Astrel

MSPA CONTROLLER

INSTALLATION AND USER MANUAL

Index

1. General warnings

Before installing or operating on the appliance, read carefully and follow the instructions contained in this manual. The information on installation refers to the electrical connections. No information is provided on the mechanical or plumbing fittings for connecting the MSPA controller to the minipool.

This manual is an integral part of the product and therefore must be kept for future reference.

Astrel S.p.A. reserves the right to make any modifications it considers necessary without prior warning or replacement.

1.1. Responsability of the user

The device described in this manual has been manufactured to operate risk-free and for the specific purpose, as long as:

- the device is installed, programmed, operated and serviced according to the instructions in this manual;
- the environmental conditions and the power supply are within the specified limits.

All other uses and modifications made to the device that are not authorised by the manufacturer are considered incorrect.
Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.

In the event of faults or malfunctions of the product under warranty, contact authorised technical personnel only.
The manufacturer is not liable for any damage caused by products that have been tampered with or repaired incorrectly.

1.2. Accessing the live parts

This device contains live electrical components. Consequently, all the service and maintenance operations must be performed by expert and qualified personnel, after having taken the necessary precautions.

As the MSPA controller does not feature any internal systems for disconnecting the power supply, the power line must be fitted with disconnecting and protection devices compliant with the standards in force in the country of installation.

Before accessing the inside parts, the unit must be disconnected from the mains power supply using a disconnecting switch.

1.3. Precautions when handling the board

To avoid damage of an electrostatic nature to the board, the following precautions must be adopted.

- Before handling the controller, the board or any electronic component, touch a grounded object so as to discharge the electrostatic charges present on the body and on the clothing.

- The materials must remain as long as possible inside their original packages; when having to remove the board from the antistatic packaging, touch it as little as possible.

- Never use plastic, polystyrene or non-antistatic sponge bags for packaging the board.

Never pass the unpackaged boards, as described previously, between operators (to avoid electrostatic induction and consequent discharges).

The following suggestions should be heeded to prevent potential problems during the life of the product:

- do not install the controller in environments with high levels of relative humidity, exposure to direct pressurised jets of water, high levels of magnetic and/or radio frequency interference.
- use cable ends suitable for the corresponding terminals and the cross-section of the wires used; tighten the cable terminals and slightly tug the cables to check that they are sufficiently tight.
- separate as much as possible probe cables, keypad cables and sensor cables from the power lines and cables supplying power to the inductive loads.
- protect the controller and the user with suitably rated electrical protection devices, in compliance with the standards in force of the country of installation.

1.5. Disposal and cleaning

The controller is made up of metal and plastic parts. These should be disposed of according to the local legislation in force.
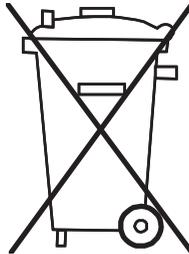
The controller should be cleaned only outside using neutral detergents and/or water.

2. General description

The MSPA series controllers are electronic controllers used in spas (or minipools). These are whirlpool tubs fitted with stations for multiple users, which include a system for heating, filtering and sanitising the water.
The MSPA controllers can manage the functional loads (that is, the loads controlled by the user) such as the whirlpool pumps, the blower and the lights, and the "service" loads, such as the heater and the ozonizer, which are controlled without the user acting directly.
The MSPA controllers can also be connected to a number of optional accessories.

Externally, the controller has a plastic case with IP65 index of protection.

Pump connectors

Power cable input

230 Vac connectors

Keypad and optional accessory cable inputs

Cover to remove to access the board and the terminal block

Front view

Pump connectors

Power cable input

230 Vac connectors

Left view
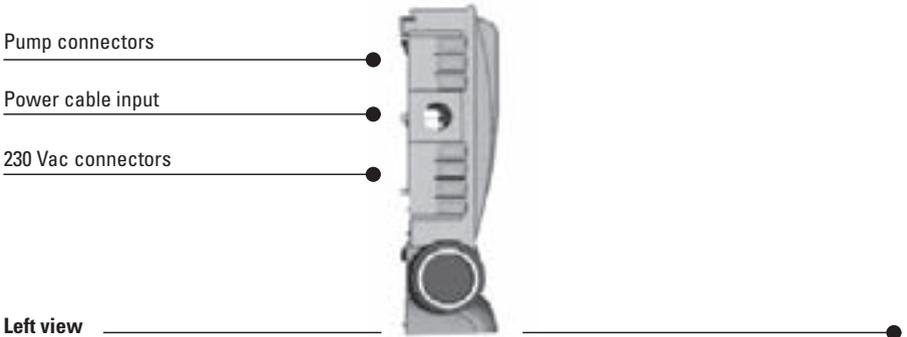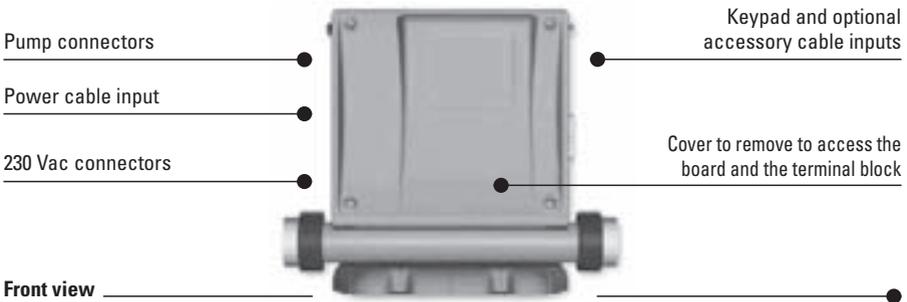
As can be seen in the figure above, the left side has J&J connectors for connecting the 230 VAC loads. On the right side, on the other hand, are openings for passing the connection cables to the keypads and to the optional external units.

The inside of the controller can be accessed by removing the front cover, unscrewing the 4 screws on the corners of the cover.
Depending on the model, the electronic board may be or may be not protected by a cover sheet (plastic or metal).

3. Installing the MSPA controller

The MSPA controller is installed by following the steps listed below:

- mounting (on the horizontal or vertical plane);
- connection to the power supply;
- connection of the loads;
- connection to the external units;
- connection of the lights.

The order shown for performing the steps is purely indicative and needs to be adapted according to the features of the minipool.

The controller can be secured either on a vertical or horizontal surface. In both cases, the controller must be fastened onto the plastic support bracket, supplied.
To fasten the controller, use screws to secure the support bracket and the controller to the structure of the minipool.
The type and the length of the screws must be chosen based on the features and the thickness of the material they are being screwed into.

3.1. Fastening vertically

To fasten the controller to a vertical surface (wall), proceed as follows:
- position the bracket horizontally so that the flat part sticks to the wall, and secure it using three screws.
- clip the controller to the bracket using the special guides;
- secure the controller to the wall using two screws through the slots at the top.

Front view.
Position of the
slots for fastening
the controller.
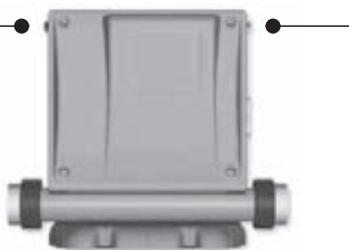
Left view.
Position of the
guides for clipping
the controller to
the plate.
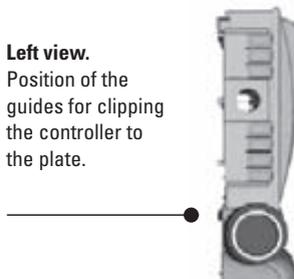
3.2. Fastening horizontally

Before fastening the controller to a horizontal surface, make sure that the surface is flat and not at an angle. Then proceed as follows:

- secure the support bracket to the surface, using three screws; the bracket should be positioned with the flat bottom facing downwards.
- press the controller against the bracket until the bottom of the controller clips onto the bracket;
- fasten the pack support to the surface with two screws in the special guides located on the base.

If the controller has been fastened correctly it will not be able to move in any direction.

Front view.
Position of
the guides for
fastening the
controller.

Left view.
Position for
clipping the
controller to the
plate.
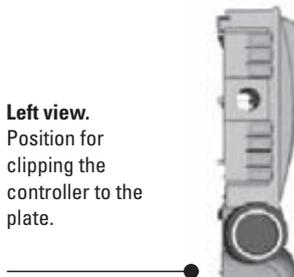
IMPORTANT:
Read carefully this paragraph before connecting the controller! Failure to observe the instructions contained in this paragraph may cause serious damage to the controller and to the other electrical devices installed.

3.3.1. General description

To connect to the power supply first remove the cover from the controller. The power cable should be connected to the terminal located on the left of the board.
The MSPA controllers feature different types of power supply:

- single-phase: 230 V, 50/60Hz, 32 A
- two-phase: 400 V with neutral, 50/60Hz, 16 A per phase
- three-phase: 400 V with neutral, 50/60Hz, 16 A per phase

The type of power supply selected must be correspond to:

- the setting of the jumpers located on the electronic board (see "Configuration using the jumpers");
- the position of other jumpers present on the board (for the distribution of the power supply to the loads).

These settings should be checked to make sure they correspond to the type of power supply.

The type of connection chosen affects how the loads are managed by the controller, and should be configured using the jumpers located on the electronic board (see "Configuration using the jumpers").

In addition, the board features other jumpers that must be suitably set according to the number of power supply phases. To access these jumpers remove the inside protection cover on the board, if present. Then check the position of the jumpers according to the diagrams shown further on.
The Pxx markings referred to for the power supply are silk-screened on the board near the jumper connector.

The table below shows the recommended connections according to the type of heater used.

		HEATER	
		Laing	Horizontal
Type of connection	1 phase 230 V, 32 A	No	Yes
	2 phase 400 V with neutral, 16 A per phase	Yes	Yes
	3 phase 400 V with neutral, 16 A per phase	Yes	No

3.3.2. Single-phase connection, 1 x 32 A

In this mode, the MSPA controller is connected to just one phase, and the maximum current drawn by the device is 32 A.
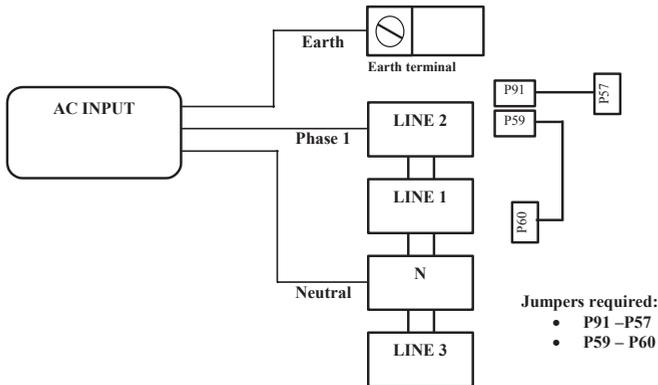
Single-phase connection, 230 Vac, 32 A, 50/60 Hz

3.3.3. Two-phase connection, 2 x 16 A

In this mode, the MSPA is connected to two phases and neutral, with the maximum current drawn by the device equal to 2x16 A.
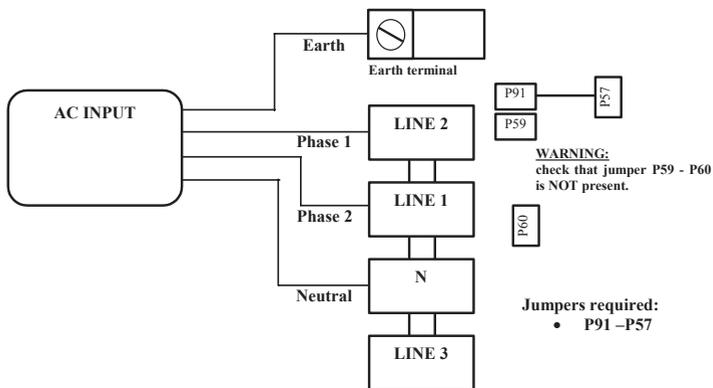
Two-phase connection, 400 Vac + N, 2 x 16 A, 50/60 Hz ━━━━━━━━━━━━━━━━━━━━●

3.3.4. Three-phase connection 3 x 16 A

In this mode, the MSPA is connected to a three-phase 400V system with neutral wire.
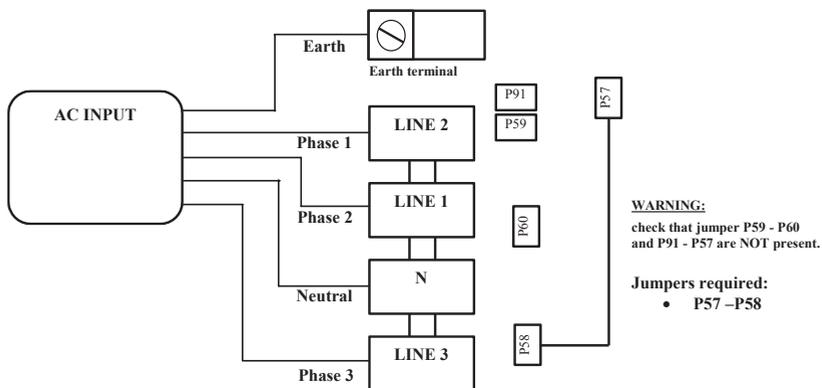
Three-phase connection, 400 Vac + N, 3 x 16 A, 50/60 Hz ━━━━━━━━━━━━━━━━━━━━●

The loads operating at mains voltage (230 VAC) must be connected to the controller using the jacks on the left side of the controller.

The corresponding load is indicated on a label next to the jack. The figure below shows the layout of the jacks.
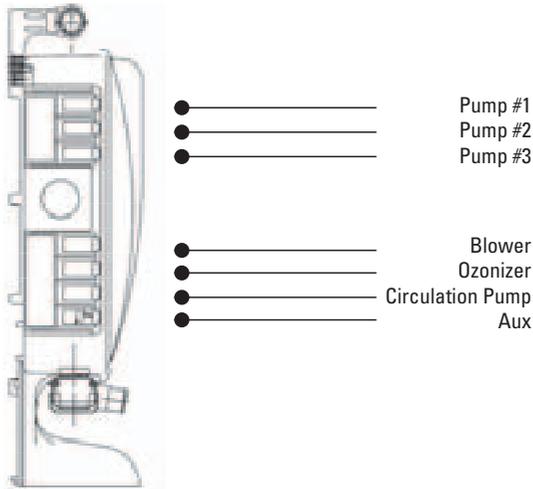
Each jack can only accept the type of plug with the contacts set out in a similar manner. For this reason, before making the connection, check that the jack corresponds to the plug.

For good mechanical tightness and protection against water penetration, insert the plug fully into the jack.

The function of each connector jack for the 230 VAC loads is shown in the appendix.

WARNING
The jacks on the controller that are not used are still connected to mains voltage.
To prevent personal injury or material damage and maintain conformity to safety standards, these must be covered on the outside so that internal contacts cannot be reached by sprays of water and are not accessible.

The controller is fitted with a cable for connecting the spa lighting. This cable is located on the right side of the controller, and supplies 12 Vac, 2 A.

For the connection of the halogen lamp simply fit the light bulb into the bayonet at the end of the cable.

3.6. Connecting the external units

The controller must be opened to make the connections to the external units. The protective cover on the board does not need to be removed.

The external units are generally supplied with a cable fitted with a cable gland and terminated with a connector that fits into the corresponding connector on the board. The cable must be inserted into the controller case through the openings on the top right-hand side.
Depending on the model of MSPA controller, the openings may be open or closed. If not already open, make a hole corresponding to the size of the cable gland on the cable from the external unit. This can be done using a tool (for example a large screwdriver and a hammer) to break the pre-cut section. When performing this operation, take special care not to damage the board inside the controller.

Below is a summary of the operations required to connect the external units.

1. Remove the cover (unscrew the 4 screws in the corners)
2. Check if there is already an opening available on the right side of the case. If not, make the hole with care.
3. Unscrew the nut on the cable gland on the cable from the external unit and remove it from the cable.
4. Pass the connector and part of the cable through the hole.
5. Replace the nut onto the cable and tighten it onto the cable gland through the hole.
6. Connect the connector on the cable to the corresponding connector on the board (see the table below), making sure it is inserted in the right direction.
7. Reduce the length of the cable inside the case and tighten the cable gland on the cable.

The figure below shows the position of the connectors for the external units.
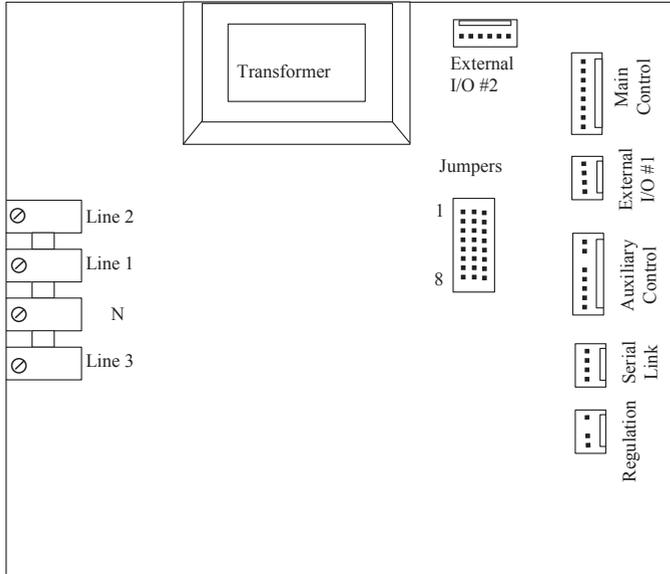
MSPA control board

Warning. The markings on the board and on the board protective cover may be different. The table below shows the differences.

External unit	Marking on board cover (if present)	Marking on board
Main keypad	Standard Side Panel	Main Control
Secondary keypad	Optional Side Panel	Auxiliary Control

4. Starting for the first time

Before switching the controller on for the first time, make sure that:
- there is sufficient water in the pool;

- all the valves are open;
- there is nothing that can block the flow of the water in the pipes.

Moreover, check that the connections of the loads correspond to the configuration settings, in particular the jumpers on the board (see the corresponding paragraph).

Generally, when starting for the first time, the temperature of the water introduced into the SPA should be lower than the temperature set point (35°C). For this reason, when started, the controller will activate the pump to send the water to the heater, as well as the heater itself.

The following diagram shows the various cases that may occur when starting for the first time.

Switch controller on → Display on, all the digits, the segments and the icons on simultaneously → The type of firmware and version flash in sequence E.g. 367 2.00; 555 1.00 → The current pool water temperature flashes on the display

Water temperature < set point, circulation pump or pressure switch jumper settings correct → Heater on, circulation pump on, heater icon on steady

Water temperature < set point, circulation pump or pressure switch jumper settings incorrect! → "**FLO**" flashes on the display, heater icon flashing (jumper settings not correct)

Water temperature > set point → The display shows the current water temperature, flashing

If the settings are correct, the controller starts operating. The display shows the current water temperature, flashing to indicate that power has just resumed. To stop the display flashing, simply press any button.

If the settings are incorrect and the display shows the message FLO, the settings of the jumpers probably do not correspond to the water and electrical connections. Switch the controller off, check and if necessary modify the settings, and then switch the controller on again.

Main and auxiliary keypads can be installed on all models of the MSPA. The models differ by the number of buttons, whether the display is fitted and if so, what type.

The main keypad manages the various functions, as well as the programming and setting of some of the controller operating parameters. The auxiliary keypads can only manage the ON/OFF functions shown on the keypad.

The table below describes the buttons available on the various models of keypad.

Button	KEYPAD MODEL		
	TSC-4 Main	TSC-8 Main	TSC-3 Secondary
Pump1	•	•	•
Pump2	•	•	•
Blower	•	•	•
Light	•	•	•
Econo	•	•	
Purge	•	•	
Up	•	•	
Down	•	•	
Pump3	•		
Clock	•		

Note: the type of main keypad used (TSC-4 or TSC-8) should be configured using the jumper located on the board.

5.1. Main keypad TSC-4

This is the most complete model, featuring 10 buttons and an LCD, which normally displays information on the status of the system, such as the water temperature or error messages. In addition, on the display is showing the icons of the loads activated.

Keypad TSC-4

5.2. Main keypad TSC-8

This has 8 buttons and an LCD, which normally displays information on the status of the system, such as the water temperature or error messages. In addition, the bottom of the display has icons that represent the status of the loads. The loads are represented by the corresponding icons marked on the mask applied to the keypad.

Keypad TSC-8

ICONS MEANING		
Icon	**On (Fixed)**	**Blinking**
	Pump 1 active at high speed	Pump 1 active at low speed
	Pump 2 active at high speed	Pump 2 active at low speed
	Blower active at high speed	Blower active at low speed
	Display shows desired temperature	
	Heater active	Heater no active, but the water should be warmed
	Light on at high intensity	Light on at low intensity
	Econo function active	
	Filter or Purge function active	Filter or purge in stand-by

5.3. Auxiliary keypad TSC - 3

This has 4 buttons and no display, and consequently does not provide any information to the user on the status of the controller.

Keypad TSC-3

BUTTONS MEANING			
Button	**1st pressure**	**2nd pressure**	**3nd pressure**
	Pump 1 active at low speed	Pump 1 active at high speed	Pump 1 Off
	Pump 2 active at low speed	Pump 2 active at high speed	Pump 2 Off
	Blower active at high speed	Blower active at low speed	Blower Off
	Light on at high intensity	Light on at low intensity	Light Off

6. Main functions

This section describes the most commonly used functions during the operation of the controller.

Typically, each function is managed by a specific button, however sometimes the same button can be used to control more than one function (depending on the version of the firmware installed). The table below summarises the functions assigned to each button.

Description of the button	Function of the button
Pump 1	Start, change speed and stop pump 1.
	Start accelerated filtering function (boost filtering).
Pump 2	Start, change speed and stop pump 2.
Pump 3 (*)	Start and stop pump 3.
	Activate standby mode (depending on the firmware).
Blower	Start, change speed and stop the blower.
Light	Switch on, change intensity and switch off light.
	Invert display (depending on the firmware)
Up	Increase the set point of the water temperature and the values being set.
Down	Decrease the set point of the water temperature and the values being set.
Filter/Purge	Set and start filtering cycles.
	Low level parameter programming.
	Activate standby mode (depending on the firmware).
	Invert display (depending on the firmware).
Economy	Program and activate "Economy" mode.
	Enable/disable keypad lock.
Clock (*)	Set the time.

(*) = button available only on the 10-button keypad (TSC 4)

6.1. Pump 1 function

This function is controlled by the user using the **Pump 1** button, which starts/stops pump 1 and changes the speed.
The operation of pump 1 can be controlled from keypad models TSC-4, TSC-8 and TSC-3.

The operation depends on the one/two speed configuration set on the jumpers.

The diagrams below indicate how the user can control pump 1 using the corresponding button, according to the one/two speed configuration. In addition, they show how the status of the function is indicated by the corresponding icon.
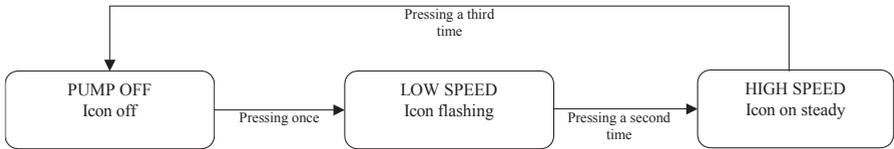
Jumper set for two speed ─────────────────────────────────────●
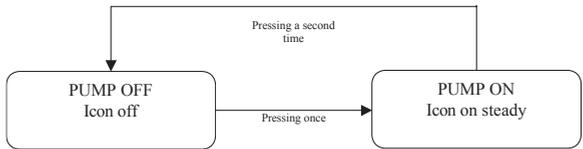
Jumper set for one speed ─────────────────────────────────────●

If the pump is not stopped manually, it stops automatically after 20 minutes of operation. If the pump is set for one-speed operation, then only the high speed output is activated (see "Outputs").

6.2. Pump 2 function

Operation is similar to Pump 1. See "Pump 1 Function".

6.3. Pump 3 function

This function is only available if pump 3 is configured as being installed by the corresponding jumper.

The operation of pump 3 can be controlled from keypad model TSC-4, using the Pump 3 button. The diagram below shows the operation of pump 3 depending on how many times the button is pressed. Furthermore, it shows the status of the function indicated by the corresponding icon.

```
                    Pressing a second
                          time
    ┌──────────────────────────────────────┐
    │                                       │
    ▼                                       │
┌─────────────┐                      ┌─────────────┐
│ PUMP OFF    │   Pressing once      │ PUMP ON     │
│ Icon off    │ ───────────────────▶ │ Icon on steady │
└─────────────┘                      └─────────────┘
```
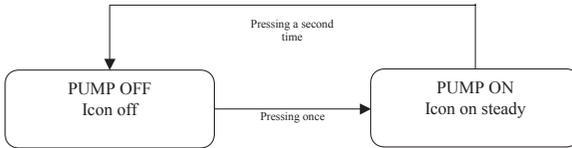
If the pump is not stopped manually, it stops automatically after 20 minutes of continuous operation.

6.4. Blower function

This function is only available if the blower is configured as having been installed by the corresponding jumper.

This function is controlled by the user using the **Blower** button, which starts/stops the blower and changes the speed.

The blower function can be controlled from keypad models TSC-4, TSC-8 and TSC-3.

The diagram below represents the operation of the blower, depending on how many times the button is pressed. Furthermore, it shows the status of the function indicated by the corresponding icon.

```
                          Pressing a third time
    ┌──────────────────────────────────────────────────────────────┐
    │                                                               │
    ▼                                                               │
┌─────────────┐               ┌─────────────┐               ┌─────────────┐
│ BLOWER OFF  │ Pressing once │ HIGH SPEED  │ Pressing a    │ LOW SPEED   │
│ Icon off    │ ────────────▶ │ Icon on steady │ second time │ Icon flashing │
└─────────────┘               └─────────────┘ ────────────▶ └─────────────┘
```
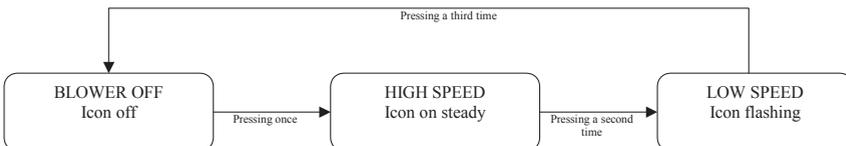
If the blower is not stopped manually, it stops automatically after 20 minutes of continuous operation.

The function is controlled using the Light button. The "**Light**" function can be controlled from keypad models TSC-4, TSC-8 and TSC-3.

This button switches the light on/off and varies the intensity, if the light is set for two levels of intensity in low level programming.

```
                              Pressing a third time
   ┌──────────────────────────────────────────────────────────────────────┐
   │                                                                        │
   ▼                                                                        │
┌──────────────┐              ┌──────────────────┐              ┌────────────────┐
│  LIGHT OFF   │ Pressing once│  HIGH INTENSITY  │Pressing a    │ LOW INTENSITY  │
│  Icon off    │─────────────▶│  Icon on steady  │second time   │ Icon flashing  │
└──────────────┘              └──────────────────┘─────────────▶└────────────────┘
```
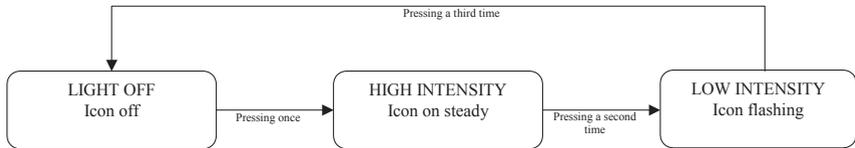
Light set for two levels of intensity in the low level programming ─────────────●

```
                 Pressing a second
                       time
   ┌──────────────────────────────────────────────┐
   │                                              │
   ▼                                              │
┌──────────────┐                    ┌──────────────────┐
│  LIGHT OFF   │                    │  HIGH INTENSITY  │
│  Icon off    │  Pressing once     │  Icon on steady  │
└──────────────┘───────────────────▶└──────────────────┘
```
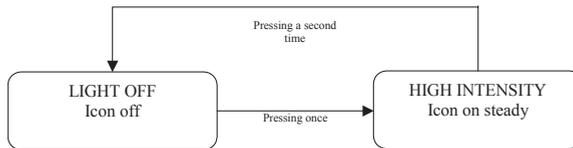
Light set for one level of intensity in the low level programming ─────────────●

If the light is not switched off manually, it switches off automatically after 2 hours.

The MSPA controller is used to clean the water in two modes, purge and filtering, which are mutually exclusive. The selected mode must be configured in the low level programming (see the corresponding section). The two processes are described in detail below.

6.6.1. Purge function

This function is controlled using the **Filter/Purge** button, present on keypad models TSC-4, TSC-8. This button has the function of programming the automatic cycle.
During operation, the filter icon is on steady.

The table below describes the activation sequence of the loads during the purge cycle (only if loads have been set on in low level program).

Type of installation	Operation 1st minute of purge	2nd minute of purge
With circulation pump	Pump1, Pump2, Pump3 high speed, blower at high speed	Circulation pump, ozonizer
Without circulation pump	Pump2, Pump3, high speed, blower at high speed	Pump1 at low speed, ozonizer

6.6.1.1. Function on hold

If one of the buttons, pump, blower or light is pressed during a purge cycle, the cycle is interrupted and will only resume 40 minutes after the last device stops.

6.6.1.2. Programming the automatic purge cycle (Pxx)

If the purge function has been selected in the low level programming, the **Filter/Purge** button and the **Up** and **Down** buttons can be used to set a certain number of automatic purge cycles per day (parameter Pxx, minimum value 1, maximum 12, default value 2). The following diagram shows how to program the function.

Press **Up**
Increase number of cycles

Display shows: **Pxx**
xx = number of cycles per day currently set

Press **Down**
Decrease number of cycles

Display shows the current water temperature

Press **Filter/ Purge**

Press **Filter/ Purge** less than 5 s
Save the new number of cycles
Immediately start the purge cycle (reset timer)

After 5 s without pressing any button
Save the new number of cycles
The next cycle will start at the current frequency

6.6.2. Filter function

This function is controlled using the **Filter/Purge** button, present on keypad models TSC-4, TSC-8. This button has the function of programming the automatic cycle and starting/stopping the function manually. During operation, the filter icon is on steady.

The table below describes the activation sequence of the loads during the filtering cycle (if in the configuration the loads are not installed, they are not activated).

Type of installation	Operation 1st minute of filtering	From the 2nd minute until the end of the cycle
With circulation pump	Pump1, Pump2, Pump3 at high speed, blower high speed	Circulation pump, ozonizer
Without circulation pump	Pump2, Pump3 at high speed, blower at high speed	Pump1 at low speed, ozonizer

6.6.2.1. Function on hold

If one of the buttons, pump, blower or light is pressed during a filtering cycle, the cycle is interrupted and will only resume 40 minutes after the last device stops.

6.6.2.2. Programming the automatic filtering cycle

If the filter function has been selected in the low level programming, the Filter/Purge button and the Up and Down buttons can be used to set the filtering cycle settings.
Due to the type of software installed, it is possible to have the following codes of the parameters:

- SW 367   F (duration)   FD (delay of start time)
- SW 555   FD (duration)   FS (delay of start time)

The duration of the filtering cycle and the time for running the first cycle can be selected according to requirements, the remaining cycles follow at 12 hour intervals.

6.6.2.3. Duration of the filtering cycles (Fxx)

The duration of the filtering cycles can be set from 0 (filtering disabled) to 12 hours (continuous filtering) with 1 hour steps.

6.6.2.4. Setting the start time (FSxx)

To set the time when the first filtering cycle is run, set the hours remaining, from the moment of programming to the start of the filtering cycle. Below is an example.

Programming at $14.^{00}$; a three-hour filtering cycle needs to be run starting at $19.^{00}$.

Calculation of the delay until start: $19.^{00} – 14.^{00} = 5$ hours

On the keypad, set the duration of the filtering cycle (3 hours) and the delay until start, in this case 5 hours. The overall effect will be that the first filtering cycle lasting three hours will start at $19.^{00}$, the next at $7.^{00}$, and the next at $19.^{00}$ etc.

Note: if the delay to start is set to 0, the filtering cycle starts immediately.

The following diagram shows how to program the function.

Press **Up**
Increase the duration

Display shows the current water temperature

Press **Filter/Purge**

Display shows:
Fxx / Fdxx
Duration of the filtering cycle
(0-12 hours)

Press **Down**
Decrease the duration

Press **Filter/Purge**

Press **Filter/Purge**
Save the new settings
of Fdxx and FSxx

Display shows:
Fdxx / Fsxx
Filtering activation delay
(0-11 hours)

Press **Down**
Decrease the delay

After 5 s, without pressing any button
Save the new settings of Fdxx but not those of Fsxx

(if there is a filtering cycle in progress this is completed)

Press **Up**
Increase the delay

6.6.3. Accelerated filtering function (BOOST)

This function is used to activate an accelerated filtering procedure of limited duration. Pump 1 is started at high speed, and the ozonizer runs for 45 minutes.
To activate the function, press and hold the **Pump 1** button for 5 seconds.

6.7. Econo function

The Econo ⟍ function allows energy savings by keeping the water temperature at a value that is 11°C lower than the set point. In any case, the minimum water temperature allowed is 15°C. This function is controlled by the user using the **Econo** button on keypad models TSC-4, TSC-8.

6.7.1. Programming the Econo function

The Econo mode is programmed by entering the duration of the reduced temperature function and the delay until the function starts.
Due to the type of software installed, it is possible to have the following codes of the parameters:

- SW 367   E (duration)   ED (delay of start time)
- SW 555   ED (duration)   ES (delay of start time)

6.7.1.1. Programming the duration (Exx) and the delay (EDxx)

The duration of the operating period in economy operating conditions varies from 0 to 24 hours, selectable on the keypad (0 = function deactivated, 24 = function always active).

The delay until start can selected on the keypad, with values from 0 to 23 hours (to calculate the delay until the function starts see in "Programming the automatic filtering cycle").
The following diagram shows how to program the function.
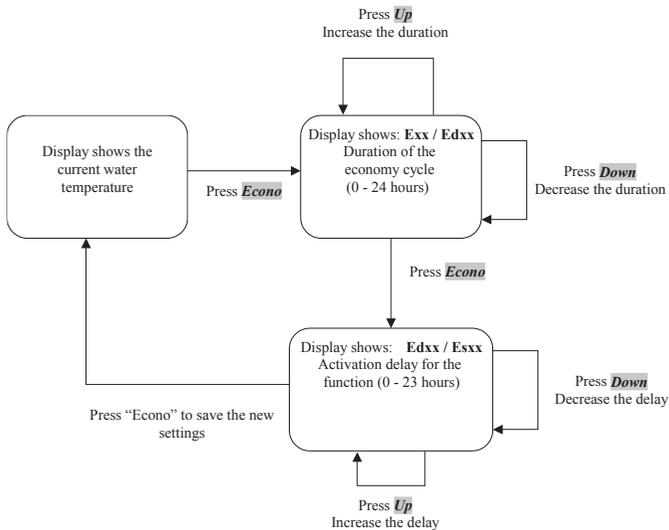
6.7.2. Economy mode time out

If the user activates a pump, the blower, or the light while Economy mode is active, stand-by the function. The function will resume 40 minutes after the last load has stopped. The Econ message or the Economy Mode icon flash irrespective of the configuration of the installation.

6.8. Clock function

This function is controlled by the user using the **Clock** button, which is used to display and set the time on the clock in the MSPA controller.
The Clock function can only be controlled from keypad model TSC-4.

6.8.1. Displaying the time

Simply press the **Clock** button: the time is displayed for 5 seconds.

6.8.2. Setting the clock

Proceed as follows:

• press the Clock button for 5 seconds, until the display shows the digits of the hours, flashing;
• use the Up and Down buttons on the keypad to set the hours to the desired value;
• press the Clock button to modify the minutes;
• use the Up and Down buttons to set the minutes to the desired value;
• press the Clock button a third time to save the new settings.

7. Secondary user functions

This section describes the accessory functions available on the MSPA controller.

7.1. Keypad lock

This function is used to lock some or all of the buttons on the keypad, so as to prevent changes to the settings or the activation of the loads.
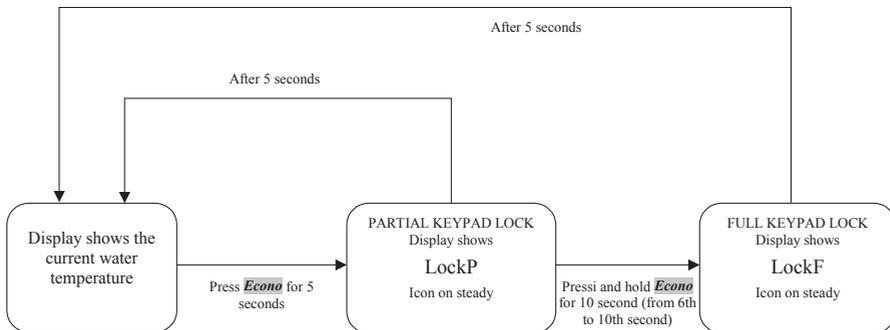This function is enabled/disabled by holding the **Econo** button on keypads TSC-8 and TSC-4.
Two types of lock are available, partial and full. The table below explains the differences.

Type of lock	Buttons active
Partial (LockP)	Pump 1, Pump 2, Pump 3, Blower, Light
Full (LockF)	No button active

When the keypad lock is active, the display is as follows:

- the corresponding icon is on steady;
- pressing a button displays LockP or LockF.

The following diagram shows how to enable the keypad lock in both cases.

After 5 seconds

After 5 seconds

| Display shows the current water temperature | Press *Econo* for 5 seconds | PARTIAL KEYPAD LOCK Display shows LockP Icon on steady | Pressi and hold *Econo* for 10 second (from 6th to 10th second) | FULL KEYPAD LOCK Display shows LockF Icon on steady |

When the keypad is locked the **Econo** button is only active to disable the function: simply press it for 5 seconds. The function is also disabled by switching the controller off.

7.2. Inverting the display

This function is used to invert the direction of the display so as to make it easy to read from the outside. To activate the function, press, for 5 seconds:

- **Light** for firmware version 555.
- **Filter/Purge** for firmware version 367.

The function is disabled in the same way. The function is also disabled by switching the controller off.

7.3. Disabling the controller outputs (stand-by)

This function is used to prevent the activation of the controller outputs for 60 minutes, or alternatively until the function is disabled.

To activate the function from keypads TSC-4 and TSC-8, press for 5 seconds:

- **Filter/Purge** for firmware version 555
  When the function is active, the display shows the time remaining until the 60 minutes expire, alternating with the message SbY.
- **Pump 3** for firmware version 367 (only with TSC-4 keypad)
  When the function is active, the display shows the message OFF.
  The stand-by is 30 minutes.

The function is disabled in the same way. The function is also disabled by switching the controller off.

7.4. Temperature unit

(Firmware version 367)
This function is used to the display the temperature in degrees centigrade or Fahrenheit. To change the unit of measure displayed, press the **Light** button for 5 seconds.
This function can be activated from keypads TSC-8 and TSC-4.

(Firmware version 555)
This function cannot be modified directly from the keypad. Refer to the paragraph "Settings from the main keypad (Low level programming)".

7.5. Filter maintenance signal

If enabled in the low level programming (See paragraph "Settings from the main keypad"), a message appears to remind the user of the need for maintenance on the pool filters. In this case the message CLE or CF will be displayed every two weeks flashing on the main keypad to indicate the need to clean the filter.
Pressing any button cancels the warning from the display.

8. Automatic functions

The controller has a number of functions that cannot be accessed directly by the user, and that are managed by the controller. This section describes the functions and their purpose.

8.1. Power-up signal

The "Power Up" function is used to notify the user that a power failure has occurred.
If the current water temperature flashes on the display (alternating with the time, if available) it

means that a power failure has occurred.

Pressing any button makes the information shown on the display come on steady.

The MSPA controller can control water temperature in a range of temperatures between 15 and 40°C. The user can set the desired temperature from keypads TSC-4 and TSC-8, using on the UP and DOWN buttons.

The temperature control function is achieved by heating the water using the heater connected to the controller. When the water temperature is less than the desired temperature, the MSPA controller:

- starts the pump configured as the heating pump (that is, the one connected to the pressure switch, see "Configuration using the jumpers inside the controller");
- checks the flow of water through the heater, using the pressure switch/flow switch (this takes a few seconds);
- starts the heater.

Once the set point has been reached, the MSPA controller first deactivates the heater and, after 1 minute, the pump to avoid overheating the heating element.

The water is cooled by simply not activating the heater. The water may not cool down when the ambient temperature is high.

The MSPA controller maintains the temperature within an interval of ± 0.5°C around the desired temperature.

When the heater is activated, the corresponding icon on the display is on steady. The same icon flashes when the water needs to be heated, but the heater is not activated to limit the power input. In fact, depending on the power management mode set (see "Configuration using the jumpers inside the controller"), the heater may be off when multiple user loads are active.

8.2.1. Setting the water temperature

The user can set the desired temperature from keypads TSC-4 and TSC-8 using the **UP** and **DOWN** buttons.
The water temperature in the pool can be set, in 0.5°C steps, between 15 and 40°C.

The diagram below represents the operation of the **UP/DOWN** button depending on how many times the button is pressed to increase the desired water temperature.
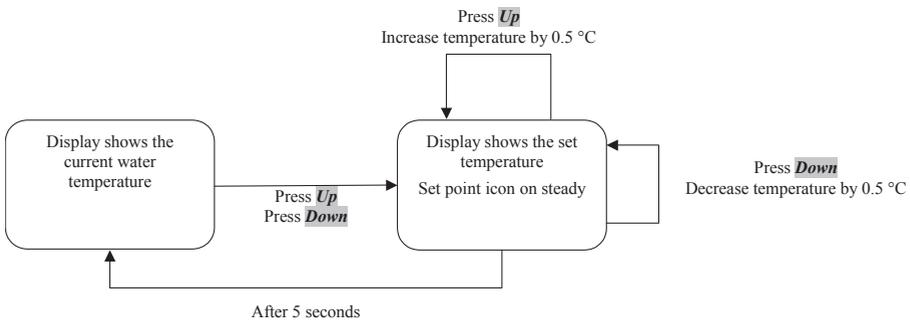
8.2.2. Setting the water temperature above 40°C

This function is used to set the desired water temperature in the pool between 40 and 42°C. Hold the **Up** button for 5 seconds; the display shows Or followed by the increase in temperature above 40°C (e.g.: to set 41.5°C the display must show Or +1.5).

The temperature is decreased using the **Down** button.

Smart Winter Mode is a function that is activated automatically when the room temperature measured by a sensor located inside the controller is less than 6°C, so as to prevent the water in the pipes of the minipool from freezing.

This protection function automatically activates all the pumps and the blower for 1 minute at variable time intervals; the lower the room temperature the more frequently the pumps will be started. The longest interval between two consecutive starts is two hours.

The activation of this function is not related to the water temperature inside the minipool, and it also can be activated from dynamic jet sequencer (DJS), if fitted.

When this function is active, the Filter icon is blinking on the display.

8.4. Mains power input management

The MSPA controller features an automatic system that deactivates the pool heater so as to limit the current drawn from the mains power supply. The way this is managed depends on the type of power supply set using the jumpers.

8.4.1. Single-phase or two-phase plus neutral power supply

If two or more of the loads, pump 1, pump 2 and blower, are active at the same time, the heater is stopped. In this situation the heater icon on the keypad flashes.

8.4.2. Three-phase plus neutral power supply (Laing heater)

If the controller is fitted with a Laing heater the heater power input is managed based on the status of pumps 2 and 3, as described in the table below.

Pump #2	Pump #3	Heater power input	Power supply lines affected	Status of the heater icon or logo
OFF	OFF	Maximum (5,1 kW)	All	On steady
ON	OFF	Partial (2,1 kW)	Line 3	On steady
OFF	ON	Partial (2,1 kW)	Line 2	On steady
ON	ON	None (0 kW)	No	Flashing

The status of the other loads has no influence on the management of the heat power.

9. Setting the operating parameters

This section describes the configurations of the controller for managing the loads and how to modify them.

9.1. Identifying the firmware version installed

In order to be able to correctly configure the controller, the type and the version of the firmware installed must be known. If this information is not known, proceed as follows:

- turn the controller off and on again;
- when power returns, the display on the MSPA will flash, for around 30 seconds, the type of firmware alternating with the version (for example, if the numbers 367 and 2.0 are displayed in sequence, the type of firmware is 367 and the version is 2.0).

Once the type of firmware installed on the MSPA has been noted, the controller can be configured as desired.
The MSPA controller features a number of configuration options that can be set in two different ways:
- setting the jumpers inside the MSPA (on the board).

- setting from the keypad (low level programming).

The number and the function of the parameters that can be configured depends on the type of firmware installed.

9.2. Configuration using the jumper

The jumpers inside the MSPA are used to modify the settings corresponding to the operation of the pumps, accessories and keypads.
To access the jumpers, first disconnect power from the MSPA controller, and then open the cover of the controller.
On the right hand side, at the top of the controller board, there are 8 jumpers. Each jumper has two possible positions: left (pos. A) or right (pos. B). See the following figure.
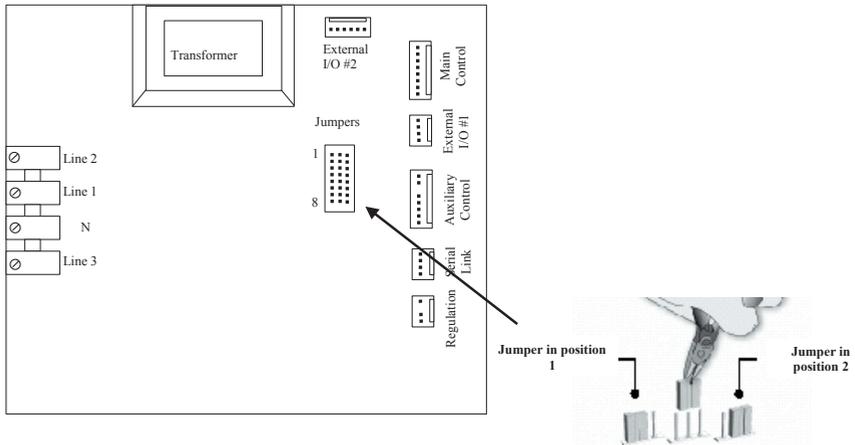
MSPA control board

The tables shown below describe the function of each individual jumper, based on the type of firmware installed. The default settings are in bold.

Firmware 555		
Jumper No.	Position 1	Position 2
1	**1 x 32 A single-phase**	3 x 16 A three-phase
2	10-button keypad	**8-button keypad**
3	**Blower installed**	Blower not installed
4	Pump 1, one-speed	**Pump 1, two-speed**
5	**Pump 2, one-speed**	Pump 2, two-speed
6	Pump 3, installed	**Pump 3 not installed**
7	Circulation pump installed	**Circulation pump not installed**
8	**Pressure switch on pump1**	Pressure switch on circulation pump

Firmware 367		
Jumper No.	Position 1	Position 2
1	**1 x 32 A single-phase**	3 x 16 A three-phase
2	**10-button keypad**	8-button keypad
3	Blower installed	**Blower not installed**
4	Pump 1, one-speed	**Pump 1, two-speed**
5	**Pump 2, one-speed**	Pump 2, two-speed
6	**Pump 3, installed**	Pump 3 not installed
7	**Circulation pump installed**	Circulation pump not installed
8	Ozonizer active during filtering	**Ozonizer always active**

Once having modified the position of the jumpers on the board, close the cover on the controller and reconnect power, only then will the modifications become operational.

IMPORTANT: do not change the positions of the jumpers without first having disconnected the power supply to the controller!
As well as the risk of electric shock, the jumper settings become operational only after power has returned.

A number of parameters can be configured on the MSPA controller from the main keypad (TSC-4, TSC-8).

The number and the meaning of the modifiable parameters depends on the type of firmware that is installed on the board.

To access to the low level programming mode, press and hold the **Filter/Purge** button for 20 seconds; after this time, the first modifiable parameter will be displayed.
Pressing the **Filter/Purge** button again moves to the next parameter, saving the value of the current parameter. The value of a parameter can be changed using the **Up** and **Down** buttons.

Pressing the **Filter/Purge** button after the last parameter has been accessed resets the system, and the new settings become effective.

The tables below describe the possible settings, the default settings are shown in **bold**.

Firmware 555		
Functionality	Hold Filter key for 20s, 1st parameter will appear (Up/ Down keys modify values)	
Duration	Press Filter key to display next parameter, System will reset after last parameter.	
Display	As table below, **default values in bold.**	
Parameter	**Display**	**Value/Meaning**
Light	LIx	1= Single intensity **2= Light with two intensity levels**
Remote heater/Optical fibre	RHx	**0= None** 1= Optical fibre option 2= Remote heater active
Level sensor options	H2Ox	**0= No water level** 1= Indicate only 2= Close outputs
Water level debounce time	Ldx	0= 1 second **1= 25 seconds**
Temperature units	TUx	0= Degrees Fahrenheit **1= Degrees Centigrade**
Ozonizer	O3x	**0= Active during filtering** 1= Always active
Filtering	FCx	**1= Filtering cycle** 2= Purge cycle
Clean filter warning	CFx	**0= Disabled** 1= Enabled

Firmware 367		
Parameter	**Display**	**Value/Meaning**
Light	LIx	1= Light with one intensity level
		2= Light with two intensity levels
Remote heater	RHx	**0= Disabled**
		1= Enabled
Filtering	FCx	**1= Filtering cycle**
		2= Purge cycle
Clean filter warning	CLEx	**0= Disabled**
		1= Enabled

10. Optional accessories

Accessory	Connector	Notes
LED light	Halogen lamp connector on cable	**Cannot** be used together with a halogen lamp
Level sensor	**External I/O #1** connector on the board	
Optical fibre kit	External **Aux** J&J connector	
Dynamic jet sequencer (DJS)	**I2C** connector on the board	
Receiver/infrared remote control kit	**External I/O #2** connector on the board	
Radio kit	The connection depends on the model of radio installed	

Signal on the display	Possible causes	Actions
The display flashes	Not a malfunction. The controller signals a previous power failure.	• Press any button.
HL steady	The system has switched off the heater because the temperature at the heater has reached 48°C (119°F). **DO NOT ENTER THE POOL**	• **DO NOT ENTER THE POOL** • Wait for the water to cool down, then switch the controller off. • If the problem persists, refer to the troubleshooting manual or contact the technical service.
HL flashing	The system has switched off the pumps and heater because the water temperature in the whirlpool tub has reached 44°C (112°F) Only Smart Winter Mode is active. **DO NOT ENTER THE POOL**	• **DO NOT ENTER THE POOL** • Wait for the water to cool down, then switch the controller off. • If the problem persists, refer to the troubleshooting manual or contact the technical service.
FLO	The pressure switch/flow switch does not detect the movement of water when the circulation pump is on (pump 1 if the circulation pump is not installed).	• Check that the low level settings of the circulation pump correspond to the configuration of the SPA. • Check that the circulation pump is operating (or pump 1 if the circulation pump is not installed). • Check that the level of the water is sufficient and that the valves are open. Clean the filter. • If the problem persists, refer to the troubleshooting manual or contact the technical service.

Signal on the display	Possible causes	Actions
FLC	The pressure switch/flow switch detects the movement of water even when the circulation pump is off (pump 1 if the circulation pump is not installed).	• Check that the circulation pump 1 (or pump 1 if the circulation pump is not installed) stops when the error occurs. Otherwise, check the connections of the loads. • Check that the low level settings of the circulation pump correspond to the configuration of the SPA. • If the problem persists, refer to the troubleshooting manual or contact the technical service.
Prr	Malfunction in the temperature probe.	• Refer to the troubleshooting manual or contact the technical service.

12. Maximum dimensions

The following are the maximum overall dimensions of the MSPA controller, with the horizontal heater and with the Laing heater.

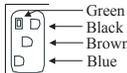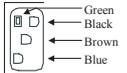|	MSPA with horiz. heater	MSPA with laing heater
Case width [mm]	338	338
Heater width [mm]	467	545
Case height [mm]	400	400
Heater height [mm]	-	450
Depth [mm]	120	120
Weight [kg]	5.6	6.2

The horizontal heater requires the connection of 2" pipes, while the Laing heater requires 1" pipes.
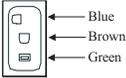
13.1. General characteristics

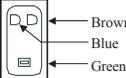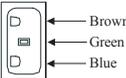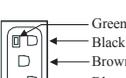|	
Ambient operating conditions:	maximum RH 80% non-condensing maximum temperature 50°C
Ambient storage conditions:	maximum RH 80% non-condensing, maximum temperature 50°C
Insulation class	class I
Index of protection	IPX5
Software class	Class A
Power supply	• single-phase: 230 V, 50/60Hz, 32 A • two-phase: 400V with neutral, 50/60Hz, 16 A per phase • three-phase: 400V with neutral, 50/60Hz, 16 A per phase

13.2. Output specifications

The table below lists the specifications of the outputs available. It also shows the connections on the board and their function for each output.

Output	Voltage, current	External connector	Board connections	Connection function
Pump 1, 2 speed	230VAC, 6.5 FLA	Green Black Brown Blue	P65: Brown P37: Black P48: Blue P71: Green	High speed Low speed Neutral Ground
Pump 2, 2 speed	230VAC, 6.5 FLA	Green Black Brown Blue	P35: Brown P22: Black P45: Blue P93: Green	High speed Low speed Neutral Ground
Pump 3, 1 speed	230VAC, 6.5 FLA	Blue Green Brown	P21: Brown P40: Blue P75: Green	Phase Neutral Ground

Blower	230VAC, 6 A	Blue / Brown / Green	P76: Brown	Phase
			P80: Blue	Neutral
			P79: Green	Ground
Circulation pump	230VAC, 1 FLA	Brown / Blue / Green	P36: Brown	Phase
			P41: Blue	Neutral
			P68: Green	Ground
Ozonizer	230VAC, 1 A	Brown / Green / Blue	P30: Brown	Phase
			P46: Blue	Neutral
			P87: Green	Ground
Aux1, Aux 2	230VAC, 1 A	Green / Black / Brown / Blue	P24: Brown	Aux #1
			P27: Black	Aux #2
			P53: Blue	Neutral
			P74: Green	Ground
Light	12 VAC, 2 A	Bayonet connector on cable	P14	
1 phase heater	230 VAC, 16 A		P63: Brown	Phase
			P66: Blue	Neutral
Laing 2 phase heater	230 VAC, 2 x 16A		P63: Brown	Phase 2
			P44: Black	Phase 3
			P66: Blue	Neutral

13.3. Signal connections

Ref. on the board	Description	Type of connector	To be used with
P1	Main keypad connector	MTA-100, 8 pin male	Keypad TSC-4, TSC-8
P3	Auxiliary keypad connector	MTA-100, 8 pin male	Keypad TSC-3
P4	Serial comunication (I²C BUS)	MTA-100, 4 pin male	DJS (Dinamic Jet Sequencer)
P10	Pressure switch input	MTA-100, 3 pin male	
P5	Water temperature control probe	MTA-100, 4 pin male	External temperature probe
P20	High-limit temperature probe	2 way pin strip	Internal flat probe / External cabled probe
P2	External I/O #1 connection	MTA-100, 4 pin male	Level sensor
P8	External I/O #2 connection	MTA-100, 6 pin male	IR receiver

Astrel