AGEON
Electronic Controls

A108

Digital temperature controller

Vx.x.5
Rev. 03

User guide

A108

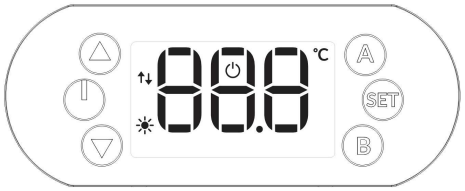
Product description

A108 is a differential temperature controller for standard solar thermal systems. The on/off control of the water pump is done by the temperature difference between the collector and the reservoir, and the maximum reservoir set temperature.

Technical characteristics

Supply voltage	110 or 220 Vac, 50-60Hz
Maximum power	4 VA
Pump relay output	10 A / 250 Vac
Measure range	-20 to +105 °C
Operating conditions	0 to 40 °C and 10 to 80 %RH (no condensation)
Recommended Panel cutout	70 x 29 mm
Front panel protection	IP 65
NTC sensor (IP68)	Ø6 mm, L=15 mm Cable length 1,5 m

Display



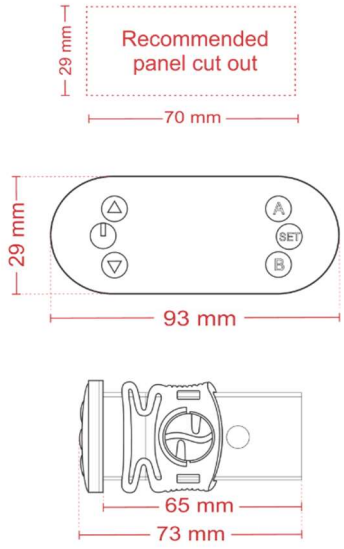
Display icons

Icon	Description
	- Off during normal operation. - On if the controller is in thermometer or Standby mode.
	- On when using the programming key; - Flashing while exchanging data with ArcSys.
	- On when the circulation pump is on. - Off when the circulation pump is deactivated. - Flashing during power-up delay or when the pump is started in manual mode.
°C	- On if the information shown on the display is a temperature in degrees Celsius.

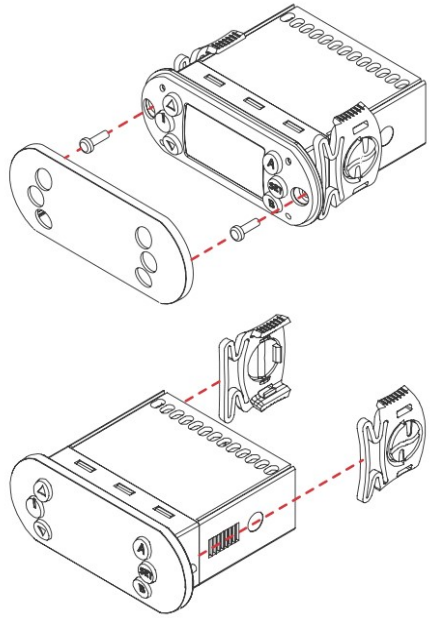
Key functions

Key	Description
Up	- Used to increment values; - If pressed together with the "down" key for 4 seconds, the user will access or exit the parameters table; - If pressed on the main screen, the display will show which protection function is working on the pump.
On/Off	- Function defined according to the value set in parameter **FP**: 0 – Key disabled 1 – Turn on/off the standby mode 2 – Turns on/off the display.
Down	- Used to decrement values. - If pressed together with the "up" key for 4 seconds, the controller will enter or exit the parameters table. - If pressed on the main screen, displays the system temperatures, t1 (collector), t2 (reservoir), and dd (t1-t2).
A	- If pressed on the main screen for 2 seconds, the controller will manually activate the pump and it will be activated during the time set in P8 - If pressed when Cd = 97, it will reset all parameters to the factory default values.
SET	- Used to show the *Setpoint* on the main screen and the values in the parameters table. - Together with the "up" and "down" keys, it adjusts values, whether of the *Setpoint* or parameters.
B	- If pressed on the main screen, the display will show the highest and lowest temperature values registered (tH and tL). If pressed again, tH and tL are redefined. - If pressed while in the parameters table, the *firmware* version will be displayed.

Dimensions (mm)



Fixing



Recommendations and warnings

These instructions are exclusively addressed to authorised skilled personnel.

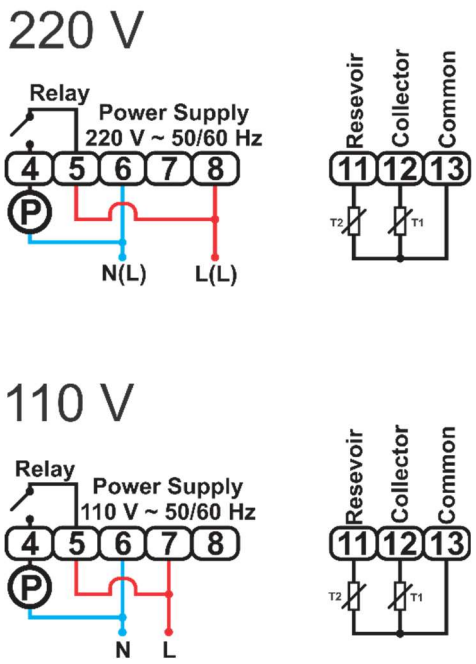
Only qualified electricians are allowed to carry out electrical works.

Initial commissioning must be effected by the system installer or qualified personnel named by the system installer.

Before powering up the device make sure all connections are correct.

Never expose the product at temperature outside the operating range (0 to 40 °C for the controller and -50 to 100 °C for the NTC sensors), this could lead to irreversible damage.

Connection diagram



Note: Back view of the device

1) Step by step installation:

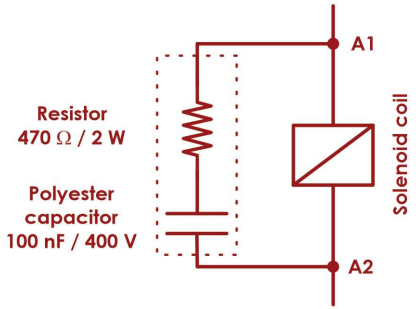
2) Power supply:
Terminals 6 and 7 **(110V);**
Terminals 6 and 8 **(220V);**

3) Jumper from 7 to 5 **(110V);**
Jumper from 8 to 5 **(220V);**

4) Pump: Terminals 4 and 6;
5) Collector sensor (T1): Terminals 12 and 13;
6) Reservoir sensor (T2): Terminals 11 and 13.

Noise supressor

When using the controller to drive inductive loads such as solenoid coils, contactors, motors, and relays, among others, it is recommended to install a noise suppressor circuit in parallel with the coil terminals (A1 and A2). This minimize the electrical noise generated, when inductive loads (coils) are deactivated, which can interfere with the controller operation and cause operation malfunctions.



Setting parameters

To adjust the parameters, on the initial main screen of the controller (showing the temperature), follow these steps:

a) Keep the “up” and “down” keys pressed simultaneously for 4 seconds until the symbol “Cd” appears on the display;

b) With the display showing “Cd”, keep the “set” key pressed and use the “up” and “down” keys to increase the parameter value up to 28 to adjust the settings in basic mode or up to 38 to set in full mode. Then, release the “set” key so that “Cd” appears again in the display.

c) Using the “up” and “down” keys, navigate until you reach the parameter that needs to be configured. Keep the “set” key pressed and use the “up” and “down” keys to change the values as desired. By setting the desired value and releasing the “set” key, the same can be done for the rest of the parameters;

d) After finishing all the adjustments, keep the "up" and "down" keys pressed for 4 seconds to exit the parameters table and start the controller operation. If no key is pressed for 30 seconds, the controller will automatically exit the parameters table.

User access

✔ ***Setpoint*** – To change the system Setpoint, hold the “set” key and adjust the value using the “up” and “down” keys. If you just want to view the Setpoint value, just press and hold the “set” key. NOTE: Remember that the setpoint is the maximum temperature that the user wants the reservoir to reach, therefore, if the temperature difference between the collector and the reservoir is greater than r0, the pump will remain running until reaching the Setpoint value.

✔ **Manual pump drive –** If you want to start the pump manually, press and hold the "A" key for 2 seconds, the same process is used to turn off the pump. Parameter P7 controls the time the pump stays on if started manually. The circulation LED will flash during the manual operation of the pump.

✔ ***Standby*** **Mode –** If the "PF" parameter is set to "1", press the *power* key to deactivate or deactivate *Standby* mode, in which mode the controller deactivates the control action, and consequently the relays, and turns-off the display.

✔ **Thermometer mode –** If the "PF" parameter is set to "2", press the power key to activate or deactivate the thermometer mode, this mode deactivates the control action, and consequently the relays, but keeps the display on showing the temperature.

✔ ***Resetting*** **the parameters to default values –** To reset the controller to factory default values, set the “Cd” parameter to 97 and press the "A" key.

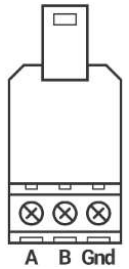
✔ **Minimum and maximum historical reservoir temperature –** To visualize the highest and lowest temperature registered in the reservoir, press the "B" key, the controller will alternate the Min. and Max. values on the display. If you need to reset the temperatures, just press the "B" key again for approximately 1 second during the display of the historical temperatures.

✔ ***Firmware*** **version–** To find out which firmware version your controller has, in the configuration screen (parameters table); press the "B" key.

✔ **Relay test –** If the user wants to ensure that the pump relay is working, it is possible to carry out a manual test. To enter the test mode, enter the parameters table, enter the value 77 in the “Cd” parameter, and wait for “tst” to be displayed. Press the "Power" button to test the relay. Pump circulation LED will be on if the relay is active.

✔ **Programming key –** Another product that can bepurchased separately is the programming key. With the programming key the user can change the parameters of the controllers quickly and easily, and can replicate the configuration of a controller to other controllers.

✔ **Comunication to Arcsys –** The controller has a USB port that can be connected to the ISX10, the device for monitoring through the ArcSys interface. If you want to monitor the controller online, a separate product must be purchased, the RS-485 adapter:



Connect the USB output adapter from the controller and make the connections to the iSX10, remembering that the co-connection must be A-A, B-B and GND-GND.

Error indications

The indication of error “E1” will appear on the display of the device whenever there is a problem with the sensor of the collector and the indication “E2” when there is a problem with the sensor of the reservoir. If this happens, check if:

✔ The sensor is properly connected to the device;

✔ The sensor is within its working temperature range (-50 to +100) °C;

✔ The sensor or its cable are damaged.

Parameters description

Cd – Access code: it is necessary to unlock the parameters so that they can be adjusted. To unlock them, enter the value 28 in "Cd" for basic parameterization mode or 38 for full mode. If this is not done, parameter values can only be viewed and not changed. This parameter prevents unauthorized persons from changing programmed values.

SP – *Setpoint* (reservoir overheating temperature): sets the maximum temperature allowed in the reservoir. NOTE: This parameter is adjusted from the main screen, by holding the "Set" key and using the "Up" or "Down" key.

td – Default displayed value: determines which temperature will have priority for visualization on the display main screen, "t1" temperature in the collector, "t2" temperature in the reservoir, and "dd" temperature difference between collector and reservoir (t1-t2).

r0 – Turn-on temperature difference (t1 – t2): determines the minimum temperature difference for turning on the relay. For example, if it is set to "6°C", the pump will turn on when the temperature in the reservoir is at least 6 degrees lower than the temperature in the collector.

r1 – Turn-off temperature difference (t1 – t2): determines the minimum temperature difference for turning off the relay. For example, if it is set to "2°C", the pump will turn off when the temperature between the reservoir and collector is 2 degrees or less.

r9 – Pump relay minimum power-up delay: defines a time period after powering up the device in which the pump relay remains off, during this period the device will only indicate the temperature value. This parameter also protects the pump from constant starts in case of consecutive power outages.

P0 – Collector´s antifreeze temperature (Turn-on the pump): this parameter is used in very cold regions where the water in the collector may freeze. In this parameter, the user sets a minimum temperature in the collector to turn on the pump, in order to circulate the water and try to prevent it from freezing.

P1 – Collector´s superheat temperature (Turn-off the pump): in this parameter, the user will program a maximum temperature in the collector. When this value is exceeded, the controller will keep the pump turned off, to prevent this excessively hot water from going to the reservoir/pool.

h2 – Superheat temperature hysteresis (P1): in this parameter, the user will set a hysteresis for the overheating protection of the reservoir.

P4 – Highest allowed setpoint: this parameter will limit the highest *setpoint*/superheating temperature for the reservoir.

P6 – Recirculation (Turn-on the pump for 25s every 25 min): if the user sets "YES" in this parameter, the pump will turn on every 25 min to recirculate the water through the piping. NOTE: the water will only recirculate if no protection parameter is active and if the collector temperature is greater than 20 °C and greater than the reservoir temperature.

P7 – Cooling: this parameter is used to cool the water in the reservoir if it is warmer than the collector is. If set to "YES", the pump will turn on when the reservoir temperature is 3°C degrees higher than the collector temperature.

P8 – Maximum time of the activated pump, if activated manually: In this parameter, it is possible to set a maximum time in which the pump will remain on if it is activated manually using the "A" key. This parameter is used to prevent the pump from remaining on for a long time if the user does not manually turn it off.

P9 – Maximum time of the activated pump, if activated by the diference (t1-t2): in this parameter, it is possible to program a maximum time the pump will stay on if it is started by the temperature difference parameter (r0). NOTE: Upon reaching the end of the time set in parameter P9, the controller turns off the pump and the display will show "P9" until the temperature difference (t1 - t2) is smaller than the temperature difference set to turn off the pump (r1).

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

FP – On/Off key function: defines the function of the On/Off key, as follows:

- 0 – key disabled;
- 1 – key activates/deactivates standby mode: the power key will turn-on/off the system's standby mode;
- 2 – key activates/deactivates the control action, but keeps the display on showing the temperature.

bt – Lock changes 10s after the last keystroke: in this parameter, the user can enable a block for 10 seconds, as follows:

- oFF – function disabled;
- 1 – Lock all changes, except the Setpoint;
- 2 – Lock all changes.

Parameters table

Parameter		Range	Default value
Cd	Access code	0 a 999	0
	Temperature control		
SP	*Setpoint* (reservoir overheating temperature)	15 to P4 °C	40
td	Default displayed value	t1, t2 or dd	t2
r0	Turn-on temperature difference (t1 – t2)	(r1 + 0.1) to + 45.0 °C	4.0
r1	Turn-off temperature difference (t1 – t2)	0.1 to (r0 - 0.1) °C	2.0
r9	Pump relay minimum power-up delay	0 to 20 min	0
	System protections		
P0	Collector´s antifreeze temperature (Turn on the pump)	oFF or 0 to 10.0 °C	2.0
P1	Collector´s superheat temperature (Turn off the pump)	15 to 100 °C	90
h2	Superheat temperature hysteresis (P1)	0.1 to 20.0 °C	2.0
P4	Highest allowed setpoint	SP to 100 °C	100
P6	Recirculation (Turn-on the pump for 25 s every 25 min)	Yes or no	no
P7	Cooling	Yes or no	no
P8	Max. time of the activated pump, if activated manually	1 to 999 min	300
P9	Max. time of the activated pump, if activated by the difference (t1-t2)	1 to 999 min	300
	Full mode **Parameters below only appear if Cd = 38**		
	Key control		
FP	On/Off key function	0, 1 or 2	0
bt	Lock changes 10s after last keystroke	oFF, 1 or 2	oFF
	Arcsys		
Ed	Network address	0 to 32	8
bU	Lock remote changes (Arcsys or ArcSys Cloud)	YES or no	no
	Temperature alarm		
A0	Hysteresis of the reservoir temperature alarm	0.1 to 20.0 °C	3.0
A1	Low-temperature reservoir alarm limit (t2)	-50 to A2 °C	-50
A2	High-temperature reservoir alarm limit (t2)	A1 to 100 °C	100
A3	Start-up alarm delay	0 to 999 min	99
A4	Alarm sending frequency	0 to 240 min	0
	Outros ajustes		
FL	Temperature digital filter	1 to 40	3
C1	Collector sensor calibration	oFF, -15.0 to +15.00 °C	0.0
C2	Reservoir sensor calibration	oFF, -15.0 to +15.00 °C	0.0
tL	Minimum historical reservoir temperature (t2)	-50 to 100 °C	-
tH	Maximum historical reservoir temperature (t2)	-50 to 100 °C	-

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 – Lock remote changes (Arcsys or ArcSys Cloud): this parameter, when set to "YES", prevents changes to controller parameters via Arcsys or ArcsysCloud.

A0 – Hysteresis of the reservoir temperature alarm: this parameter defines the alarm temperature differential.

A1 – Low-temperature reservoir alarm limit (t2): defines the lower temperature alarm limit for the reservoir. If this limit is reached, the display will flash and the relay output will be turned off.

A2 – High-temperature reservoir alarm limit (t2): defines the upper temperature alarm limit for the reservoir. If this limit is reached, the display will flash and the relay output will be turned off.

A3 – Start-up alarm delay: defines the time in which the alarm monitoring will be disabled after the cycle starts.

A4 – Alarm sending frequency: defines how often Arcsys/ArcsysCloud should send alarm alert E-mails to the user, as long as the recipient e-mail is configured.

FL – Temperature digital filter: applies a filter to smooth the temperature variation shown on the display. The higher the filter value is, the smoother the variation shown is. If the filter is at the maximum value (40) the shown temperature varies at most 0.1 °C every 2 seconds, and if it is at the lowest value (1) the temperature shown varies up to most 0.1 °C every 0.05 seconds.

C1 – Collector sensor calibration: the value configured in this parameter *offsets* the collector temperature, for any deviations in sensor accuracy.

C2 – Reservoir sensor calibration: the value configured in this parameter *offsets* the temperature of the reservoir, for eventual deviations in the accuracy of the sensor.

tL – Minimum historical reservoir temperature (t2): this read only parameter indicates the lowest temperature recorded in the reservoir over the course of system operation.

tH – Maximum historical reservoir temperature (t2): this read only parameter indicates the highest temperature recorded in the reservoir throughout the system operation.

Notes