Variation Electronic Control Unit
Installation and operating manual

Read and keep these instructions

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Contents

1. Introduction

This document is a technical manual for the standard version of the Variation electronic control unit. Its purpose is to provide manufacturers of whirlpool and spa baths with information on the features of the device and its accessories, also its operation, and the installation procedures involved.

The document contains various sections serving respectively:

- to define the main specifications of the Variation control unit;
- to list the accessories that can be connected and describe the connection procedures;
- to describe how the user panels are utilized;
- to describe the operation of the device.

2. General description

The Variation control unit is an electronic controller for whirlpool baths. It is a highly flexible device that can be:

- connected to a wide range of accessories, and in particular to a variety of user panels;
- used with tubs having different load configurations; the setting of the configuration is accomplished by means of dip-switches on a PCB.

3. Safety warnings

All hardware connections must be made by persons who are professionally skilled and aware of the risks associated with installation. Installation procedures must be carried out with the power supply isolated, observing the appropriate safety standards. The user assumes all liability and risk during the installation, configuration and use of products. The liability of the Astrel Group in respect of its products is regulated by the Astrel Group General Conditions of Sale (published on the company's website www.astrelgroup.com.

4. Main features

4.1 Technical specifications

Power supply	230 Vac Single-phase +10%,-10% 50/60Hz 16A
Overall dimensions	200 x 190 x 80 mm
Weight	0.7 kg
Degree of protection	IPx5
Ambient operating conditions	0 to 35 ℃, <80% R.H., non-condensing
Ambient storage conditions	0 to 60 ℃, <80% R.H., non-condensing

Note
The Variation controller can also be connected to a 115Vac supply. Contact the Astrel Group if this voltage is to be used.

4.2 Reference standards

Electromagnetic compatibility	
EN 55014-1	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
EN 55014-2	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard
Safety	
EN 60335-2-60	Household and similar electrical appliances - Safety - Part 2-60: Particular requirements for whirlpool baths and whirlpool spas
EN 60335-1	Household and similar electrical appliances - Safety - Part 1: General requirements
EN 62233	Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure

4.3 Inputs/outputs

4.3.1 High voltage outputs

Pump 1	Relay	1 HP @ 230V, ½ HP @ 115V
Pump 2	Relay	1 HP @ 230V, ½ HP @ 115V
Blower	Triac	3 A@230V (700W), 3A@115V (350W)
Heater	Relay	8A@230V (1800W)
Pump 1(1)	Triac	2 A@230V (560W)

Note 1.
Contact the Astrel Group if the loads to be used are higher than the ratings indicated above.

Note 2.
The TRIAC output of the pump is used in conjunction with the relay output of pump 1 to operate a variable speed pump, type SIREM ATL2990G4BMV4.

4.3.2 Output protection

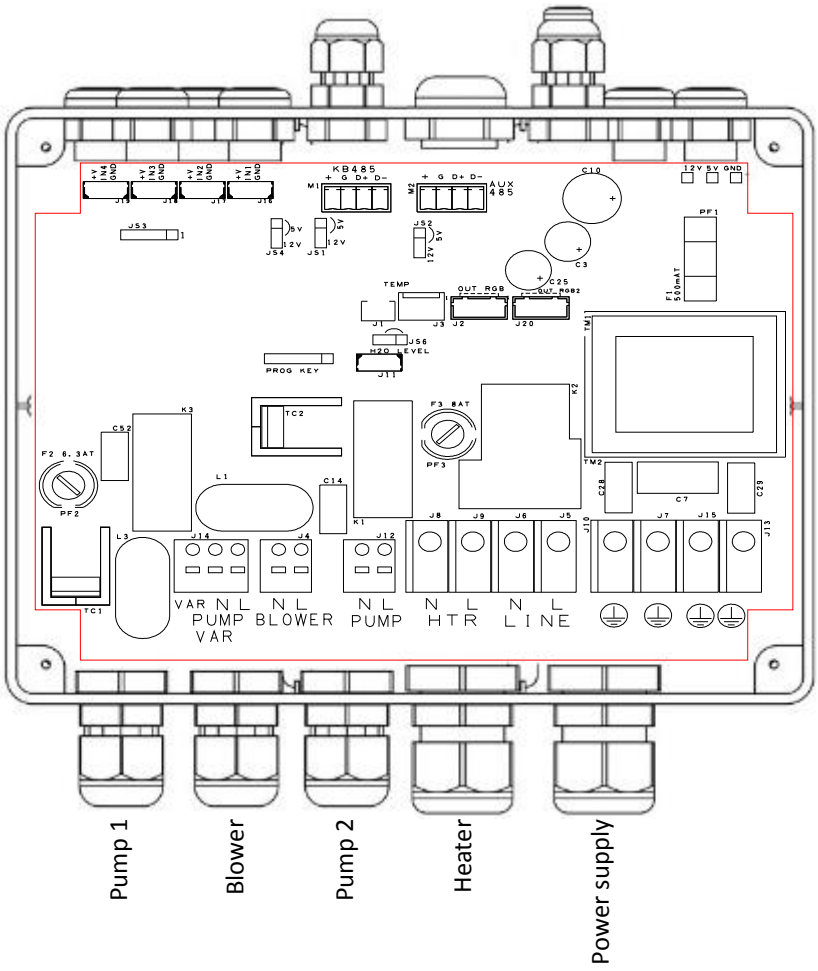
The outputs of Pump 1 (relay and triac) are protected by a single 8AT fuse.
The outputs of Pump 2 (relay) and Blower (triac) are protected by a single 8AT fuse.

4.3.3 Other connections

Description	**Notes**
4 x connection for ON/OFF keys	ONE.KI, ONE.KI DOUBLE keys
1 x RS485 master bus connection with selectable 12 or 5 V power supply	KAP.KI, ONE.KI TRIPLE, TEM.KI. user panels. DLC Led strip ECU, 2 spot ECU
1 x RS485 slave bus connection with selectable 12 or 5 V power input	RF REM.KI. remote control
2 x output for RGB SPOT 1W	
1 x level sensor input	
1 x water temperature probe input	

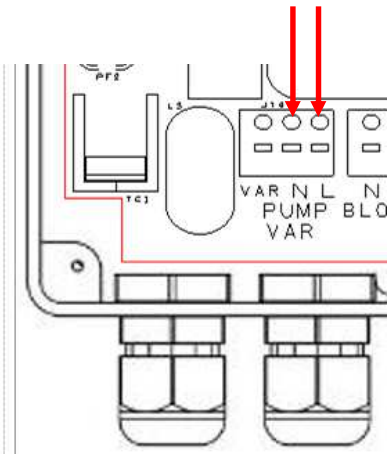
5. Connection of power supply and loads

The power supply and loads must be connected by inserting the wires through the relative cable glands and securing them to the spring terminals. The connection points are clearly indicated on the printed circuit (see figure).

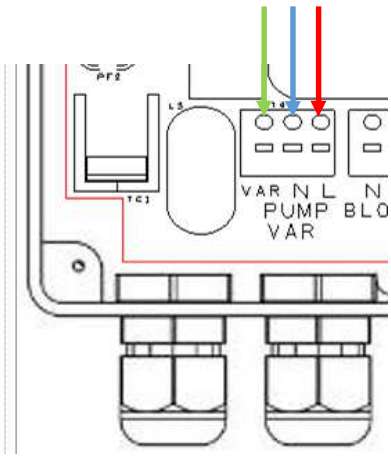


Caution. The wire is held in the spring terminal by mechanical pressure. It is advisable to check that the connection is secure by tugging gently on the wire.

Pump 1 can be connected in one of two ways, depending on whether it is a fixed speed or variable speed type.



Pump 1, fixed speed



Pump 1, variable speed type ASD ATL2

- Red: fixed speed
- Blue: neutral
- Green: variable speed

6. Accessories

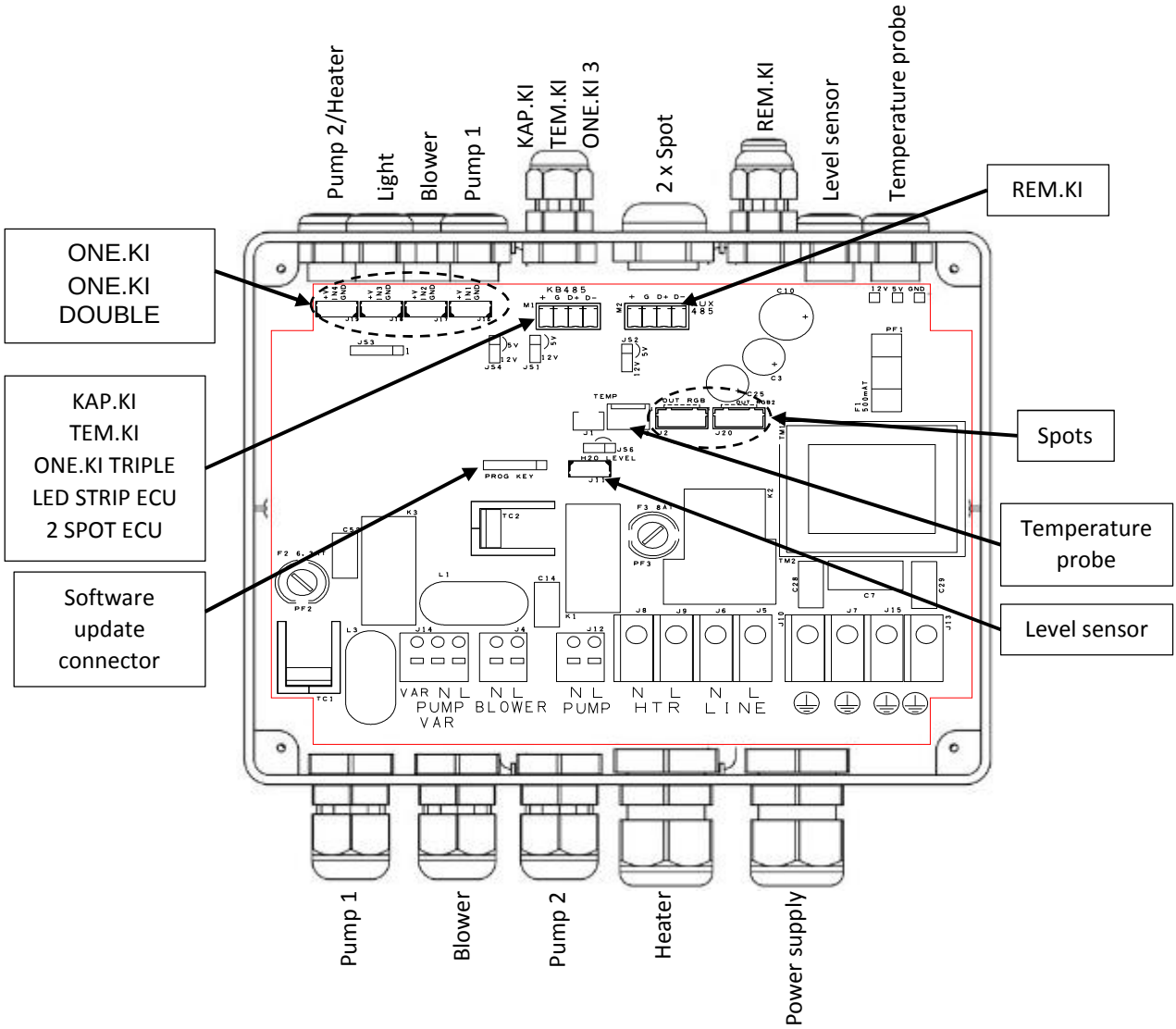
6.1 List of accessories

The following table lists the accessories that can be used with the Variation controller. The reader should bear in mind that devices listed in the **User panels/Keys** column cannot all be connected simultaneously, as in this case certain connection points would be duplicated, as also would the method of controlling the functions.

Description	Code	Notes
User panels/Keys		
Key ONE.KI	PFATICQ1xxxx	Cable 10A580A001, 240 cm, without gland
Key ONE.KI DOUBLE	PFATICQ2xxxx	Cable 10A580A001, 240 cm, without gland
Panel KAP.KI	PFATIC03xxxx	Cable 10A602A007, 180 cm, without gland
Panel TEM.KI	PFATICR4xxxx	Cable 10A602A007, 180 cm, without gland
Panel ONE.KI TRIPLE	PFATICR3xxxx	Cable 10A602A007, 180 cm, without gland
Base REM.KI	PFAIRB000000	Length of cable provided 350 cm
Radio control REM.KI	PFAIRTA00000	
Light		
RGB spot 1W	PFAASL000x01	Cable 10A627A006, 200 cm, for 2 spots, with gland
Led strip ECU	PFAICP100000	Length of cable provided 80 cm, with gland
2 spot ECU	PFA0S2000101	Cable with at least 3 x 0.35 mm^2conductor
Sensors		
Water temperature probe	98A540P010	Length of cable provided 300 cm, with gland
Level sensor	PFSELI05CCC1	Length of cable provided 175 cm, with gland
Fixing		
Wall mount bracket	140002AAXX	2 x bracket for ECU

6.2 Connection of accessories

The following figure shows the points at which accessories are connected on the PCB. It also shows which cable gland to use for routing the connection to a given accessory.



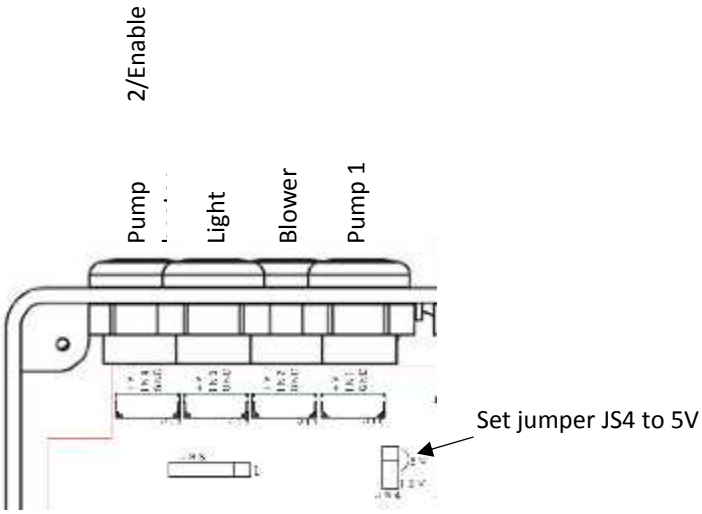
6.2.1 Connection of ONE.KI and ONE.KI DOUBLE keys

The ONE.KI and ONE.KI DOUBLE keys must be wired to dedicated connectors J16, J17, J18, J19.

The function associated with the key depends on the connector to which it is wired.

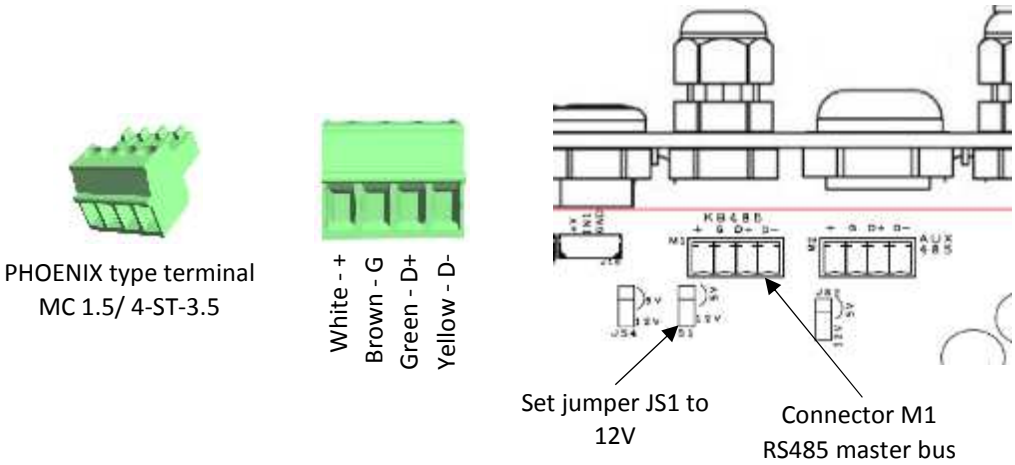
For the keys to function correctly, jumper JS4 must be set to 5V.

The illustration below shows the points to which the connectors of keys ONE.KI and ONE.KI DOUBLE are wired, and the associated functions in the case of standard software.



6.2.2 Connection to RS485 master bus

The following illustration shows the part of the circuit board on which the connector of the RS485 master bus is located.



Connection to the RS485 master bus requires a block type terminal, which is supplied (PHOENIX MC 1.5/ 4-ST-3.5 - see figure).

To connect multiple devices to the bus, the relative conductors must be inserted into the sockets of the terminal block, thereby creating a parallel connection.

The figure indicates the nature of the signal carried by each contact of the terminal block and the relative colour of the wire to be attached, using the cables specified in the "*List of accessories*".

The following accessories can be connected to the RS485 master bus:

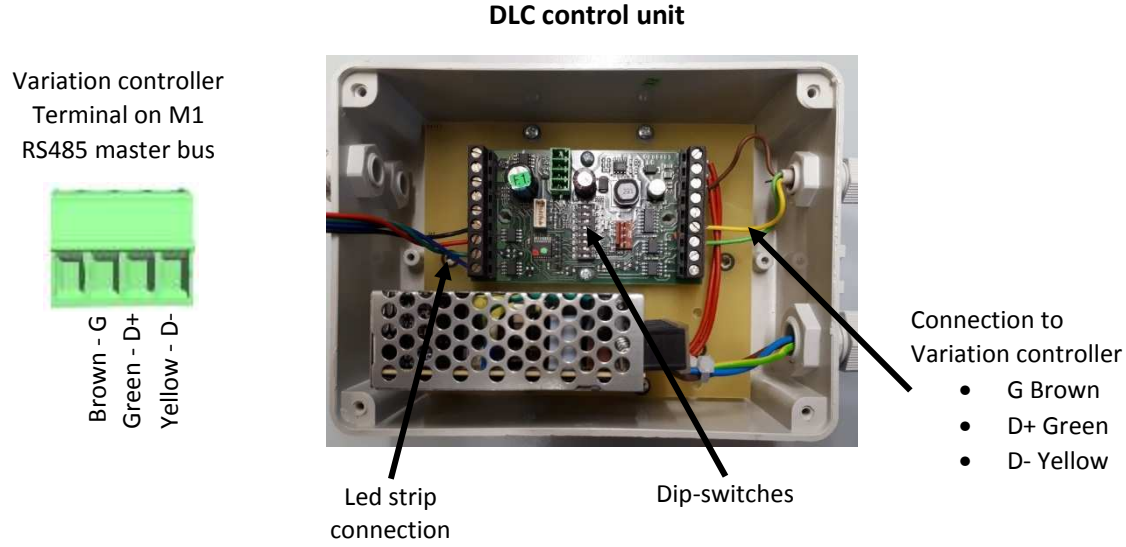
- user panel KAP.KI
- user panel TEM.KI
- user panel ONE.KI TRIPLE
- DLC Led strip ECU
- 2 spot ECU

For KAP.KI, TEM.KI and ONE.KI TRIPLE user panels, it is essential that jumper JS1 be set to 12V. In the case of other peripherals, the position of jumper JS1 is irrelevant.

Connection of DLC Led strip control unit

To connect the DLC Led strip ECU, the cable already attached to the actual DLC unit at one end needs to be adapted by removing the connector from the opposite end and peeling the conductors. These must then be wired up to the terminals, matching the colours in the same way as for the connection of the ONE.KI TRIPLE panel.

For more information, refer to the documentation prepared specifically for the DLC Led strip ECU.



The dip-switches of the 2 DLC control unit must be set as in the table below.

Dip-switches	1	2	3	4	5	6	7	8
Setting	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF

Connection of 2 spot control unit

The 2 spot ECU must be connected to the RS485 master bus using a cable with at least 3 conductors of 0.35 mm^2 section.

The following illustration shows how the cable is connected to the terminals on the Variation controller and on the 2 spot ECU. Also shown are the positioning of terminal M3 and of the dip-switches on the 2 spot ECU.

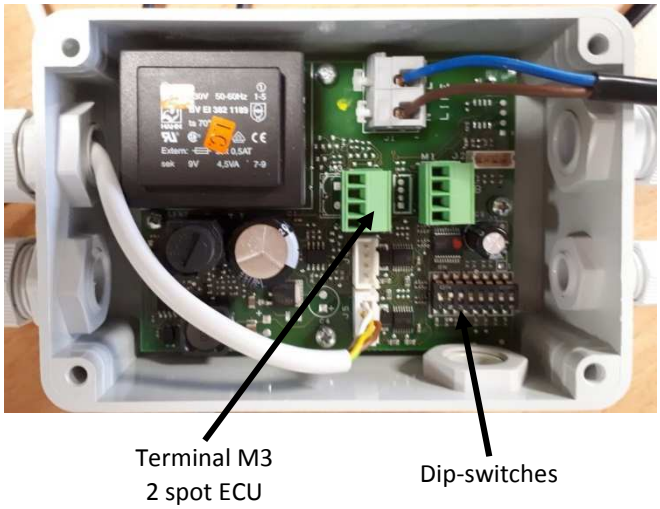
Variation controller
Terminal on M1
RS485 master bus

Brown - G
Green - D+
Yellow - D-

2 spot ECU
Terminal on M3
RS485 master bus

Green - D+
Yellow - D-
Brown - G

2 spot ECU



The dip-switches of the 2 spot ECU must be set as in the table below.

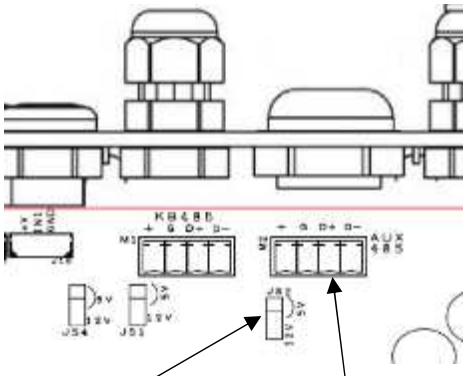
Dip-switches	1	2	3	4	5	6	7	8
Setting	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF

6.2.3 Connection to RS485 slave bus

The following illustration shows the part of the circuit board on which the connector of the RS485 slave bus is located.

PHOENIX type terminal
MC 1.5/ 4-ST-3.5

White - +
Brown - G
Green - D+
Yellow - D-

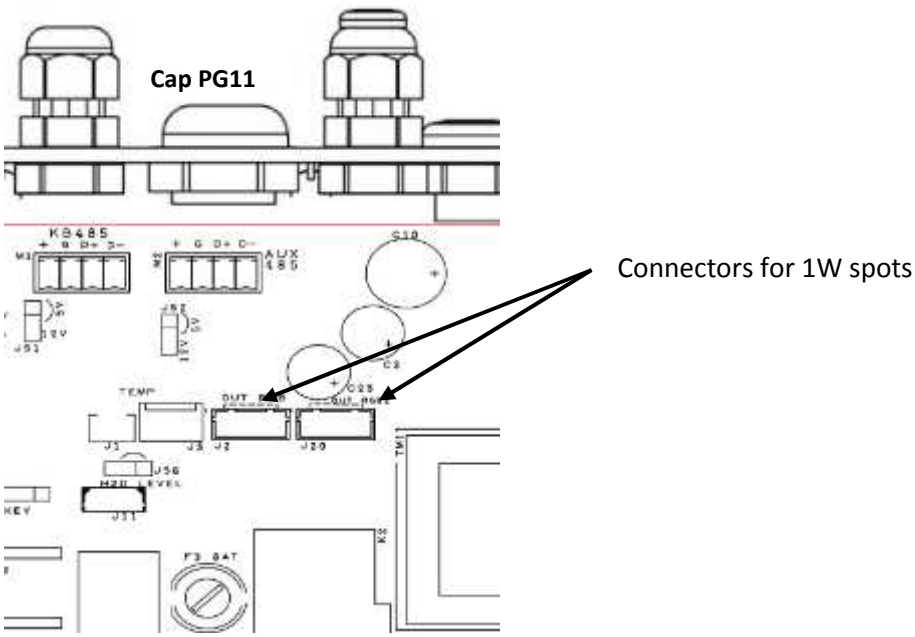


Connection to the RS485 slave bus requires a block type terminal, which is supplied (PHOENIX MC 1.5/ 4-ST-3.5 - see figure); due care must be given to the nature of the signal carried by each contact of the terminal block and the relative colour of the wire to be attached.

Only the base of the REM.KI radio remote control can be connected to the RS485 bus. Jumper JS2 must be set to 5V.

6.2.4 Connection of RGB spots

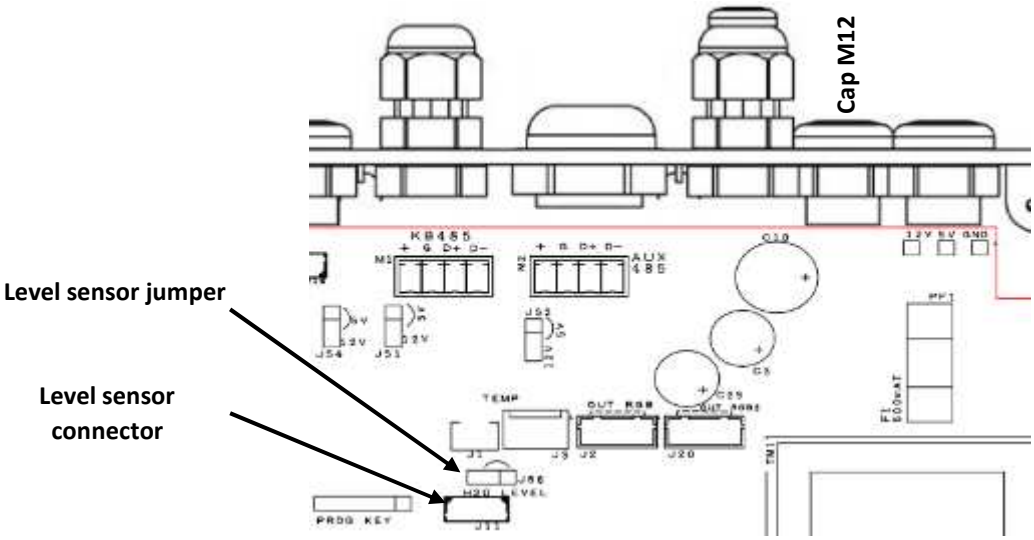
The following illustration shows the position of the connectors for plugging in the 2 RGB spots rated 1W.



To connect the spots, proceed as follows:

- remove cap PG11;
- feed the end connectors of cable 10A627A006 through the hole exposed by removing the cap;
- slip nut PG11 over the cable internally of the housing;
- plug in the connectors at the points (J2 and J20) indicated;
- secure the gland PG11 by tightening the nut.

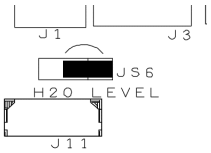
6.2.5 Connection of level sensor



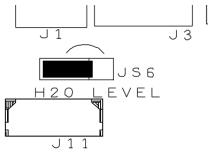
The level sensor must be wired to connector J11. The sensor is supplied with cable and gland preassembled. To connect the sensor, proceed as follows:

- remove cap M12;
- remove the nut from the sensor cable
- feed the end connector of the sensor cable through the hole exposed by removing the cap;
- slip the nut over the cable internally of the housing;
- plug the connector into J11
- secure the gland M12 by tightening the nut.

Jumper JS6 must be positioned as illustrated below, according to whether or not the level is physically installed.

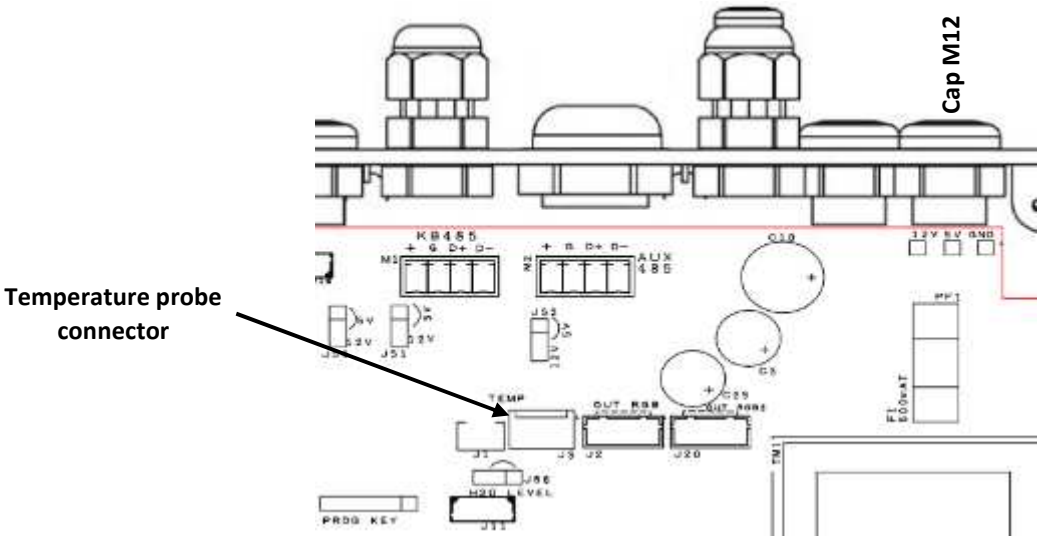


Level sensor not installed



Level sensor installed. The jumper can also be removed if preferred.

6.2.6 Connection of water temperature probe

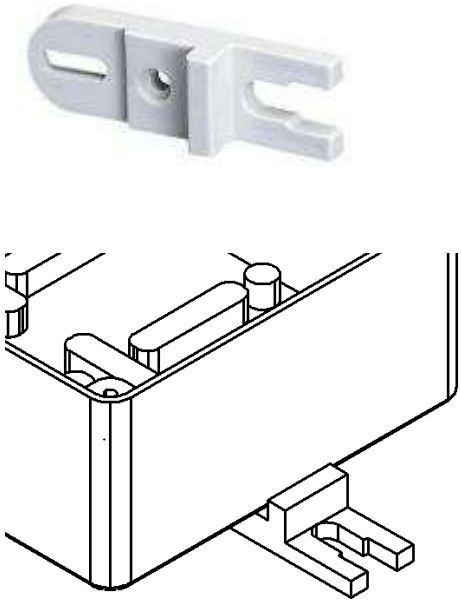


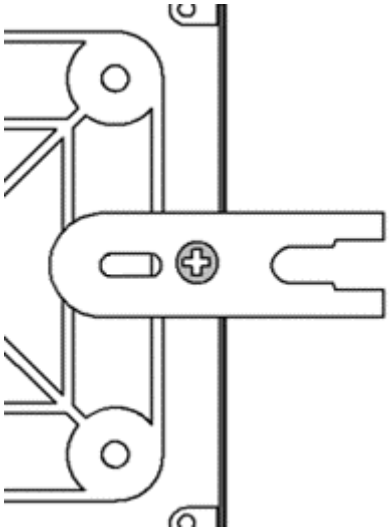
The level sensor must be wired to connector J3, as shown in the illustration. Feed the cable through the hole exposed by removing cap M12 indicated. Finally, secure the cable by tightening the gland through which it is already inserted.

7. Fixing

The method of fixing the controller is left to the discretion of the end product manufacturer. It is important to avoid mechanical stresses that might damage the plastic casing. Also, the degree of protection against ingress of water must not be jeopardized.

If required, in any event, wall-mounting brackets are available (Astrel Group code 140002AAXX, 2 pcs per single ECU, fixed with screws to the bottom of the housing).





8. Models of user panel

8.1 General indications

Various types of user panel can be connected to the Variation controller, singly and simultaneously.

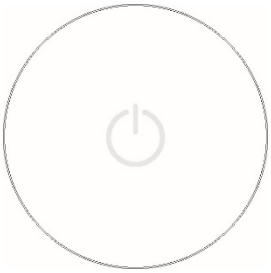
The controller is able to determine automatically which user panels are connected to the RS485 master and slave buses.

The different models of user panel available will provide control over the same set of functions. In other words, a given function can be activated and deactivated from different user panels. Accordingly, the number of panels to be used, and the model, should be selected with care so as to avoid any redundancy.

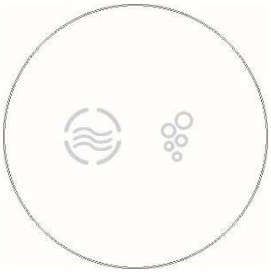
The features of the various user panels are described in brief below.

8.2 ONE.KI and ONE.KI DOUBLE keys

These are panels with 1 or 2 keys and backlighting in two colours, white and blue.



ONE.KI



ONE.KI DOUBLE

The function attributed to the action of the user depends on the connector to which the key is wired.
Both panels require 5V power supply.
They are used as alternative options: 1 x ONE.KI DOUBLE panel or 2 x ONE.KI panel.

8.3 KAP.KI panel

A high end panel having 6 keys, two-colour white and blue backlighting, and a display with 2 x 7-segment blue digit.

It communicates with the controller via the RS485 master serial bus. Requires 12V power supply.

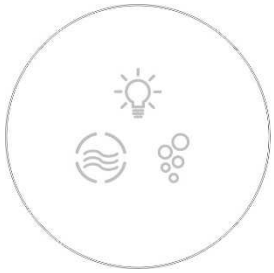
8.4 TEM.KI panel

A panel having keys with white backlight and a display with 2 x 7-segment blue digit.

It communicates with the controller via the RS485 master serial bus. Requires 12V power supply.
The TEM.KI is used to display the water temperature and change the relative set point.

8.5 ONE.KI TRIPLE panel

A panel having 3 keys with two-colour white and blue backlighting.



It communicates with the controller via the RS485 master serial bus. Requires 12V power supply.

8.6 REM.KI radio remote control

A radio frequency remote handset providing control over all functions.

To enable operation of the handset, the REM.KI base (code PFAIRB000000) must be connected to the RS485 slave bus and jumper JS2 set to 5V.

Detailed information on the use of the REM.KI remote control can be found in the document “ - Modo VS2 Manuale d'uso”.

8.7 Examples of panel selection

The following table indicates the functions typically available and the appropriate panels to select.

Pump 1	Pump 2	Blower	Heater w/o thermostat	Heater with thermostat	Spots	Temp probe		Panel	Notes
X	X	X	X		X	X		KAP.KI	
X	X	X		X	X	X		KAP.KI	Temperature display only
X		X	X		X	X		KAP.KI	P2 key unavailable
X		X		X	X	X		KAP.KI	Temperature display only P2 key unavailable
X		X	X		X	X		ONE.KI TRIPLE TEM.KI	Select 1 x ONE.KI TRIPLE or alternatively 3 x ONE.KI.
X		X		X	X	X		ONE.KI TRIPLE TEM.KI	Select 1 x ONE.KI TRIPLE or alternatively 3 x ONE.KI. Temperature display only
X	X	X	X		X	X		REM.KI	
X	X	X			X			4 ONE.KI o 2 ONE.KI DOUBLE	
X		X		X	X			4 ONE.KI o 2 ONE.KI DOUBLE	

9. How user panels are utilized

9.1 General indications

As a general rule, for all panels except the REM-KI remote control:

- to activate any of the pump, blower or light functions, simply press the relative key and release, without holding; to deactivate, the key must be pressed and held;
- the key backlight colour is blue as long as the relative function remains activated, and white when the function is deactivated;
- when different types of panel are in use, any action on one panel influences the status of the display on the others.

The same considerations apply for the REM.KI remote control, except that the keys have no blue backlight; the colour is white only, but with different levels of brightness indicating the active or inactive status of the relative function.

9.2 ONE.KI and ONE.KI DOUBLE keys

The Variation controller attributes a function to the ONE.KI (DOUBLE) keys according to the connectors they are associated with (See also “Connection of accessories”)

- J16 →Pump 1
- J17 → Blower
- J18 → Light
- J19 → Pump 2 (or enables heater if the dip-switch settings reflect a configuration with one pump only).

To activate any one of the pump 1, pump 2 (heater) or blower functions, simply press the relative key and release, without holding. To deactivate the function, conversely, the key must be pressed and held (at least 1 second) until deactivation occurs.

To set the speed of variable speed loads (pump 1 and blower) at one of 5 levels (minimum 1, maximum 5):

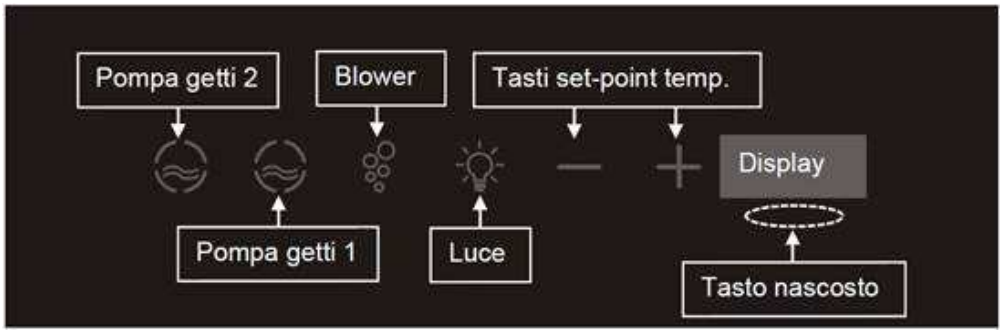
- pressing the key at first and releasing immediately, the motor will start up at level 5 (maximum speed);
- pressing the key repeatedly thereafter, the speed will change in the following sequence: 5 → 1 → 2 → 3 → 4 → 5;
- Pressing the key and holding (at least 1 second), the motor will be shut off.

The key backlight colour is blue as long as the relative function remains activated, and white when the function is deactivated; No indication is given as to the current speed level of the load.

The function of the heater key, when installed (pump 2 key if there is no second pump), is to enable the heat source: the key backlight colour is white for disabled status, and blue for enabled status.

9.3 KAP.KI panel

The illustration below shows the KAP.KI panel and the association of the keys with the various functions.



When the system is powered up, the panel automatically runs a startup procedure: this allows the user to check that all display elements are working as they should, and to view the firmware version of the Variation controller to which the panel is connected.

As a rule, only the keys that can be used at this particular moment will be backlit. Keys associated with functions not actually installed are never illuminated; for example, there will be no backlight on the pump 2 key if the controller has been configured by way of the dip-switches for use with only one pump.

The status of the panel can change during operation, between:

- normal
- speed selection
- temperature set point selection

9.3.1 Normal status

This is the status assumed normally by the KAP.KI panel.

Visual aids

- Display. Current water temperature. Indicates the value read by the Variation controller.
- Backlighting of function keys. Status of functions: activation (permanently alight, white when deactivated; blue when activated) or availability (off when unavailable).
- Backlighting of PLUS/MINUS keys. Bright white, permanently alight, only if heater is installed and without thermostat. Otherwise no backlight, and PLUS/MINUS keys disabled. In the event of the temperature set point value being equal to the maximum permissible, the backlight will disappear from the PLUS key. In the event of the temperature set point value being equal to the minimum permissible, the backlight will disappear from the MINUS key.

Possible user actions

- Activation/deactivation of functions by pressing the associated key momentarily.
- Transition to water temperature selection status by pressing the PLUS key or the MINUS key.
- Transition to speed selection status by pressing the pump 1 key (only if configured for variable speed via dip-switch) or the blower key. This transition will take place only if the key is pressed when the function is active.

9.3.2 Speed selection status

Visual aids

- Display. Current speed level (1 to 5) of the selected function (pump 1 or blower).
- Backlighting of key associated with the selected function: alternates between blue when active and white when inactive.
- Backlighting of function keys. Status of functions: activation (permanently alight, white when deactivated; blue when activated) or availability (off when unavailable).
- Backlighting of PLUS/MINUS keys. In the event of the speed value being equal to the maximum permissible, the backlight will disappear from the PLUS key. In the event of the speed value being equal to the minimum permissible, the backlight will disappear from the MINUS key.

Possible user actions

- Activation/deactivation of functions by pressing the associated key momentarily.
- Transition to water temperature selection status by pressing the PLUS key or the MINUS key.
- Change of speed level by pressing the PLUS or MINUS key.
- Pressing the key of the selected function (pump 1 or blower), the panel reverts to normal status (temperature display). Alternatively, the panel will revert to normal status after 10 seconds have elapsed since any key was last pressed.

9.3.3 Temperature selection status

The display indicates the selected temperature set point. This can be changed by means of the PLUS or MINUS keys. When the value is at the minimum level, the backlight disappears from the MINUS key; when at maximum level, the backlight disappears from the PLUS key.

9.3.4 Further information

The KAP.KI panel will also transition to speed selection status when the user sets the speed by way of the ONE.KI key.

In the event that a temperature sensing error should occur, the KAP.KI panel shows the message “Er” in place of the water temperature value usually displayed during operation (normal status). To remove the error message, the cause of the problem must be eliminated, and the controller switched off and on again.

9.4 TEM.KI panel

The TEM.KI panel allows the user to display the water temperature and select the set point, following the same procedures as for the KAP.KI panel.

In the event that a temperature sensing error should occur, the TEM.KI panel shows the message “Er” in place of the water temperature value usually displayed during operation. To remove the error message, the cause of the problem must be eliminated, and the controller switched off and on again.

9.5 ONE.KI TRIPLE panel

This panel combines the function of 3 distinct ONE.KI keys in a single device, using the same procedures. The only difference is that the TRIPLE version uses a RS485 serial connection.

10. Description of operation

10.1 Configuration

The operation of the controller can be customized by means of the dip-switches located on the PCB.

DIP-SWITCH	FUNCTION	OFF	ON
DIP 1	Number of pumps	1 pump	2 pumps
DIP 2	Speed, pump 1	Fixed	Variable
DIP 3	Function timer	NO TIMER	TIMER 20 min.
DIP 4	Heater	Not installed	Installed
DIP 5	Heater with thermostat	NO	YES
DIP 6	FW customization	X	
DIP 7	FW customization	X	
DIP 8	FW customization	X	

Dip-switches 6, 7 and 8 define the firmware customization. The OFF, OFF, OFF setting indicated in the table relates to the standard firmware (specified in this document); the other configurations are for customizations requested by customers.

In the event that the system is configured for pump 1 only (see dip-switch), the ONE.KI key utilized normally to activate pump 2 is designated automatically to the function of enabling the thermostat-controlled heater.

CAUTION. To enable variable speed operation of pump 1, it is essential:

- that the necessary electronic components are mounted on the Variation PCB;
- to use a pump with a dual winding motor, type ASD ATL2.

The Variation controller detects the positioning of the dip-switches when powered up. To ensure correct operation of the system, it is advisable to set the dip-switches when the controller is not powered up.

10.2 User functions

10.3 PUMP function (pump 1 and pump 2)

Activated by pressing the associated key momentarily; deactivated by pressing the key and holding until off.

When pump 1 is deactivated by the user, it will continue running for a given interval in order to ensure that the heater does not overheat. This condition (pump turned OFF by the user but still in operation to cool the heater) is indicated by the backlight of the pump key, which blinks.

10.4 BLOWER function

Activated by pressing the associated key momentarily; deactivated by pressing the key and holding until off.

The speed of the blower is variable through 5 levels (minimum 1, maximum 5). For full instructions, reference can be made to the section describing the selected user panel

10.5 Light function

This consists in turning on the coloured light source (RGB spots connected to the Variation controller, or other light sources connected to the DLC or 2-spot ECU) and in either varying the colours by activating a preset sequence, or retaining a fixed colour. The transition from one colour to another occurs with a fade-out fade-in step of 2 seconds duration. The following table indicates the sequence of colours.

Colour	Persistence
White	15 s
Red	15 s
Orange	15 s
Yellow	15 s
Green	15 s
Blue	15 s
Indigo	15 s
Violet	15 s

Pressing the light key momentarily, the function will be activated for 30 minutes in colour sequence mode.

Once activated, pressing the light key momentarily a second time will freeze the colour showing at that particular moment. Pressing the key repeatedly thereafter, the light will cycle through the colours listed in the table.

10.6 Heater function

The operation of this function depends on the type of heater set by way of the dip-switch: with or without thermostat control.

Heater without thermostat

In this case the tub must have a water temperature probe installed.

The water heating function will activate only if:

- the heater is installed (dip-switch);
- the water temperature is currently below the set point;
- pump 1 is active (the pump by which water is directed through the heater).

The default temperature set point is 33 ℃. The wat er temperature set point can be changed by way of the user panels, but the selected value will not be saved by the non volatile memory. Consequently, if the controller is powered down, the set-point will revert to the default value.

The function can be enabled by selecting a set point higher than the actual temperature of the water.

Heater with thermostat

In this case the water temperature probe is required only for the purpose of indicating the temperature value on user panels equipped with a display. It has no actual temperature control function.

The water heating function will activate only if:

- the heater is installed (dip-switch);
- the function is enabled; at the moment when the controller powers up, the function is disabled;
- pump 1 is active (the pump by which water is directed through the heater).

The function can be enabled by pressing the relative key (ONE.KI and REM.KI) when pump 1 is active, and disabled by pressing this same key a second time.

Deactivating Pump 1 also has the effect of disabling the heater.

When a thermostat-controlled heater is in use:

- selection of the temperature set point is disabled; the PLUS and MINUS keys on the user panels remain off.
- temperature control is disabled: the heater relay remains closed until such time as the heater is enabled. If KAP.KI or TEM.KI are installed, these serve only to display the temperature, or an alert that the probe is faulty/disconnected.

Coordination of pump 1 and heater

To avoid the risk of overheating caused by an insufficient flow of water to the heater, the Variation controller runs specific safety sequences before connecting or disconnecting the heater to or from its power source. More exactly:

- pump 1 must be in operation for at least 15 seconds before the heater switches on;
- pump 1 must keep running for 30 seconds before the heater switches off.

In other words, if the user deactivates pump 1 while the heater is still on, the pump keeps running for 30 seconds. This condition is indicated by the backlight of the pump 1 key, which will blink.

10.7 Timer functions

If active (dip-switches), the pump 1, pump 2 and blower functions are timed to deactivate after 20 minutes.

Each function has an independent timer that begins counting down whenever the user activates the function.

The timers of the pump 1, pump 2 and blower functions will restart if the user presses the key associated with the single function when active. The purpose of the timer is to limit the duration of the function.

The maximum duration of the light function is 30 minutes, irrespective of any timer setting. This timer restarts whenever the user presses the light key.

10.8 Level sensor safety

The Variation controller offers the facility of connecting a water level sensor such as will disallow the activation of the pump 1 and pump 2 function in the event that water cannot be detected in the tub. If either key is pressed with the water level low, the white backlight will blink for 5 seconds to warn the user that the function is currently inhibited.

If there is no level sensor connected to the controller, the necessary level of water in the tub must be simulated by placing a jumper across the dedicated connector (see "Connection of level sensor").

10.9 Blowing after

The purpose of this function is to remove any residual water from the pipes when the tub is emptied.

This is an accessory function that cannot be activated by the user, but can operate only after the level sensor has indicated the presence of water for at least 2 minutes. It comprises the steps of:

- checking that the level sensor does not detect any water for 12 minutes (after indicating its presence for at least 2 minutes);
- activating the blower at maximum speed;
- maintaining maximum speed for 75 seconds;
- deactivating the blower.

With blowing after in progress, the backlight of the dedicated blower key indicates that the blower function is deactivated. The blowing after function can be stopped by pressing and holding the key for more than 1 second. In this situation, the blower after procedure will be reinitialized.

Should it happen that the presence of water is detected again during the blowing after procedure, it will be deactivated.

If there is no level sensor, the blowing after function will not activate. There is no way the function can be activated manually from a user interface.

10.10 Disinfection

The tub can be disinfected only when all functions (including the light) are deactivated and the the presence of water is detected by the level sensor. Disinfection involves the following sequence of steps:

- on the KAP.KI panel, pressing the hidden key and then, within 3 seconds, the pump 1 key. The pump 1 key blinks to indicate that the system is awaiting confirmation, which the user gives by pressing the light key within 10 seconds; in the absence of confirmation, the panel reverts to normal status;
- with ONE.KI keys, pressing and holding the pump 1 key, then simultaneously pressing the light key, then releasing both; the backlight of the two keys will alternate between white and blue to indicate that the system is awaiting confirmation, which the user gives by pressing the light key within 10 seconds;
- on the REM.KI remote control, pressing the disinfection key and the light key and holding for at least 2 seconds; the backlight of the disinfection key blinks bright white to indicate that the system is awaiting confirmation; the user must respond within 10 seconds by pressing and holding the disinfection key for at least 2 seconds;

All key backlights will blink for the duration of the disinfection procedure. All user functions remain disabled.

Once the disinfection cycle has been activated, it cannot be ended except by isolating the controller from the power supply.

Disinfection involves the energization of a 230V solenoid valve, which requires a power source. The relay of pump 2 or of the heater can be used for this purpose.

- If the dip-switches have been configured for operation with one pump only, then the relay of pump 2 can be used.
- If the system is configured for operation with 2 pumps but there is no heater, then the heater relay can be used.
- If the dip-switches are set for operation with both pump 2 and heater, the disinfection cycle cannot be activated.

The disinfection cycle consists in the steps of:

- energizing the solenoid valve for 5 seconds;
- thereafter, activating pump 1 (at maximum speed, if variable speed type) for 10 minutes.

Once the disinfection cycle has ended, user functions pump 1, pump 2, blower and light can be activated only:

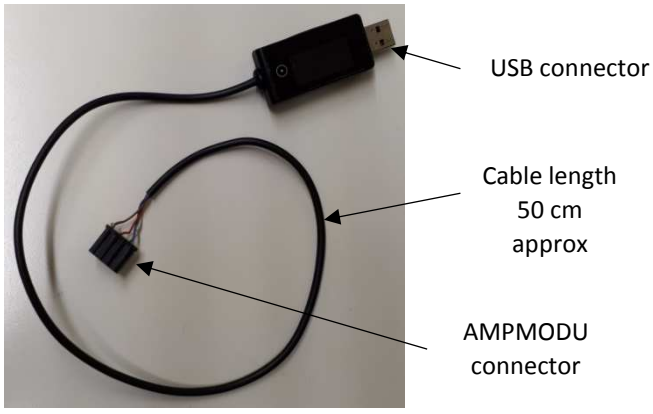
- if the controller is first isolated from its power source;
- or, having verified that the tub has been empty for at least 2 minutes; during the interim, when the user functions cannot be activated, all key backlights will blink.

11. Software update

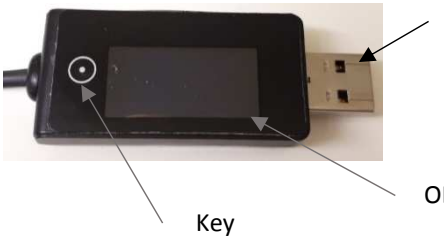
The firmware can be updated using flash drive PFHPXMPR0000. This is a device that allows the user to:

- store programming files in binary format by plugging into the USB port of a PC;
- download one of the stored files to the control unit due for updating.

The flash drive is illustrated in the following image.



In addition to the USB connector, the body of the drive incorporates an OLED display and a key.



Caution. In the event of malfunction, proceed to format the drive (FAT file system).

11.1 Memorization of programming files

Once connected to the USB port of a PC, the flash drive functions as a normal mass storage device of 2 MB capacity. Accordingly, programming files can be copied to the drive in binary format (files with .bin extension) using the customary tools provided by the operating system installed on the PC (e.g. Windows Explorer). The files must be copied to the root folder, without creating sub-folders.

Remember that it is advisable to follow the safe removal procedure before disconnecting the flash drive.

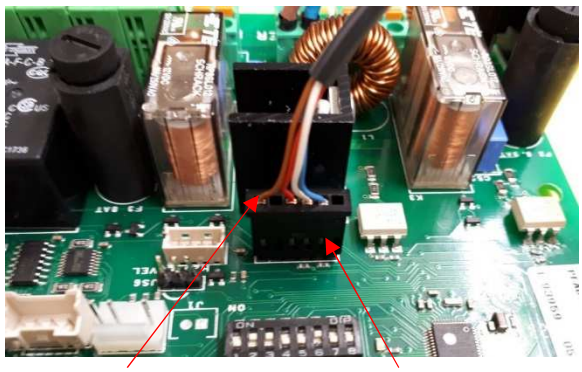
11.2 Updating the control unit

To update the ECU, proceed as follows:

1. before powering up the ECU, plug in the drive using the AMPMODU connector;
2. disconnect the devices wired to the AUX 485 cionnector;
3. power up the ECU;
4. select the file with which to update the ECU;
5. start the update procedure and wait for it to be completed.

11.2.1 Connection of flash drive to ECU

With the ECU powered down, plug the AMPMODU connector into the connector marked PROG KEY on the circuit board, observing the position indicated in the figure below (brown wire on the AMPMODU connector directed toward the water level sensor - H2O LEVEL).



11.2.2 Firmware download

Having connected the flash drive to the control unit, the unit can be powered up. The display on the drive shows the list of files stored.

List of files

The selection can be changed by pressing the key repeatedly to scroll down the list until the required file is highlighted. The selection scrolls in one direction only, returning to the first item after the last has been reached. Bear in mind that if the stored files are many in number, the list may occupy multiple screens.

To confirm the selection, the key must be pressed and held. The display will show a screen prompting confirmation to start the download (see figure below).

Screen showing prompt to start download

Pressing the key and releasing, the procedure will begin. Pressing the key and holding, the display will return to the list of files.

On starting the download, the display shows a start download screen with dimmed brightness. After a few seconds, a screen appears showing the progress of the operation.

Start download screen

Progress screen

Should an error occur during the download procedure, the display will revert to normal brightness and show an abort alert, indicating an error code.

Screen showing error

The following illustration shows the screen that appears when the download has been successfully completed.

Download successfully completed

The controller firmware has been updated. Switch off the ECU and disconnect the flash drive.

12. Safety and disposal

Electrical and electronic equipment requiring sorted collection, in compliance with local regulations on waste disposal currently in force.

Astrel Group reserves the right to change product specifications without notice.

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