Z31A/Z31AS

DIGITAL ELECTRONIC TEMPERATURE CONTROLLER

OPERATING INSTRUCTIONS

23/05 - Code: ISTR_M_Z31A_E_01_--

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PREFACE

This manual contains the information necessary for the product to be installed correctly and also instructions for its maintenance and use; we therefore recommend that the utmost attention is paid to the following instructions and to save it.

Ascon Tecnologic S.r.l. and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, wrong or improper use or in any case not in compliance with the instrument features.

Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional electromechanical devices which will guarantee safety.

Index

1 INSTRUMENT DESCRIPTION

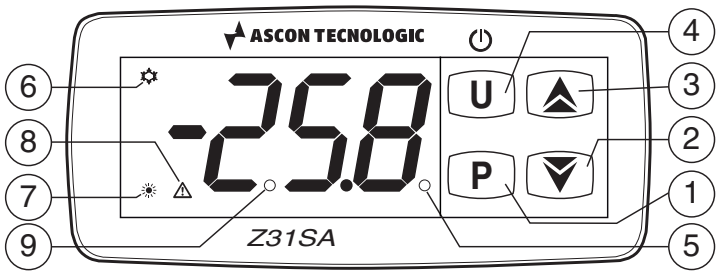
1.1 General Description

The model Z31A is a digital electronic temperature controller with ON/OFF temperature control.

The instrument has one relay output and one input for PTC or NTC temperature probes, in addition can be equipped with an internal buzzer that is the sound system for alarms.

The model Z31SA have the “S-touch” capacitive sensor keyboard system.

1.2 Front Panel Description



1 (P)**:** Used for setting the Set point (press and release) and for programming the function parameters (pressed for 5 s). In programming mode is used to enter in parameters edit mode and confirm the values. In programming mode (P) can be used together with (▲) key to change the programming level of the parameters. When the keyboard is locked, (P) can be used together with (▲) (pressed for 5 s) key to unlock the keyboard.

2 ▼: In programming mode is used to decrease the setting value or to select the parameter that is to be changed.

3 ▲: In programming mode it is used to increase the setting value or to select the parameter that is to be changed. In programming mode ▲ can be used together with key P to change parameters level. When the keyboard is locked ▲ can be used together with the P key (pressed for 5 s) to unlock the keyboard.

4 U: Pressed and released causes the display of the instrument variables (measured temperatures etc.). In programming mode can be used to return in normal mode. If programmed with parameter Ł.uF it allows to switch the controller between normal mode and stand-by (pressed for 1 s while in normal mode).

5 **LED SET:** In normal mode it indicates that a key is pressed. In programming mode indicates the programming level of the parameters.

6 **LED ☼:** Indicates the **control output status** (compressor or temperature control device) when the instrument is programmed for **cooling** operation: **Active** (on), **not active** (off) or **inhibited** (flashing).

7 **LED ☼:** Indicates the control output status (compressor or temperature control device) when the instrument is programmed for **heating** operation: **Active** (on), **not active** (off) or **inhibited** (flashing).

8 **LED ⚠:** Indicates the alarm status: **active** (on), **not active** (off) or **acknowledged** (flashing).

9 **LED Stand-By:** Indicate the **Stand-by status**. When the instrument is in Stand-by is the only LED lit.

2 PROGRAMMING

2.1 Fast Set Point Programming

Press the P key then release it, the display shows SP alternated to the set value; to change it press the key ▲ to increase or ▼ decrease its value. These keys increase or decrease the value one digit at a time, but if the button is pressed for more than one second the value increase or decreases rapidly, and after 2 s pressed, the speed increases even more to quickly reach the desired valued.

When the desired value is set, press the P key or press **NO KEYS** for about 10 seconds to exit from fast Set Point programming mode and returns to the normal function mode.

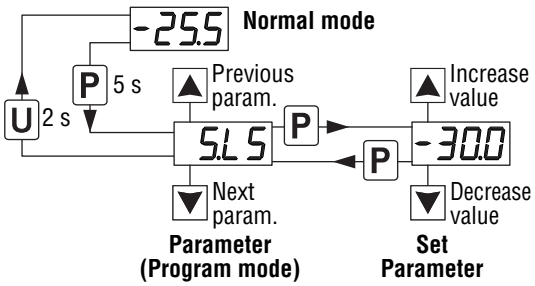
2.2 Standard Mode Parameters Programming

To access the instrument function parameters when password protection is disabled, press the P key and keep it pressed for about 5 seconds, after which the display shows the code that identifies the first programmable parameter.

The desired parameter can be selected using the ▲/▼ keys, then, pressing the P key again, the display shows the parameter code alternated to its value that can be changed with the ▲ and ▼ keys.

Once the desired value has been set, press the P key again: the new value is stored and the display shows only the code of the changed parameter. Pressing the ▲ and ▼ keys, it is possible to select another parameter and change it as described.

To exit the programming mode, press no keys for about 30 s, or keep the U key pressed for 2 s until the controller returns in normal mode.



2.3 Parameter Protection Using a Password

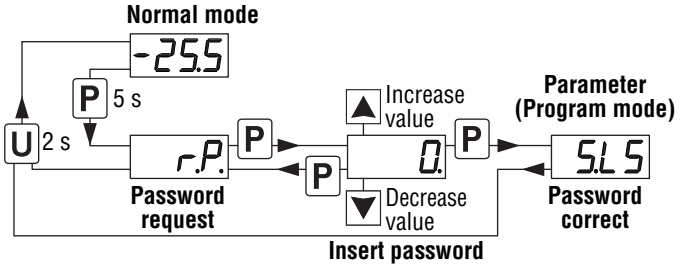
The instrument has a parameter protection function with password that can be customized using the Ł.PP parameter.

To protect the parameters, set the desired Password Number at parameter Ł.PP and exit the parameters programming session.

When the protection is active, keep the P key pressed for about 5 s to access the parameters, the display shows r.P. Press again the P key, the display changes to 0, now, using the ▲/▼ keys, insert the programmed password number and press the key P again.

If the password is correct the instrument displays the code of the first parameter and it will be possible to program the instrument in the same way described in the previous paragraph.

The password protection can be disabled by setting Ł.PP = **oF**.



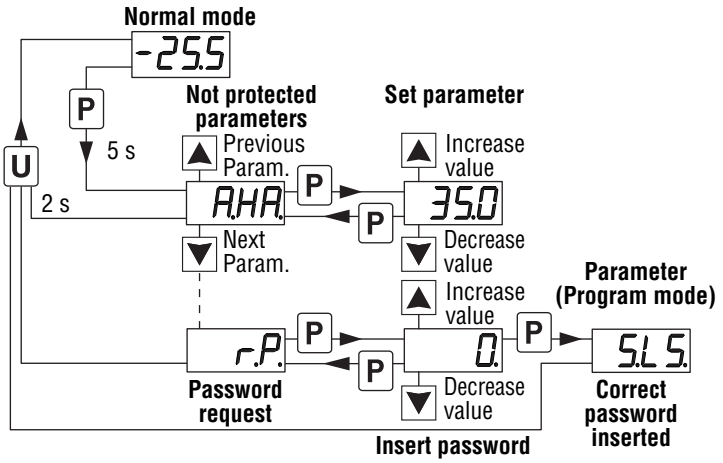
Note: If the Password gets lost, just switch OFF and ON the instrument power supply, push P key during the initial display test and keep it pressed for 5 seconds. In this way it is possible to have access to **ALL** the parameters, verify and modify the parameter Ł.PP.

2.4 Customized Mode Parameters Programming (parameters programming level)

The password protection hides all the configuration parameters to avoid unwanted changes being made to the programming of the controller. To make a parameter accessible without having to enter the password when Ł.PP password protection is active, use the procedure that follows:

– Enter the Program mode using the Ł.PP Password and select the parameter that must always be accessible (not password protected).
– Once the parameter has been selected, a blinking **SET** LED means that the parameter can be programmed only entering the password (is protected), if the **SET** LED is steady ON the parameter is programmable without password (not protected).
– To change the parameter visibility, press the P key and keeping it pressed press also the ▲ key. The **SET** LED changes its state indicating the new access level of the parameter (**on** = not protected; **blinking** = protected by password).

In case some parameters are not protected, accessing the the programming mode the display first shows those parameters that are not protected, then the r.P parameter (through which will be possible to access the "*protected*" parameters).



2.5 Reset Parameters to Default Value

The instrument allows the reset of the parameters to those values programmed in factory as default.

To restore the default parameters value, set the value **-48** at r.P password request.

Therefore, to make the reset to the default parameters, enable the Password using the t.PP parameter so that the r.P setting is requested, at this point insert **-48** instead of the programmed access password.

Once confirmed the password with the P key, the display shows "- - -" for 2 s after which the instrument resets all the parameters to the factory default setting.

2.6 Keyboard Lock Function

On the instrument it is possible to completely lock the keyboard. This function is useful when the controller is installed in an accessible area and changes must be avoided.

To activate the keyboard lock it is enough program the parameter t.Lo to a value different than **oF**.

The t.Lo value is the keys inactivity time after which the instrument automatically locks the keyboard. Therefore, pressing no buttons for the time set at t.Lo, the normal functions of the keys are automatically disabled.

When the keyboard is locked, if any of the key is pressed, the display shows Ln to indicate that the lock is active.

To unlock the keyboard it is enough to press P + ▲ keys at the same time and keep them pressed for 5 s, after which the label LF appears on the display and all the key functions will be available again.

3 USAGE WARNINGS

3.1 Admitted Usage

⚠ The instrument has been projected and manufactured as a measuring and control device to be used according to EN60730-1 at altitudes operation below 2000 m.

The use of the instrument for applications not expressly permitted by the above mentioned rule must adopt all the necessary protective measures.

The instrument **MUST NOT BE USED** in dangerous (flammable or explosive) environments without adequate protections.

⚠ The installer must ensure that EMC rules are respected, also after instrument installation, if necessary using proper filters.

4 INSTALLATION WARNINGS

4.1 Mechanical Mounting

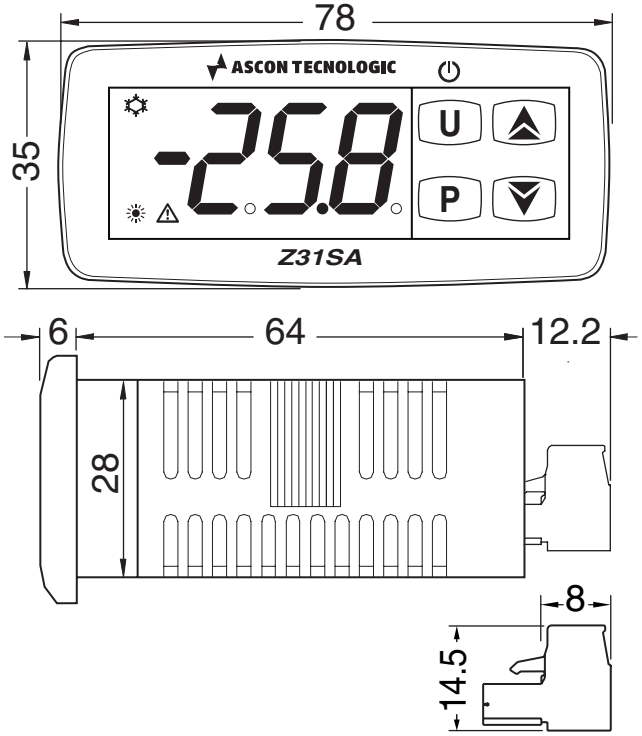
The instrument, in case 78 x 35 mm, is designed for flush-in panel mounting. Make a hole 71 x 29 mm and insert the instrument, fixing it with the provided special brackets.

In order to obtain the declared front protection degree, use the screw type bracket (optional).

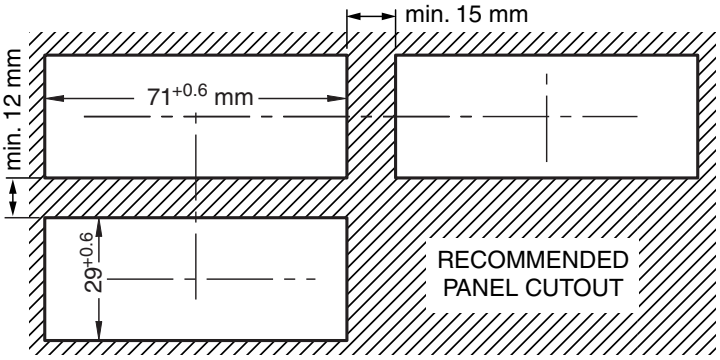
– Avoid installing the instrument in places where high humidity can generate condensation or where dirt could lead to the introduction of conductive substances into the instrument.
– Ensure the adequate ventilation to the instrument and avoid the installation within boxes where are placed devices which may overheat or have, as a consequence, the instrument functioning at temperature higher than allowed and declared.
– Connect the instrument as far as possible from source of electromagnetic disturbances so as motors, power relays, relays, electrovalves, etc..

4.2 Dimensions [mm]

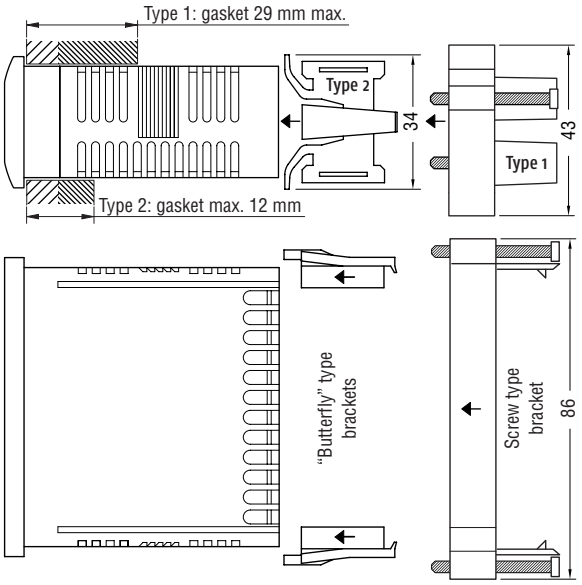
4.2.1 Mechanical Dimensions



4.2.2 Panel Cut-Out



4.2.3 Brackets



4.3 Electrical Connections

Carry out the electrical wiring by connecting only one wire to each terminal, according to the following diagram, checking that the power supply is the same as that indicated on the instrument and that the load current absorption is no higher than the maximum electricity current permitted.

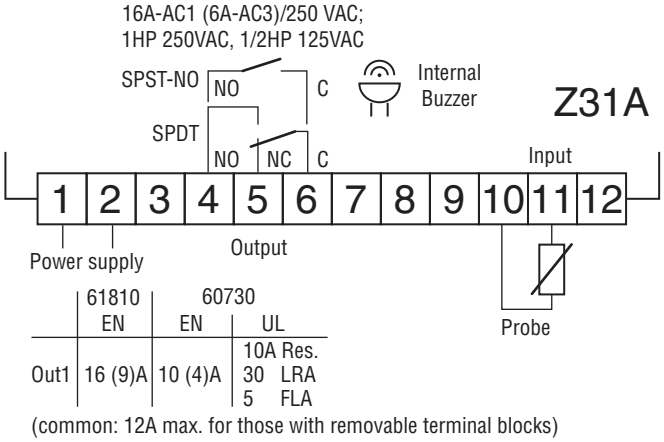
As the instrument is built-in equipment with permanent connection inside housing, it is not equipped with either switches or internal devices to protect against overload of current: the installation will include an overload protection and a two-phase circuit-breaker, placed as near as possible to the instrument, and located in a position that can easily be reached by the user and marked as instrument **disconnecting device** which interrupts the power supply to the equipment.

Further recommendations:

– The supply of all the electrical circuits connected to the instrument must be properly protected using devices (ex. fuses) proportionate to the circulating currents;
– Use cables with proper insulation, according to the working voltages and temperatures;
– Make sure that the input sensor cables are kept separate from line voltage wiring in order to avoid induction of electromagnetic disturbances;
– If some cables are shielded, the protection shield must be connected to ground at only one side;
– For those instruments with 12 or 24 V power supply (codes **F** or **G**) it is necessary to use an external TCTR transformer, or equivalent (Class II insulation), and to use only one transformer for each instrument because there is no insulation between supply and input.

⚠ **Before connecting the outputs** we recommend to check that the parameters are those desired and the application operates correctly the actuators so as to avoid malfunctioning which may cause irregularities in the plant and could cause damage to people, animals or things.

4.3.1 Electrical Wiring Diagram



	61810 EN	60730 EN	60730 UL
Out1	16 (9)A	10 (4)A	10A Res. 30 LRA 5 FLA

(common: 12A max. for those with removable terminal blocks)

5 FUNCTIONS

5.1 ON/STAND-BY Function

Once powered the instrument can assume 2 different conditions:
ON: The controller uses the control functions.
STAND-BY: The controller uses no control function and the display is turned OFF except for the Stand-by LED.

The transition between Standby and ON status is equivalent to power ON the instrument providing the electrical power.

In case of power failure, the system always sets itself in the condition it was in before the black-out.

The ON/Stand-by function can be selected: pressing the key U/⏻ for at least 1 s if Ł.UF = **4**;

5.2 Measuring Inputs and Display

With SE parameter is possible to select the type of probe connected to the instrument:

Pt Thermistors PTC KTY81-121;
nt NTC 103AT-2.

Using uP parameter is possible to select the temperature unit of measurement and the desired resolution (C0 = **°C/1°**, C1 = **°C/0.1°**, F0 = **°F/1°**, F1 = **°F/0.1°**).

The instrument allows to re-calibrate the measurements to adapt the instrument according to the application needs, through parameter CI.

Using FŁ parameter can be set a software filter for the measuring the input values in order to decrease the sensibility to rapid temperature changes (increasing the time).

The instrument normally displays the temperature measured by the probe but it is possible to visualise the highest and lowest **Pr1** peak measurement values in rotation by pressing and releasing key U/⏻. The display shows the code that identifies the variable alternated to its value:

Lt and the lowest **Pr1** peak temperature;
Ht and the highest **Pr1** peak temperature.
Pr1 and the temperature read by the probe;

When the instrument is switched OFF, the peak values are reset, however, it is possible to reset these values also by using the ⏷ key hold pressed for 3 s during peak visualization.

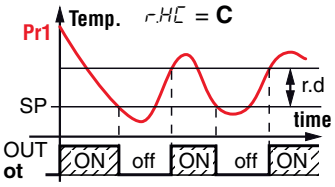
The display shows "- - -" and the peak memory will be reset.

The instrument automatically exits the variables display mode after about 15 seconds from the last pressure on the U/⏻ button.

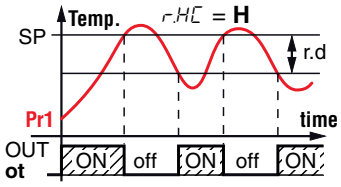
5.3 Temperature Control

The instrument control is ON/OFF and acts on the output depending on the probe measurement, the active Set Point (**SP**), the intervention differential (r.d)(hysteresis) and the rHC action type selected. Depending ON the function mode programmed with parameter rHC the differential is automatically considered by the controller with **positive** values for **Cooling** actions (rHC = **C**) or with **negative** values for **Heating** actions (rHC = **H**). Through the rHC parameter the following action types can be selected:

Cooling (rHC = C)



Heating (rHC = H)



In the event of a probe error, it is possible to set the instrument so that the output continues working in cycles according to the times programmed at the parameters r.t1 (activation time) and r.t2 (deactivation time). When a probe error occurs the instrument activates the output for r.t1 time, then deactivates it for r.t2 time and so on whilst the error remains. Programming r.t1 = **oF** the output, in probe error condition, remains **switched OFF**. Programming instead r.t1 to any value and r.t2 = **oF** the output in probe error condition remains switched **ON**.

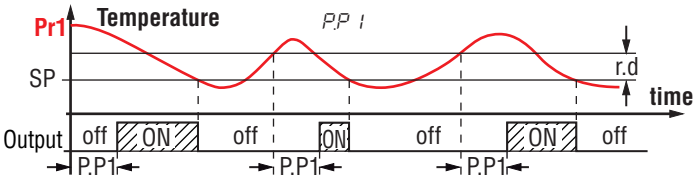
Remember that the temperature control function can be conditioned by the *Compressor Protection and output delay at power-ON* functions.

5.4 Compressor Protection Function and Delay at Power-ON

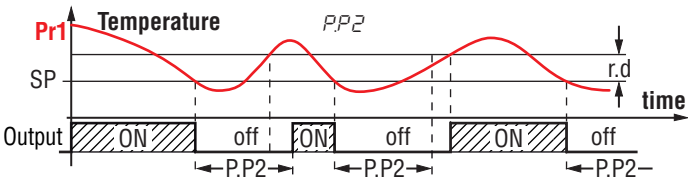
The "*Compressor Protection*" function aims to avoid those close compressor start ups requested by the instrument in Cooling applications or, in any case, it can be used to add a time control on the output intended for commanding the actuator. The "*Compressor Protection*" function provides **3** time controls that manage the switching ON of the output.

The protection consists of preventing the output being enabled (switched ON) during the protection times set with parameters PP1, PP2 and PP3 and therefore that any activation occurs only after all the times have elapsed.

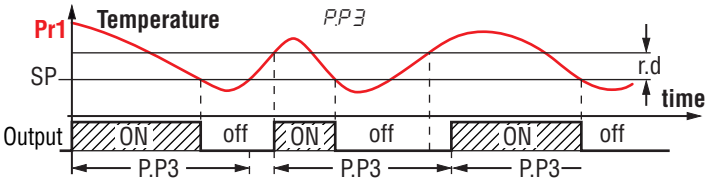
First control (PP1) foresees an output activation delay (switching ON delay).



Second control delays the activation of the output by a time (PP2) that starts when the output is turned OFF (delay after switching-OFF).



Third control delays the activation of the output by a time (PP3) that starts when the output was turned ON last time (delay between switching-ONs).



During output inhibition the **OUT** LED (Cool ☼/Heat ☀) blinks.

It is also possible to prevent the output activation after the instrument is turned ON for the time set at parameter Pod.

During power ON delay phase, the display shows the label od alternated with the normal visualization.

All these functions are disabled if the relative parameters are set to **OFF** (oF).

5.5 Alarm Functions

The alarm conditions of the instrument are:

– Probe errors: E 1, -E 1;

– Temperature alarms: H i and Lo.

The instrument alarm functions act on the alarm LED **(⚠)**, on internal buzzer (if present and programmed by parameter oBu). All alarm conditions are pointed out lighting up the ⚠ LED, while the silenced or stored alarm is shown with the ⚠ LED flashing.

oBu parameter configures the internal buzzer as follws:

oF Internal buzzer disabled;

1. The buzzer sounds when an alarm is active;

2. The buzzer sounds when a key pressed (no alarm);

3. The buzzer sounds when a key pressed and when an alarm is active.

The buzzer (if oBu = **1** or **3**) is activated in alarm condition and can be manually disabled pressing any instrument key (alarm silencing).

5.5.1 Temperature Alarm

The temperature alarm works according to the programmed probe measurement, the type of alarm set at parameter AAy, the alarm thresholds at parameters AHA (maximum alarm) and ALA (minimum alarm) and the relative differential Ad. Through parameter AAy it is possible to set if alarm thresholds AHA/ALA are to be considered as Absolute or Relative to the Set Point. The possible selections of the parameter AAy are:

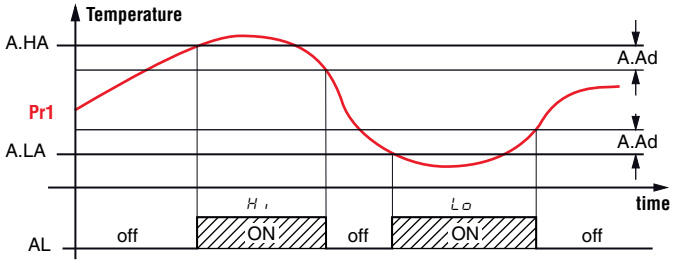
1. Absolute Alarm;

2. Relative Alarm.

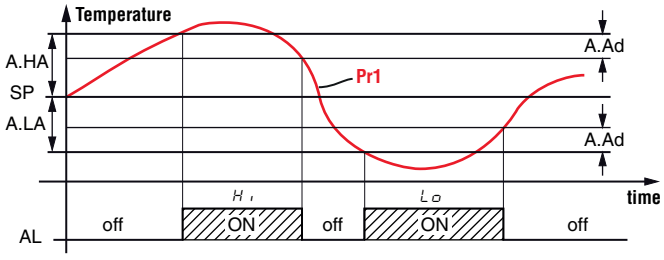
Using the parameters that follow it is also possible to delay the enabling and the intervention of the alarm.

A.PA Temperature alarm intervention delay **at instrument power ON** when the instrument is in alarm status at power ON. If the instrument is not in alarm status at power ON, APA is not considered.

A.At Temperature alarm delay activation time. Temperature alarm is enabled at the end of the exclusion time and is activated after the AAt time when the temperature measured by the probe exceeds or goes below the respective maximum and minimum alarm thresholds. The alarm thresholds are those set at parameters AHA and ALA when the alarms are set as absolute (AAy = **1**);



or assume the values [**SP** + AHA] and [**SP** + ALA] if the alarms are relative (AAy = **2**).



The maximum and minimum temperature alarms can be disabled setting AHA and ALA = **oF**.

6 ACCESSORIES

The instrument is equipped with a connector that allows the connection to some accessories.

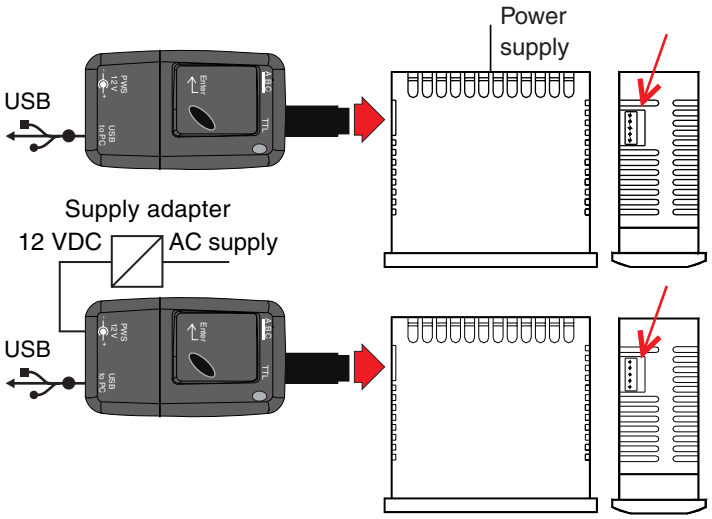
6.1 Parameters Configuration by A01

The instrument is equipped with a 5 poles connector that allows the transfer from and toward the instrument of the functioning parameters through the device **A01**.

This device it is mainly usable for serial programming those instruments that need the same parameters configuration or to keep a copy of the parameters setting of an instrument and allow its fast duplication.

The same device allows to connect a **PC** via **USB** with which, through the appropriate configuration software "*AT Universal-Conf tools*", the operating parameters can be configured.

To use the **A01** device it is necessary that the device or instrument are being correctly supplied.



For additional info, please look at the A01 instruction manual.

7 PROGRAMMABLE PARAMETERS TABLE

Here below is a description of all the parameters available on the instrument. Some of them may not be present because depend on the model/type of instrument.

S. - Set Point parameters

Parameter		Description	Range	Default	Note
1	SLS	Minimum Set Point	-99.9 ÷ S.HS	-50.0	
2	SHS	Maximum Set Point	S.LS ÷ 999	99.9	
3	SP	Set Point	S.LS ÷ S.HS	0.0	

i - Inputs parameters

Parameter		Description	Range	Default	Note
4	iSE	Probes Type	Pt PTC; nt NTC.	nt	
5	iuP	Unit of measurement and resolution (decimal point)	C0 °C resolution 1°; F0 °F resolution 1°; C1 °C resolution 0.1°; F1 °F resolution 0.1°.	C1	
6	iFt	Measurement filter	oF/0.1 ÷ 20.0s	2.0	
7	iC1	Pr1 Probe Calibration	-30.0 ÷ +30.0°C/°F	0.0	

r. - Temperature control parameters

Parameter		Description	Range	Default	Note
8	rd	Differential (Hysteresis)	0.0 ÷ 30.0°C/°F	2.0	
9	rt1	Output activation time for probe error	oF/0.01 ÷ 9.59 (min.s) ÷99.5 (min.s x 10)	oF	
10	rt2	Output deactivation time for probe error	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	
11	rHC	Control output operating mode	H Heating; C Cooling.	C	

P. - Compressor protection and power on delay parameters

Parameter		Description	Range	Default	Note
12	PP1	Output activation delay	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	
13	PP2	Delay after output switch OFF	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	
14	PP3	Minimum time between two output power ON	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	
15	Pod	Delay output activation at power ON	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	

A. - Alarm parameters

Parameter		Description	Range	Default	Note
16	AAY	Temperature alarms type	1 Absolute to **Pr1**; 2 Relative to **Pr1**.	1	
17	AHA	High Temperature Alarm threshold	oF/-99.9 ÷ +999°C/°F	oF	
18	ALA	Low Temperature Alarm threshold	oF/-99.9 ÷ +999°C/°F	oF	
19	AAd	Temperature Alarms Differential	0 ÷ 30°C/°F	1.0	
20	AAt	Temperature Alarms delay	oF/0.01 ÷ 9.59 (min.s) ÷ 99.5 (min.s x 10)	oF	
21	APA	Temperature Alarms delay at power on	oF/0.01 ÷ 9.59 (h.min) ÷ 99.5 (h.min x 10)	2.00	

o. - Buzzer configuration parameters

Parameter		Description	Range	Default	Note
22	obu	Buzzer function mode	oF Disable; 1 Active alarms only; 2 Key pressed only; 3 Active alarms and key pressed.	3	

t. - Keyboard parameters

Parameter		Description	Range	Default	Note
23	tUF	Function mode key (U)	oF No function; 1 ÷ 4 Switch ON/OFF (Stand-by).	oF	
24	tLo	Keyboard lock function delay	OF/0.01 ÷ 9.59 (min.s) ÷ 30.0 (min.s x 10)	oF	
25	tPP	Password to access the parameter setting mode	oF/999	oF	

8 PROBLEMS AND MAINTENANCE

8.1 Error messages

Error	Reason	Action
E1-E1	The probe may be interrupted (E) or in short circuit (-E), or may measure a value outside the range allowed	Check the correct connection of the probe with the instrument and check the probe works correctly
EPr	Internal EEPROM memory error	Press the (P) key

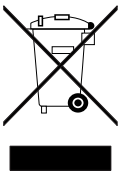
8.2 Other messages

Message	Reason
od	Delay at power-on in progress
Ln	Keyboard lock
H1	Maximum temperature alarm in progress
Lo	Minimum temperature alarm in progress

8.3 Cleaning

We recommend cleaning of the instrument only with a slightly wet cloth using water and not abrasive cleaners or solvents.

8.4 Disposal



The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

9 WARRANTY AND REPAIRS

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 18 months from delivery date.

The guarantee is limited to repairs or to the replacement of the instrument.

The eventual opening of the housing, the violation of the instrument or the improper use and installation of the product will bring about the immediate withdrawal of the warranty's effects.

In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company.

The faulty product must be shipped to Ascon Tecnologic with a detailed description of the faults found, without any fees or charge for Ascon Tecnologic, except in the event of alternative agreements.

10 TECHNICAL DATA

10.1 Electrical Data

Power supply: 12 VAC/VDC, 12 ÷ 24 VAC/VDC, 100 ÷ 230 VAC ±10%;

AC Frequency: 50/60 Hz;

Power consumption: 4 VA approx.

Inputs: 1 input for temperature probes:
NTC (103AT-2, 10 kW @ 25°C) or
PTC (KTY 81-121, 990 W @ 25°C);

Outputs: 1 relay output SPDT or SPST-NO (16A-AC1, 6A-AC3 250 VAC, 1 HP 250 VAC, 1/2HP 125 VAC);
12 A Max. for screw removable terminal block model;

Electrical life for relay outputs: SPST-NO: 100000 operations, SPDT: 50000 operations (VDE approval);

Action type: type 1.B (EN 60730-1);

Overvoltage category: II;

Protection class: Class II;

Insulation: Reinforced insulation between the low voltage part (H type supply and relay output) and front panel; Reinforced insulation between the low voltage section (H type supply and relay output) and the extra low voltage section (inputs); Reinforced between supply and relay output; No insulation between supply F or G type and inputs.

10.2 Mechanical Data

Housing: Self-extinguishing plastic, UL 94 V0;

Heat and fire resistance category: D;

Ball Pressure Test as described in EN60730: Accessible parts 75°C, support live parts 125°C;

Dimensions: 78 x 35 mm, depth 64 mm;

Weight: 120 g approx.;

Mounting: Incorporated Flush in panel (thickness 12/29 mm max.) in 71 x 29 mm hole;

Connections: 2.5 mm^2 screw terminals block or 2.5 mm^2 removable screw terminals block for 0.2 ÷ 2.5 mm^2/ AWG 24 ÷ 14 cables;

Front panel protection degree: IP65 (NEMA 3S) mounted with optional screw type bracket;

Pollution degree: 2;

Operating temperature: 0 ÷ 50°C;

Operating humidity: < 95 RH% with no condensation;

Storage temperature: -25 ÷ +60°C.

10.3 Functional Features

Temperature Control: ON/OFF mode;

Measurement range: **NTC**: -50 ÷ 109°C/-58 ÷ 228°F,
PTC: -50 ÷ 150°C/-58 ÷ 302°F;

Display resolution: 1° (or 0.1° in the range -99.9 ÷ +99.9°);

Overall accuracy: ±(0.5% fs + 1 digit);

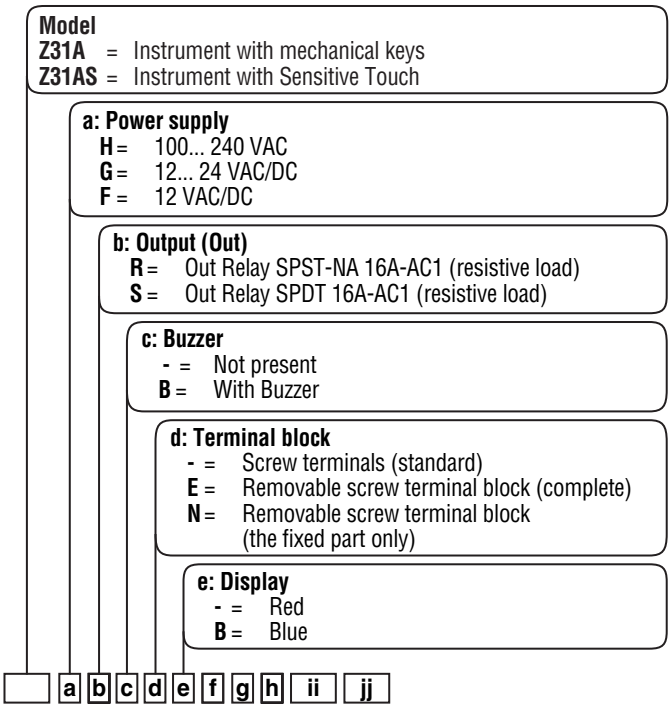
Sampling rate: 130 ms;

Display: 3 Digit Red (Blue optional) h 15.5 mm;

Software class and structure: Class A;

Compliance: **Directive 2004/108/CE** (EN55022: class B; EN61000-4-2: 8kV air, 4KV cont.; EN61000-4-3: 10V/m; EN61000-4-4: 2kV supply and relay outputs, 1kV inputs; EN61000-4-5: supply 2kV com. mode, 1kV\ diff. mode; EN61000-4-6: 3V),
Directive 2006/95/CE (EN 60730-1, EN 60730-2-9).

11 HOW TO ORDER



Note: To order the optional Screw type Bracket necessary to obtain the IP65 Front protection degree, please, contact your Ascon Tecnologic supplier