PRESSURE CONTROL
INVERTER TECHNOLOGY
Type MITO

230 V~ ±10%
50/60Hz

1x230 V~
750W max.
6A max.

User's manual

Rel. 1.0

⚠ WARNING:

READ THIS INSTRUCTION MANUAL CAREFULLY BEFORE INSTALLATION OR START UP

The manufacturing company guarantees the product for 24 months from the date of purchase; the equipment must be returned with this instruction manual indicating on the last page the date of installation and the parameters programmed.
The warranty will be void if the device is tampered with, dismantled or damaged due to misuse and/or improper installation, used for purposes other than those for which it is intended, installed in unsuitable environmental conditions or connected to an electrical system not in compliance with current regulations.
The manufacturer disclaims all liability for personal injury or property damage due to lack of the necessary protective electrical devices upstream of the device, or to deviations from best engineering practices during the installation.
The installation and the maintenance of the device must be carried out by specialized personnel, with a thorough understanding of the content of this instruction manual.
All operations which require removing the cover of the device must be carried out with the power supply disconnected.
There is no reason to access the circuit board during installation or use. To do so is dangerous as some parts can remain live after the unit is disconnected from the power supply.
The manufacturer assumes no responsibility for damage to people or property as a result of one of the internal protections not operating, except for the repayment of the purchase price of the device, if still covered by the warranty.

This equipment complies with Directive ROHS 2002/95/EC.
The symbol of the crossed out wheeled bin shown above indicates that, for protection of the environment, the equipment at the end of its life cycle cannot be disposed of with household waste. Dispose of the device and the packaging material in accordance with local regulations.

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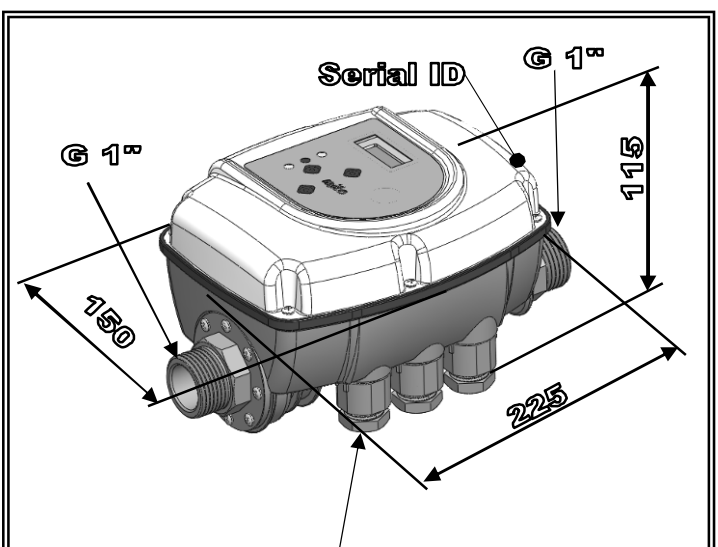
↔ CLEARANCE - DIMENSIONS - IDENTIFICATION



🕮 DESCRIPTION

Mito is an electronic device that controls the starting and stopping of an electric pump, regulating its operation in response to the instantaneous supply conditions. It is designed for domestic applications, where supply demands are medium-short term and generally timed over the space of one day.
The pump is initially started at maximum speed and is then progressively adjusted depending on the flow required.
In this way, output pressure is supplied at a constant rate for greater comfort.
Pressure is regulated for a maximum time interval (settable in the parameter "Cool mode" from 5 to 30 minutes according to the type of pump), during which supply demand should expire. When this period elapses, if the demand for water supply persists, the pump motor is set to maximum speed to avoid overheating, caused by reduced ventilation. On closure of all supply points, pump shutdown and consequent cooling of the motor enables reset of the regulation time for the next pump start-up cycle, in relation to the pause time and operation time (one minute shutdown corresponds to one minute of regulation in the next cycle).

TECHNICAL DATA

Network power supply	1-phase 230V AC ±10% - 50/60Hz
Output motor	1-phase 230V ~
Maximum engine power	750W – 1Hp
Maximum phase current of the motor	6.0Arms
Maximum line absorption	15A (internal fuse)
Maximum system pressure	800 KPa (8 bar)
Maximum temperature (liquid)	30 °C
Maximum room temperature	40 °C*
Friction loss of unit	0.7 Bar at 100 l/min
Set-point adjustment range	1.5÷5 bar
Differential adjustment range	0.3÷3.0 bar
Hydraulic connection	1" M-M (optional revolving 1"F input)
Degree of protection	IP 65
Weight	1.1 Kg
Dimensions	225x150x115 mm
Type of Action	1 (according to EN 60730-1)

**** The controlled motor may occasionally reach temperatures approximately 10 °C higher than independent operation. Please note that the maximum ambient temperature for the pump must therefore be decreased by 10 °C compared to manufacturer values .***

TECHNICAL FEATURES

√ Constant pressure during supply
√ Protection against dry operation of the pump in case of lack of intake water
√ Automatic reset following shutdown due to dry operation
√ Digital indication of pressure on the display
√ Signalling of the various operation/error conditions via light indicators and messages on the display
√ Alarm relay and signalling of anomalies
√ Digital input for float or connection to external control
√ Removable electric terminals to facilitate wiring

PROTECTION

√ Dry operation
√ Internal overheating of the device
√ Overload (fixed value: 8A)

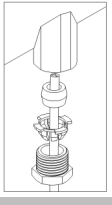
🛠 INSTALLATION

HYDRAULIC CONNECTION:

Mito must be installed on the pump's output, in horizontal or vertical position, with the direction of flow as indicated by the arrow on the cover. The water from the pump flows through the device to then be distributed to the various users.
Water supplied to *Mito* must not have impurities or other contamination which could block the movement of the check valve located inside. To minimize this problem it is helpful to mount specific filters on the intake of the pump.
Install a small expansion vessel (1-2 litres) after *Mito*. This limits restarts caused by possible small pressure fluctuations in the system and improves the system's response to small demands of water from the system (i.e. washing machines, toilet flushing systems, etc.).
The pre-charge value of the vessel must be suitable for the pressure values set.
It is absolutely imperative that no check valve be installed between *Mito* and the electric pump or between the actual device and the users, since this can cause malfunctions of the device.
A check valve may be installed in the suction pipe of the electric pump to avoid emptying at shut-off.
We advise against installing the device inside wells or sealed boxes where a heavy condensation could develop.

⚠ WARNING: when the pump stops the pipes are still under pressure. Before any intervention it is advisable to discharge the system by opening a tap.
CAUTION: this device is not to be considered a mechanical pressure reducer and therefore all system parts must be sized according to the maximum supply pressure of the pump.

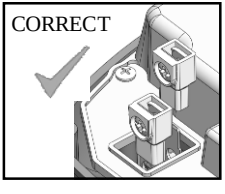
WIRING:

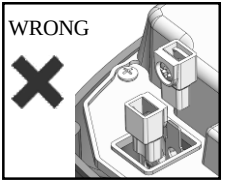


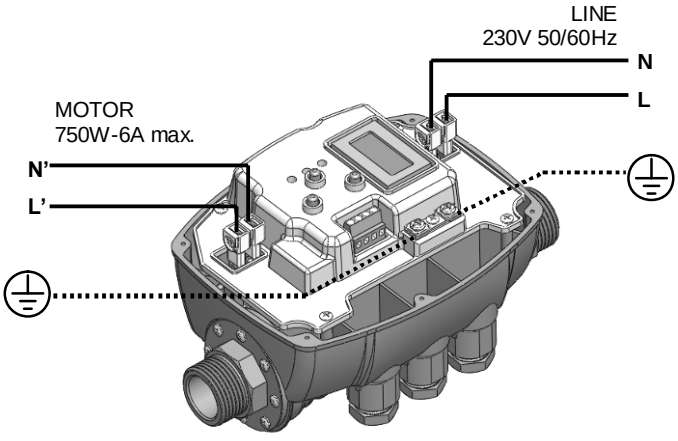
Insert the electric cables into the specific cable glands in the correct order of assembly of all the components. Tighten the gland nuts sufficiently to prevent movement of the cables.
The central cable gland for the auxiliary contact is blind: if you want to insert a cable for remote control, the bottom of the plastic nut must be broken through with a screwdriver after removing the nut from the unit.

The electrical connectors supplied with the device must be used.

⚠ WARNING: Insert the connectors so that the fastening screws of the cable are not adjacent to each other!







✔ CONNECTION TO POWER SUPPLY

The power supply to the device is 230 Volt 50/60Hz single-phase. The electrical system to which the device is connected must comply with the current safety regulations and must therefore be equipped with:

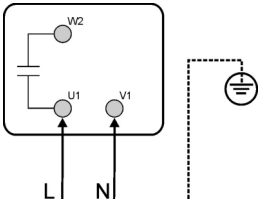
- Automatic trip switch suitable for motor use and with a tripping current appropriate to the power of the pump installed
- Earthing with total resistance in compliance with the local standards and in any case never greater than 100Ω.

If the device is installed in swimming pools or fountains or garden ponds, it is compulsory that a type "A" automatic differential switch (RCD) with IΔn=30mA be installed.
If the device is not supplied with a fitted power supply cable and plug, install another device that guarantees omnipolar disconnection from the power supply network with a contact gap of least 3 mm.
If the terminals supplied are not used, the faston terminals must be crimped, using specific pliers, by specialized personnel.

The recommended diameter of the cables is 1.0mm^2, compatible with electric pumps up to 750W.
In the case of power supply line lengths greater than 5-10 meters, it is advisable to use a cable with an appropriate larger diameter to reduce voltage drops in the cable.

The type of electric cable must be suitable for the conditions of use (use in domestic premises, dry or wet, for indoor or outdoor installation).

CONNECTION OF THE ELECTRIC PUMP



Mito can be installed on 230V AC single-phase pumps, already fitted with a capacitor. Before connecting to the power supply, check that the connections inside the electrical terminal box of the motor are connected in compliance with the manufacturer's instructions. The diagram (shown left) gives a typical example of connection.
If the terminals supplied are not used, the crimping of the faston terminals must be performed by specialized personnel, by using specific pliers.

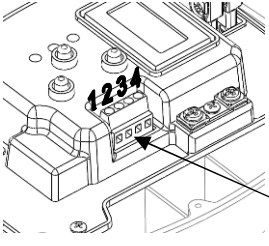
This device is suitable for operation with pumps with nominal frequency of 50Hz or 60Hz and power up to 750 Watt. The device incorporates an internal 15A fast-acting protection fuse.

The recommended diameter of the cables is 1.0mm^{2}; the maximum length of the connection cable to the pump is 5 meters.

The type of electric cable must be suitable for the conditions of use (use in domestic premises, dry or wet, for indoor or outdoor installation).
Furthermore, follow the pump manufacturer instructions to which *Mito* is to be connected.

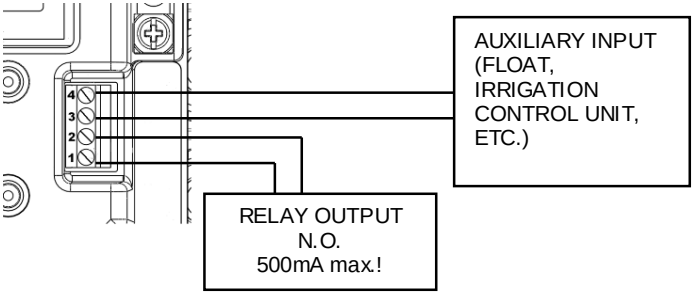
WARNING:
- All wiring must be performed by specialized personnel.
- Incorrect connection of the electric motor can damage the device and the pump motor.
- Failure to comply with the instructions given in this paragraph may result in serious damage to property and/or personal injuries for which the manufacturer disclaims all responsibility.
- If the power supply cable or the cable connecting *Mito* to the electric pump is damaged, it must be replaced exclusively by the manufacturer or by authorized or qualified personnel in order to prevent risks of damage or injury.

CONNECTION TO AUXILIARY CONTACT



Mito is fitted with a connector through which an auxiliary contact is available which allows the use of additional features by interfacing the device with other external equipment. The terminal strip provides an input to enable or disable pump operation and an alarm relay output (N.O. contact) which trips at every device anomaly.

CONNECTOR
AUXILIARY CONTACT



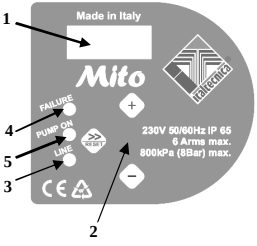
⚠ **WARNING: An incorrect connection of the auxiliary contact could cause a short circuit in the low voltage circuit and the consequential blowing of the fuse! Take care during connection.**

START-UP:

⚠ **WARNING: At first start-up, avoid operating the device for a long time without water to avoid overheating the inverter! Fill the pump suction pipe before powering the system. If the overheating protection triggers, fill the electric pump by connecting it directly to the power supply to avoid damaging the device!**

Once all the electrical connections are made correctly, close the cover of the unit and connect the device to the power supply.
Mito will start the pump automatically in order to fill the system.
If the pump does not turn, or produces anomalous vibrations, check that the pump and the capacitor are correctly connected.
To facilitate the filling of the electric pump, it is possible to hold down the "+" key on the main screen, to make the pump turn at maximum speed and without the dry run protection triggering.
After setting the device parameters, record them on the specific form that can be found at the end of this manual for future reference and for warranty purposes.

PROGRAMMING:



✔ INTERFACE DESCRIPTION

1. Display, with digital indication of pressure, errors and the configuration menu.
2. Keys for programming.
3. Power-on - Green indicator light (LINE).
4. Error - Red indicator light (FAILURE).
5. Pump on - Yellow indicator light (PUMP ON).

✔ DESCRIPTION OF THE KEYS

Arrow/reset: Scrolls the pages of the menu forward and resets the unit in case of alarms and/or errors

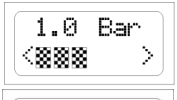
Key "+": Increases the value of the parameter currently shown on the display. Also permits forced operation at maximum speed

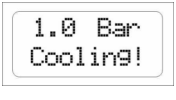
Key "-": decreases the value of the parameter currently shown on the display.

✔ DESCRIPTION OF THE PARAMETERS AND SCREENS

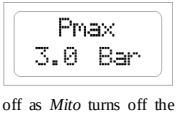
USER PARAMETERS:

These parameters are normally accessible when the device is powered.

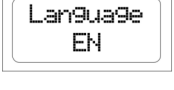




Main screen: When *Mito* is operating correctly, on the first line of the display is shown the instantaneous pressure detected by the system; on the second line a bar graph is displayed that reproduces the speed of the pump's motor.When the message "Cooling!" is displayed on the bottom line, Mito operates in motor cooling mode setting the pump to maximum rpm. From this position, it is possible to start scrolling the various menus with the arrow key. By holding down the "+" key , the pump is brought to maximum speed and the dry run protection is by-passed (Use this function to fill the pump at the first start-up).



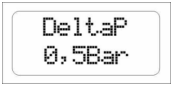
Pmax: This parameter is used to set the device set-point at the desidered pressure value (maximum pressure). During operation, *Mito* adjusts the electric pump operation to adapt pump supply to user demand, maintaining constant pressure in the system. If the Pmax value is set above the pump maximum head capability, the motor will still stop when taps are turned off as *Mito* turns off the pump when water flow falls below the minimum value (approximately 4 litres/minute) regardless of the pressure reached in the system. Press the + and – keys to modify the parameter value.



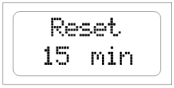
Language: it is possible to chose the language in the menus and the alarm messages. Press the + and – keys to modify the parameter value.

INSTALLER PARAMETERS:

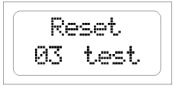
These parameters are usually hidden and should only be modified during installation. To access these pages press the "+" and "-" keys simultaneously for 5 seconds. Once access is reached to the hidden menu, use the arrow key ">>" to scroll through the screens and the "+" and "-" keys to modify the parameters. To return to the main screen, press again the "+" and "-" keys simultaneously for 5 seconds.



Delta P: this value is the pressure difference below Pmax required for pump restart. When supplying a user, the pump is not started until the pressure in the system has dropped below the value of Pmax minus the Delta P value. After the motor has started, the speed rotation is adjusted to maintain the pressure value as close as possible to the preset Pmax parameter value. The differential can be adjusted between 0.3 and 3.0 Bar, the recommended value being at least 0.5 Bar. Use the + and – keys to modify the parameter value.

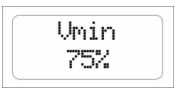


Auto-Reset Interval: If during pump operation there is a temporary lack of water on pump intake, *Mito* turns off the motor to avoid any damage. This screen sets the delay in minutes after which the device performs an automatic restart to check if water is available on the intake. If the attempt is successful, *Mito* automatically exits the error mode and the system is once again operational; if this is not the case, another attempt will be performed after the same interval of time. The maximum interval set is 300 minutes (recommended value 60 min.). Use the + and – keys to modify the parameter value.



N° Auto-Reset Tests: this parameter defines the number of attempts that *Mito* performs to reactivate the pump after a cut-out due to dry running. After this number of restart attempts, the system stops and operator intervention is needed. By setting this value to zero, the Auto-Reset is disabled. The maximum number of attempts is 10. Use the + and – keys to modify the parameter value.

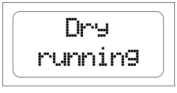
Stop Delay: With this parameter it is possible to define the pump stop delay (in seconds) following all the taps being closed. If the pump cycles continuously when there is low water demand, increase the pump stop delay to smooth operation. Increasing this parameter may also help eliminate too frequent dry run protection interventions, especially for pumps with self-priming problems. The factory setting is 10 seconds. Use the "+" and "–" keys to change stop delay value.



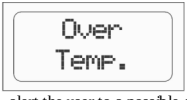
Vmin: this parameter enables entry of the minimum voltage (Volt) supplied to the motor during the regulation phase. The setting of this parameter depends mainly on the motor's ability to dissipate heat in reduced ventilation conditions. If excessive electric motor heating is noted, the value Vmin should be increased. The factory setting is 75% (referred to the maximum power supply value). Use keys "+" and "-" to modify the minimum voltage value.

Cool mode: this parameter defines the maximum time, from opening of the first utility, for which *Mito* activates pressure regulation. When this time interval elapses, the pump speed is set to maximum, regardless of the instant pressure value. When water supply is completed, pump shutdown and consequent cooling of the motor enables reset of the regulation time for the next pump start-up cycle, in relation to the pause time and operation time (one minute shutdown corresponds to one minute of regulation in the next cycle) through to the maximum value set in the "Cool mode" parameter.. Use keys "+" and "-" to set the parameter to a minimum of 5 to a maximum of 30 minutes. The factory setting is 10 minutes.

✔ **ALARMS**



Dry running: This message appears when the system stops due to lack of water supply to the pump. If the Auto-Reset function has been activated, *Mito* performs automatic attempts to check water availability. Press "reset" to restore normal operation .



Over-Temperature: This alarm appears when the device shuts down following internal overheating, with consequent stopping of the pump. The intervention threshold is approximately 70 °C. The system will be automatically restarted approximately 3 minutes after the temperature has returned to normal level (55 °C) but the message remains on the screen to alert the user to a possible anomaly in the system. **Every time this alarm is displayed, have the system checked by specialized personnel to avoid electrical damage.** To remove the error message from the display press the "reset" key.

Overload: this alarm appears when the power absorption of the electric pump has exceeded the maximum current value allowed. This can occur due to difficult pump operating conditions, continuous restarts at short time intervals, problems in the windings of the motor, blocking or seizure of the pump or wiring problems between the motor and *Mito*. If this alarm appears often, we recommend to have the system checked by the installer.

? TROUBLE SHOOTING:

✔ **Excessive motor heating with display of the "Dry run" error even when water is present.**

The motor overload cut-out may have tripped. Wait for the motor to cool, increase the value "Vmin" and if necessary reduce the setting in the parameter "Cool mode"

✔ **When opening one of the taps of the system the pump does not start, or starts after a few seconds**

The set value of Delta P is too high or a check valve has been fitted downstream of the device. Try to decrease the value of the DeltaP and eliminate any possible valve after *Mito*.

When turning off the taps, the pump stops but restarts after a few seconds without there being any leaks in the system

The Delta P value is too low and the pressure drop which occurs when the pump is stopped is sufficient to make it restart. Increase the "Delta P" value

The pump goes on and off continuously

There are leaks in the system. Check the various hydraulic connections. Via the display check any possible pressure drop when the taps are turned off. Check for any possible presence of dirt in the *Mito* check valve which would prevent it operating correctly and if necessary clean with a jet of compressed air.

The device frequently signals a condition of dry operation

During periods of system inactivity the suction pipe of the pump may have emptied preventing the pump from filling at the next start. The Pmax value could also be set too high.
Check the sealing of the foot valve, if present, and correct Pmax setting.

At low water flows the pump operates irregularly

The flow is too low for the device to detect which causes the pump to stop. Install a small expansion vessel (1-2 litres) on *Mito* output to make the system more flexible and reduce the number of restarts.
Increase the value of Stop Delay.

The pump does not stop

The system has major leaks or the unit check valve has clogged due to dirt; try to move the check valve manually and check that the spring can ensure closing.
The sensor that detects valve position is damaged; have the unit checked by the manufacturer.

The pump operates at maximum speed but with poor performance

The pump is damaged or blocked due to foreign bodies.

The pressure drops when high water flow is demanded by the system

This is a normal condition due to the fact that the device is not capable of forcing the pump beyond its maximum performance; above a certain flow, the pressure is not compensated for because the pump is already working at maximum speed. If this is the case, it is recommended that a higher performance pump be installed.

The wording "Over Temperature" often appears on the display a few second after starting the electric pump

The device could contain air in the water passage, preventing correct circuit board cooling. Try running the pump at maximum speed by holding the Key "+" down in order to purge any possible air.
Ensure that the system piping is designed to avoid air being trapped near the Mito.

🛠 MAINTENANCE:

Mito was designed to minimize maintenance. The following instructions must be closely followed to guarantee trouble free operation of the device for a long time:

- Do not allow the device to reach temperatures below 3 °C; if this is not possible, make sure that all the water present in the device has been drained to avoid any damage to the plastic housing in case of freezing.
- If the pump is fitted with suction filters, periodically check that they are clean.
- Always make sure that the cover is completely closed to avoid infiltration of water from outside.
- During long periods of system inactivity, disconnect from power supply and drain the water from the system.
- Avoid forcing pump operation when there is no water intake; this could damage both the pump and *Mito*.
- Before using the device with liquids other than water, check with the manufacturer.
- Never operate the device without the covers in place.
- Before removing the cover of the device wait 3 minutes to allow the capacitors to discharge.

⚠ **WARNING: The device does not contain any user serviceable parts. We recommend against removing the protective cover of the circuit board as this will void the warranty and could be dangerous.**

Installation Date	**…./…./…….**	**Installer**	
Client			
Pump Brand-Model			
Serial No. *Mito*			
VALUES SET DURING INSTALLATION			
Pmax:	**Bar**		
DeltaP	**Bar**		
	Bar		
Stop Delay	**Seconds**		
Auto-Reset Time	**Minutes**		
Auto-Reset Test	**N° test**		
Note			