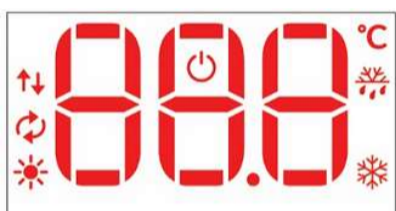## Installation guide

A103 PID-U

Product description

A103 PID-U is a humidity and temperature controller. It has one TRIAC output with PID control for heating, one relay output for humidity control, and one auxiliary relay output which can be set for on/off temperature control or in a cyclic mode.

Technical characteristics

|	
Supply voltage	110 or 220 Vac
Maximum power	2 VA
TRIAC output (resistive load only)	2 A / 250 Vac 400W/220 Vac – 200W/110 Vac
Humidity relay	0.4 CV or 8 A / 250 Vac
Auxiliary relay	0.5 CV or 10 A / 250 Vac
Measure range	Temperature: -20 to + 80 °C Humidity: 10 to 90 %RH
Resolution	0.4 °C from -20 to + 80 °C 3.0 %RH from 10 to 90 %RH
Operating conditions	0 to + 40 °C and 10 to 80 %RH (no condensation)
Recommended panel cut-out	70 x 29 mm
Front panel protection	IP65
Sensor module	Ø16 mm / L = 100 mm Cable length 1 m

Display

Display icons

| Icon	Description
(power)	- Off during normal operation. - On, if the controller is in thermometer or stand-by mode.
(up/down arrows)	- On when using the programming key. - Blinks while exchanging data with *ArcSys* monitoring system.
(cyclic)	1) If the auxiliary output is set to cyclic mode (L3 = 2): - Blinking when the auxiliary output is powered; - Lit when the auxiliary output is enabled, but de-energized; - Off when the auxiliary output is disabled. 2) If the auxiliary output is configured for heating (L2 = 1): - Lit when the relay is on; - Off when the relay is off.
(sun)	- Blinks at a frequency proportional to the voltage delivered by the TRIAC output.
°C	- On when a temperature in degrees Celsius is displayed.
(humidity drops)	Shows the operation of the humidity control output. - Lit if the output is on; - Off if the output is off; - Blinking if it is off and waiting for any set delay.
(snowflake)	Indicates the operation of the auxiliary relay if it is configured for cooling (L3 = 0), considering that: - Lit if the relay is on; - Off if the relay is off.

Key functions

Key	Description
(triangle up)	- Used to increment values; - If pressed together with the "down" key for 4 seconds, the user will access or exit the parameters table; - On the main screen, it can be pressed repeatedly to choose a *setpoint* to be adjusted (**SP** -TRIAC output *setpoint*, **SU**-Humidity control

setpoint, **SA**-Auxiliary output setpoint).

After choosing a setpoint, keep the SET key pressed and use the "up" or "down" key to adjust its value.

(I key)	- Its function depends on the value set to parameter FP; - If FP = 0, this key is disabled; - If FP = 1, it alternates between normal mode and standby mode (display and control action off) - If FP = 2, it activates/deactivates the control action but keep showing the temperature on the display (thermometer mode). - If in test mode (Cd = 77) activates the auxiliary relay output;
(triangle down)	- Used to decrement values. - If pressed together with the "up" key for 4 seconds, the user will access or exit the parameters table; - If pressed while on the main screen, it will sequentially show the lowest and highest temperatures and humidity registered by the sensor, being tL = lowest temperature, tH = highest temperature, uL = lowest humidity and uH = highest humidity. To reset the corresponding value, hold down the "down" key for a few seconds; - If in test mode (Cd = 77) activates the TRIAC output.
(A key)	- Its function depends on the value set to parameter FA; - If FA = oFF, this key is disabled When L3=2 (cyclic mode): - If FA = 1, pressing for 4 seconds forces the auxiliary relay to turn on for the time set in "L5" - If FA = 2, pressing for 4 seconds temporaly activates or deactivates the auxiliary relay cyclic function. - If pressed with Cd = 97, it resets the parameters to the factory configuration. - If in test mode (Cd = 77), it activates the humidity relay.
(SET key)	- Used to show the setpoint value on the main screen and the values in the parameter table. - Use together with the "up" and "down" keys to adjust setpoints and parameter values.
(B key)	- If enabled by the "FB" parameter, press for 4 seconds for quick access to the calibration parameter r4. - If pressed in the parameter table, it displays the firmware version.

Dimensions (mm)

Recommended painel cutout
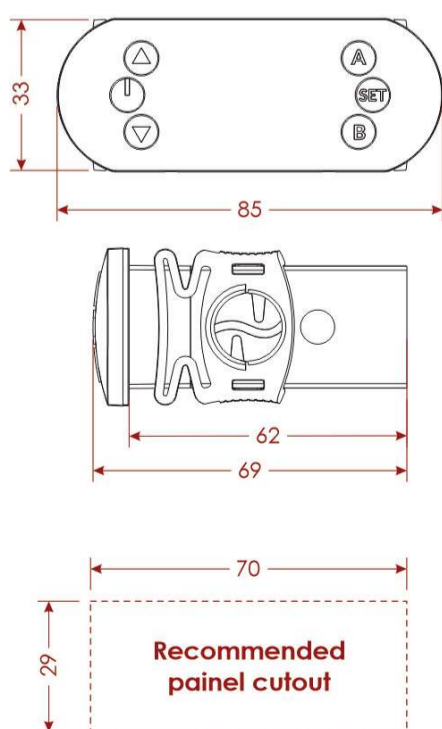
Fixing
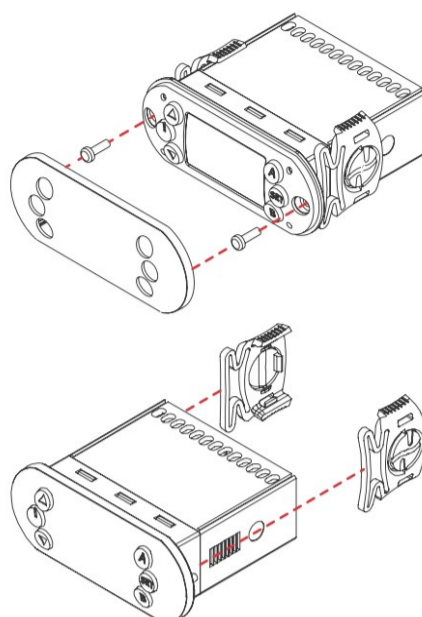
Recommendations and warnings

These instructions are only for skilled personnel.

Only qualified electricians are allowed to carry out electrical work.

The system installer or qualified personnel named by the system install must execute the initial commissioning.

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

Never expose the product at a temperature outside the operating range (0 to +40 °C for the controller and -20 to +80 °C for the sensor), as this could lead to irreversible damage.

Connection diagram
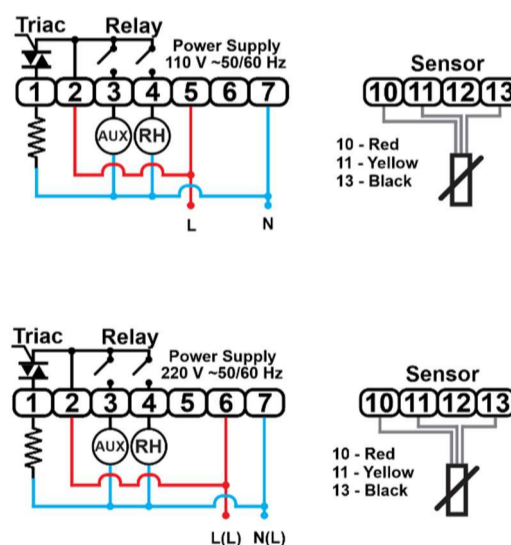
Note: Back view of the device

1) Step by step installation:

2) Power supply:
   Terminals 5 and 7 (110V);
   Terminals 6 and 7 (220V);

3) Jumper from 5 to 2 (110V);
   Jumper from 6 to 2 (220V);

4) Heating resistance element: Terminals 1 and 7;
5) Auxiliary relay: Terminals 3 and 7;
6) Humidity relay: Terminals 4 and 7;

7) Temperature and humidity sensor:
   Red wire: Terminal 10;
   Yellow wire: Terminal 11;
   Black wire: Terminal 13;

Setting parameters

To adjust the parameters follow these steps:

1. On the main screen, keep the "up" and "down" keys pressed simultaneously for 4 seconds until the parameter Cd appears on the display;

2. With the display showing "Cd", hold down the "set" key and with the help of the "up" and "down" keys increase the parameter value up to 28 for adjusting the settings in simplified mode or up to 38 for setting in full mode. Then release the "set" key to appear "Cd" again on the display.

3. Using the "up" and "down" keys, navigate until you reach the parameter you want to configure. 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;

4. Hold down the "up" and "down" keys for 4 seconds to exit the parameter table and start the operation of the controller. If you do not press, any key for 30 seconds the controller will automatically exit the parameter table.

User access

✔ **Setpoints adjustment** – On the main screen, press repeatedly the key "up" to select the symbol of the *setpoint* you want to adjust (**SP** -TRIAC output *setpoint*, **SU**-Humidity control *setpoint*, **SA**-Auxiliary output setpoint).

When you select the desired *setpoint* symbol, keep the "set" key pressed and adjust the value using the "up" and "down" keys.

If you only want to view the value of the corresponding *setpoint*, press and hold the "set" key.

✔ **Resetting to the factory values** – To reset all parameters to the factory value, set the parameter "Cd" to 97 and press "A" key.

✔ **Firmware version** – If you are in the configuration screen (parameter table) and press the press the "B" key, the *firmware* version of your controller will appear on the display.

✔ **Outputs testing** – If you want to ensure that the electrical connections are correct and/or that the relays and TRIAC are working properly, it is possible to manually force them to turn on, using the test mode.

To enter the test mode, set the parameter "Cd" to 77 and wait "tst" to appear on the display. Then, you can press the "down" key to trigger the TRIAC, the "A" key to turn on the humidity control output, and the "*power*" to turn on auxiliary relay output.

✔ **TTL communication port** – The A103 PID-U has a TTL serial communication port that uses a mini USB connector. This port is used for online/remote monitoring and configuring of the controller, using an optional device. If you want to know more about this, please contact us at www.ageon.com.br.

✔ **Programming key** – The TTL communication port also is an interface for an optional programming device. With the programming key, the user can change the parameters of the controllers quickly and easily, replicating the configuration of one controller to another.

✔ **Calibration of the temperature sensor quickly** – If FB = 1, while on the main screen, hold the B key to quickly calibrate the temperature sensor. However, the only way to calibrate the humidity sensor is through the U4 parameter.

✔ **Visual alarm** – The user can set a temperature and humidity alarm. If the alarm goes off, the display will flash. The parameters from A0 to A6 set the alarm configuration. If the measured temperature exceeds the value set in A2, the TRIAC output is deactivated.

✔ **Manual activation of the auxiliary relay** – If the auxiliary relay is set in cyclic mode (L3 = 2) and FA = 2, the user can force this auxiliary output to turn on by holding the "A" key.

✔ **Sensor error** – If the controller detects the absence of the sensor connection, it will display "E01" and turn off the TRIAC output and the humidity control output. The auxiliary relay output will work according to the L7 parameter.

Error indications

When there is any problem with the temperature and humidity sensor, an error indication "E1" will be displayed. If this occurs, check if:
✔ The electrical installation of the sensor is correct;
✔ The sensor is within its temperature range;
✔ The sensor or its cable are not damaged.

Noise suppressor

In the use of the controller to drive inductive loads such as solenoid coils, contactors, motors, relays, among others, it is recommended to install a suppressor circuit in parallel with the load terminals (A1 and A2), as described in the illustration below.
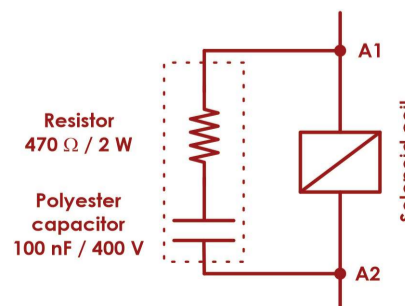
Parameters description

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 – Temperature setpoint (TRIAC output): temperature *setpoint* to be achieved with the control action of the TRIAC output.

SU – Humidity setpoint (Humidity relay output): humidity *setpoint* to be achieved with the control action of the humidity relay output.

SA – Temperature setpoint (Auxiliary relay output): temperature *setpoint* to be achieved with the control action of the auxiliary output.

r1 – Lowest temperature setpoint allowed (SP): it defines the lowest temperature value the user can adjust for the setpoint "SP". It prevents setting a too low value by mistake.

r2 – Highest allowed temperature setpoint (SP): it defines the highest temperature value the user can adjust for the setpoint "SP". It prevents setting a too high value by mistake.

r4 – Calibration of the temperature sensor: the value set in this parameter is added to the temperature measured by the sensor. With this parameter, it is possible to correct eventual temperature deviation in the accuracy of the sensor.

L5 – Auxiliary output timer 1: if L3 = 2 (cyclic mode) it sets the auxiliary relay output on time in seconds. If L3 = 0 (Cooling) or 1 (heating), it sets the minimum time in minutes that the auxiliary relay output will remain on after activation, regardless of the temperature.

L6 – Auxiliary output timer 2: if L3 = 2 (cyclic mode) it sets the auxiliary relay output off time in minutes. If L3 = 0 (cooling) or 1 (heating), it sets the minimum time in minutes that the auxiliary relay output will remain off after deactivation. If using refrigeration compressors, this parameter allows time for the temperature and pressure of the gas to stabilize before the new start-up, reducing the starting current and extending the life of the equipment.

u0 – Humidity control differential (Hysteresis): It defines the difference in humidity at which the relay will turn on or off. For example, if the output is in humidification mode, SU = 70 %RH and u0 = 5 %RH, the relay will be on until the humidity reaches 70 %RH. Then it turns off and only turns back on when humidity reaches 65 % RH (70 %RH - 5% RH).

u1 – Lowest allowed humidity setpoint: it sets the lowest humidity value the user can adjust for the humidity setpoint "SU". It prevents the user from setting a too low value by mistake.

u2 – Highest allowed humidity setpoint: it sets the highest humidity value the user can adjust for the humidity setpoint "SU". It prevents the user from setting a too high value by mistake.

u4 – Calibration of the humidity sensor: the value set in this parameter is added to the humidity measured by the sensor. With this parameter, it is possible to correct eventual humidity deviation in the accuracy of the sensor

u5 – Delay after activation of the humidity control output: this parameter defines the minimum time the auxiliary relay will remain on after the activation (regardless of humidity).

u6 – Delay after deactivation of the humidity control output: this parameter defines the minimum time the auxiliary relay will remain off after deactivation (regardless of humidity).

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

At – Auto Tuning: If "At" is set to 1, the controller will run three heating cycles and automatically adjust the best gains for J0, J1 and J2. During the auto tuning, "At" will be displayed on the main screen.

J0 – Proportional gain: It sets the proportional output response to the error signal. The higher the proportional gain, the faster the response, however it increases the chance of destabilizing the system.

J1 – Integral gain: this gain determines the system stability in a permanent regime. An excessive increase in the integral gain can lead to a temperature an *overshoot.*

J2 – Derivative gain: this gain assists in stabilizing the system. It eliminates the accumulated errors in the integrative gain. An excessive increase in this parameter may slow down the system response.

u3 – Humidity control action: it determines the control action of the humidity control output, 0 = dehumidification or 1 = humidification.

L0 – Auxiliary relay control differential (hysteresis): if L3 is 0 or 1, it sets the hysteresis for the temperature control when using the auxiliary output relay.

L1 – Lowest *auxiliary temperature setpoint allowed* if L3 is 0 or 1, it defines the lowest temperature value the user can adjust for the setpoint "SA". It prevents setting a too low value by mistake.

L2 – Highest allowed temperature auxiliary setpoint: it defines the highest temperature value the user can adjust for the setpoint "SA". It prevents setting a too high value by mistake.

L3 – Auxiliary relay function: it determines the function of the auxiliary relay output: 0 = Cooling, 1 = Heating, 2 = Cyclic mode.

L7 – Percentage of operation of the auxiliary relay in cooling mode in case of error "E1" (Time base: 10 minutes): In case of sensor error E1, the auxiliary relay will operate cyclically considering a 10 min period. For example, if L7 = 40%, in case of sensor failure, the relay remains 4 min on (40% of 10 min) and 6 min off (60% of 10 min).

FP – Power key function: It defines the power key behaviour as below:
If FP = 0, this key is disabled.
If FP = 1, it alternates between normal mode and standby mode (display and control action off).
If FP = 2, it activates/deactivates the control action but keep showing the temperature on the display (thermometer mode).

FA – Function of the A key: parameter to define the operation of the "A" key as below:
- Off – key disabled;
- 1 – Pressing for 4 seconds forces the auxiliary relay to turn on.
- 2 – Pressing for 4 seconds activates or deactivates the auxiliary relay function.

FB – Function of the B key: parameter to define the operation of the "B" key.
- Off – key disabled;
- 1 – Shortcut for calibration of the temperature sensor. Pressing for 4 seconds will enter the calibration, hold down and calibrate the temperature sensor by using the "up" and "down" key.

Ed – Network address: this parameter defines the device address in RS-485 network.

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

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

A1 – Temperature alarm lower limit: sets the lower limit of the alarm. If this limit is reached, the display will flash and the relay output will be turned off.

A2 – Temperature alarm upper limit: sets the upper limit of the alarm. If this limit is reached, the display will flash and the relay output will be turned off.

A3 – Star-up alarm delay: Sets the time at which the alarm will be disabled after system start up.

A4 – Alarm sending frequency: this parameter defines the frequency at which the monitoring system, if used, will send the alert emails to the user.

A5 – *Humidity alarm* lower limit: sets the lower limit of the humidity alarm.

A6 – *Humidity alarm* upper limit: defines the upper limit of the humidity alarm.

r9 – Device power up delay: defines a period after the energization of the apparatus in which all the relays and the TRIAC remain off, in this period the apparatus will only indicate the temperature value.

td – Display function: defines which value will be shown on the main screen, where: 0 = Alternates between humidity and temperature, 1 = temperature and 2 = humidity.

tL – Minimum historical temperature: this view only parameter indicates the lowest temperature recorded throughout the operation of the system.

tH – Maximum historical temperature: this view only parameter indicates the highest temperature recorded throughout the operation of the system.

uL – Minimum historical humidity: this view only parameter indicates the lowest humidity recorded throughout the operation of the system.

uH – Maximum historical humidity): this view only parameter indicates the highest humidity recorded throughout the operation of the system.

Notes

Parameters table

	Parameter	Range	Default value
Cd	Access code	0 to 999	0
	setpoints		
SP	Temperature *setpoint* (TRIAC output)	r1 to r2 °C	37.5
SU	Humidity *setpoint* (Humidity relay output)	u1 to u2 % UR	60.0
SA	Temperature *setpoint* (Auxiliary relay output)	L1 to L2 °C	0
	Temperature control		
r1	Lowest *setpoint* allowed	-50 °C to SP	35.0
r2	Highest allowed *setpoint*	SP to 100 °C	38.0
r4	Temperature sensor calibration	-15.0 to +15.00 °C	0.0
	Auxiliary output – Time on/off or delays		
L5	Auxiliary output timer 1. If L3 = 2 (cyclic mode), L5 is the auxiliary relay **on** time in seconds. If L3 = 0 (cooling) or 1 (heating), L5 is the delay after the activation of the auxiliary relay in minutes.	0 = OFF, 1 to 999 sec or min	8
L6	Auxiliary output timer 2. If L3 = 2 (cyclic mode), L5 is the auxiliary relay **off** time in minutes. If L3 = 0 (cooling) or 1 (heating), L6 is delay after deactivation of the auxiliary relay in minutes.	1 to 999 min	60
	Humidity control		
u0	Humidity control differential (hysteresis)	0.1 to 20.0 % UR	2.0
u1	Lowest allowed humidity setpoint	0 to SU % UR	30.0
u2	Highest allowed humidity setpoint	SU to 100 % UR	80.0
u4	Humidity sensor calibration	Off, -20.0 to 20.0 % UR	0.0
u5	Delay after activation of the humidity control output	0 to 999 sec	0
u6	Delay after deactivation of the humidity control output	0 to 999 sec	0
	Full mode **The parameters below only appear if Cd = 38**		
At	PID control auto tuning	1 = Yes or 0 = No	0
J0	Proportional gain	0 to 999	50
J1	Integral gain	0 to 1990	100
J2	Derivative gain	0 to 999	25
u3	Humidity control action (0 = dehumidification or 1 = humidification)	0 or 1	1
L0	Auxiliary relay control differential (hysteresis) (If L3 = 0 or 1)	0.1 to 20 °C	3.0
L1	Lowest allowed temperature auxiliary setpoint (If L3 = 0 or 1)	-50 °C to SA	-50
L2	Highest allowed temperature auxiliary setpoint (If L3 = 0 or 1)	SA to 100 °C	100
L3	Auxiliary relay function (0 = Cooling, 1 = Heating, or 2 = Cyclic Mode)	0, 1 or 2	2
L7	Operating percentage of the auxiliary relay in cooling mode in case of error "E1" (Time base: 10 minutes)	0 to 100 %	50
FP	Power key function	0,1 or 2	0
FA	"A" key function	Off, 1 or 2	1
FB	Function of the B key	Off or 1	1
Ed	Network address	0 = OFF, 1 to 32	23
bU	Lock remote changes (ArcSys or ArcSys Cloud)	YES or no	no
A0	Alarm differential	0.1 to 20.0 °C	2.0
A1	Temperature alarm lower limit	-50 to A2 °C	0.0
A2	Temperature alarm upper limit	A1 to 100 °C	100
A3	Start-up alarm delay	0 to 999 min	0
A4	Alarm sending frequency	0 = Off, 1 to 240 min	0
A5	Humidity alarm lower limit (Uses hysteresis in U0)	0.0 to A6 % UR	0.0
A6	Humidity alarm upper limit (Uses hysteresis in U0)	A5 to 100 % UR	100
r9	Device power-up delay	0 to 20 min	1
td	Display function (0 = Toggle, 1 = Temperature, 2 = Humidity	0, 1 or 2	0
tL	Minimum historical temperature	-50 to 100 °C	-
tH	Maximum historical temperature	-50 to 100 °C	-
uL	Minimum historical humidity	0 to 100 % UR	-
uH	Maximum historical humidity	0 to 100 % UR	-