PIXSYS
elettronica

- REGOLATORE
- CONTROLLER

ATR142

Manuale Installatore
User Manual

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1 Introduction

Thank you for choosing a Pixsys controller.
With the ATR142 model Pixsys makes available in a single device all the resources relevant to sensor input and actuators command, in addition to the extended power range 24…230 Vac/Vdc. With 17 sensors to select and outputs configurable as relay or SSR command, the user or retailer can reduce warehouse stock by rationalising investment and device availability. The series is completed with models equipped with serial communication RS485 Modbus. The configuration is further simplified by the Memory cards which are equipped with internal battery and therefore don't require cabling to power the controller.

2 Model Identification

The range of ATR142 controllers comes in two versions. Refer to the table below to easily select your preferred model.

Models available, with power 24…230 Vac/Vdc +/-15% 50/60Hz – 3,5VA	
ATR142-ABC	2 relays (8A+5A) + 1 Ssr
ATR142-ABC-T	1 relays 8A + 1 Ssr + Rs485

3 Technical Data

3.1 General Features

Displays	4 0.40 inch displays + 4 0.30 displays
Operating temperature	0-45℃, humidity 35..95uR%
Sealing	IP65 front panel (with gasket) IP30 casing and IP20 terminals
Material	Polycarbonate UL94V0 self-extinguishing
Weight	100 g

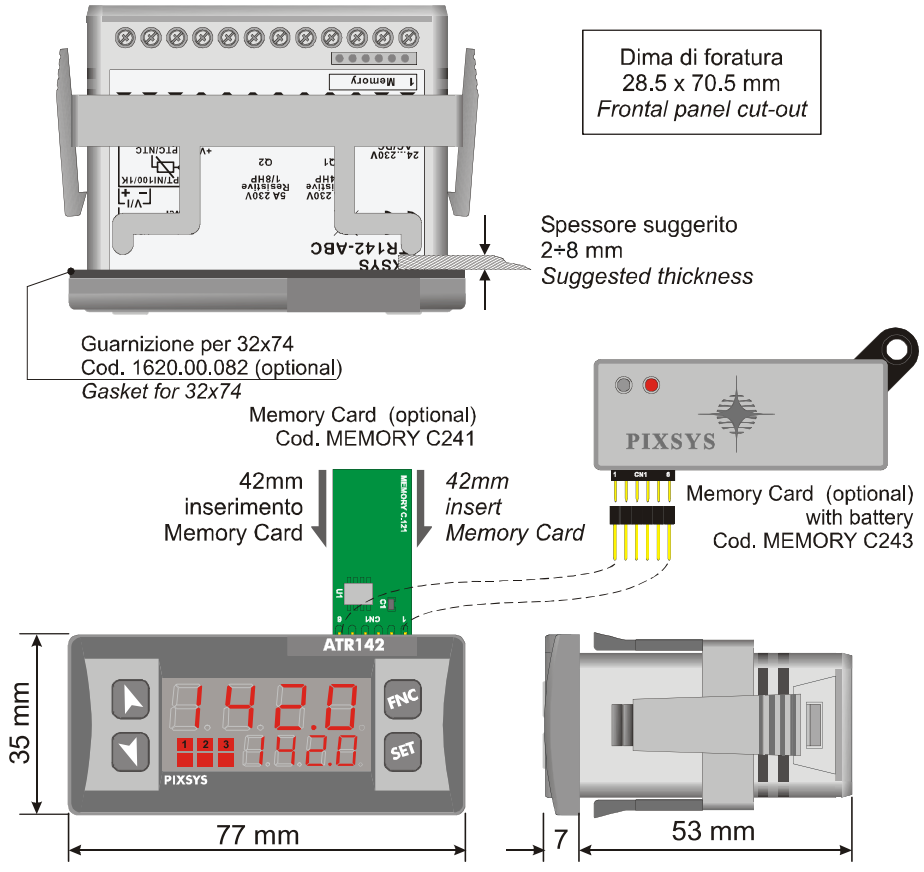
3.2 Hardware Features

Analogue input	**1**: AN1 Configurable via software **Input** Thermocouple type K, S, R, J Automatic compensation of cold junction from 0℃ to 50℃. **Thermoresistance:** PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K) **Linear:** 0-10V, 0-20 or 4-20mA, 0-40mV **Potentiometers**: 6KΩ, 150KΩ,	Tolerance (25℃) +/-0.2 % ± 1 digit for thermocouple input, thermo resistance and V/mA. Cold junction accuracy 0.1℃/℃
Relay output	**2** relays (Atr142-ABC) **1** relay (Atr142-ABC-T) Configurable as command and/or alarm output	Contacts: Q1 – 8A-250V~ Q2 – 5A-250V~
SSR output	**1** SSR Configurable as command output and/or alarm output.	12Vdc/30mA
Supply	Power supply 24..230 Vac/Vdc +/-15% 50/60Hz	Power consumption 3.5VA

3.3 Software Features

Regulation algorithms	ON-OFF with hysteresis. P, PI, PID, PD with proportional time
Proportional band	0...9999℃ or ℉
Integral time	0,0...999,9 sec (0 excluded)
Derivative time	0,0...999,9 sec (0 excluded)
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



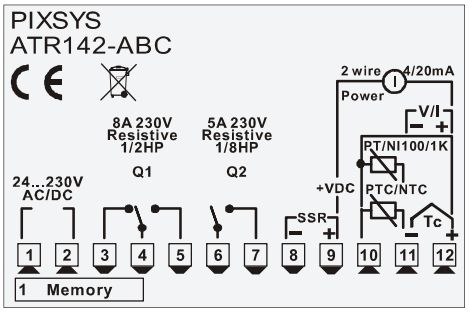
5 Electrical wirings

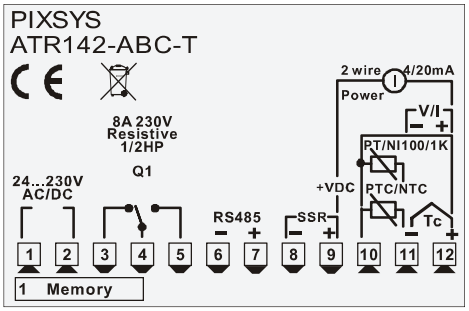
Although this controller was designed to resist noises in industrial environments, pease notice following safety guidelines:

- Separate the feeder line from the power lines.
- Avoid placing near units with remote control switches, electromagnetic contactors, high powered motors and in all instances use specific filters.
- Avoid placing near power units, particularly if phase controlled.

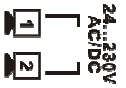
5.1 Wiring diagram

The connections are reported below for the three models available.





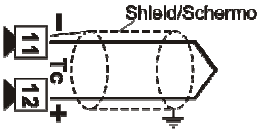
Power



Switching power supply with extended range

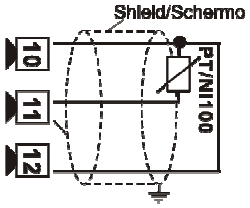
24…230 Vac/dc ±15% 50/60Hz – 5,5VA.

AN1 Analogue Input



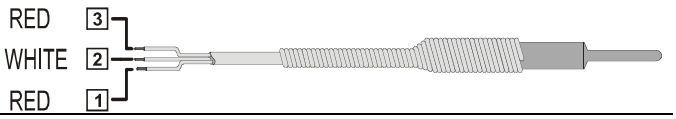
For thermocouples K, S, R, J.

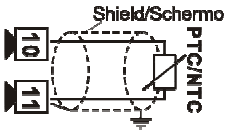
- Comply with polarity
- For possible extensions, use a compensated wire and terminals suitable for the thermocouples used (compensated)
- When shielded cable is used, it should be grounded at one side only



For thermoresistances PT100, NI100

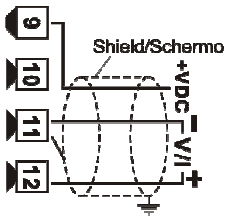
- For the three-wire connection use wires with the same section
- For the two-wire connection short-circuit terminals 10 and 12
- When shielded cable is used, it should be grounded at one side only to avoid ground loop currents





For thermoresistances NTC, PTC, PT500, PT1000 e potentiometers

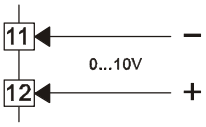
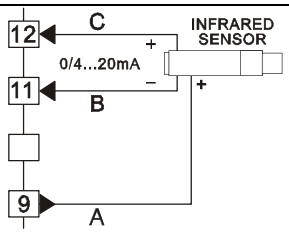
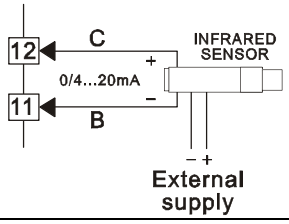
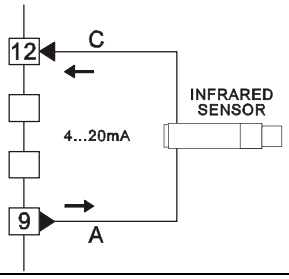
- When shielded cable is used, it should be grounded at one side only to avoid ground loop currents



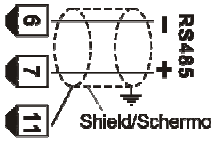
For linear signals V/mA

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

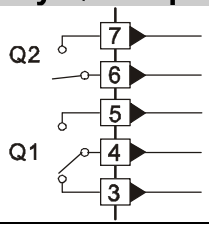
Examples of Connection for linear input

	For signals 0….10V Comply with polarity
	For signals 0/4….20mA with **three-wire sensor** Comply with polarity C=Sensor output B=Sensor ground A=Sensor power
	For signals 0/4….20mA with **external power of sensor** Comply with polarity A=Sensor output B=Sensor round
	For signals 0/4….20mA with **two-wire sensor** Comply with polarity C=Sensor output A=Sensor power supply

Serial input

	RS485 Modbus RTU communication ⚠ **<u>Do not use LT (line termination) resistors</u>** • For networks with more than five instruments supply in low voltage

Relay Q1 Output



Capacity:
Q1 - 8A/250V~ for resistive loads
Q2 - 5A/250V~ for resistive loads

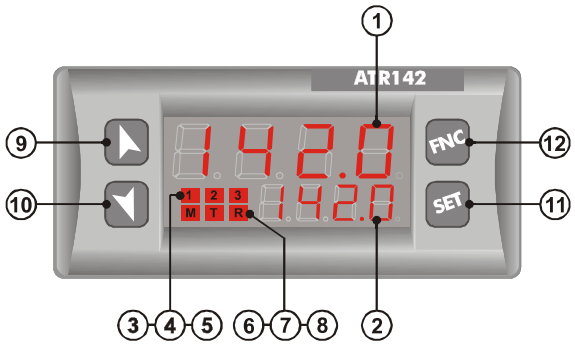
SSR output

SSR command output 12V/30mA

Digital Input on ATR243-20ABC

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

6 Display and Key Functions



6.1 Numeric Indicators (Display)

1	123.4	Normally displays the process. During the configuration phase, it displays the parameter being inserted.
2	123.4	Normally displays the setpoint. During the configuration phase, it displays the parameter value being inserted.

6.2 Meaning of Status Lights (Led)

3	1	ON when the output command is on. For motorised valve command, led in on when valve is opening and blink when closing.
4	2	ON when alarm 1 is on.
5	3	ON when alarm 2 is on.
6	M	ON when the “Manual” function is on.
7	T	ON when the controller is running an “Autotune” cycle.
8	R	ON when the controller communicates via serial port.

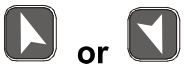
6.3 Keys

9		• 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.
10		• 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.
11	SET	• Allows to display the alarm setpoint and runs the autotuning function. • Allows to vary the configuration parameters.
12	FNC	• 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 from the keyboard as follows:

	Press	Effect	Operation
1		Value on display 2 changes	Increases or decreases the main setpoint
2		Visualize alarm setpoint on display 1	
3		Value on display 2 changes	Increases or decreases the alarm set point value

7.2 Auto-Tune

The Tuning procedure calculates the controller parameters and can be manual or automatic according to selection on parameter 46 tunE.

7.3 Manual Tuning

The manual procedure allows the user greater flexibility to decide when to update PID algorithm work parameters. The procedure can be activated in two ways.

- **By running Tuning from keyboard**:

Press the FNC key until display 1 shows the writing tunE with display 2 showing oFF , press , display 2 shows on . The T led switches on and the procedure begins.

- **By running Tuning from digital input**:

Select tunE on parameter 50 dGt. 1 .

On first activation of digital input (commutation on front panel) the T led switches on and on 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 the new PID parameters is determined by the setpoint value minus the "Set Deviation Tune" (see Parameter 47 SdtU).
To exit Tuning and leave the PID values unchanged, just press the FNC key until display 1 shows the writing tunE with the display showing on, press , display 2 shows oFF.
The T led switches off and the procedure finishes.

7.5 Soft Start

To reach the setpoint the controller can follow a gradient expressed in units (e.g. degree/hour).
Set the increase value in parameter 51 GrAd with the desired units/hour; only **on subsequent activation** the controller uses the soft start function.
Automatic/manual tuning cannot be enabled if the Soft start is active.

7.6 Automatic/Manual Regulation for % Output Control

This function allows you to select automatic functioning or manual command of the output percentage.
With parameter 49 AuMA, you can select two methods.

1. **The first selection** En allows you to enable the FNC key with the writing P.--- on display 1, while display two shows Auto.

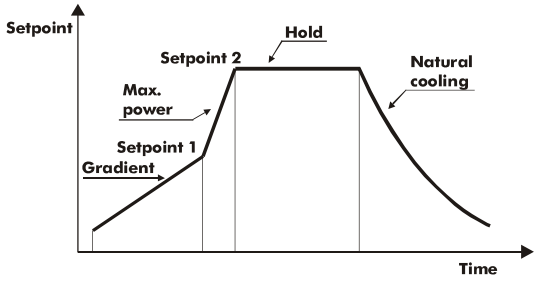
Press the key to show nAn.; it is now possible, during the process display, to change the output percentage using the keys and . To return to automatic mode, using the same procedure, select Auto on display 2: the M led switches off and functioning returns to automatic mode.

2. **The second selection** EnSt. enables the same functioning, but with two important variants:

- If there is a temporary lack of voltage or after switch-off, the manual functioning will be maintained as well as the previously set output percentage value.
- If the sensor breaks during automatic functioning, the controller moves to manual mode while maintaining the output percentage command unchanged as generated by the PID immediately before breakage.

7.7 Pre-Programmed Cycle

The pre-programmed cycle function activates by setting PrcY. in parameter 48 oPMo.
The controller reaches setpoint1 basing on the gradient set in parameter 51 GrAd., then it reaches maximum power up to setpoint2. When the process reaches maximum power, this setpoint is maintained for the time set in parameter 52 MAt i. On expiry, the command output is disabled and the controller displays StoP.



The cycle starts at each activation of the controller, or via digital input if it is enabled for this type of functioning (see parameter 50 dCt. i).

7.8 Memory Card (optional)

Parameters and setpoint values can be duplicated from one controller to another using the Memory card.
There are two methods:

- With the controller connected to the power supply

Insert the memory card **when the controller is off**.
On activation display 1 shows nEno and display 2 shows ----
(Only if the correct values are saved in the memory card). By pressing the key display 2 shows LoAd, then confirm using the FNC key. The controller loads the new data and starts again.

- 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 buttons.
When writing the parameters, the led turns red and on completing the procedure it changes to green. It is possible to repeat the procedure without any particular attention.

⚠ Updating Memory Card

To *update* the memory card values, follow the procedure described in the first method, setting display 2 to ---- so as not to load the parameters on controller[2].
Enter configuration and **change at least one parameter**.
Exit configuration. Changes are saved automatically.

[2] If on activation the controller does not display nEno it means no data have been saved on the memory card, but it is possible to update values.

7.9 Loading default values

This procedure makes it possible to restore factory settings of the instrument.

	Premere	Effetto	Eseguire
1	FNC for 3 seconds.	Display 1 shows 0000 with the 1st digit flashing, while display 2 shows PASS	
2	or	Change the flashing digit and move to the next one using the SET key.	Enter password 9999
3	SET to confirm	Instrument loads default settings	Turn off and on the instrument

8 LATCH ON Functions

For use with input Pot.1 (potentiometer 6KΩ) and Pot.2 (potentiometer 150KΩ) and with linear input (0…10V, 0...40mV, 0/4…20mA), you can associate start value of the scale (parameter 6 LoL.1) to the minimum position of the sensor and value of the scale end (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.

To use the LATCH ON function configure as you wish the parameter LAtc. [3].

For the calibration procedure refer to the following table:

	Press	Effect	Operation
1	FNC	Exit parameters configuration. Display 2 shows the writing LAtc.	Position the sensor on the minimum functioning value (associated with LoL.)
2	◀	Set the value to minimum. The display shows LoU	Position the sensor on the maximum functioning position (associated with uPL.)
3	▶	Set the value to maximum. The display shows H iGH	To exit the standard procedure press FNC. For “virtual zero” settings position the sensor on the zero point.
4	SET	Set the virtual zero value. The display shows u irt. N.B.: for selection of u.0 in the procedure in point 4 should be followed on each re-activation.	To exit the procedure press FNC.

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

8.1 Digital Input Functions

Digital input is programmable for several functions which are useful to simplify controller operability. Select the desired function on parameter 50 dGt. i.

1. Hold function (enabled by setting LcnA or LcnC.) allows to lock the reading of sensors when the digital input is active (useful for wide ranging oscillation on less significant values). During the lock phase, display 2 flashes and shows Lock.
2. Enables/disables the autotuning function from digital input if the parameter tunE is set on nAn.
3. Enable regulation with rmnA or rmnC.
4. Switch from automatic to manual functioning if AuMA is set on En. or EnSt.
5. Start of pre-programmed cycle (see paragraph 7.7) with St.St.
6. Change setpoint function.
   This function is useful where there are 2 to 4 working thresholds required during system functioning without having to press the arrow keys.

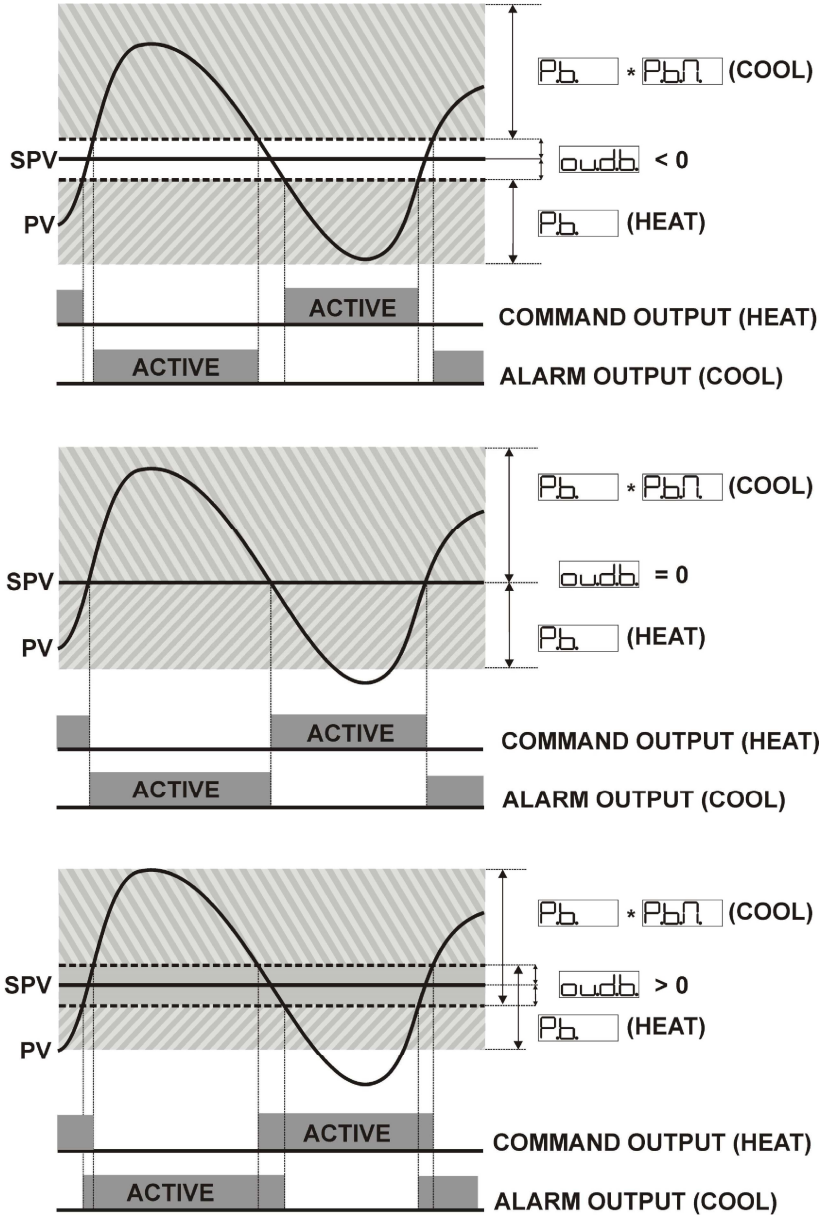
   To enable the function use the parameter oPnA, by selecting the number of setpoints desired (no. thresholds switch). They can be switched during functioning by pressing the SET key.

N.B.:
The digital input functions **are not** available with sensors PT100, NI100, NTC, PTC, PT500, PT1000 e potentiometers.

8.2 Dual Action Heating-Cooling

ATR142 is also suitable also for systems requiring a combined heating-cooling action.
The command output must be configured as Heating PID (Act.t.=HEAt and with a Pb. greater than 0), and one of the alarms (AL. 1 or AL. 2) must be configured as cooL. The command output must be connected to the actuator responsible for heat, while the alarm will control cooling action.
The parameters to configure for the Heating PID are:
Act.t. = HEAt Command output type (Heating)
Pb. : Heating proportional band
t. i. : Integral time of heating and cooling
t.d. : Derivative time of heating and cooling
t.c. : Heating time cycle
The parameters to configure for the Cooling PID are the following (example: action associated to alarm1):
AL. 1 = cooL Alarm1 selection (cooling)
Pb.n. : Proportional band multiplier
oudb. : Overlapping/Dead band
cat.c. : Cooling time cycle
The parameter Pb.n. (that ranges from 1.00 to 5.00) determines the proportional band of cooling basing on the formula:
Cooling proportional band = Pb. * Pb.n.
This gives a proportional band for cooling which will be the same as heating band if Pb.n. = 1.00, or 5 times greater if Pb.n. = 5.00.
The **integral time and derivative time** are the same for both actions.
The parameter oudb. determines the percentage overlapping between the two actions. For systems in which the heating output and cooling output must never be simultaneously active a dead band (oudb. ≤ 0) must be configured, and vice versa you can configure an overlapping (oudb. > 0).

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



The parameter cat.c. has the same meaning as the heating time cycle t.c. .
The parameter coo.F. (cooling fluid) pre-selects the proportional band multiplier Pb.M. and the cooling PID time cycle cat.c. basing on the type of cooling fluid:

coo.F.	Cooling fluid type	Pb.M.	cat.c.
Air	Air	1.00	10
oil	Oil	1.25	4
H2o	Water	2.50	2

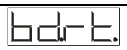
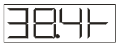
Once selected, the parameter coo.F., the parameters Pb.M., oudb. and cat.c. can however be changed.

9 Serial Communication

9.1 Slave

ATR142-ABC-T, equipped with RS485, can receive and broadcast data via serial communication using MODBUS RTU protocol. The device operates as slave if parameter 59 MASt. is set as dIS. .
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 SLAd. The addresses permitted 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.
ATR142 can introduce a delay (in milliseconds) in the response to the master request. This delay must be set on parameter 58 SEdE.
Each parameter change is saved by the controller in the 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	Can be selected on parameter 70  4800bit/sec 9600bit/sec 19200bit/sec 28800bit/sec  38400bit/sec 57600bit/sec
Format	8, N, 1 (8bit, no parity, 1 stop)
Supported functions	WORD READING (max 20 word) (0x03, 0x04) SINGLE WORD WRITING (0x06) MULTIPLE WORDS WRITING (max 20 word) (0x10)

The list below includes all the available addresses, where:
RO = Read Only
R/W = Read/Write
WO = Write Only

Modbus address	Description	Read Write	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	-
1000	Process (with tenths of degree for temperature sensors; digits for linear sensors)	RO	?
1001	Setpoint1	R/W	EEPROM
1002	Setpoint2	R/W	EEPROM
1003	Setpoint3	R/W	EEPROM
1004	Setpoint4	R/W	EEPROM
1005	Alarm1	R/W	EEPROM
1006	Alarm2	R/W	EEPROM
1007	Setpoint gradient	RO	EEPROM

1008	Outputs status (0=off, 1=on) Bit 0 = **Q1** relay Bit 1 = **Q2** relay Bit 2 = **SSR**	RO	0
1009	Heating output percentage (0-10000)	RO	0
1010	Cooling output percentage (0-10000)	RO	0
1011	Alarms status (0=none, 1=active) Bit0 = Alarm 1 Bit1 = Alarm 2	RO	0
1012	Manual reset: write 0 to reset all the alarms. In reading (0=not resettable, 1=resettable): Bit0 = Alarm 1 Bit1 = Alarm 2	WO	0
1013	Error flags Bit0 = Eeprom writing error Bit1 = Eeprom reading error Bit2 = Cold junction error Bit3 = Process error (sensor) Bit4 = Generic error Bit5 = Hardware error	RO	0
1014	Cold junction temperature (tenths of degree)	RO	?
1015	Start/Stop 0=controller in STOP 1=controller in START	R/W	0
1016	Lock conversion ON/OFF 0=Lock conversion off 1=Lock conversion on	R/W	0
1017	Tuning ON/OFF 0=Tuning off 1=Tuning on	R/W	0
1018	Automatic/manual selection 0=automatic 1=manual	R/W	0
1019	OFF LINE[1] time (milliseconds)	R/W	0
1100	Process visualized (decimal as display)	RO	?
1101	Setpoint1 visualized (decimal as display)	R/W	EEPROM
1102	Setpoint2 visualized (decimal as display)	R/W	EEPROM
1103	Setpoint3 visualized (decimal as display)	R/W	EEPROM
1104	Setpoint4 visualized (decimal as display)	R/W	EEPROM
1105	Allarme1 visualized (decimal as display)	R/W	EEPROM

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

1106	Allarme2 visualized (decimal as display)	R/W	EEPROM
1107	Setpoint gradient (decimal as display)	RO	EEPROM
1108	Heating output percentage (0-1000)	RO	0
1109	Heating output percentage (0-100)	RO	0
1110	Cooling output percentage (0-1000)	RO	0
1111	Cooling output percentage (0-100)	RO	0
2001	Parameter 1	R/W	EEPROM
2002	Parameter 2	R/W	EEPROM
...	...	...	...
2060	Parameter 60	R/W	EEPROM
3000	Disabling serial control of machine [2]	WO	0
3001	First word display1 (ASCII)	R/W	0
…..	…..	R/W	0
3008	Eighth word display1 (ASCII)	R/W	0
3009	First word display2 (ASCII)	R/W	0
…..	…..	R/W	0
3016	Eighth word display2 (ASCII)	R/W	0
3017	Word LED Bit 0 = LED **1** Bit 1 = LED **2** Bit 2 = LED **3** Bit 3 = LED **MAN** Bit 4 = LED **TUN** Bit 5 = LED **REM**	R/W	0
3018	Word keys (write 1 to command keys) Bit 0 = Bit 1 = Bit 2 = Bit 3 =	R/W	0
3019	Word serial outputs Bit 0 = **Q1** relay Bit 1 = **Q2** relay Bit 2 = **SSR**	R/W	0
3020	Word serial outputs state if off-line Bit 0 = **Q1** relay Bit 1 = **Q2** relay Bit 2 = **SSR**	R/W	0
3021	Word serial process	R/W	0

[2] 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.

9.2 Master

The device works as master if the value selected on parameter 59 MASt. is other than d iS. .

9.2.1 Master Mode in retransmission

Selecting this mode, the device will write the value to be retransmitted at the address selected on parameter 60 Addr. of the slave devices having same ID as the value selected on parameter 57 SLAd.
Regarding retransmission of setpoint values, after writing the value on slaves, ATR142 starts reading the corresponding word, so that any modification of value on the slave will be automatically updated also on the Master. Two successive pollings will be delayed for the time selected on parameter 57 SEdE. .
The following table includes the options allowing the Master mode in retransmission and the relevant retransmitted value.

MASt.	Descrizione
UPro. Write Process	Write process value
r.U.co. Read/Write Command Setpoint	Write and read command setpoint value
U.ou.P. Write Output Percentage	Write output percentage rated by P.I.D. function (Range 0-10000)
r.U.A. 1 Read/Write Alarm 1	Write and read alarm 1 setpoint value

The read/written value might be rescaled according to the proportion described in the following table:

MASt.	Limiti valore ingresso		Limiti valore riscalato	
	Min.	Max.	Min.	Max.
U.Pro. Write Process	LoL. i Lower Limit Input	uPL. i Upper Limit Input	LoLr. Lower Limit Retransmission	uPLr. Upper Limit Retransmission
r.U.co. Read/Write Command Setpoint	LoLS. Lower Limit Setpoint	uPLS. Upper Limit Setpoint	LoLr. Lower Limit Retransmission	uPLr. Upper Limit Retransmission
U.ouP. Write Output Percentage	**0**	**10000**	LoLr. Lower Limit Retransmission	uPLr. Upper Limit Retransmission
r.UA.1 Read/Write Alarm 1 Setpoint	LoLS. Lower Limit Setpoint	uPLS. Upper Limit Setpoint	LoLr. Lower Limit Retransmission	uPLr. Upper Limit Retransmission

The input value (included between minimum and max limit) is linearly converted into the retransmitted value which is included between min and max output value.

Rescaling is not executed if parameters LoLr. and uPLr. have the same value.

9.2.2 Master Mode Remote process

To enable this function it is necessary to select r.Pro. on parameter 59 MASt.. In this mode the process value on ATR142 is a value read via serial communication. The ID of the slave must be same as value selected on parameter 57 SLAd. and the word to read is selected on parameter 60 Addr.. Two successive pollings will be delayed for the time selected on parameter 57 SEdE. The read value might be rescaled according to the proportion described in the following table:

MASt.	Limits of read value		Limits of rescaled value	
	Min.	Max.	Min.	Max.
rPro. Read Process	LoLr. Lower Limit Retransmission	uPLr. Upper Limit Retransmission	LoL. i Lower Limit Input	uPL. i Upper Limit Input

10 Configuration

10.1 Modify Configuration Parameter

For configuration parameters see paragraph 11.

	Press	Effect	Operation
1	FNC for 3 seconds.	Display 1 shows 0000 with the 1st digit flashing, while display 2 shows PASS.	
2	▶ or ◀	Change the flashing digit and move to the next one using the 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 the value displayed by pressing firstly SET and then an arrow key.	Enter the new data which will be saved on releasing the keys. To change another parameter return to point 4.
6	FNC	End of configuration parameter change. The controller exits from programming.	

11 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 features.

no.	Display	Parameter description	Entering range
1	Command Output	Select command output type	Default

ATR142-ABC			
	COMMAND	*ALARM 1*	*ALARM 2*
	Q2	Q1	SSR
	Q1	Q2	SSR
	SSR	Q1	Q2
	Q1(opens) Q2(closes)	SSR	-

ATR142-ABC-T		
	COMMAND	*ALARM 1*
	Q1	SSR
	SSR	Q1
	Q1(opens) SSR(closes)	-

no.	Display	Parameter description	Entering range
2	SEn. Sensor	Analog input configuration	tc. H Tc-K (-260…1360℃) (Default) tc. S Tc-S (-40…1760℃) tc. r Tc-R (-40…1760℃) tc. J Tc-J (-200…1200℃) Pt PT100 (-200…600℃) Pt 1 PT100 (-200…140℃) n i NI100 (-60…180℃) ntc NTC10K (-40…125℃) Ptc PTC1K (-50…150℃) PtS PT500 (-100…600℃) Pt 1H PT1000 (-100…600℃) 0. 10 0…10Volt 0.20 0…20mA 4.20 4…20mA 0.40 0…40mVolt Pot. 1 Pot. max 6Kohm Pot.2 Pot. max 150Kohm
3	dP. Decimal Point	Select number of displayed decimal points	0 Default 0.0 0.00 0.000
4	LoLS. Lower Limit Setpoint	Lower limit setpoint	**-999…+9999** digit* (degrees if temperature) Default: 0.
5	uPLS. Upper Limit Setpoint	Upper limit setpoint	**-999…+9999** digit* (degrees if temperature) Default: 1750.

* The display of the decimal point depends on the setting of parameter SEn. and the parameter dP. .

no.	Display	Parameter description	Entering range
6	LoL. 1 Lower Linear Input	Lower range limit An1 only for linear input	**-999…+9999** digit* Default: 0.
7	uPL. 1 Upper Linear Input	Upper range limit An1 only for linear input	**-999…+9999** digit* Default: 1000.
8	LAtc. Latch On Function	Automatic setting of limits for Linear input	dis. (Disabled) Default Std. (Standard) u.0St. (Virtual Zero Stored) u.0 in. (Virtual Zero Initialized)
9	oCAL. Offset Calibration	Offset calibration Number added to displayed value of process (normally corrects the room temperature value)	**-999…+1000** digit* for linear sensors and potentiometers. **-200.0…+100.0** tenths for temperature sensors. Default: 0.0.
10	GCAL. Gain Calibration	Gain calibration Value multiplied with process value to perform calibration on working point	**-10.0%…+10.0%** Default: 0.0.
11	ACtt. Action type	Regulation type	HEAt: Heating (N.O.) Default cool: Cooling (N.C.) HooS.: HEat Off Over Setpoint
12	c. rE. Command Reset	Type of reset for state of command contact (always automatic in PID functioning)	AutE. (Automatic Reset) Default MAn. (Manual Reset) MAnS. (Manual Reset Stored)
13	c. SE. Command State Error	State of contact for command output in case of error	oA. Default cC.
14	c. Ld. Command Led	State of the OUT1 led corresponding to the relevant contact	oA. cC. Default
15	c. HY. Command Hysteresis	Hysteresis in ON/OFF or dead band in P.I.D.	**-999…+999** digits* (tenths of degree if temperature) Default: 0.0.

* The display of the decimal point depends on the setting of parameter SEn. and parameter dP. .

no.	Display	Parameter description	Entering range
16	c. dE. Command Delay	Command delay (only in ON/OFF functioning). (In case of servo valve it also functions in PID and represents the delay between the 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. SP. Command Setpoint Protection	Allows or not to change the command setpoint value	FrEE Default Loch
18	Pb. Proportional Band	Proportional band Process inertia in units (E.g.: if temperature is in ℃)	**0** on/off if t. i equal to **0.** Default **1-9999** digit* (degrees if temperature)
19	t. i Integral Time	Integral time. Process inertia in seconds	**0.0-999.9** seconds (0 integral disabled) Default: 0.
20	t.d. Derivative Time	Derivative time. Normally ¼ the integral time	**0.0-999.9** seconds (0 derivative disabled) Default: 0.
21	t.c. Cycle Time	Cycle time (for PID on remote control switch 10/15sec, for PID on SSR 1 sec) or servo time (value declared by servo-motor manufacturer)	**0.1-300.0** seconds Default: 10.0. For motorised valve minimum time in 1.0.
22	o.PoL. Output Power Limit	Limit of output power %	**10-100** % Default: 100.
23	AL. 1 Alarm 1	Alarm 1 selection. Intervention of the alarm is associated with AL1	dSA (Disabled) Default A. AL. (Absolute Alarm) b. AL. (Band Alarm) H.dAL. (High Deviation Alarm) L.dAL. (Low Deviation Alarm) A.cAL. (Absolute Command setpoint Alarm) StAL. (Start Alarm) Active in Run cool (Cooling)

no.	Display	Parameter description	Entering range
24	A. 1Sa. Alarm 1 State Output	Alarm 1 output contact and intervention type	no. S. (n.o. start) Default Normally open, active at start nc. S. (n.c. start) Normally closed, active at start no. t. (n.o. threshold) Normally open, active on reaching alarm[4] nc. t. (n.c. threshold) Normally closed on reaching alarm[4]
25	A 1rE. Alarm 1 Reset	Type of Reset for contact of alarm 1	Ar E. (Automatic Reset) Default Mr E. (Manual Reset) MrES. (Manual Reset Stored)
26	A. 1SE. Alarm 1 State Error	State of contact for alarm 1 output in case of error	cn. Default cc.
27	A. 1Ld. Alarm 1 Led	State of the OUT2 led corresponding to the relative contact	cn. cc. Default
28	A. 1HY. Alarm 1 Hysteresis)	Alarm 1 hysteresis	**-999…+999** digit* (tenths of degree if temperature). Default: 0.
29	A. 1dE. Alarm 1 Delay	Alarm 1 delay	**-180…+180** Seconds Negative: delay in alarm output phase. Positive: delay in alarm entry phase. Default: 0.
30	A. 1SP. Alarm 1 Setpoint Protection	Alarm 1 set protection. Does not allow user to modify setpoint	FrEE Default Loct HidE

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

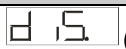
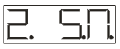
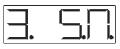
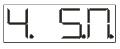
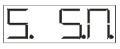
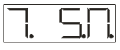
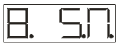
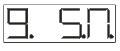
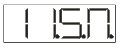
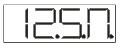
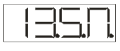
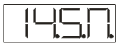
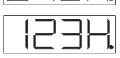
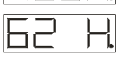
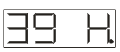
* The display of the decimal point depends on the setting of parameter SEn. and parameter dP. .

no.	Display	Parameter description	Entering range
31	AL. 2 Alarm 2	Alarm 2 selection. Alarm intervention is associated with AL2	d.S. (Disabled) Default A. AL. (Absolute Alarm) b. AL. (Band Alarm) HdAL. (High Deviation Alarm) LdAL. (Low Deviation Alarm) AcAL. (Absolute Command setpoint Alarm) StAL. (Start Alarm) cool (Cooling)
32	A2S.o. Alarm 2 State Output	Alarm 2 output contact and intervention type	n.o. S. (n.o. start) Default Normally open, active at start n.c. S. (n.c. start) Normally closed, active at start n.o. t. (n.o. threshold) Normally open, active on reaching alarm[5] n.c. t. (n.c. threshold) Normally closed, active on reaching alarm[5]
33	A2.rE. Alarm 2 Reset	Type of Reset for contact of alarm 2	A.rE. (Automatic Reset) Default M.rE. (Manual Reset) M.rES. (Manual Reset Stored)
34	A2SE. Alarm 2 State Error	State of contact for alarm 2 output in case of error	c.o. Default c.c.
35	A2Ld. Alarm 2 Led	State of OUT2 led corresponding to relative contact	c.o. c.c. Default
36	A2HY. Alarm 2 Hysteresis	Alarm 2 hysteresis	**-999…+999** digit* (tenths of degree if temperature). Default: 0.

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

no.	Display	Parameter description	Entering range
37	A2dE Alarm 2 Delay	Alarm 2 delay	**-180…+180** Seconds Negative: delay in alarm output phase. Positive: delay in alarm entry phase. Default: 0.
38	A2SP Alarm 2 Setpoint Protection	Alarm 2 set protection. Does not allow operator to change value of setpoint	FrEE Default Loct HIdE
39	coAF Cooling Fluid	Type of cooling fluid	Air Default oIL H2O
40	Pbn Proportional Band Multiplier	Proportional band multiplier	**1.00-5.00** Default: 1.00.
41	ouAb (Overlap/Dead Band)	Overlapping/Dead band	**-20.0-50.0%** Default: 0.
42	cAtc Cooling Cycle Time	Cycle time for cooling output	**1-300** seconds Default: 10.

* The display of the decimal point depends on the setting of parameter SEn and parameter dP.

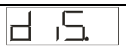
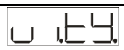
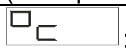
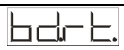
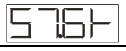
no.	Display	Parameter description	Entering range
43	Conversion Filter	ADC filter: number of means on analog-digital conversions	 (Disabled)  (2 Samples Mean)  (3 Samples Mean)  (4 Samples Mean)  (5 Samples Mean) (6 Samples Mean)  (7 Samples Mean)  (8 Samples Mean)  (9 Samples Mean) (10 Samples Mean) Default  (11 Samples Mean)  (12 Samples Mean)  (13 Samples Mean)  (14 Samples Mean) (15 Samples Mean)
44	Conversion Frequency	Frequency of sampling of analog-digital converter	 (242 Hz)  (123 Hz) (62 Hz)  (50 Hz) (39 Hz) (33.2 Hz) (19.6 Hz) (16.7 Hz) Default (12.5 Hz) (10 Hz) (8.33 Hz) (6.25 Hz) (4.17 Hz)

no.	Display	Parameter description	Entering range
45	uFLt. Visualisation Filter	Visualisation filter	dIS. (Disabled) Default PtcH (Pitchfork filter) F ord. (First Order) FdrP. (First Order with Pitchfork) 2. SM (2 Samples Mean) 3. SM. (3 Samples Mean) 4. SM (4 Samples Mean) 5. SM (5 Samples Mean) 6. SM (6 Samples Mean) 7. SM (7 Samples Mean) 8. SM (8 Samples Mean) 9. SM (9 Samples Mean) 10SM (10 Samples Mean)
46	tunE Tune	Tuning type selection	dIS. (Disabled) Default Auta (Automatic) PID parameters are calculated at activation and change of set. MAn. (Manual) Launch from keys or digital input.
47	SdtU Setpoint Deviation Tune	Select the deviation from the command setpoint, for the threshold used by autotuning to calculate the PID parameters	**0-5000** digit* (tenths of degree if temperature). Default: 10.

* The display of the decimal point depends on the setting of the parameter SEn. and the parameter dP. .

no.	Display	Parameter description	Entering range
48	oPMo. Operating Mode	Select operating mode	cont. (Controller) Default Prc4 (Programmed Cycle) 2t.S. (2 Thresholds Switch) 2t.S. i (2 Thresholds Switch Impulsive) 3t.S. i (3 Thresholds Switch Impulsive) 4t.S. i (4 Thresholds Switch Impulsive)
49	AuMA. Automatic / Manual	Enable automatic/manual selection	d iS. (Disabled) Default En. (Enabled) EnSt. (Enabled Stored)
50	dCt. i Digital Input	Digital input functioning (P48 selection must be cont. or Prc4)	d iS. (Disabled) Default: 0. St.St. (Start/Stop) rMo. (Run n.o.) rMc. (Run n.c.) LcMo. (Lock Conversion n.o.) LcMc. (Lock Conversion n.c.) tunE (Tune) Manual AMA. i (Automatic Manual impulse) AMAc. (Automatic Manual Contact)
51	GrAd. Gradient	Increase gradient for soft start or pre-programmed cycle	**0** disabled **1-9999** Digit/time* (degrees/hours with display of tenths if temperature) Default: 0.

* The display of the decimal point depends on the setting of parameter SEn. and parameter dP. .

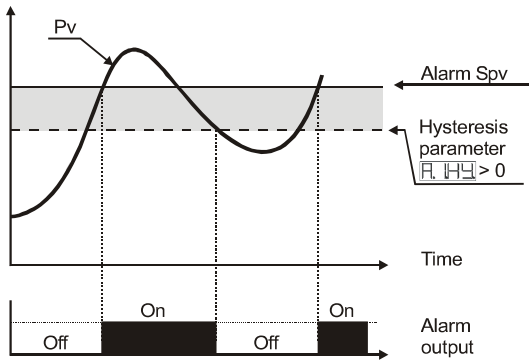
no.	Display	Parameter description	Entering range
52	Maintenance Time	Maintenance time for pre-programmed cycle	**00.00-24.00** hh.mm Default: 00.00.
53	User Menu Cycle Programmed	Allows the rise gradient and the maintenance time to be changed from the user menu, in pre-programmed cycle functioning	 (Disabled) Default (Gradient) (Maintenance Time) (All)
54	 Visualization Type	Select visualization for display 1 and 2	 (1 Process, 2 Setpoint) Default (1 Process, 2 Hide after 3 sec.) (1 Setpoint, 2 Process) (1 Setpoint, 2 Hide after 3 sec.)
55	Degree	Select degree type	 : Centigrade Default :Fahrenheit
56	 Baud Rate	Select baud rate for serial communication	 Default 
57	Slave Address	Select slave address for serial communication	**1 – 254** Default: 254.
58	Serial Delay	Select serial delay	**0 – 100** milliseconds Default: 20.

no.	Display	Parameter description	Entering range
59	MASt. Master	Select the master mode	d iS. (Disable) Default UPro. (Write Process) rUco. (Read/Write Command Setpoint) UouP. (Write Output Percentage) rUA 1 (Read/Write Alarm 1 Setpoint) rPro. (Read Process)
60	Addr. Address Retransmission	Select address for retransmission	**0x0000 – 0xFFFF** (hexadecimal) Default: 0x03E9.
61	LoLr. Lower Limit Retransmission	Lower limit retransmission range	**-999 – 9999** digit* (degrees if temperature) Default: 0.
62	uPLr. Upper Limit Retransmission	Upper limit retransmission range	**-999 – 9999** digit* (degrees if temperature) Default: 0.

* The display of the decimal point depends on the setting of parameter SEn. and parameter dP. .

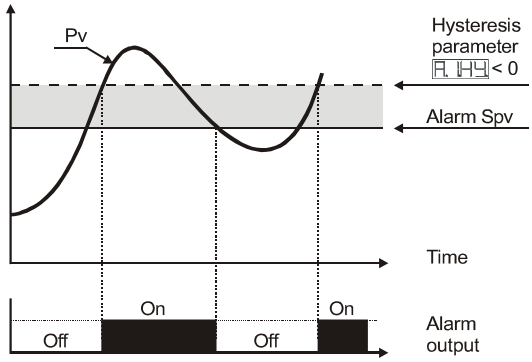
12 Alarm Intervention Modes

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



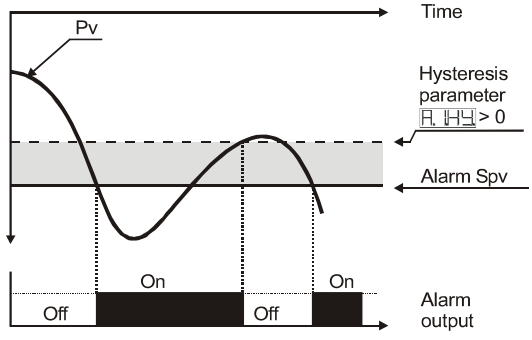
Absolute alarm with controller in heating functioning (Par.11 Act.t. selected HEAt) and hysteresis value greater than "0" (Par.28 A. HY > 0).

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



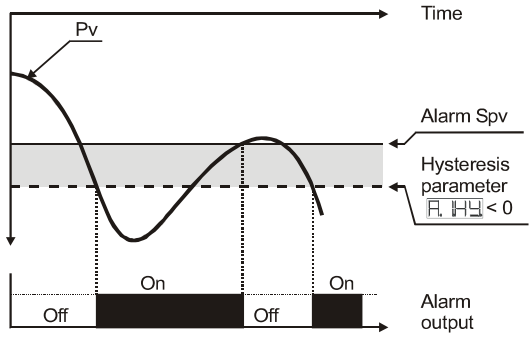
Absolute alarm with controller in heating functioning (Par.11 Act.t. selected HEAt) and hysteresis value less than "0" (Par.28 A. HY < 0).

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.11 Act.t. selected cooL) and hysteresis value greater than "0" (Par.28 A. HY > 0).

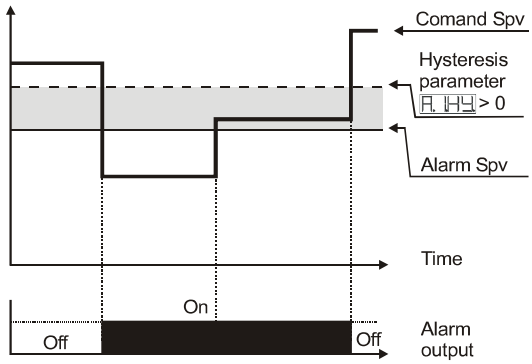
N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.



Absolute alarm with controller in cooling functioning (Par.11 Act. selected cooL) and hysteresis value less than “0” (Par.28 A. HY < 0).

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

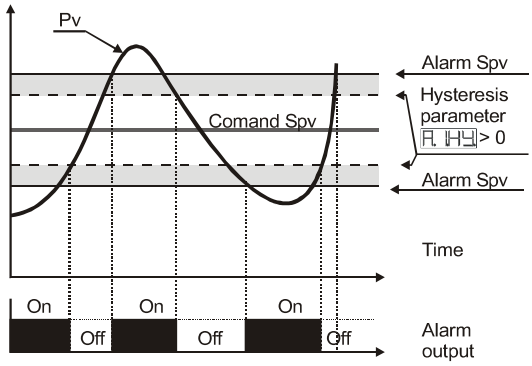
Absolute Alarm or Threshold Alarm Referring to Setpoint Command (AcAL. selection)



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

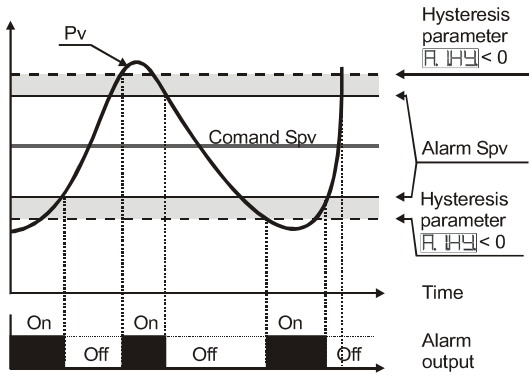
N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.

Band Alarm (b. AL. selection)



Band alarm <u>hysteresis value greater than “0”</u> (Par.28 A. HY > 0).

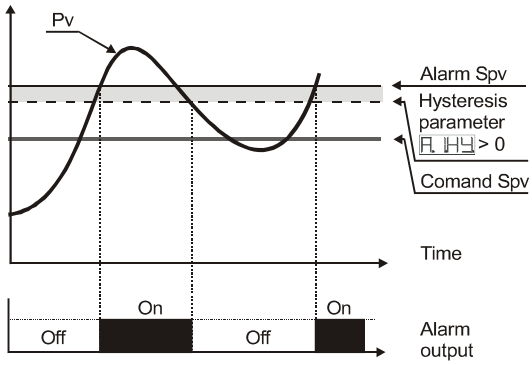
N.B.: The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.



Band alarm <u>hysteresis value less than “0”</u> (Par.28 A. HY < 0).

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 (HdAL. selection)

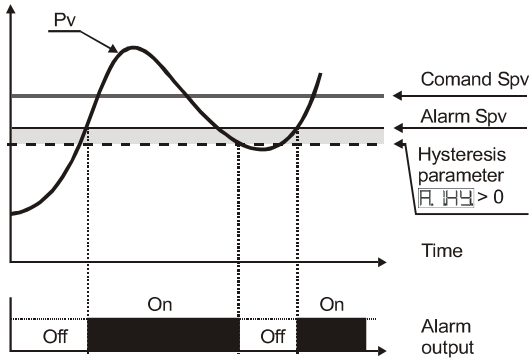


Upper deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (Par.28 A. HY > 0).

N.B.:

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 less than “0” (A. HY < 0) the broken line moves above the alarm setpoint.



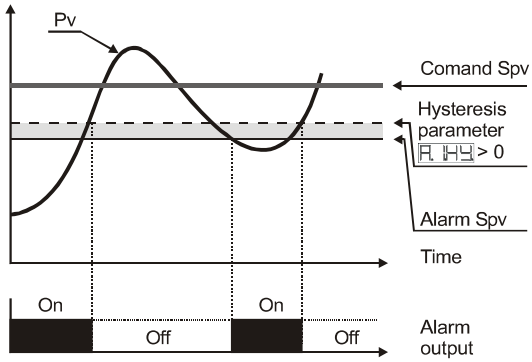
Upper deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (Par.28 A. HY > 0).

N.B.:

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

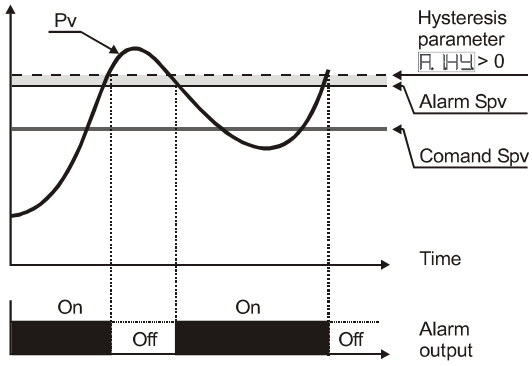
b) With hysteresis less than “0” (A. HY < 0) the broken line moves above the alarm setpoint.

Lower Deviation Alarm (HdAL. selection)



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

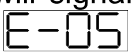
N.B.:
a) The example refers to alarm 1; the function can also be enabled for alarms 2 and 3 on models that include it.
b) With hysteresis less than “0” (A. HY < 0) the broken line moves under the alarm setpoint.



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

N.B.:
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” (A. HY < 0) the broken line moves under the alarm setpoint.

13 Table of Anomaly Signals

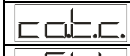
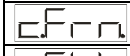
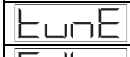
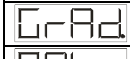
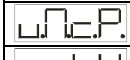
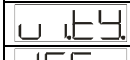
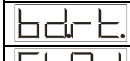
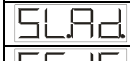
In case of malfunctioning of the system, the controller switches off the regulation output and displays the type of anomaly.
For example the controller will signal the breakage of any connected thermocouple by displaying  (flashing) on display. For other notifications, see the table below.

#	Cause	What to do
E-01	Error in E^2PROM cell programming	Call Assistance
E-02	Cold junction sensor fault or room temperature outside of allowed limits.	Call Assistance
E-04	Incorrect configuration data. Possible loss of calibration values.	Check if the configuration parameters are correct.
E-05	Thermocouple open or temperature outside of limits.	Check the connection with the sensors and their integrity.
E-06	Off-line in master mode remote process	Check the serial connection, baud-rate and device ID .

14 Summary of Configuration parameters

Date:	**Model ATR142:**
Installer:	**System:**
Notes:	

c.out	Command output type selection	
SEn.	Analog input configuration	
d.P.	Number of decimal points	
LaL.S.	Lower limit setpoint	
uPL.S.	Upper limit setpoint	
LaL. 1	Lower limit range An1 only for linear	
uPL. 1	Upper limit range An1 only for linear	
LAtc.	Automatic setting of linear input limits.	
o.cAL.	Offset calibration	
G.cAL.	Gain calibration	
Act.t.	Regulation type	
c. rE.	Command output reset type	
c. SE.	Contact state for command output in case of error	
c. Ld.	Define the OUT1 led state	
c. HY.	Hysteresis in ON/OFF or dead band in P.I.D.	
c. dE.	Command delay	
c. SP.	Command setpoint protection	
Pb.	Proportional band	
t. i.	Integral time	
t.d.	Derivative time	
t.c.	Cycle time	
o.PoL.	Limit of output power %	
AL. 1	Alarm 1 selection	
A. 1Sa.	Alarm 1 output contact and intervention type	
A 1-E.	Reset type of alarm 1 contact.	
A. 1SE.	State of contact for alarm 1 output	

	State of OUT2 led	
	Alarm 1 hysteresis	
	Alarm1 delay	
	Alarm 1 set protection	
	Alarm 2 selection	
	Alarm 2 output contact and intervention type	
	Reset type of alarm 2 contact	
	State of contact for alarm 2 output	
	State of OUT2 led	
	Alarm 2 hysteresis	
	Alarm 2 delay	
	Alarm 2 set protection	
	Cooling fluid type	
	Proportional band multiplier	
	Overlapping/Dead band	
	Cycle time for cooling output	
	Analog converter filter	
	Sampling frequency of analog converter	
	Display filter	
	Autotuning type selection	
	Command setpoint deviation for tuning threshold	
	Operating mode	
	Automatic/manual selection	
	Digital input functioning	
	Gradient for soft start	
	Cycle maintenance time	
	Gradient change and maintenance time by user	
	Display data selection	
	Degree type selection	
	Select baud rate for serial communication	
	Select slave address	
	Select the serial delay	
	Select value to retransmit by ModBus	

Addr.	Seelct address for retransmission	
LoLr.	Lower limit of retransmission range	
uPLr.	Upper limit of retransmission range	

Note

PIXSYS
Via Tagliamento, 18
30030 Mellaredo di Pianiga (VE)
www.pixsys.net
e-mail: sales@pixsys.net - support@pixsys.net

Software Rev. 1.04

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