mm insert Memory Card

72 mm

ATR171

72 mm

66 mm

DIMA DI FORATURA 66,5 x 66,5 mm
Frontal panel cut-out

Memory Card

Spessore suggerito *Suggested thickness* 2÷8 mm

5   89 mm   10
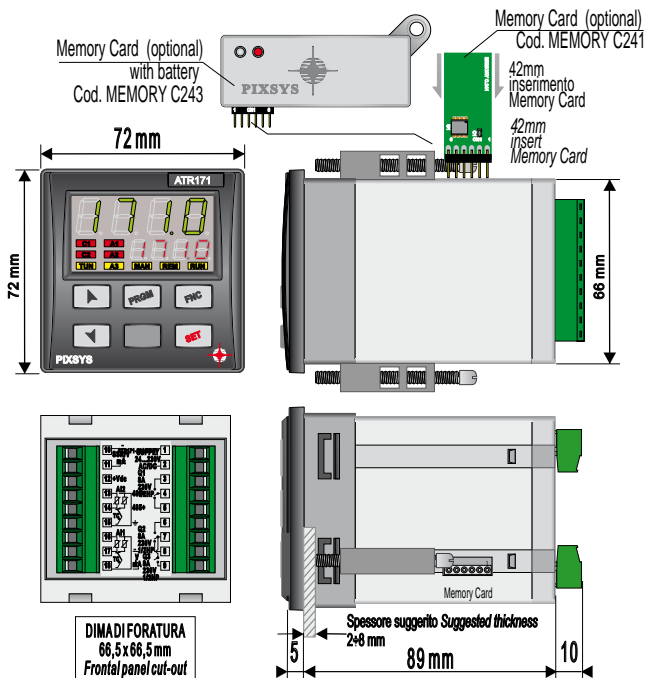
5 Electrical wirings

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

WARNING

- 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

Belon the wiring diagrams of the 4 available models.
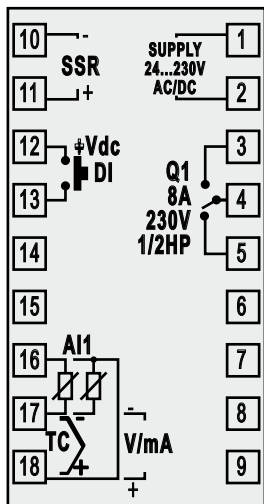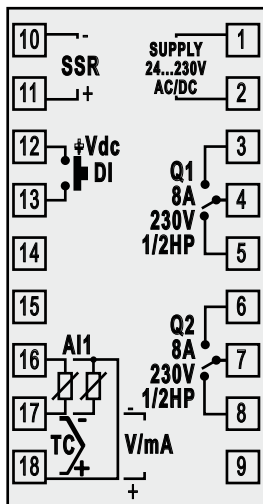
ATR171-11ABC   **ATR171-12ABC**
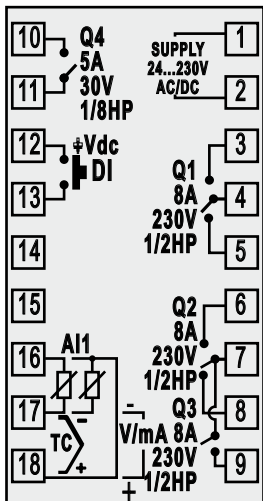
ATR171-14ABC
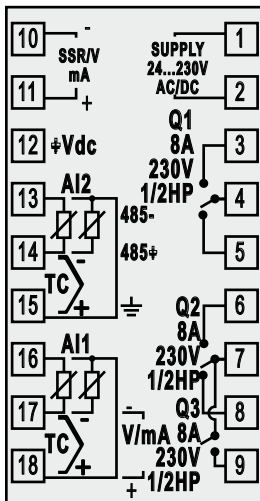
ATR171-23ABC-T

Power Supply
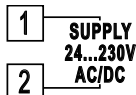
Switching supply with exstended range
24…230 Vac/dc ±15% 50/60 Hz – 5,5 VA.

Analogue input AI1
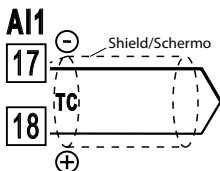
For thermocouples K, S, R, J.
- Comply with polarity.
- For extensions make sure to use the correct extension/compensating cable.
- When shielded cable is used, it should be grounded at one side only.
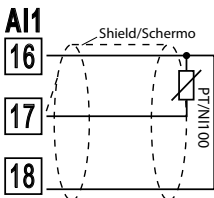
For thermoresistances PT100, NI100.

- For a three-wires connection use cables with the same diameter.
- For a two-wires connection short-circuit terminals 16 and 18.
- When shielded cable is used, it should be grounded at one side only .
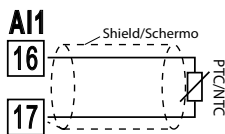
For thermoresistances NTC, PTC, PT500, PT1000 and linear potentiometers.

- When shielded cable is used, it should be grounded at one side only.
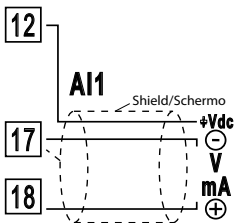
For linear signals Volt / mA.

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

Analogue input AI2 (only for ATR171-23ABC-T)
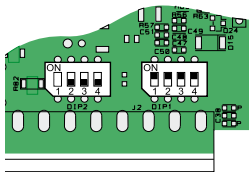
To enable the second analogue input, set the dip switches as indicated in the figure.

In this configuration the serial RS485 is **not** available.

AI2
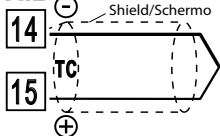
For thermocouples K, S, R, J.

- Comply with polarity.
- When extending thermocouples be sure to use the correct extension/compensating cable.
- When shielded cable is used, it should be grounded at one side only.

14 ⊖ Shield/Schermo
TC
15 ⊕

AI2
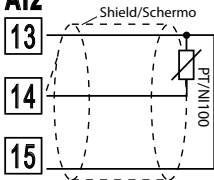
For thermoresistances PT100, NI100.

- For a three-wires connection use cables with the same diameter.
- For a two-wires connection short-circuit terminals 13 and 15.
- When shielded cable is used, it should be grounded at one side only .
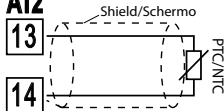
13 Shield/Schermo
PT/NI100
14
15

RED 13
WHITE 14
RED 15

AI2

For thermoresistances NTC, PTC, PT500, PT1000 and linear potentiometers.

- When shielded cable is used, it should be grounded at one side only.

13 Shield/Schermo
PTC/NTC
14

Examples of connection for linear input

17 ⊖
0...10V
18 ⊕
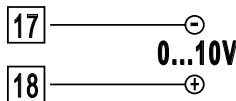
For linear signals 0….10 V.

- Comply with polarity.
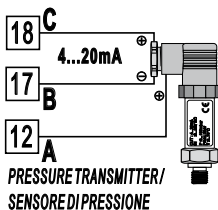
For linear signals 0/4….20 mA with **three-wires sensors.**

Comply with polarity:
A= Sensor supply
B= Sensor ground
C= Sensor output
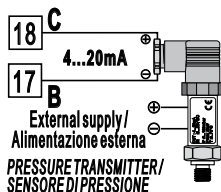
For linear signals 0/4..20 mA
with **external power supply for sensor.**

Comply with polarity:
C= Sensor output
B= Sensor ground
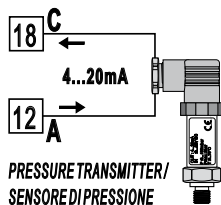
For linear signals in current 0/4..20 mA
with **two-wires sensors.**

Comply with polarity:
C= Sensor output
A= Sensor supply

Serial input (only for ATR171-23ABC-T)
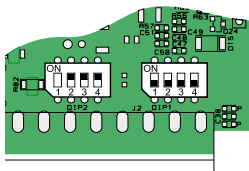
To enable the second analogue input, set the dip switches as indicated in the figure.

In this configuration the second analogue input is **not** available.
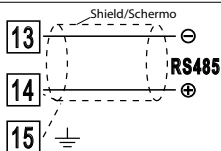
Communication RS485 Modbus RTU.

• For networks with more than five instruments supply in low voltage.

Relay outputs Q1, Q2, Q3

Contacts capacity:
- 8 A, 250 Vac, resistive charge 10^5 operations;
- 30/3 A, 250 Vac, $\cos\varphi = 0.3$, 10^5 operations.

3
Q1
4 8A
   230V
5 1/2HP

6
Q2
7 8A
   230V
8 1/2HP

Q3
9 8A
   230V
   1/2HP

250Vac
resistive load

Operations

Switching current [A]

S0324-A
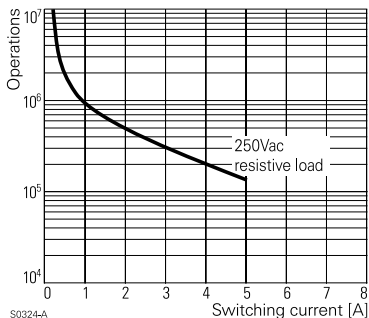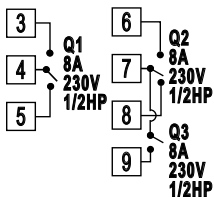
Relay output Q4 (only for ATR171-14ABC)

Contacts capacity:
- 5 A, 30 Vac/dc, resistive 18×10^4 operations.

10
Q4
11 5A
    30V
    1/8HP

Life Curve

Service life ($\times 10^4$ operations)

AC250V
DC30 V

AC125 V

AC125V COS ø=0.4

DC30 V t=7ms

AC250V COS ø=0.4

DC30 V t=15ms

Contact load current (A)

SSR output

[10] ⊖
SSR
[11] ⊕
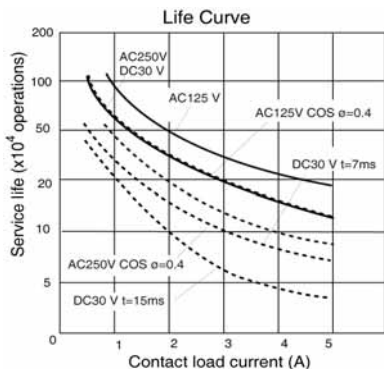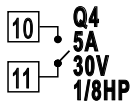
SSR Command output 12 V / 30 mA.
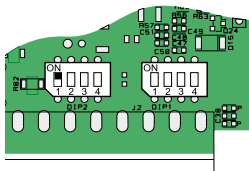
> ⚠️ **To use SSR output it is necessary to set channel 1 of DIP2 as indicated in the figure.**

Output mA / Volt (only for ATR171-23ABC-T)

[10] ⊖
mA
[11] ⊕

Analogue output in **mA** configurable as command (Par. $\boxed{\text{cout}}$) or retransmission of process-setpoint (Par. $\boxed{\text{rEtr.}}$).
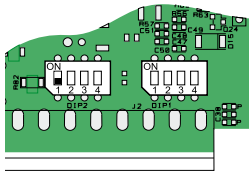
> ⚠️ **To use SSR output it is necessary to set channel 1 of DIP2 as indicated in the figure.**

[10] ⊖
V
[11] ⊕

Analogue output in **Volt** configurable as command (Par. $\boxed{\text{cout}}$) or retransmission of process-setpoint (Par. $\boxed{\text{rEtr.}}$).
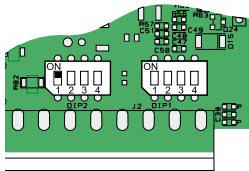
> ⚠️ **To use SSR output it is necessary to set channel 1 of DIP2 as indicated in the figure.**

Digital Input (only for ATR171-11/12/14-ABC)

[12] Vdc
[13] DI

Digital Input (Par. $\boxed{\text{dGt.i}}$).

6 Display and keys functions
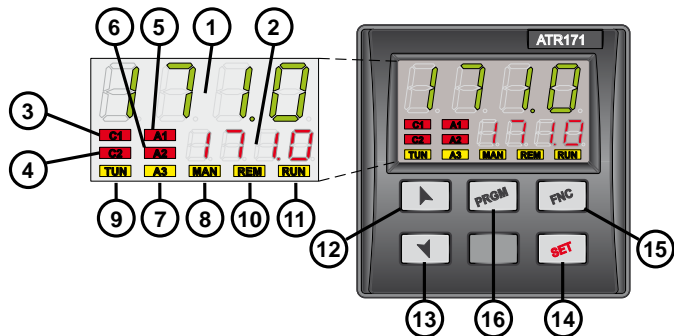
6.1 Numeric indicators (Display)

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	On when command output is active. For open / close logic: on during valve opening.
4	C2	For open/ close logic: on during valve closing.
5	A1	On when alarm 1 is active.
6	A2	On when alarm 2 is active.
7	A3	On when alarm 3 is active.
8	MAN	On when "Manual" function is active.

9 **TUN**		On when controller is executing an auto-tuning cycle.
10 **REM**		On when serial communication is in progress.
11 **RUN**		On when counting of Timer function is active.

12	▶	• Increases main setpoint. • In configuration mode allows to scroll and modify parameters. • Press after ⟨set⟩ key increases alarm setpoints or time value of timer.
13	◀	• Decreases main setpoint. • In configuration mode allows to scroll and modify parameters. • Press after ⟨set⟩ key decreases alarm setpoints or time value of timer.
14	SET	• Allows to visualize alarm setpoints or time value of Timer. • In configuration mode allows to access the parameter to change and confirm its modification.
15	FNC	• Allows to enter tuning launch, selection automatic / manual. • In configuration mode operates as exit key (ESCAPE).
16	PRGM	• If pressed allows to enter configuration password. • In configuration mode assigns at selected parameter a mnemonic code or a number. • Starts or stops timer counting.

7 Dual input mode (only for ATR171-23ABC-T)

To enable second input it is necessary to set dip switches as indicated in the figure.
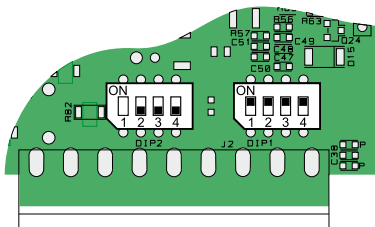
In this configuration some parameters and functions are not available. For exemple: RS485 serial, preprogrammed cycle and soft-start function are desabled.

7.1 Selection of process value related to the command output and to the alarms

When second input is enabled (parameter 9 $\boxed{\text{SEn2}}$ other than $\boxed{\text{d iS}}$) it is possible to choose the process value to be related to command output, to alarms and to retransmission. Following options are available:

- $\boxed{\text{Pro 1}}$: Value read by input AI1;
- $\boxed{\text{Pro2}}$: Value read by input AI2;
- $\boxed{\text{NEAn}}$: Mean between inputs AI1 and AI2;
- $\boxed{\text{d iFF}}$: Difference between inputs: AI1-AI2;
- $\boxed{\text{AbSd}}$: Difference between inputs AI1-AI2 as absolute value.
- Process related to command output must be set on parameter 15 $\boxed{\text{cPro}}$.
- Process related to alarms must be set on par. 34 $\boxed{\text{A 1Pr}}$ for alarm 1, on par. 43 $\boxed{\text{A2Pr}}$ for alarm 2 and on par. 52 $\boxed{\text{A3Pr}}$ for alarm 3.
- Value to retransmit must be set on par. 79 $\boxed{\text{rEtr}}$.

It is possible to choose the visualization for display 2 on parameter 77 $\boxed{\text{u d2}}$.

> ⚠ **Mean and difference are available only if both inputs are configured for temperature sensors.**

7.2 Remote setpoint

It is possible to enable remote setpoint function setting $\boxed{En}$ on par. 16 $\boxed{rEnS}$.
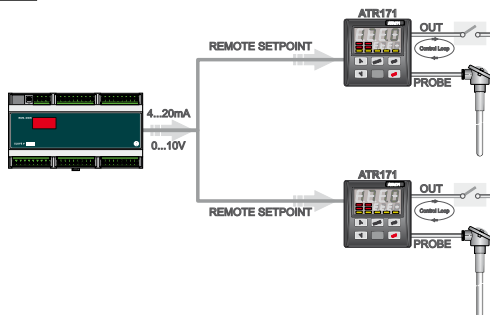
In this configuration the value read by one of the two inputs becomes the main control setpoint:

• If parameter 15 $\boxed{cPro}$ is set as $\boxed{Pro1}$, AI1 becomes the main process (command) and AI2 becomes the setpoint value;

• If parameter 15 $\boxed{cPro}$ is set as $\boxed{Pro2}$, AI2 becomes the main process (command) and AI1 becomes the setpoint value.

Remote setpoint function works only with one of these two settings of parameter 15 $\boxed{cPro}$.

8 Controller functions

8.1 Modification of main and alarm setpoint value

Setpoint value can be modified from keyboard as follows:

	Press	Display	Do
1	▶ or ◀	Value on display 2 changes.	Increase or decrease main setpoint value.
2	SET	Visualizes alarm setpoint on display 1.	
3	▶ or ◀	Value on display 2 changes.	Increase or decrease alarm setpoint value.

8.2 Auto-tuning

Tuning procedure to calculate regulation parameters can be manual or automatic and selected from parameter 24 $\boxed{\text{EunE}}$.

8.3 Manual Tuning

Manual procedure allows user more flexibility on deciding when to update regulation parameters of P.I.D. algorithm.

Press key $\boxed{\text{FNC}}$ until display 1 visualizes writing $\boxed{\text{EunE}}$ and display 2 visualizes $\boxed{\text{oFF}}$. Pressing $\boxed{\blacktriangleright}$ display 2 visualizes $\boxed{\text{on}}$.

Led **TUN** switches on and procedure starts.

8.4 Automatic Tuning

Automatic tuning starts when the controller is switched-on or when setpoint value has been modified over 35%.

To avoid overshooting, the threshold where controller calculates new P.I.D. parameters is determinated by setpoint value minus "Set Deviation Tune" value (see parameter 25 $\boxed{\text{SdEu}}$).

To interrupt Tuning keeping the P.I.D. values unchanged, press key $\boxed{\text{FNC}}$ until display 1 visualizes writing $\boxed{\text{EunE}}$ and display 2 visualizes $\boxed{\text{on}}$. Pressing $\boxed{\blacktriangleleft}$, display 2 visualizes n$\boxed{\text{oFF}}$, led **TUN** switchs off and procedure ends.

Setting $\boxed{\text{oncE}}$ on parameter 24 $\boxed{\text{EunE}}$ autotuning procedure starts only once when instrument is switched on: after calculating P.I.D. parameters parameter 24 $\boxed{\text{EunE}}$ returns to $\boxed{\text{dıS}}$.

8.5 Soft-Start

At switch-on the controller follows a rising gradient expressed in units (ex. degree/ hour) to reach the setpoint.

The chosen rising gradient in Unit / Hour must be set on parameter 73 $\boxed{\text{rGr}}$; at next switch-on the controller will execute Soft Start function. Automatic and manual Tuning function cannot be enabled if Soft Start function is active.

8.6 Automatic / manual regulation of % control output

This function allows to switch from automatic functioning to manual control of output porcentage.

With parameter 71 $\boxed{\text{A.uᑎA}}$, it is possible to select two modes.

1 The first selection ($\boxed{\text{En}}$): pressing key $\boxed{\text{FNC}}$ display 1 visualizes writing $\boxed{\text{P.---}}$, while display 2 visualizes $\boxed{\text{Auto}}$.

Press $\boxed{\blacktriangleright}$ to select manual mode $\boxed{\text{MAn}}$. Whit $\boxed{\blacktriangleright}$ and $\boxed{\blacktriangleleft}$ change output percentage.

To return to automatic mode with the same procedure select $\boxed{\text{Auto}}$ on display 2: led **MAN** switches on and operation returns to automatic mode.

2 The second selection ($\boxed{\text{EnSt}}$): enables the same functioning, but with two important variants:

• In case of power failure or after a switch-off, at restart both the manual functioning and the previously fixed output percentage value will be maintained.
• If during automatic functioning there is a sensor failure, controller will automatically switch to manual mode while maintaining command output percentage unchanged as generated by P.I.D. immediately before failure.

8.7 Pre-programmed cycle

This function allows to program a simple working cycle on time basis, and can be enabled setting $\boxed{\text{PrcY}}$ on parameter 70 $\boxed{\text{oPﬆo}}$: process reaches setpoint1 according to gradient set on parameter 73 $\boxed{\text{Gr-Ad}}$, then it reaches setpoint2 with the maximum power .

Once reached setpoint2, process is hold for the time set on parameter 75 $\boxed{\text{MAᑦ.i}}$. At expiry, process reaches environmental temperature according to gradient set on parameter 74 $\boxed{\text{FACr.}}$ and then command output is disabled and controller visualizes $\boxed{\text{StoP}}$.
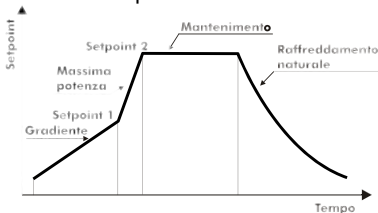
Cycle starts at each switch-on of the controller.

8.8 Memory Card (optional)

◯ Look!

Parameters and setpoint values can be easily copied from one controller to others using the Memory Card.

Two modes are available:

- With the controller connected to the power supply:
  Insert Memory card **when the controller is off.**
  At switch-on display 1 visualizes $\Pi E \Pi_{\square}$ and display 2 visualizes
  $\boxed{----}$ **(only if correct values are stored on Memory)**.
  Pressing $\boxed{\blacktriangleright}$ display 2 visualizes $\boxed{LoAd}$.
  Confirm with $\boxed{\text{\tiny FNC}}$. Controller loads news values and restarts.

- With the controller not connected to power supply:
  The memory card is equipped with an internal battery with an autonomy of about 1000 uses. Insert the memory card and press the programming button. When writing the parameters, led turns red and on completing the procedure it turns to green. It is possible to repeat the procedure without any particular attention.

⚠ **WARNING**	**Updating Memory Card** To *update* the memory card values, follow the procedure described in the first method, setting display 2 to $\boxed{----}$ so as not to load the parameters on controller[1]. Enter configuration and **change at least one parameter.** Exit configuration. Changes are saved automatically.

---

[1] If on activation the controller does not display $\Pi E \Pi_{\square}$ it means no data have been saved on the memory card, but it is possible to update values.

8.9 Loading default values

This procedure allows to restore default settings of the instrument.

	Press	Display	Do
1	PRGM for 3 second	Display 1 visualizes ▯▯▯▯ with 1st digit blinking, while display 2 shows PASS.	
2	▲ or ◀	Changes blinking digit and moves to the next one with SET.	Enter password: 9999.
3	PRGM to confirm	Device loads default settings.	Switch the instrument off and on.

8.10 LATCH ON Function

For use with input Pot.1 (potentiometer 6 KΩ) and Pot2 (potentiometer 150 KΩ) and with linear input (0…10 V, 0...40 mV, 0/4…20 mA), you can associate start value of the scale (parameter 6 LoL.) to the minimum position of the sensor and value of the scale end (parameter 7 uPL.) 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. and uPL.) using the "virtual zero" option by setting uOSt or uOin in parameter 8 LAtc.

If you set uOin the virtual zero will reset after each activation of the tool; if you set uOSt the virtual zero remains fixed once tuned.

To use the LATCH ON function configure as you wish the parameter LAtc.[2]. For the calibration procedure refer to the following table:

---

[2] Calibration procedure starts by exiting configuration after parameter change.

	Press	Display	Do
1	FNC	Exit parameters configuration. Display 2 visualizes writing $\boxed{LAtc}$.	Place the sensor on minimum operating value (corresponding to $\boxed{LoL.1}$).
2	◀	Store value on minimum. Display shows $\boxed{LoU}$.	Place sensor on maximum operating value (corresponding to $\boxed{uPL.1}$).
3	▶	Store value on max. Display shows $\boxed{H1GH}$.	To exit standard proceeding press $\boxed{FNC}$. For "virtual zero" setting, place the sensor to zero point.
4	SET	Set the virtual zero. Display shows $\boxed{u1rt}$. **N.B.:** If $\boxed{uD1n}$ is selected, the procedure must be executed at each start	To exit procedure press $\boxed{FNC}$.

8.11 Timer function

To enable a Timer with time value selectable by the user, configurate parameter 60 $\boxed{tnrF}$ as follows:

- $\boxed{nnSS}$: Timer with time base in seconds (mm.ss);
- $\boxed{HHnn}$: Timer with time base in minutes (hh.mm).

To modify counting time duration, follow the steps below:

	Press	Display	Do
1	SET	Press until $\boxed{\text{EПr}}$ is visualized on display 1.	
2	▶ or ◀	Value on display 2 changes	Increase or decrease time value of selected Timer.

To start or stop timer press $\boxed{\text{PROM}}$.

During counting led **RUN** is on and display 2 visualizes decrementing time. At expiry of Timer led **RUN** turns off and display 2 blinks showing time value until a key is pressed.

8.12 Digital input functions (only for ATR171-11/12/14ABC)

Select chosen function on parameter 72 $\boxed{\text{dGt.i}}$.

1. Hold Function: Enable $\boxed{\text{Lcno}}$ or $\boxed{\text{Lcnc}}$ and allows to lock sensors reading when digital input is active. It's useful when measure oscillates on less significant values. During hold phase display 2 blinks showing $\boxed{\text{LAtc}}$.
2. Enable / Desables tuning by digital input if parameter $\boxed{\text{tunE}}$ is set on $\boxed{\text{ПAn}}$.
3. Enables regulation with $\boxed{\text{rono}}$ or $\boxed{\text{ronc}}$.
4. Switch from automatic to manual mode if $\boxed{\text{AuПA}}$ is set on $\boxed{\text{En}}$ or $\boxed{\text{EnSt}}$.
5. Preprogrammed cycle starts with $\boxed{\text{St.St}}$.
6. It's possible to use digital input for setpoint change function. This mode allows to recall 2 to 4 thresholds / setpoints by external button without pressing the arrow keys during operation. To enable this function select chosen number of setpoints on parameters 70 $\boxed{\text{oPПo}}$ (n. Thresholds switch). The setpoints can be entered during operation pressing $\boxed{\text{SET}}$ key.

8.13 Heating-Cooling P.I.D.

ATR171 is suitable also for also for applications requiring a combined heating-cooling P.I.D. action.

Command output has to be configured as heating P.I.D. ($\boxed{\text{RcEE}}$ = $\boxed{\text{HERE}}$ and $\boxed{\text{Pb}}$ greater than 0), and one of alarms ($\boxed{\text{RL. 1}}$, $\boxed{\text{RL. 2}}$ or $\boxed{\text{RL. 3}}$) has to be configured as $\boxed{\text{cooL}}$.

Command output must be connected to actuator responsible for heating action, while alarm will control the cooling action.

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

$\boxed{\text{RcEE}}$ = $\boxed{\text{HERE}}$ Command output action type (Heating);

$\boxed{\text{Pb}}$: Proportional band Heating;

$\boxed{\text{E. ι}}$: Integral time Heating and cooling;

$\boxed{\text{Ed}}$: Derivative time Heating and cooling;

$\boxed{\text{Ec.}}$: Cycle time Heating.

Configuration parameters for Cooling P.I.D. are (example: action associated to alarm 1):

$\boxed{\text{RL. 1}}$ = $\boxed{\text{cooL}}$ Alarm 1 selection (Cooling);

$\boxed{\text{Pbπ}}$: Proportional band multiplier;

$\boxed{\text{oudb}}$: Overlapping / dead band;

$\boxed{\text{cotc.}}$: Cycle time Cooling.

Parameter $\boxed{\text{Pbπ}}$ (that ranges from 1.00 to 5.00) sets the proportional band for cooling action, according to the formula here below:

Proportional band for cooling action = $\boxed{\text{Pb}}$ x $\boxed{\text{Pbπ}}$.

In this way it is possible to have a proportional band for cooling action that will be equal to heating proportional band if $\boxed{\text{Pbπ}}$ = 1.00, or 5 times greater if $\boxed{\text{Pbπ}}$ = 5.00.

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

Parameter $\boxed{\text{oudb}}$ sets the percentage overlapping between the two actions. For installations where heating and cooling output cannot be activated at the same time, a dead band will be configured ($\boxed{\text{oudb}}$ ≤ 0), vice versa an overlapping will be configured ($\boxed{\text{oudb}}$ > 0).

Figure here below shows an example of double action P.I.D. (heating-cooling) with $\boxed{\text{E. ι}}$ = 0 and $\boxed{\text{Ed}}$ = 0.

SPV
PV
Pb * $PbՈ$ (COOL - FREDDO)
$budb$ < 0
Pb (HEAT - CALDO)

ACTIVE — COMMAND OUTPUT (HEAT - CALDO)
ACTIVE — ALARM OUTPUT (COOL - FREDDO)

SPV
PV
Pb * $PbՈ$ (COOL - FREDDO)
$budb$ = 0
Pb (HEAT - CALDO)

ACTIVE — COMMAND OUTPUT (HEAT - CALDO)
ACTIVE — ALARM OUTPUT (COOL - FREDDO)

SPV
PV
Pb * $PbՈ$ (COOL - FREDDO)
$budb$ > 0
Pb (HEAT - CALDO)

ACTIVE — COMMAND OUTPUT (HEAT - CALDO)
ACTIVE — ALARM OUTPUT (COOL - FREDDO)
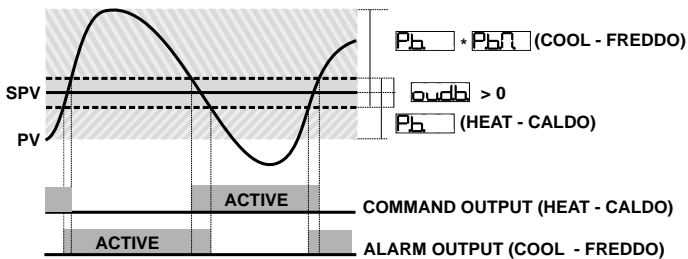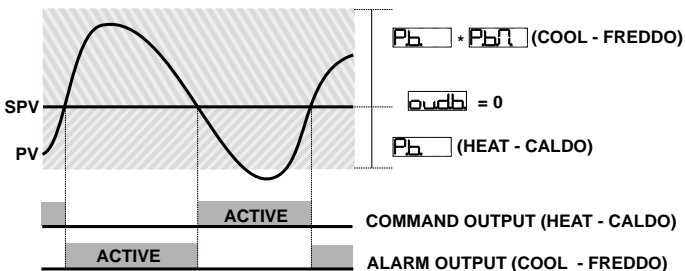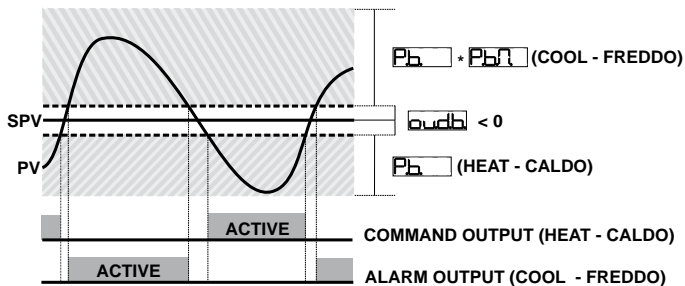
Parameter $\boxed{\text{cotc}}$ has the same meaning of cycle time for heating action $\boxed{\text{tc.}}$. Parameter $\boxed{\text{cooF.}}$ (Cooling Fluid) pre-selects the proportional band multiplier $\boxed{\text{PbN}}$ and the cooling P.I.D. cycle time $\boxed{\text{cotc}}$ according to cooling fluid type:

$\boxed{\text{cooF.}}$	**Cooling fluid type**	$\boxed{\text{PbN}}$	$\boxed{\text{cotc}}$
$\boxed{\text{Air}}$	Air	1.00	10
$\boxed{\text{oiL}}$	Oil	1.25	4
$\boxed{\text{H2o}}$	Water	2.50	2

Once parameter $\boxed{\text{cooF.}}$ has been selected, the parameters $\boxed{\text{PbN}}$, $\boxed{\text{oudb}}$ and $\boxed{\text{cotc}}$ can be however modified.

9   Serial communication (only for ATR171-23ABC-T)

To enable serial input set the dip switchs as indicated in the figure:
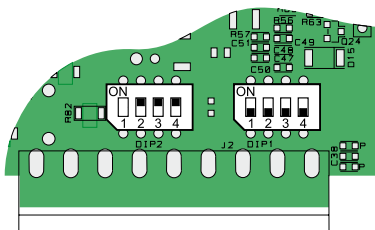
In this configuration mode, parameters and functioning related to double analogue input are not available.

9.1 Modbus RTU

ATR171-23ABC-T is provided with RS485 and can receive/broadcast data via MODBUS-RTU protocol. Device can be configured only as Slave. This function allows to control multiple controllers connected to a supervisory system (SCADA).

Each instrument will answer to a Master query only if contains same address as on parameter 84 $\boxed{\text{5LAd}}$. Allowed addresses are 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 connected equipments (broadcast mode), while with 0 all devices receive command, but no answer is expected. ATR171 can introduce an answer delay (in milliseconds) to Master request. This delay has to be set on parameter 85 $\boxed{\text{5EdE}}$. At each parameters modification, instrument stores values in EEPROM memory (100000 writing cycles), while setpoints are stored with a delay of 10 seconds after last modification.

N.B.: Modifications made to Words different from those described in the following table can lead to instrument malfunction.

Modbus RUT protocol features	
Boud-rate	Selectable on parameter 83 $\boxed{\text{bdrt}}$: $\boxed{\text{48 }\vdash}$ 4800 bit/sec . $\boxed{\text{96 }\vdash}$ 9600 bit/sec. $\boxed{\text{192}\vdash}$ 19200 bit/sec. $\boxed{\text{288}\vdash}$ 28800 bit/sec. $\boxed{\text{384}\vdash}$ 38400 bit/sec. $\boxed{\text{576}\vdash}$ 57600 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)

Here below list of available addresses:

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

Modbus Address	Description	Read Write	Reset value
0	Device type	RO	EEPROM
1	Sotware version	RO	EEPROM
5	Slave address	R/W	EEPROM
6	Boot version	RO	EEPROM
50	Automatic addressing	WO	-
51	Installation code comparison	WO	-
500	Loading Default values: **9999** restore all values **9998** restore all values except for baud-rate and slave address **9997** restore all values except for baud-rate **9996** restore all values except for slave address	R/W	0
1000	Process (degrees with tenths of degree 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 = **SSR** Bit 1 = Relay **Q1** Bit 2 = Relay **Q2** Bit 3 = Relay **Q3**	RO	0
1010	Heating output percentage (0-10000)	RO	0
1011	Heating 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 juntion error Bit 3 = Error AI1 (probe 1)	RO	0

1024	Bit 4 = Error AI2 (probe 2) Bit 5 = Generic error Bit6 = Hardware error Bit 7 = Missing calibration error Bit 8 = Incongruous control parameters Bit 9 = Incongruous alarm parameters Bit 10 = Incongruous retransmission parameters Bit 11 = Incorrect visualization parameters error Bit 12 = Incorrect remote setpoint parameters error	RO	0
1015	Cold junction temperature (with decimal point)	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	OFF LINE[3] time (milliseconds)	R/W	0
1100	Process with decimal point	RO	?
1101	Setpoint 1 with decimal point	RW	EEPROM
1102	Setpoint 2 with decimal point	RW	EEPROM
1103	Setpoint 3 with decimal point	RW	EEPROM
1104	Setpoint 4 with decimal point	R/W	EEPROM
1105	Alarm 1 with decimal point	R/W	EEPROM
1106	Alarm 2 with decimal point	RW	EEPROM
1107	Alarm 3 with decimal point	RW	EEPROM
1108	Setpoint gradient with decimal point	RO	EEPROM
1109	Percentage heating output (0-1000)	R/W	0
1110	Percentage heating output (0-100)	RW	0
1111	Percentage cooling output (0-1000)	RO	0
1112	Percentage cooling output (0-100)	RO	0
2001	Parameter 1	R/W	EEPROM
….	….	….	….
2085	Parameter 85	R/W	EEPROM
4001	Parameter 1[4]	R/W	EEPROM
….	….	….	….
4085	Parameter 85	R/W	EEPROM

---

[3] If it is 0, control is desabled. If it is different from 0, it is "maximum time that can elapse between two pollings before the controller goes off-line". If it goes Off-line, the controller goes to Stop mode, the control output is desabled, but the controllers keeps alarms activated.

[4] Parameters changed using serial address from 4001 to 4085 are saved in eeprom only after 10'' after the last writing of parameters.

10 Configuration

10.1 Modify configuration parameters

For configuration parameters see next paragraph.

	Press	Display	Do
1	PRGM for 3 seconds	Display 1 shows ⬛⬛⬛⬛ with 1st digit flashing, while display 2 shows PASS.	
2	▲ or ◀	Modify flashing digit and move to next digit with SET.	Enter password: 1234.
3	PRGM to confirm	Display 1 shows first parameter and second display shows its value.	
4	▲ or ◀	Scroll parameters.	
5	PRGM	Allows to pass from mnemonic parameter code to the numeric one and viceversa.	
6	SET	Allows parameter modification (display 2 flashes).	
7	▲ or ◀	Increases or decreases visualized value.	Introduce new data that will be stored when keys are released.
8	SET	Confirms data entering (display 2 stops flashing).	To change another parameter return to point 4.
9	FNC	End of parameters modification Controller esc from programming mode.	

11 Table of Configuration Parameters

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

1 `cout` **Command Output:** Command output type selection 🔴 **Look!**

`c. o I` **Default** (necessary for using process and setpoint retransmission function with Volt / mA output)

`c.uAL`
`c.SSr`
`c.420`
`c.020`
`c.0 I0`

ATR171-11ABC

	COMMAND	ALARM 1
`c. o I`	Q1	SSR
`c.uAL`	Q1 (open) / Q2 (close)	-
`c.SSr`	SSR	Q1

ATR171-12ABC

	COMMAND	ALARM 1	ALARM 2
`c. o I`	Q1	Q2	SSR
`c.uAL`	Q1 (open) / Q2 (close)	SSR	-
`c.SSr`	SSR	Q1	Q2

ATR171-14ABC

	COMMAND	ALARM 1	ALARM 2	ALARM 3
`c. o I`	Q1	Q2	Q3	SSR
`c.uAL`	Q1 (open) / Q2 (close)	Q1	Q4	-

ATR171-23ABC

	COMMAND	ALARM 1	ALARM 2	ALARM 3
`c. o I`	Q1	Q2	Q3	SSR
`c.uAL`	Q1 (open) / Q2 (close)	Q1	SSR	-
`c.SSr`	SSR	Q1	Q2	Q3
`c.420`	4...20 mA	Q1	Q2	Q3
`c.020`	0...20 mA	Q1	Q2	Q3
`c.0 I0`	0...10 V	Q1	Q2	Q3

2 `SEn I` **Sensor 1:** Analogue input configuration 1 / sensor selection 🔴 **Look!**

`d.iS` Disabled **(Default)**

`tc. H` Tc-K   -260…1360 °C

`Ec. 5`	Tc-S	-40…1760 °C	
`Ec. r`	Tc-R	-40…1760 °C	
`Ec. J`	Tc-J	-200…1200 °C	
`PE`	PT100	-200…600 °C	
`PE I`	PT100	-200…140 °C	
`n I`	NI100	-60…180 °C	
`nEc`	NTC10K	-40…125 °C	
`PEc`	PTC1K	-50…150 °C	
`PE5`	PT500	-100…600 °C	
`PE IF`	PT1000	-100…600 °C	
`0- 10`	0…10 Volt		
`0-20`	0…20 mA		
`4-20`	4…20 mA		
`040`	0…40 mVolt		
`PoE.1`	Potentiometer max 6 KΩ F.S		
`PoE2`	Potentiometer max 150 KΩ F.S		

3	`dP. 1`	**Decimal Point 1:** Select number of visualized decimal points	
	`0`	**Default**	
	`0.0`	1 Decimal	
	`0.00`	2 Decimal	
	`0.000`	3 Decimal	

4	`LoL. 1`	**Lower Limit Setpoint:** AN1 lower range limit only for linear signals	🔴 Look!
		-999…+9999 digit*, **Default: 0.**	

5	`uPL. 1`	**Upper Limit Setpoint:** AN1 upper range limit only for linear signals	🔴 Look!
		-999…+9999 digit*, **Default: 1000.**	

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* The display of the decimal point depends on the setting of parameter `5En 1` and `dP. 1` (or parameters `5En2` and `dP. 2` for ATR171-23ABC-T).

6 `□cR.1` **Offset Calibration 1:** Offset AN1 calibration.
Number added to visualized process value (normally correcting
ambient temperature value)

-999…+9999 digit* (for linear sensors and potentiometers),
Default: 0.0.

7 `GcR.1` **Gain calibration 1:** AN1 gain calibration.
% Value multiplied with displayed value to calibrate process value

-99.9%…+100.0%, **Default: 1000.**

8 `Loct` **Latc On Function:** Automatic setting of limits for linear
inputs and potentiometers

`d.iS.`	Disabled **(Default)**
`Std`	Standard
`u.0St.`	Virtual zero stored
`u.0 in`	Virtual zero initialized

9 `SEn2` **Sensor 2:** Analog input configuration 2 /
sensor selection **(only on ATR171-24ABC-T)**

`d.iS.`	Disabled **(Default)**	
`tc. H`	Tc-K	-260…1360 °C
`tc. S`	Tc-S	-40…1760 °C
`tc. r`	Tc-R	-40…1760 °C
`tc. J`	Tc-J	-200…1200 °C
`Pt`	PT100	-200…600 °C
`Pt 1`	PT100	-200…140 °C
`ni`	NI100	-60…180 °C
`ntc`	NTC10K	-40…125 °C
`Ptc`	PTC1K	-50…150 °C
`PtS`	PT500	-100…600 °C
`Pt 1F`	PT1000	-100…600 °C

10 `dP. 2` **Decimal Point 2:** Select number of visualized decimal points

`0`	**Default**
`00`	1 Decimal

11 `□cR2` **Gain Calibration 2:** AN2 offset calibration.
Number added to visualized process value (normally
correcting environment temperature value) **(only on ATR171-24ABC-T)**

-99.9…+100.0 tenths of degree, **Default: 0.0**

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* Decimal point visualization depends on the setting of parameter `SEn 1` and
`dP. 1` (or parameters `SEn2` and `dP. 2` for ATR171-23ABC-T).

12 $\boxed{\text{GcR2}}$ **Gain calibration 2:** AN2 gain calibration. % Value multiplied with displayed value to calibrate process value.

-99.9%…+100.0%, **Default: 1000.**

13 $\boxed{\text{LoLS}}$ **Lower Limit Setpoint:** Lower limit selectable for setpoint   ◯ **Look!**

-999…+9999 digit* (degrees if temperature), **Default: 0.**

14 $\boxed{\text{uPLS}}$ **Upper Limit Setpoint:** Upper limit selectable for setpoint   ◯ **Look!**

-999…+9999 digit* (degrees if temperature), **Default: 1750.**

15 $\boxed{\text{cPro}}$ **Command Process:** Selects process value related to command output and visualized on display 1. This determinates which is the primary process

$\boxed{\text{Pro1}}$ Process 1 **(Default)**
$\boxed{\text{Pro2}}$ Process 2
$\boxed{\text{NEAn}}$ Processes Mean
$\boxed{\text{diFF.}}$ Processes Difference
$\boxed{\text{AbSd}}$ Processes difference as absolute value

16 $\boxed{\text{rENS}}$ **Remote Setpoint:** Enables remote setpoint. Command setpoint is the secondary process. It works if $\boxed{\text{Pro1}}$ or $\boxed{\text{Pro2}}$ is selected on parameter $\boxed{\text{cPro}}$

$\boxed{\text{diS.}}$ Disabled **(Default)**
$\boxed{\text{En}}$ Enabled

17 $\boxed{\text{Actt.}}$ **Action type:** Regulation type for command output

$\boxed{\text{HEAt}}$ Heating (N.O.) **(Default)**
$\boxed{\text{cool}}$ Cooling (N.C.)
$\boxed{\text{HooS}}$ Lock command above SPV.

18 $\boxed{\text{c. HY}}$ **Command Hysteresis:** Hysteresis in ON / OFF or dead band in P.I.D.
-999…+999 digit* (tenth of degree if temperature), **Default: 0.0.**

19 $\boxed{\text{c. rE}}$ **Command Reset:** Type of reset for state of command contact (always automatic in P.I.D. functioning)

$\boxed{\text{A-E.}}$ Automatic Reset **(Default)**
$\boxed{\text{N-E.}}$ Manual Reset by keyboard
$\boxed{\text{N-ES}}$ Manual reset stored (keeps relay status also after an eventual power failure)

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* The display of the decimal point depends on the setting of parameter $\boxed{\text{SEn1}}$ and $\boxed{\text{dP. 1}}$ (or parameters $\boxed{\text{SEn2}}$ and $\boxed{\text{dP. 2}}$ for ATR171-23ABC-T).

20 `c. SE`	**Command State Error:** Contact state for command output in case of error	
`co`	Open contact **(Default)**	
`cc.`	Closed contact	
21 `c. Ld`	**Command Led:** Defines led OUT1 state corresponding to relevant contact	
`co`	ON with open contact	
`cc.`	ON with closed contact **(Default)**	
22 `c. dE.`	**Command Delay:** Command delay (only in ON/OFF functioning). (In case of servo valve it works also in P.I.D. and represents delay between opening and closure of two contacts)	
	-600…+600 seconds (tenths of second if servo valve). Negative: delay when turning off. Positive: delay when turning on. **Default: 0.**	
23 `c. SP.`	**Command Setpoint Protection:** Allows or not to change command setpoint value from keyboard	
`FrEE`	Modification allowed **(Default)**	
`Loc├`	Protected	
24 `tunE`	**Tune:** Autotuning type selection	
`d iS`	Disabled **(Default)**	
`Auto`	Automatic (P.I.D. parameters calculation at each activation and / or each change)	
`NAn`	Manual (launch by keyboards or by digital input)	
`oncE`	Once (P.I.D. parameters calculation only at first start)	
25 `Sdtu`	**Setpoint Deviation Tune:** Selects deviation from command setpoint as threshold used by autotuning to calculate P.I.D. parameters	
	0…5000 digit* (tenth of degree if temperature), **Default: 10.0.**	
26 `Pb`	**Proportional Band:** Proportional band. Process inertia in units (Example: °C if temperature)	
	0 ON / OFF if also `t. i` is equal to 0 **(Default).** **1…9999** digit* (tenth of degree if temperature).	
27 `t. i`	**Integral Time:** Process inertia in seconds	
	0.0-999.9 seconds (0 = integral disabled), **Default: 0.**	

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* The display of the decimal point depends on the setting of parameter `SEn 1` and `dP. 1` (or parameters `SEn2` and `dP. 2` for ATR171-23ABC-T).

28 $\boxed{\text{Ed}}$	**Derivative Time:** Normally ¼ of integral time
	0.0-999.9 seconds (0 = derivative disabled), **Default: 0.**
29 $\boxed{\text{Ec.}}$	**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)
	0.1-300 seconds, **(Default: 10)**
30 $\boxed{\text{LLoP.}}$	**Lower Limit Output Percentage:** Selects minimum value for command output percentage
	0…100%, **Default: 0%.**
31 $\boxed{\text{uLoP.}}$	**Upper Limit Output Percentage:** Selects maximum value for command output percentage
	0…100%, **Default: 100%.**
32 $\boxed{\text{dEGr.}}$	**Degree:** Select degree type
$\boxed{\text{°c}}$	Centigrade **(Default)**
$\boxed{\text{°F}}$	Fahrenheit

33 $\boxed{\text{AL. 1}}$	**Alarm 1:** Alarm 1 selection. Alarm intervention is correlated to AL1	🔴 Look!
$\boxed{\text{d iS.}}$	Disabled **(Default)**	
$\boxed{\text{A. AL.}}$	Absolute alarm, referring to process	
$\boxed{\text{b. AL.}}$	Band alarm	
$\boxed{\text{HdAL.}}$	Upper deviation alarm	
$\boxed{\text{LdAL.}}$	Lower deviation alarm	
$\boxed{\text{AcAL.}}$	Absolute alarm, referring to command setpoint	
$\boxed{\text{StAL.}}$	Status alarm (active in Run / Start)	
$\boxed{\text{cooL}}$	Cooling action	
$\boxed{\text{trun}}$	Timer run	
$\boxed{\text{tEnd}}$	Timer end	

34 $\boxed{\text{A 1Pr.}}$	**Alarm 1 Process:** Selects process value related to alarm 1
$\boxed{\text{Pro 1}}$	Process 1 **(Default)**
$\boxed{\text{Pro2}}$	Process 2
$\boxed{\text{NEAn}}$	Processes Mean
$\boxed{\text{d iFF.}}$	Processes Difference
$\boxed{\text{AbSd}}$	Processes difference as absolute value

35 $\boxed{R.~I5o}$	**Alarm 1 State Output:** Alarm 1 output contact and intervention type
$\boxed{no.~5}$	(N.O. start) Normally open, active at start
$\boxed{nc.~5}$	(N.C. start) Normally closed, active at start
$\boxed{no.~t.}$	(N.O. threshold) Normally open, active on reaching alarm[5]
$\boxed{nc.~t.}$	(N.C. threshold) Normally closed, active on reaching alarm[5]
36 $\boxed{R.~IHY}$	**Alarm 1 Hysteresis**
	-999…+999 digit* (tenths of degree if temperature), **Default: 0.0.**
37 $\boxed{R~I-E}$	**Alarm 1 Reset:** Type of reset for contact of alarm 1
$\boxed{R-E.}$	Automatic Reset **(Default)**
$\boxed{n-E.}$	Manual Reset by keyboard
$\boxed{n-E5}$	Manual reset stored (keeps relay status also after an eventual power failure)
38 $\boxed{R.~I5E}$	**Alarm 1 State Error:** Contact status for alarm 1 output in case of error
$\boxed{co}$	Open contact **(Default)**
$\boxed{cc.}$	Closed contact
39 $\boxed{R.~ILd}$	**Alarm 1 Led:** Defines led A1 status corresponding to relevant contact
$\boxed{co}$	ON with open contact
$\boxed{cc.}$	ON with closed contact **(Default)**
40 $\boxed{R.~IdE.}$	**Alarm 1 Delay**
	-600…+600 seconds. Negative: delay at exit from alarm. Positive: delay at starting of alarm. **Default: 0.**

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* The display of the decimal point depends on the setting of parameter $\boxed{5En~I}$ and $\boxed{dP.~I}$ (or parameters $\boxed{5En2}$ and $\boxed{dP.~2}$ for ATR171-23ABC-T).

[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.

41 $\boxed{\text{R ISP}}$	**Alarm 1 Setpoint Protection:** Alarm 1 set protection. Does not allow the user to change set value
$\boxed{\text{FrEE}}$	Modification allowed **(Default)**
$\boxed{\text{Lock}}$	Protected
$\boxed{\text{H idE}}$	Protected and not visualized

42 $\boxed{\text{AL. 2}}$	**Alarm 2:** Alarm 2 selection. Alarm intervention is associated to AL2
$\boxed{\text{d iS}}$	Disabled **(Default)**
$\boxed{\text{R. AL.}}$	Absolute alarm, referring to process
$\boxed{\text{b. AL.}}$	Band alarm
$\boxed{\text{HdAL}}$	Upper deviation alarm
$\boxed{\text{LdAL}}$	Lower deviation alarm
$\boxed{\text{RcAL}}$	Absolute alarm, referring to command setpoint
$\boxed{\text{StAL}}$	Status alarm (active in Run / Start)
$\boxed{\text{cool}}$	Cooling action
$\boxed{\text{trun}}$	Timer Run
$\boxed{\text{tEnd}}$	Timer End

43 $\boxed{\text{R2Pr}}$	**Alarm 2 Process:** Selects value correlated to alarm 2
$\boxed{\text{Pro 1}}$	Process 1 **(Default)**
$\boxed{\text{Pro2}}$	Process 2
$\boxed{\text{NEAn}}$	Processes mean
$\boxed{\text{d iFF}}$	Processes difference
$\boxed{\text{AbSd}}$	Processes difference as absolute value

44 $\boxed{\text{R2So}}$	**Alarm 2 State Output:** Alarm 2 output contact and intervention type
$\boxed{\text{no S}}$	(N.O. start) Normally open, active at start
$\boxed{\text{nc S}}$	(N.C. start) Normally closed, active at start
$\boxed{\text{no t}}$	(N.O. threshold) Normally open, active on reaching alarm[6]
$\boxed{\text{nc t}}$	(N.C. threshold) Normally closed, active on reaching alarm[6]

45 $\boxed{\text{R2HY}}$	**Alarm 2 Hysteresis**
	-999…+999 digit* (tenth of degree if temperature), **Default: 0.0.**

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* The display of the decimal point depends on the setting of parameter $\boxed{\text{SEn 1}}$ and $\boxed{\text{dP. 1}}$ (or parameters $\boxed{\text{SEn2}}$ and $\boxed{\text{dP. 2}}$ for ATR171-23ABC-T).

[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.

46 `A2rE`	**Alarm 2 Reset:** Type of reset for contact of alarm 2
`ArE`	Automatic Reset **(Default)**
`nrE`	Manual Reset by keyboard
`nrES`	Manual reset stored (keeps relay status also after an eventual power failure)

47 `A2SE`	**Alarm 2 State Error:** Contact status for alarm 2 output in case of error
`co`	Open contact **(Default)**
`cc`	Closed contact

48 `A2Ld`	**Alarm 2 Led:** Defines led A2 status corresponding to relevant contact
`co`	ON with open contact
`cc`	ON with closed contact (**Default**)

49 `A2dE`	**Alarm 2 Delay:** **-600…+600** seconds. Negative: delay at exit from alarm. Positive: delay at starting of alarm. **Default: 0.**

50 `A2SP`	**Alarm 2 Setpoint Protection:** Alarm 2 set protection. Does not allow the user to change set value
`FrEE`	Modification allowed **(Default)**
`Loct`	Protected
`HidE`	Protected and not visualized

51 `AL 3`	**Alarm 3:** Alarm 3 selection. Alarm intervention is associated to AL3
`diS`	Disabled **(Default)**
`A AL`	Absolute alarm, referring to process
`b AL`	Band alarm
`HdAL`	Upper deviation alarm
`LdAL`	Lower deviation alarm
`AcAL`	Absolute alarm, referring to command setpoint
`StAL`	Status alarm (active in Run / Start)
`cooL`	Cooling action
`trun`	Timer Run
`tEnd`	Timer End

52 $\boxed{\text{R3Pr}}$	**Alarm 3 Process:** Selects value correlated to alarm 3
$\boxed{\text{Pro1}}$	Process 1 **(Default)**
$\boxed{\text{Pro2}}$	Process 2
$\boxed{\text{NERn}}$	Processes mean
$\boxed{\text{d iFF}}$	Processes difference
$\boxed{\text{AbSd}}$	Processes difference as absolute value

53 $\boxed{\text{R35o}}$	**Alarm 3 Process:** Selects value correlated to alarm 3
$\boxed{\text{no 5}}$	(N.O. start) Normally open, active at start
$\boxed{\text{nc. 5}}$	(N.C. start) Normally closed, active at start
$\boxed{\text{no t}}$	(N.O. threshold) Normally open, active on reaching alarm[7]
$\boxed{\text{nc. t}}$	(N.C. threshold) Normally closed, active on reaching alarm[7]

54 $\boxed{\text{R3HY}}$	**Alarm 3 Hysteresis** **-999…+999** digit* (tenths of degree if temperature), **Default: 0.0.**

55 $\boxed{\text{R3rE}}$	**Alarm 3 Reset:** Type of reset for contact of alarm 3
$\boxed{\text{A-E.}}$	Automatic Reset **(Default)**
$\boxed{\text{N-E.}}$	Manual Reset by keyboard
$\boxed{\text{N-ES}}$	Manual reset stored (keeps relay status also after an eventual power failure)

56 $\boxed{\text{R3SE}}$	**Alarm 3 State Error:** Contact status for alarm 3 output in case of error
$\boxed{\text{co}}$	Open contact **(Default)**
$\boxed{\text{cc.}}$	Closed contact

57 $\boxed{\text{R3Ld}}$	**Alarm 3 Led:** Defines led A3 status corresponding to relevant contact
$\boxed{\text{co}}$	ON with open contact
$\boxed{\text{cc.}}$	ON with closed contact **(Default)**

58 $\boxed{\text{R3dE}}$	**Alarm 3 Delay** **-600…+600** seconds. Negative: delay at exit from alarm. Positive: delay at starting of alarm. **Default: 0.**

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* The display of the decimal point depends on the setting of parameter $\boxed{\text{5En 1}}$ and $\boxed{\text{dP. 1}}$ (or parameters $\boxed{\text{5En2}}$ and $\boxed{\text{dP. 2}}$ for ATR171-23ABC-T).

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

59 $\overline{R35P}$	**Alarm 3 Setpoint Protection:** Alarm 3 set protection. Does not allow the user to change set value
$\overline{F-EE}$	Modification allowed **(Default)**
$\overline{Loc\vdash}$	Protected
$\overline{H\ id E}$	Protected and not visualized

60 $\overline{L\Pi-F}$	**Timer functions:** Enabling timer function and select time base
$\overline{d\ i5}$	
$\overline{\Pi\Pi55}$	
$\overline{HH\Pi\Pi}$	

63 $\overline{cooF.}$	**Cooling Fluid:** Type of refrigerant fluid for heating / cooling P.I.D.
$\overline{R\ ir}$	Air **(Default)**
$\overline{o\ iL}$	Oil
$\overline{H2o}$	Water

64 $\overline{Pb\Pi}$	**Proportional Band Multiplier:** Proportional band for cooling action is given by parameter 18 multiplied for this parameter
	1.00-5.00 **(Default: 1.00)**

65 $\overline{oudb}$	**Overlap / Dead Band:** Dead band combination for heating / cooling P.I.D.
	-20.0-50.0%, (Default: 0).

66 $\overline{cotc.}$	**Cooling Cycle Time:** Cycle Time for Cooling output
	1-300 seconds, **Default: 10.**

67 $\overline{cFLE}$	**Conversion Filter:** ADC Filter: Number of sensor readings to calculate mean that defines process value. **N.B.:** When readings increase, control loop speed slows down
$\overline{d\ i5}$	Disabled
$\overline{2.\ 5\Pi}$	2 Samples Mean
$\overline{3.\ 5\Pi}$	3 Samples Mean
$\overline{4.\ 5\Pi}$	4 Samples Mean
$\overline{5.\ 5\Pi}$	5 Samples Mean
$\overline{6.\ 5\Pi}$	6 Samples Mean
$\overline{7.\ 5\Pi}$	7 Samples Mean
$\overline{8.\ 5\Pi}$	8 Samples Mean
$\overline{9.\ 5\Pi}$	9 Samples Mean
$\overline{105\Pi}$	10 Samples Mean
$\overline{1\ 15\Pi}$	11 Samples Mean

`125N`	12 Samples Mean
`135N`	13 Samples Mean
`145N`	14 Samples Mean
`155N`	15 Samples Mean

68 `cFrn` **Conversion Frequency:** Sampling frequency of digital / analogue converter.
N.B.: Increasing the conversion speed will slow down reading stability (example: for fast transients, as the 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
`332H`	33.2 Hz
`196H`	19.6 Hz
`167H`	16.7 Hz **(Default)** Ideal for filtering noises 50 / 60 Hz
`125H`	12.5 Hz
`10 H`	10 Hz
`833H`	8.33 Hz
`625H`	6.25 Hz
`4.17H`	4.17 Hz (Minimum speed conversion)

69 `uFLt` **Visualization Filter:** Slow down the update of process value visualized on display, to simplify reading

`d 15`	Disabled with pitchfork (maximum speed of display update)
`F ior.`	First order filter with pitchfork
`2. 5N`	2 Samples Mean
`3. 5N`	3 Samples Mean
`4. 5N`	4 Samples Mean
`5. 5N`	5 Samples Mean
`6. 5N`	6 Samples Mean
`7. 5N`	7 Samples Mean
`8. 5N`	8 Samples Mean
`9. 5N`	9 Samples Mean
`105N`	10 Samples Mean (Maximum slow down of display update)

70 `oPПo`	**Operating Mode:** Selects operating mode
`cont.`	Controller **(Default)**
`Prc4`	Programmed Cycle
`2ES.`	2 Setpoints Switch
`2ES.i`	2 Setpoints Switch Impulsive
`3ES.i`	3 Setpoints Switch Impulsive
`4ES.i`	4 Setpoints Switch Impulsive

71 `AuПA`	**Automatic / Manual:** Enables automatic / manual selection
`d iS.`	Disabled **(Default)**
`En.`	Enabled
`EnSt.`	Enabled with memory

72 `dGt. i`	**Digital Input:** Digital input functioning (P69 selection must be `cont.` or `Prc4`)
`d iS.`	Disabled **(Default: 0)**
`St.St.`	Pre-programmed cycle with Start / Stop
`rnno`	Run N.O. (enables regulation with N.O. contact)
`rnnc.`	Run N.C. (enables regulation with N.C. contact)
`Lcno`	Lock conversion N.O. (stop conversion and display value with N.O.)
`Lcnc.`	Lock conversion N.C. (stop conversion and display value with N.C.)
`tunE`	Manual Tune (by digital input)
`AПA i`	Auto manual impulsive
`AПAc.`	Automatic manual contact
	Timer inpulse

73 `r iGr.`	**Rising Gradient:** Rise gradient for Soft Start or pre-programmed cycle.
0	Disabled.
1…9999	Digit/hour* (degrees/hour with decimal visualization if temperature), **Default: 0.**

74 `FAGr`	**Falling Gradient:** Falling gradient for pre-programmed cyle
0	Disabled.
1…9999	digit/hour* (degrees/hour with decimal visualization if temperature), **Default: 0.**

75 `ПAt. i`	**Maintenance Time:** Holding time for pre-programmed cycle
00.00-24.00 hh.mm, **Default: 00.00**	

76 `uПcP.`	**User Menu Cycle Programmed:** Allows to modify rise gradient and maintenance time from user menu, when pre-programmed cycle is selected
`d iS.`	Disabled **(Default)**
`r iGr.`	Rising Gradient

* The display of the decimal point depends on the setting of parameter `SEn i` and `dP. i` (or parameters `SEn2` and `dP. 2` for ATR171-23ABC-T).

76 ⌐⌐⊏⊡	**User Menu Cycle Programmed:** Allows to modify rise gradient and maintenance time from user menu, when pre-programmed cycle is selected
⊓⊓⊏ ⸴	Maintenance Time
⌐⊏⊓⊡	Rising Gradient and Maintenance Time
⊏⊓⊏⌐	Falling Gradient
⌐⊏⊏⌐	Rising and Falling Gradient
⊏⊏⊓⊡	Falling Gradient and Maintenance Time
⊓⊏⊏	All

77 ⊔ ⊏⊡	**Visualization Display 2:** Set visualization on display
⊏⊏⊏⊔	Command Setpoint **(Default)**
⊏⌐⊏ ⸴	Process 1
⊏⌐⊏⊡	Process 2
⊓⊏⊏⊓	Processes mean
⊏ ⸴⊏⊏	Processes difference
⊓⊏⊏⊏	Processes difference as absolute value
	Amp (ampere visualization)

78 ⊔ ⸴⊏⊔	**Visualization Type:** Set visualization type on display
⊏⊏⊏ ⸴	Display 1 process + Display 2 as ⊔ ⊏⊡ **(Default)**
⊏⊡⊏ ⸴	Display 1 process + Display 2 as ⊔ ⊏⊡ hidden after 3 sec.
⊏⊔⊓⊏	Display 1 as ⊔ ⊏⊡ + Display 2 process
⊏⊏⊡⊏	Display 1 as ⊔ ⊏⊡ + Display 2 process hidden after 3 sec.

79 ⌐⊏⊏⌐	**Retransmission:** Retransmission for output 0…10 V or 0/4…20 mA. Parameters 90 and 91 defines upper/lower limit of scale
⊏ ⸴⊏	Disabled **(Default)**
⊏⊏⊏⊔	Command Setpoint
⊏⌐⊏ ⸴	Process 1
⊏⌐⊏⊡	Process 2
⊓⊏⊏⊓	Processes Mean
⊏ ⸴⊏⊏	Processes Difference
⊓⊏⊏⊏	Processes Difference as absolute value

80 ⌐⊏⊏⊔	**Retransmission Type:** Select retransmission type
⊏⊐ ⊏⊏	0…10 Volt **(Default)**
⊏⊐⊏⊏	0…20 mA
⊔⊐⊏⊏	4…20 mA

* The display of the decimal point depends on the setting of parameter ⊏⊏⊏ ⸴ and ⊏⊏ ⸴ (or parameters ⊏⊏⊏⊡ and ⊏⊏ ⊡ for ATR171-23ABC-T).

81 $\boxed{\text{LoLr}}$	**Lower Limit Retransmission:** Lower limit analogue output range **-999…9999** digit* (degrees if temperature), **Default: 0.**
82 $\boxed{\text{UPLr}}$	**Upper Limit Retransmission:** Upper limit analogue output range **-999…9999** digit* (degrees if temperature), **Default: 1000.**

83 $\boxed{\text{bdrt}}$ **Baud Rate:** Selects baudrate for serial communication

$\boxed{\text{48 r}}$	4800	bit/s
$\boxed{\text{96 r}}$	9600	bit/s
$\boxed{\text{192r}}$	19200	bit/s **(Default)**
$\boxed{\text{288r}}$	28800	bit/s
$\boxed{\text{384r}}$	39400	bit/s
$\boxed{\text{576r}}$	57600	bit/s
$\boxed{\text{1152}}$	115200	bit/s

84 $\boxed{\text{SLAd}}$ **Slave Address:** Selects slave address for serial communication

1 – 254, Default: 254

85 $\boxed{\text{SEdE}}$ **Serial Delay:** Selects serial delay

0 – 100 miliseconds, **Default: 20**

12 Alarm Intervention Modes ⬤ Look!
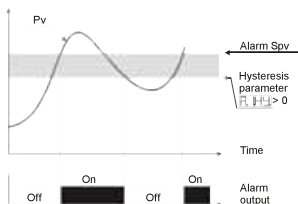
Absolute Alarm or Threshold Alarm ($\boxed{\text{A AL}}$ selection)

Absolute alarm with controller in heating functioning (par. 17 $\boxed{\text{Actt}}$ selected $\boxed{\text{HEAt}}$) and hysteresis value greater than "0" (par. 36 $\boxed{\text{A IHY}}$ > 0).

N.B.

Absolute alarm with controller in heating functioning (par. 17 $\boxed{\text{Actt}}$ selected $\boxed{\text{HEAt}}$) and hysteresis value less than "0" (par. 36 $\boxed{\text{A IHY}}$ < 0).

N.B.
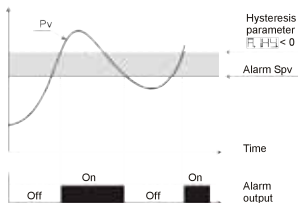
N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.
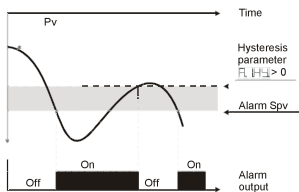
Absolute alarm with controller in cooling functioning (par. 17 $\boxed{Actt}$ selected $\boxed{cool}$) and hysteresis value than "0" (par. 36 $\boxed{A.1HY}$ > 0).
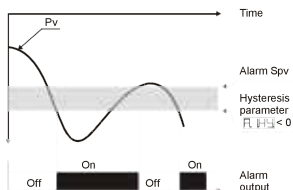
N.B.

Absolute alarm with controller in cooling functioning (par. 17 $\boxed{Actt}$ selected $\boxed{cool}$) and hysteresis value less than "0" (par. 36 $\boxed{A.1HY}$ < 0).

N.B.

Absolute Alarm or Threshold Alarm Referring to Setpoint Command ($\boxed{AcAL}$ selection)
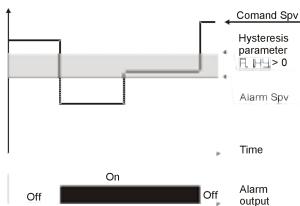

AAbsolute alarm refers to the command set, with the controller in heating functioning (par. 17 $\boxed{Actt}$ selected $\boxed{HEAt}$) and hysteresis value greater than "0" (par. 36 $\boxed{A.1HY}$ > 0). The command set can be changed by pressing the arrow keys on front panel or using serial port RS485 commands.
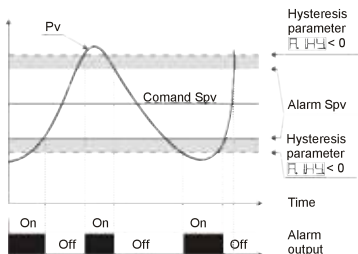
N.B.

Band Alarm ($\boxed{b. AL}$ selection)

N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.
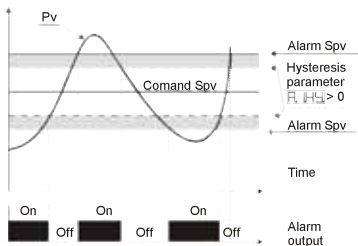
Band alarm <u>hysteresis value greater than "0"</u>
(par. 36 $\boxed{\text{A. IHY}}$ > 0).
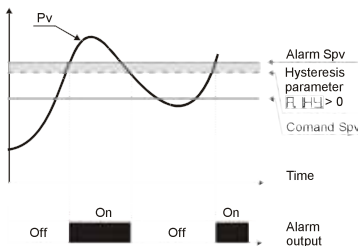
N.B.

Band alarm <u>hysteresis value less than "0"</u>
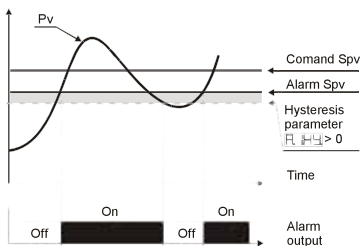(par. 36 $\boxed{\text{A. IHY}}$ < 0).

N.B.

N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.

Upper Deviation Alarm ($\boxed{\text{H.dAL}}$ selection)

Upper deviation alarm <u>value of alarm setpoint greater than "0"</u> and <u>hysteresis value greater than "0"</u> (par. 36 $\boxed{\text{A. IHY}}$ > 0).

N.B.[2]

Upper deviation alarm <u>value of alarm setpoint less than "0" and hysteresis value greater than "0"</u> (par. 36 $\boxed{\text{A.1HY}}$ > 0).

N.B.²

Lower Deviation Alarm ($\boxed{\text{H.dAL}}$ selection)

Lower deviation alarm <u>value of alarm setpoint greater than "0" and hysteresis value greater than "0"</u> (par. 36 $\boxed{\text{A.1HY}}$ > 0).
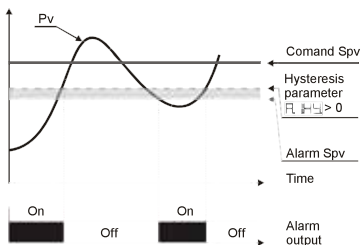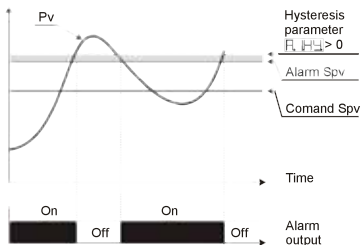
N.B.²

Lower deviation alarm <u>value of alarm setpoint less than "0" and hysteresis value greater than "0"</u> (par. 36 $\boxed{\text{A.1HY}}$ > 0).

N.B.²

N.B.²: a) 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" ($\boxed{\text{A.1HY}}$ < 0) the broken line moves under the alarm setpoint.

13 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.

#	Causa	Cosa fare
E-01 5Y5E	Error in EEPROM cell programming.	Call Assistance.
E-02 5Y5E	Cold junction sensor fault or room temperature outside of allowed limits.	Call Assistance.
E-04 5Y5E	Incorrect configuration data. Possible loss instrument calibration.	Verify that configuration parameters are correct.
E-05 Prb.1	Sensor connected to AI1 broken or temperature out of range.	Control connection with probes and their integrity.
E-06 Prb2	Sensor connected to AI2 broken or temperature out of range.	Control connection with probes and their integrity.
E-08 5Y5E	Missing calibration.	Contact technical service.
E-10 cPAr	Incorrect control parameters.	Verify control parameters.
E-11 APAr	Incorrect alarm parameters.	Verify alarm parameters.
E-12 rPAr	Incorrect retransmission parameters.	Verify retransmission parameters.
E-13 uPAr	Incorrent visualization parameters.	Verify visualization parameters.
E-14 5PAr	Incorrect remote setpoint parameters.	Verify remote setpoint parameters.

14 Summary of Configuration parameters

Date:	Model ATR171:
Installer:	**System:**

Notes:

`cout`	Select type of command output	
`SEn.1`	Analogue input 1 configuration	
`dP. 1`	Select type of decimal visualized by sensor 1	
`LoL. 1`	AN1 range lower limit only for linear	
`uPL. 1`	AN1 range upper limit only for linear	
`ocA.1`	AI1 Offset calibration	
`GcA.1`	AI1 Gain calibration	
`LAtc.`	Limits automatic setting for linear inputs	
`SEn2`	Analogue input 2 configuration	
`dP. 2`	Select type of decimal visualized by sensor 2	
`ocA2`	AI2 Offset calibration	
`GcA2`	AI2 Gain calibration	
`LoL.S`	Setpoint lower limit	
`uPL.S`	Setpoint upper limit	
`cPro`	Select process value related to command output	
`rEMS`	Enable remote setpoint	
`Actt.`	Regulation type for command output	
`c. HY`	Hysteresis in ON / OFF or dead band in P.I.D.	
`c. rE`	Command contact reset type	
`c. SE`	Contact status for command output in case of error	
`c. Ld`	C1 led status in correspondence of relevant contact	
`c. dE`	Command delay	
`c. SP.`	Command setpoint protection	
`tunE`	Autotuning type selection	
`Sdtu`	Deviation from command setpoint for autotuning	
`Pb`	Proportional band	
`t. i`	Integral time	
`td`	Derivative time	
`tc.`	Cycle time	

L L o P.	Minimum value for command output percentage	
A2-E	Maximum value for command output percentage	
dEGr.	Degrees type	
AL. 1	Alarm 1 selection	
A1Pr.	Select process value related to alarm 1	
A1So	Alarm 1 output contact and intervention type	
A1HY	Alarm 1 hysteresis	
A1rE	Alarm 1 contact reset type	
A1SE	Alarm 1 output contact status in case of error	
A1Ld	Led A1 status in correspondance of relevant contact	
A1dE	Alarm 1 delay	
A1SP.	Alarm 1 set protection	
AL. 2	Alarm 2 selection	
A2Pr.	Select process value related to alarm 2	
A2So	Alarm 2 output contact and intervention type	
A2HY	Alarm 2 hysteresis	
A2rE	Alarm 2 contact reset type	
A2SE	Alarm 2 output contact status in case of error	
A2Ld	Led A2 status in correspondance of relevant contact	
A2dE	Alarm 2 delay	
A2SP.	Alarm 2 set protection	
AL. 3	Alarm 3 selection	
A3Pr.	Select size related to alarm 3	
A3So	Alarm 3 output contact and intervention type	
A3HY	Alarm 3 hysteresis	
A3rE	Alarm 3 contact reset type	
A3SE	Alarm 3 output contact status in case of error	
A3Ld	Led A3 status in correspondance of relevant contact	
A3dE	Alarm 3 delay	
A3SP.	Alarm 3 set protection	
tNr.F	Enabling timer function	
cooF.	Cooling fluid type	
PbN	Proportional band multiplier	
oudb	Overlap / Dead band	

`cotc.`	Cooling output cycle time	
`cFLt.`	Adc filter	
`cFrn`	Sampling frequency	
`uFLt.`	Filter in visualization	
`oPno`	Function selection	
`AunA`	Enable automatic / manual selection	
`dGt.i`	Digital input functioning	
`r Gr.`	Rising gradient	
`FAGr.`	Falling gradient for pre-programmed cycle	
`nAt.i`	Holding time for pre-programmed cycle	
`uncP.`	User Menu in pre-programmed cycle functioning	
`u.d2`	Set visualization on display 2	
`u.ty`	Set visualization type on displays	
`rEtr.`	Retransmission for output 0-10 V or 4…20 mA	
`rEty`	Select retransmission type	
`LoLr.`	Lower limit analogue output range	
`uPLr.`	Upper limit analogue output range	
`bdrt.`	Select baud rate for serial communication	
`SLAd`	Select slave address	
`SEdE`	Select serial delay	

Notes / Updates