AGEON
Electronic Controls

A102

Digital temperature controller

Vx.x.3
Rev. 01

User guide

A102

Product description

The A102 model is an automatic electrical temperature sensing controller that can be used for heating or cooling applications with a range from -50 to 100 °C. The A102 measures, indicates and controls the temperature by turning the relay on and off based on the setpoint chosen by the user. The refrigeration mode can also work with configurable periodic defrosts (defrost when the compressor is switched off), with maximum intervals of 999 hours and a maximum duration of 999 minutes.

This model has waiting time parameters (delays) for device energization and relay operation.

Other functions present in the A102 are: eco mode, thermometer mode, support for WEB communication via RS-485 for the Arcsys and Arcsys Cloud monitoring system, temperature records, alarm and standby mode.

The A102 has 6 keys with shortcuts to simplify the use of the temperature controller.

Specifications

Power supply voltage	(110 or 220) Vac
Rated power	1,5 VA
Relay output	Heating/Cooling (17 A / 250 Vac)
Measurement range	(-50 to +100) °C
Resolution	0,1 °C (within the range: -50ºC to +100ºC)
Operating conditions	(0 to 40) °C and (10 to 80) % RH (noncondensing)
Panel cutout	(70 x 29) mm (± 5%)
Protection index	IP 65 (front panel)
NTC Sensor (IP68)	Ø6 mm / L=15 mm (sensor) Standard length 1,5 m (wiring)

Applications

The A102 model can be used for both heating and refrigeration (with and without defrosting by compressor stop). It has a very wide range of applications, but among them the following stand out:
- Heaters;
- Refrigerators;
- Floor heating;
- Air conditioning systems;
- Greenhouses and their variations;
- Drinks and ice cream displays;
- Refrigerated and frozen counters, etc.

Display

A102 display

Display icons

LED	Description
(power icon)	- Off during normal operation. - On if the controller is in thermometer or Standby modes.
(leaf icon)	- On when the device is in eco mode.
(up/down arrows icon)	- On when the programming key is being used. - Flashing if communicating with ArcSys (remote monitoring system).
(refresh icon)	- Not used on this model.

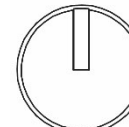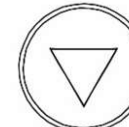|	
(sun icon)	- On when the output is active in heating mode. - Flashing when the controller is waiting for temporization.
°C	- On if the information shown on the display is a temperature in degrees Celsius.
(defrost icon)	- On during the defrost cycle. - Flashing when the controller is waiting for the delay (defined by the parameter **r9**) to time out.
(fan icon)	- Not used on this model.
(snowflake icon)	- On when the output is active in refrigeration mode. - Flashing during the device energization delay if defrosting is programed to happen when starting.

User interface
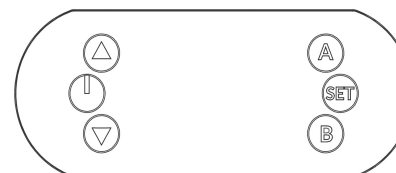
A102 interface

Key functions

Key	Description
(up arrow)	- Used to increment values. - If pushed together with the **down** key for 4 seconds, the controller will enter or exit the parameters setting list.

(I / standby key)	- Used according to the value in the **FP** parameter: 0 - Key disabled 1 - Turn on/off Standby mode 2 - Turns on/off thermometer mode **NOTE: Use this function responsibly. In certain applications, disconnecting loads may spoil/damage the products.**
(down arrow)	- Used to decrement values. - If pushed together with the **up** key for 4 seconds, the controller will enter or exit the parameters setting list. - If pushed for more than 4 seconds, it will skip to the next refrigeration cycle (in case the parameter **r3 = CL**).
(A)	- If pushed for 2 seconds, the controller will enter/exit eco mode (If parameter **FE = YES**). - If pushed in the parameters setting list, with **Cd = 97**, it will reset the parameters to factory default.
(SET)	- Used to show the setpoint on the initial screen and the values in the parameters setting list. - Along with the **up** and **down** keys, adjust values of the setpoint and parameters.
(B)	- If pushed, the display will show the highest and lowest temperature values (**tH** and **tL**). If pushed again, it will redefine the temperature historical data. - If pushed in the parameters setting list, the firmware version will be displayed. - If on the test mode (test mode is when parameter **Cd = 77**), activates the compressor relay.

Recommended panel cut out

29 mm

70 mm

29 mm

93 mm

65 mm

73 mm
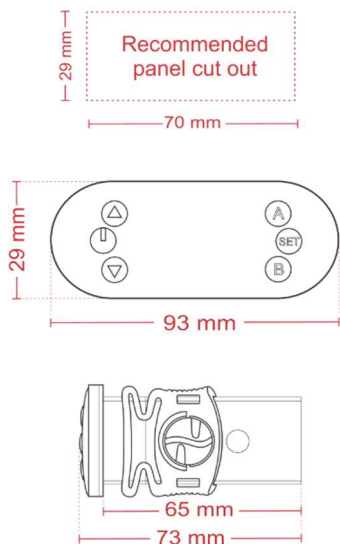
Controller dimensions

Fixing
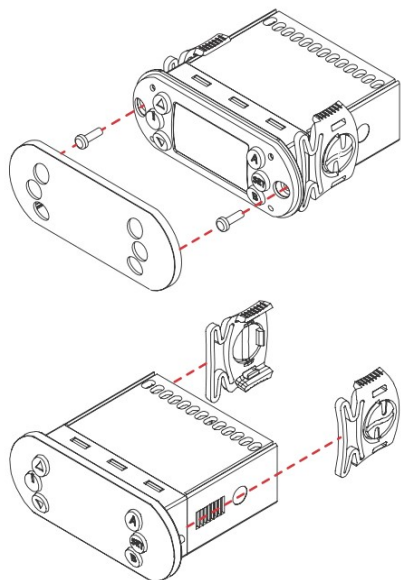
Fixing methods

NOTE: When making the cut, take into account the thickness of the paint/varnish that will be used.

Recommendations and warnings

If the controller has to be removed, detach the two side clips and pull the controller out. In case the fixing method chosen was by screws, remove the front display protection, remove the screws and pull the controller out.

It is recommended to check the tightness of the terminal screws and condition of the wires every 6 months.

It is recommended that the handling and installation of the equipment are carried out by qualified personel.

Connections must be done with suitable connectors for better fixing to the terminals. Before energizing the device, make sure all the connections are correct, otherwise, irreparable damage may be inflicted.

Never subject the system elements to a temperature outside the operating range (0 to 40 °C for the controller and -50 to 100 °C for the NTC sensors), as this could also cause irreparable damage.
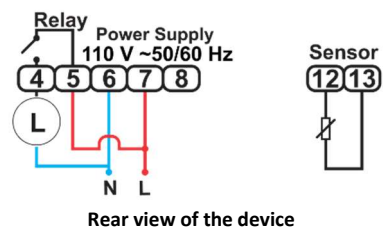
220 V connection

Rear view of the device
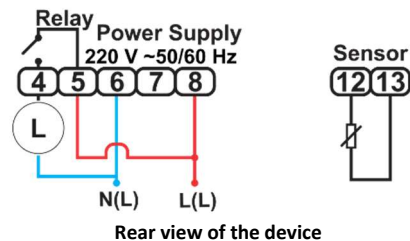
Step-by-step installation at 220 V:

1) Power supply: Terminals 6 and 8;
2) Jumper from terminal 8 to terminal 5;
3) Load: Terminals 4 and 6;
4) Sensor: Terminals 12 and 13.

110 V connection

Rear view of the device

Step-by-step installation at 110 V:

1) Power supply: Terminals 6 and 7;
2) Jumper from terminal 7 to terminal 5;
3) Load: Terminals 4 and 6;
4) Sensor: Terminals 12 and 13.

Parameters table

Parameter		Values	Default value
Cd	Access code	0 to 999	0
Temperature control			
SP	Setpoint	(r1 to r2) °C	0
SE	Eco mode Setpoint	(r1 to r2) °C	2
r0	Differential (hysteresis)	(0.1 to +20.0) °C	3.0
r1	Setpoint lower limit	-50 °C to SP/SE	-50
r2	Setpoint upper limit	SP/SE to +100 °C	100
r3	Operation mode (CL = cooling e Ht = heating)	CL or Ht	CL
r9	Delay for device starting	(0 to 20) min	0
Load			
C1	Delay after relay switching on	(0 to 20) min	0
C2	Delay after relay switching off	(0 to 20) min	0
C3	Percentage of relay operation in case of "E1" error (time base: 10 min)	(0 to 100) %	50
Defrosting			
d1	Interval between defrost cycles [3]	(1 to 999) hours	6
d2	Defrost duration time [3]	(oFF, 1 to 999) min	20
d4	Defrosting at system start [3]	YES or no	no
d6	Display locked during defrosting [3]	YES or no	YES
Full mode **The parameters below appear only if Cd = 38**			
Key control			
FE	Enable eco mode function	YES or no	no
FP	Power key function	0,1 or 2	0
bt	Block of settings changes 10 s after the last use of the keyboard	oFF, 1 or 2	oFF
Arcsys			
Ed	Network address [1]	0 to 32	2
bU	Block settings changes via WEB (ArcSys and Cloud)	YES or no	no
Temperature alarm			
A0	Temperature alarm differential (Hysteresis)	(0.1 to 20.0) °C	3.0
A1	Minimum temperature alarm	(-50 to A2) °C	-50
A2	Maximum temperature alarm	(A1 to 100) °C	100
A3	Start-up alarm delay (cooling/heating)	(0 to 999) min	99
A4	WEB notification frequency (ArcSys and Cloud)	(0 to 240) min	0
Other adjustments			
FL	Digital temperature filter	1 to 40	3
r4	Sensor calibration (offset)	(oFF, -15.0 to +15.00) °C	0.0
tL	Lowest temperature (historical minimum temperature) [2]	(-50 to 100) °C	-
tH	Highest temperature (historical maximum temperature) [2]	(-50 to 100) °C	-
Notes			

[1] **Visible and adjustable only on the controller and programming key, on Arcsys it will be only visible (not adjustable)**

[2] **View only**

[3] **I heating mode (r3 = Ht) this parameter is not applied**

Parameters description

Cd – Access code: the parameters must be unlocked so that they can be adjusted. To unlock them, enter the value **28** in **Cd** for the simplified parameterization mode or **38** for the full mode. If it is not done, the parameter values can only be viewed, but not changed. This parameter prevents unauthorized people from changing the programmed values.

SP – Setpoint: temperature value that the user wants to obtain with the system. **NOTE: The Setpoint can be changed either through this parameter or on the initial screen with the "Set" key.**

SE – Eco mode Setpoint: temperature value that the user wants to obtain with the system when the eco mode is on.

r0 – Differential (Hysteresis): the value of this parameter controls the operation of the relay, that is, it defines the temperature difference at which the relay will turn on/off. For example, if the device is in refrigeration mode and it is configured with setpoint = **5 °C** and r0 = **2 °C**, the relay remains activated until the temperature reaches 5 °C, then, it turns off. It only turns on again when the temperature reaches 7 °C (5 °C + 2 °C).

r1 – Setpoint lower limit: defines the lowest temperature value that the user can assign to the Setpoint and Eco mode Setpoint. Prevents a value below the recommended temperature limit from being applied to the system.

r2 – Setpoint upper limit: defines the highest temperature value that the user can assign to the Setpoint and Eco mode Setpoint. Prevents a value above the recommended temperature limit from being applied to the system.

r3 – Operation mode: defines the controller operation mode, being the values **CL** for "Cooling" and **Ht** for "Heating".

r9 – Delay for device starting: defines a period after energizing the device in which all relays remain off. During this time, the device will only indicate the temperature value. This parameter protects the compressor from constant starts in case of power surges (consecutive power outages). It is also used in large refrigeration systems to prevent simultaneous activation of compressors when returning from a power failure.

C1 – Delay after relay switching on: after activating the relay, it will remain on regardless of the temperature, for the period defined in **C1**. This parameter prevents voltage spikes in the power line.

C2 – Delay after relay switching off: after turning off the relay, regardless of the temperature, it will remain off for the period defined in **C2**.

C3 – Percentage of relay operation in case of "E1" error: if a problem occurs with the sensor (error E1), the relay will be activated cyclically and this parameter defines the percentage of 10 minutes the relay will remain on. For example, 50% of 10 minutes is 5 minutes.

d1 – Interval between defrost cycles: determines the time interval between the end of one defrost cycle and the beginning of the next one.

d2 – Defrost duration time: determines the duration of defrosting, that is, how much time the compressor will be off during one defrosting cycle.

d4 – Defrosting at system start: allows you to defrost as soon as the device is turned on. This can be useful in applications with frequent power outages, as the controller resets time counts after shutdowns. It is often preferable to defrost at startup to prevent ice formation from happening due to a power outage.

d6 – Display locked during defrosting: allows locking, on the display, the temperature indicated at the beginning of defrosting to prevent any possible increase in temperature from being shown. After the end of defrosting, the temperature display is unlocked.

– Parameters available in full mode (Cd = 38) –

FE – Enable eco mode function: this parameter is used to block or unblock the enablement of eco mode using the **A** key. This mode allows having a second setpoint to be defined during night periods, for example, when a different temperature can be met with less power consumption.

FP – Power key function: parameter to control the function of the power key. The values and descriptions are listed below:
 - 0 – key disabled;
 - 1 – key will turn off/on the system standby mode;
 - 2 – key activates/deactivates thermometer mode.

bt – Block of settings changes 10 s after the last use of the keyboard: in this parameter, the user can enable a lock for 10 seconds after the last use of keyboard, where:
 - oFF – function disabled;
 - 1 – Blocks all changes, except the setpoint;
 - 2 – Blocks all changes.

Ed – Network address: this parameter defines the device address in standard RS-485 communication with the ISX10 (Arcsys). If the system has two or more controllers, they must not have the same **Ed** value.

bU – Block settings changes via WEB (ArcSys and Cloud): this parameter, when set to **YES**, prevents changes to controller parameters from being made via Arcys/Cloud.

A0 – Temperature alarm differential (Hysteresis): this parameter defines the alarm temperature differential. In other words, how many degrees the temperature must be above the parameters **A1** or below **A2** so the alarm shuts off after activated.

A1 – Minimum temperature alarm: sets the lower alarm limit. If this limit is reached, the display will flash and the relay output will be switched off.

A2 – Maximum temperature alarm: sets the upper alarm limit. If this limit is reached, the display will flash and the relay output will be switched off.

A3 – Start-up alarm delay (cooling/heating): defines the time the alarm monitoring will be deactivated after system initialization, starting from the beginning of the cooling/heating mode.

A4 – WEB notification frequency (ArcSys and Cloud): this parameter defines the frequency at which Arcsys/Cloud should send alert emails to the user, as long as the recipient's email is determined.

FL – Digital temperature filter: this parameter applies a filter to the temperature variation. The higher the filter value, the slower the temperature variation and the lower the filter value, the faster the variation. If the filter is at the maximum value (40), the temperature varies 0.1 ºC every 2 seconds and, if it is at the lowest value (1), the temperature varies 0.1 ºC every 0.05 seconds.

r4 – Sensor calibration (offset): the value defined in this parameter applies an offset to the temperature reading (refrigeration), for possible deviations in the sensor's accuracy.

tL – Lowest temperature (historical minimum temperature): this parameter indicates the lowest temperature recorded throughout the system's operation. **NOTE: This parameter is not adjustable, it is for viewing only (it can be redefined as wished).**

tH – Highest temperature (historical maximum temperature): this parameter indicates the highest temperature recorded throughout the system's operation. **NOTE: This parameter is not adjustable, it is for viewing only (it can be redefined as wished).**

Follow the below steps to adjust the parameters, starting on the controller's initial screen (when the ambient temperature is indicated):

a) Keep the **up** and **down** keys pushed simultaneously for 4 seconds. At the end of the 4 seconds, **Cd** will be shown on the display;

b) With the display showing **Cd**, keep the **set** key pushed and, using the **up** and **down** keys, increase the parameter value to **28** to allow the settings in simplified mode or **38** to full mode. Then, release the **set** key and **Cd** will be displayed again;

c) Using the **up** and **down** keys, navigate until you reach the parameter that needs to be modified. When the parameter to be changed is displayed, keep the **set** key pushed

and, using the **up** and **down** keys, change the values as desired. Release the **set** key so the value will be defined and you will go back to the parameters listing. The same can be done for the rest of the parameters;

d) After finishing all adjustments, keep the **up** and **down** keys pushed for 4 seconds to leave the parameters listing and return to the controller initial screen. **NOTE: Within 30 seconds, if no key is pushed, the controller will automatically leave the parameters listing.**

✔ **Setpoint** – To change the system setpoint, push and hold the **set** key and adjust the value using the **up** and **down** keys (while still holding the **set** key). As soon as you reach the target setpoint, you can release the **set** key and the new setpoint will be defined. If you just want to view the setpoint value, just push and hold the **set** key. **NOTE: The eco mode setpoint will be displayed if the device is in eco mode; if the setpoint is changed on the initial screen, it will also be changed in the parameters listing.**

✔ **Keyboard blocking** – Using the **bt** parameter, it is possible to configure the blocking of keys behavior.

✔ **Check controller status** – To check the operating state of the controller (whether it is refrigerating or defrosting), check which LED is on.

✔ **Standby mode** – If the **FP** parameter is set to **1**, push the power key to activate or deactivate Standby mode. In this mode, the controller switches off all relays and turns off the display.

✔ **Alarm** – The user can set a temperature alarm at which the display will flash to alert the user. The alarm is configurable by the parameters **A0**, **A1**, **A2**, **A3** and **A4**.

✔ **Thermometer mode** – If the **FP** parameter is set with the value **2**, push the power key to activate or deactivate the thermometer mode. In this mode, the controller switches off all relays activation rules and just keeps the temperature indication on the display.

✔ **Eco mode** – Push the **A** key for 2 seconds to activate or deactivate eco mode. In mode of functioning, the setpoint will be the value programmed in **SE** (Eco mode Setpoint).

✔ **Reset parameters to default values** – To reset the controller to factory default settings, apply the value **97** to the **Cd** parameter and push the **A** key.

✔ **Historical highest and lowest temperatures** – To view the highest and lowest temperature recorded by the controller, on the controller initial screen (in which the temperature is shown) push the **B** key. The controller will alternate

the values on the display. If it is necessary to reset the highest and lowest temperatures, push the **B** key again during the historical temperatures displaying for about 1 second.

✔ **Firmware version –** To find out the firmware version of your controller, push the **B** key on the parameters listing screen.

✔ **Relay testing –** If the user wants to ensure that the cooling/heating relay is working, it is possible to manually test it. To start the test mode, enter the parameters listing, adjust the **Cd** parameter to the value **77** and wait for the value **tst** to appear on the display. Push button **B** to test the relay.

✔ **Communication with Arcsys –** The controller has a USB input that can be connected to the ISX10, device for monitoring via the ArcSys interface. If you want to monitor and manage the controller via WEB, get in touch with a sales partner to purchase this device. Have in mind that you will also need a RS-485 adapter to the wiring connection between the controller and ISX10.
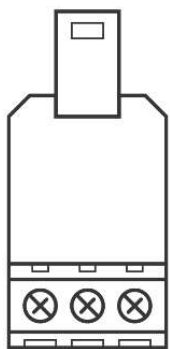
RS-485 adapter

Connect the adapter to the controller USB output and attach to the iSX10. It is important to notice that the connection must be A-A, B-B and Gnd-Gnd.

✔ **Programming key –** Another product that can be purchased separately is the programming key (FastKey). This device allows changing the controller parameters quickly and easily, as well as permit replicating the settings of a controller to other controllers.

Error alerts

The **E1** error indication will appear on the device display whenever there is a problem with the temperature sensor. If this happens, check if:
✔ The sensor is well connected to the device;
✔ The sensor is within its temperature range (-50 to +100) °C;

✔ The sensor or its cable are damaged.

Noise filtering

When using the controller to manage inductive loads such as solenoid coils, contactors, motors or relays, it is recommended to install a noise filter circuit in parallel with the load terminals (A1 and A2), as described in the illustration below.
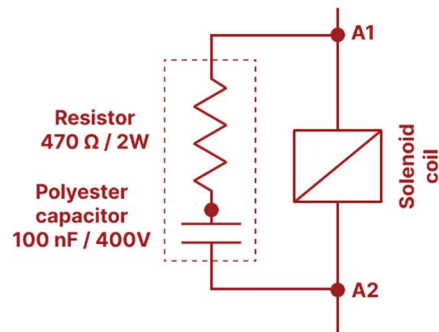
Noise filtering diagram

Package content

✔ 1 x A102 Temperature controller;
✔ 1 x NTC temperature sensor, 1.5 m long (wiring);
✔ 1 x A102 user guide.

Classification according to IEC 60730-2-9

Mounting surface temperature limit	Ts max 50ºC
Storage conditions	(-20 to 70)°C; < 90% RH (noncondensing)
Operation frequency	Minimum T OFF between two starts must be greater than 1 min
Operation time limitation	@85°C – 2,000 h; @40°C – 100,000 h
Automatic action type	Type 1.C
Control pollution situation	2
Rated impulse voltage	1.5kV
Temperature for ball pressure test	(75 and 125)ºC

Notes