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INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE

DAB
WATER•TECHNOLOGY

(IT) DICHIARAZIONE DI CONFORMITÀ CE

Noi, DAB Pumps S.p.A. - Via M.Polo, 14 - Mestrino (PD) - Italy, dichiariamo sotto la nostra esclusiva responsabilità che il prodotto al quale questa dichiarazione si riferisce è conforme alle seguenti direttive

2006/95/CE
2004/108/CE
2009/125/EC ErP
2011/65/EU

ed alle seguenti norme:

EN 60335-2-41
EN 60335-1
EN 55014-1
EN 55014-2

(GB) DECLARATION OF CONFORMITY CE

We, DAB Pumps S.p.A. - Via M.Polo, 14 - Mestrino (PD) - Italy, declare under our responsibility that the product to which this declaration refers is in conformity with the following directives:

2006/95/CE
2004/108/CE
2009/125/EC ErP
2011/65/EU

and with the following standards:

EN 60335-2-41
EN 60335-1
EN 55014-1
EN 55014-2

Mestrino (PD) 01/01/2013

Francesco Sinico
Technical Director

INDEX

KEY

The following symbols have been used in the discussion:

Situation of general danger. Failure to respect the instructions that follow may cause harm to persons and property.

Situation of electric shock hazard. Failure to respect the instructions that follow may cause a situation of grave risk for personal safety.

Notes

WARNINGS

Read this documentation carefully before installation.
Installation and operation must comply with the local safety regulations in force in the country in which the product is installed.
Everything must be done in a workmanlike manner.
Failure to respect the safety regulations not only causes risk to personal safety and damage to the equipment, but invalidates every right to assistance under guarantee.

Skilled personnel
It is advisable that installation be carried out by competent, skilled personnel in possession of the technical qualifications required by the specific legislation in force.
The term skilled personnel means persons whose training, experience and instruction, as well as their knowledge of the respective standards and requirements for accident prevention and working conditions, have been approved by the person in charge of plant safety, authorizing them to perform all the necessary activities, during which they are able to recognize and avoid all dangers. (Definition for technical personnel IEC 364)

The appliance is not intended to be used by persons (including children) with reduced physical, sensory or mental capacities, or who lack experience or knowledge, unless, through the mediation of a person responsible for their safety, they have had the benefit of supervision or of instructions on the use of the appliance. Children must be supervised to ensure that they do not play with the appliance. (EN 60335-1: 02).

Safety
Use is allowed only if the electric system is in possession of safety precautions in accordance with the regulations in force in the country where the product is installed (for Italy CEI 64/2).

Pumped liquids
The machine has been designed and made for pumping water, free from explosive substances and solid particles or fibres, with a density of 1000 Kg/m³, a kinematic viscosity of 1mm²/s and non chemically aggressive liquids.

The power supply cable must never be used to carry or shift the pump.

Never pull on the cable to detach the plug from the socket.

If the power cable is damaged, it must be replaced by the manufacturer or by their authorised technical assistance service, so as to avoid any risk.

Failure to observe the warnings may create situations of risk for persons or property and will void the product guarantee.

RESPONSIBILITY

The Manufacturer does not vouch for correct operation of the electropumps or answer for any damage that they may cause if they have been tampered with, modified and/or run outside the recommended work range or in contrast with other indications given in this manual.
The Manufacturer declines all responsibility for possible errors in this instructions manual, if due to misprints or errors in copying. The Manufacturer reserves the right to make any modifications to products that it may consider necessary or useful, without affecting their essential characteristics.

1- GENERAL

The product is an integrated system composed mainly of a pump unit, a multi-impeller centrifugal electropump, an electronic control unit that controls it and an expansion vessel. On the outside the product appears as a parallelepiped that presents 6 faces as shown in Fig.1.
Applications
multistage self-priming centrifugal pump suitable for domestic or industrial uses, for water supply and pressure boosting systems.

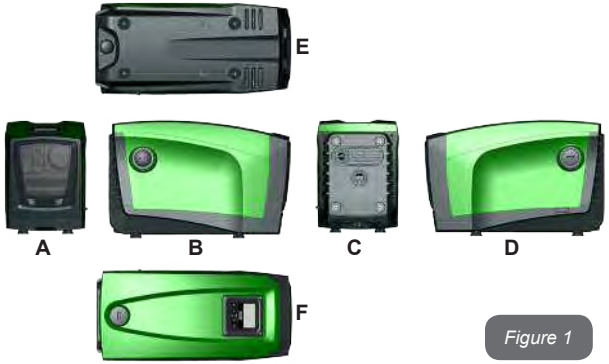


Figure 1

Face A: a door allows access to the Technical Compartment. The door can be removed by inserting 2 fingers in the rubber grips, squeezing and rotating the door around the hinges on the side opposite the grips (see Fig.2). To put the door back in place, insert the hinges in their slots and close the door until it clicks.

Figure 2

Inside the technical compartment you can access (see Fig.3):

1. Valve of the expansion vessel;
2. Technical data plate;
3. Rapid Guide;
4. Motor shaft;
5. Accessory tool;
6. Filling cap (only for vertical configuration)

Figure 3

Face B: a removable screw cap gives access to the non return valve (see par. 16.3). Remove it only in the case of maintenance by skilled personnel.

Face C: the 4 brass threads form the seat for the 4 support feet in the case of vertical installation. The two 1" screw caps can be removed to make the connections towards the system, depending on the installation configuration you want to adopt. If applicable, connect to the connection marked "IN" the system from which you want to draw water (well, cistern,…) and connect the delivery system to the connection marked "OUT". There is also a ventilation grid.

Face D: removing the 1" cap allows access to a second delivery connection which can be used at the same time or alternatively to the one

marked ”OUT” of face C. The power supply cable is for connection to the power mains.

Face E: the 4 brass threads form the seat for the 4 support feet in the case of horizontal installation. The 1” cap has the main function of emptying the system. There are also 2 ventilation grids.

Face F: as indicated by the label to be removed, the 1” cap has a dual function: in the case of horizontal installation, the outlet that is closed by the cap acts as the system’s loading door (see below “loading operations”, par. 4.3); in the case of vertical installation, the same outlet can act as the input hydraulic connection (exactly like the one marked “IN” on face C and as an alternative to it). The user interface panel is composed of a display and a keyboard and its function is to set the system, query its status and communicate any alarms.

The system can be installed in 2 different configurations: horizontal (Fig.4) or vertical (Fig.5).

Figure 4

Figure 5

1.1 Description of the Integrated Inverter

The electronic control integrated in the system is of the type with inverter and it makes use of flow, pressure and temperature sensors, also integrated in the system.

By means of these sensors the system switches on and off automatically according to the utility’s needs and it is able to detect conditions of malfunction, to prevent and indicate them.

The Inverter control ensures different functions, the most important of which, for pumping systems, are the maintaining of a constant pressure value in delivery and energy saving.

- The inverter is able to keep the pressure of a hydraulic circuit constant by varying the rotation speed of the electropump. In operation without an inverter the electropump is unable to modulate and, when there is an increase of the request for flow, the pressure necessarily decreases, or vice versa; this means the pressures are too high at low flow rates or too low when there is an increased request for flow.
- By varying the rotation speed according to the instantaneous request of the utility, the inverter limits the power supplied to the electropump to the minimum necessary to ensure that the request is satisfied. Instead, operation without an inverter contemplates operation of the electropump always and only at maximum power.

The system is configured by the manufacturer to satisfy the majority of installation cases, that is:

- Operation at constant pressure;
- Set-Point (desired value of constant pressure: SP = 3.0 bar
- Reduction of pressure to restart: RP = 0.5 bar
- Anti-cycling function: Disabled

However, these parameters and others can be set according to the system. All the settable values are illustrated in the par. 10-11-12: pressure, intervention of protections, rotation speed, etc.
There are many other operating modes and accessory functions. Thanks to the different possible settings and the availability of configurable input and output channels, it is possible to adapt the inverter operation to the requirements of various systems. See 10-11-12.

1.2 Integrated Expansion Vessel

The system is complete with an integrated expansion vessel with a total capacity of 2 litres. The main functions of the expansion vessel are:

• to make the system elastic so as to protect it against water hammer;
• to ensure a water reserve which, in the case of small leaks, maintains the pressure in the system for a longer time and spreads out needless restarts of the system which otherwise would be continuous;
• when the utility is turned on, ensure the water pressure for the seconds that the system takes to switch on and reach the correct rotation speed.

It is not a function of the integrated expansion vessel to ensure a water reserve such as to reduce interventions of the system (requests from the utility, not from a leak in the system). It is possible to add an expansion vessel with the capacity you prefer to the system by connecting it to one of the 2 delivery outlets (in the case of horizontal installation) or to a point on the delivery system (not suction point!). When choosing the tank, consider that the quantity of water released will also depend on the parameters SP and RP that can be set on the system (par.11-12).

The expansion vessel is preloaded with pressurised air through the valve accessible from the technical compartment (Fig.3, point 1). The preload value with which the expansion vessel is supplied by the manufacturer is in agreement with the parameters SP and RP set as default, and anyway it satisfies the following equation:

Pair = SP – RP – 0.5bar Where:
- Pair = air pressure value in bar
- SP = Set Point (par.12.3) in bar
- RP = Reduction of pressure to restart (par. 15.5.1) in bar

So, by the manufacturer: Pair = 3 – 0.5 – 0.5 = 2.0 bar

If different values are set for the parameters SP and/or RP, regulate the valve of the expansion vessel releasing or letting in air until the above equation is satisfied again (e.g.: SP=2.0bar; RP=0.3bar; release air from the expansion vessel until a pressure of 1.5bar is reached on the valve).

Failure to respect the above equation may lead to malfunctions of the system or to premature breakage of the diaphragm inside the expansion vessel.

Considering the expansion vessel capacity of only 2 litres, any operation to check the air pressure must be performed by connecting the pressure gauge very rapidly: on small volumes the loss of even a limited quantity of air can cause an appreciable drop in pressure. The quality of the expansion vessel ensures the maintenance of the set air pressure value, proceed to check it only at calibration or if you are sure of a malfunction.

Any operation to check and/or reset the air pressure must be performed with the delivery system not under pressure: disconnect the pump from the power supply and open the utility nearest to the pump, keeping it open until it no longer gives any water.

The special structure of the expansion vessel ensures its quantity and duration over time, especially of the diaphragm which is typically the component subject to wear for items of this type. However, in the case of breakage, the entire expansion vessel must be replaced and exclusively by authorised personnel.

Description of the Electropump

The system has a built-in multi-impeller centrifugal electropump. Specifically, the electropump comprises a hydraulic assembly of 5 impellers driven by a water-cooled three-phase electric motor. Cooling of the motor with water rather than air ensures less noise in the system and the possibility of locating it even in recesses without ventilation.

The graph in Fig.6 shows in red the characteristic curve of the hydraulic performance of the electropump at maximum rotation speed (pump not controlled by the inverter). This gives:
- maximum flow rate = 125 litres/minute;
- maximum head = 65 metres => about 6.5 bar maximum pressure.

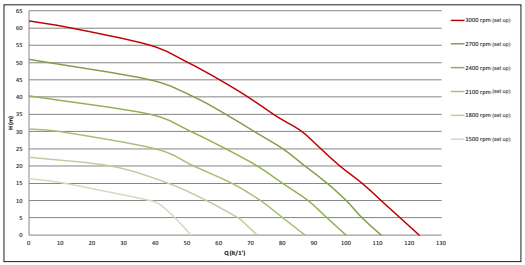


Figure 6

The same graph in Fig.6 shows in green other characteristic curves corresponding to reduced rotation speeds of the same electropump. By automatically modulating the rotation speed of the electropump, the inverter allows it to move its operation from one of the characteristic curves to another, maintaining the constant set pressure value (SP). Practically, the resulting curve of the system controlled by the inverter becomes the one shown in Fig.7 (considering a default SP value = 3.0 bar).

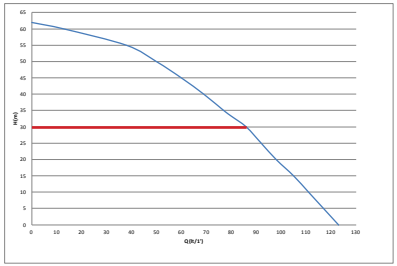


Figure 7

This means that, with SP = 3.0 bar, the system is able to ensure the constant set pressure to utilities that require flow rates between 0 and 90 litres/minute. For higher flow rates the system works according to the characteristic curve of the electropump at maximum rotation speed. For flow rates lower than 90 litres/minute, as well as ensuring constant pressure, the system reduces the absorbed power and therefore the energy consumption.

The above performances are to be considered measured at ambient temperature and water at about 20°C, during the first 10 minutes of motor operation, with water level at suction at a depth of no more than 1 metre

As the suction depth increases, the performance of the electropump decreases.

1.3 Technical characteristics

ELECTRIC POWER SUPPLY	Input current frequency	50/60 Hz
	Input current voltage	1 x 220/240 ~ VAC
	Current intensity	12 A
	Maximum absorbed power - P1	1550 W
CONSTRUCTION CHARACTERISTICS	Overall dimensions	565x265x352 mm without feet
	Empty weight (excluding packaging)	24,8 kg
	Protection class	IP x4
	Motor insulation class	F
HYDRAULIC PERFORMANCE	Maximum head	65 m
	Maximum flow rate	120 l/min
	Priming	<5min at 8m
WORKING CONDITIONS	Maximum working pressure	8 bar
	Liquid temperature max	40 °C
	Environment temperature max	50 °C
	Storage environment temperature	-10÷60 °C

2- INSTALLATION

The system is designed for indoor use: do not install the system outdoors and/or directly exposed to atmospheric agents.

The system is designed to be able to work in environments where the temperature remains between 0°C and 50°C (on condition that the electric power supply is ensured: see par. 12.7.7 “anti-freeze function”).

The system is suitable for treating drinking water.

The system cannot be used to pump salt water, sewage, inflammable, corrosive or explosive liquids (e.g. petroleum, petrol, thinners), greases, oils or food products.

The system can take in water the level of which must not be at a depth greater than 8m (the height between the water level and the pump suction mouth).

If the system is used for the domestic water supply, respect the local regulations of the authorities responsible for the management of water resources.

When choosing the installation site, check that:

- The voltage and frequency on the pump’s technical data plate correspond to the values of the power supply system.
- The electrical connection is made in a dry place, far from any possible flooding.
- The electrical system is provided with a residual-current circuit breaker with I Δn ≤ 30 mA and that the earth system is efficient.
- Any extension cables comply with the regulations in force.

If you are not sure of the absence of foreign bodies in the water to be pumped, install a filter on the system intake that is suitable for catching impurities.

The installation of a filter on intake causes a decrease of the system’s hydraulic performance proportional to the loss of load caused by the filter itself (generally the greater the filtering power, the greater the fall in performance).

Choose the type of configuration you intend to use (vertical or horizontal) considering the connections to the system, the position of the user interface panel, and the spaces available according to the indications below. Other types of installation configuration are possible using DAB accessory interfaces: see dedicated paragraph (par.15.2, 15.3).

3 - VERTICAL CONFIGURATION

Remove the 4 support feet from the bottom tray of the packaging and screw them fully into their brass seats on face C. Put the system in place, taking into account the dimensions in Fig.8.

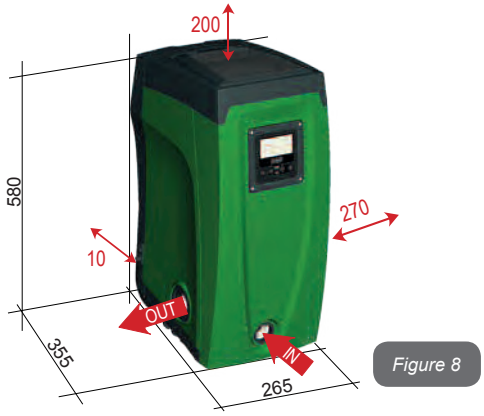


Figure 8

- The distance of at least 10mm between Face E of the system and any wall is obligatory to ensure ventilation through the grids provided.

• The distance of at least 270mm between Face B of the system and an obstruction is recommended so as to be able to carry out maintenance on the non-return valve without disconnecting the system.
• The distance of at least 200mm between Face A of the system and an obstruction is recommended so as to be able to remove the door and gain access to the technical compartment.

If the surface is not flat, unscrew the foot that is not touching and adjust its height until it contacts the surface so as to ensure the stability of the system. The system must in fact be placed in a safe and stable position, ensuring that its axis is vertical: it must not be in an inclined position.

3.1 Hydraulic connections

Make the connection at input to the system through the mouth on Face F marked “IN” in Fig.8 (suction connection). Then remove the respective cap with the aid of the accessory tool or with a screwdriver.

Make the connection at output from the system through the mouth on Face F marked “OUT” in Fig.8 (delivery connection). Then remove the respective cap with the aid of the accessory tool or with a screwdriver.

All the hydraulic connections of the system to the plant to which it can be connected are of the threaded female type 1” GAS, made of brass.

If you intend to connect the product to the plant with fittings that have a diameter larger than the normal 1” pipe (for example the ring nut in the case of fittings in 3 pieces), make sure that the 1” Gas male thread of the coupling protrudes at least 25mm from the above diameter (see Fig.9)

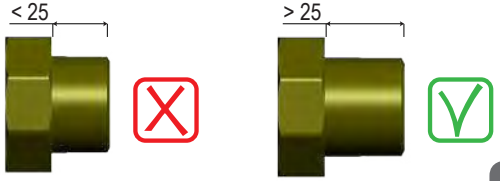


Figure 9

With reference to its position with respect to the water to be pumped, the installation of the system may be defined “above head” or “below head”. In particular the installation is defined “above head” when the pump is placed at a level higher than the water to be pumped (e.g. pump on the surface and water in a well); vice versa it is “below head” when the pump is placed at a level lower than the water to be pumped (e.g. overhead cistern and pump below).

If the vertical installation of the system is of the “over head” type, it is recommended to fit a non-return valve in the suction section of the system; this is to allow the operation of loading the system (par. 3.2).

If the installation is of the “over head” type, install the suction pipe from the water source to the pump in such a way as to avoid the formation of goosenecks or siphons. Do not place the suction pipe above the pump level (to avoid the formation of air bubbles in the suction pipe). The suction pipe must draw at its entrance at a depth of at least 30cm below the water level and must be watertight along its whole length, as far as the entrance to the electropump.

The suction and delivery pipes must be fitted so that they do not exert any mechanical pressure on the pump.

3.2.Loading Operation
Installation above head and below head

Installation “above head” (par. 3.1): access the technical compartment and, with the aid of the accessory tool (Fig.3_point 5) or with a screwdriver, remove the filling cap (Fig.3_point 6). Fill the system with clean water through the loading door, taking care to let the air out. If the non-return valve on the suction pipe (recommended in paragraph 3.1) has been placed close to the system entry door, the quantity of water with which to fill the system should be 2.2 litres. It is recommended to fit the non-return valve at the end of the suction pipe (foot valve) so as to be able to fill it

quickly too during the loading operation. In this case the quantity of water necessary for the loading operation will depend on the length of the suction pipe (2.2 litres + …).

Installation “below head” (par. 3.1): if there are no check valves between the water deposit and the system (or if they are open), it loads automatically as soon as it is allowed to let out the trapped air. So slackening the filling cap (Fig.3_point 6) enough to vent the trapped air allows the system to load completely. You must survey the operation and close the loading door as soon as the water comes out (however it is recommended to fit a check valve in the section of the suction pipe and to use it to control the loading operation with the cap open). Alternatively, in the case where the suction pipe is intercepted by a closed valve, the loading operation may be carried out in a similar way to the one described for installation over head.

4 - HORIZONTAL CONFIGURATION

Remove the 4 support feet from the bottom tray of the packaging and screw them fully into their brass seats on face E. Put the system in place, taking into account the dimensions in Fig.10.

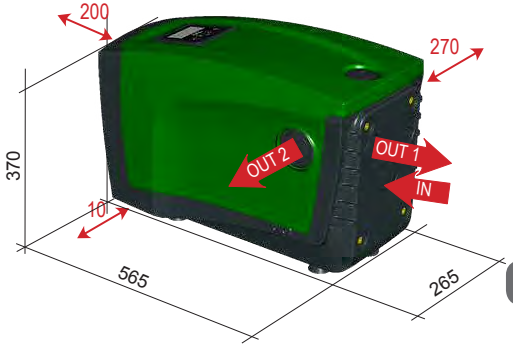


Figure 10

• The distance of at least 270mm between Face B of the system and an obstruction is recommended so as to be able to carry out maintenance on the non-return valve without disconnecting the system.

• The distance of at least 200mm between Face A of the system and an obstruction is recommended so as to be able to remove the door and gain access to the technical compartment.

• The distance of at least 10mm between Face D of the system and an obstruction is obligatory to let out the power supply cable.

If the surface is not flat, unscrew the foot that is not touching and adjust its height until it contacts the surface so as to ensure the stability of the system. The system must in fact be placed in a safe and stable position, ensuring that its axis is vertical: it must not be in an inclined position.

4.1 Hydraulic connections

Make the connection at input to the system through the mouth on Face C marked “IN” in Fig.10 (suction connection). Then remove the respective cap with the aid of the accessory tool or with a screwdriver.

Make the connection at output from the system through the mouth on Face C marked “OUT 1” in Fig.10 and/or through the mouth on Face D marked “OUT 2” in Fig.10 (delivery connection). In this configuration either of the 2 mouths can be used as an alternative to the other (depending on the convenience of the installation), or simultaneously (dual delivery system). So remove the cap(s) from the door(s) you intend to use with the aid of the accessory tool or with a screwdriver.

All the hydraulic connections of the system to the plant to which it can be connected are of the threaded female type 1” GAS, made of brass.

See WARNING for Figure 9.

4.2 Orientation of the Interface Panel

The Interface Panel has been designed so that it can be oriented in the direction where it is most convenient for the user to read: its square shape allows it to be rotated from 90° to 90° (Fig.11).

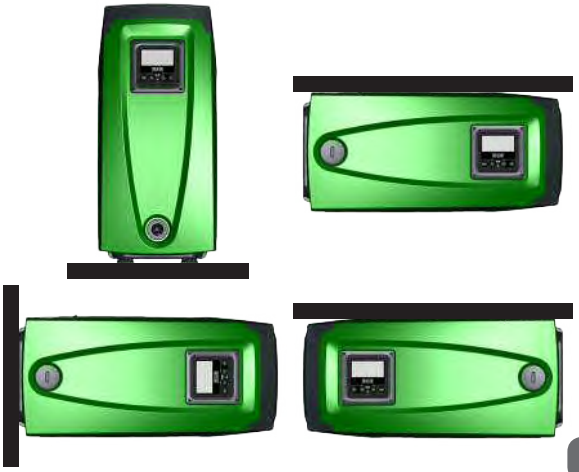


Figure 11

• Disengage the 4 screws at the corners of the panel using the hex wrench provided with the accessory tool.
• Do not remove the screws, just disengage them from the thread on the product body.
• Be careful not to drop the screws into the system
• Move the panel away, taking care not to pull on the signal transmission cable
• Reposition the panel in its seat at the preferred angle
• Tighten the 4 screws with the wrench

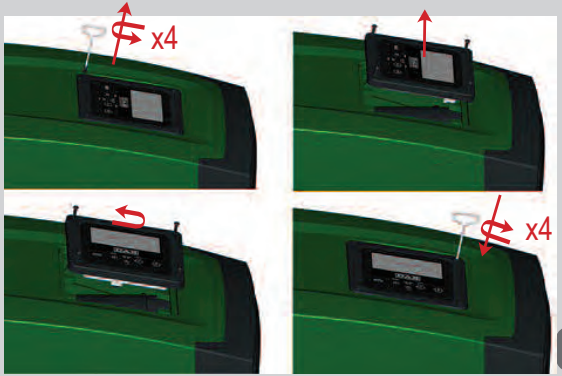


Figure 12

4.3 Loading Operation
Installation above head and below head

With reference to its position with respect to the water to be pumped, the installation of the system may be defined “above head” or “below head”. In particular the installation is defined “above head” when the pump is placed at a level higher than the water to be pumped (e.g. pump on the surface and water in a well); vice versa it is “below head” when the pump is placed at a level lower than the water to be pumped (e.g. overhead cistern and pump below).

Installation “above head”: with the aid of the accessory tool (Fig.3_point 5) or with a screwdriver, remove the filling cap which, for the horizontal configuration, is the one on Face F (Fig.1). Fill the system with clean water through the loading door, taking care to let the air out. The quantity of water with which to fill the system must be at least 1.5 litres. It is recommended to fit a non-return valve at the end of the suction pipe (foot valve) so as to be able to fill it quickly too during the loading operation. In this case the quantity of water necessary for the loading operation will depend on the length of the suction pipe (1.5 litres + …).

Installation “below head”: if there are no check valves between the water

deposit and the system (or if they are open), it loads automatically as soon as it is allowed to let out the trapped air. So slackening the filling cap (Face F - Fig.3) enough to vent the air allows the system to load completely. To slacken the cap, use the accessory tool (Fig.3_point 5) or a screwdriver. You must survey the operation and close the loading door as soon as the water comes out (however it is recommended to fit a check valve in the section of the suction pipe and to use it to control the loading operation with the cap loose). Alternatively, in the case where the suction pipe is intercepted by a closed valve, the loading operation may be carried out in a similar way to the one described for installation over head.

5 - COMMISSIONING

The pressure at pump input must not be higher than 2 bar.

The suction depth must not exceed 8 m.

5.1 - Electrical Connections

To improve immunity to the possible noise radiated towards other appliances it is recommended to use a separate electrical duct to supply the product.

Attention: always respect the safety regulations!
Electrical installation must be carried out by an expert, authorised electrician, who takes on all responsibility.

The system must be correctly and safely earthed as required by the regulations in force.

The line voltage may change when the electropump is started. The line voltage may undergo variations depending on other devices connected to it and on the quality of the line.

The differential switch protecting the system must be correctly sized and must be of the “Class A” type. The automatic differential switch must be marked with the following two symbols:

The thermal magnetic circuit breaker must be correctly sized (see Electrical Characteristics)

5.2 Configuration of the Integrated Inverter

The system is configured by the manufacturer to satisfy the majority of installation cases, that is:

- operation at constant pressure;
- Set-Point (desired value of constant pressure): SP = 3.0 bar
- Reduction of pressure to restart: RP = 0.5 bar
- Anti-cycling function: Disabled

However, all these parameters and many others can be set by the user. There are many other operating modes and accessory functions. Thanks to the different possible settings and the availability of configurable input and output channels, it is possible to adapt the inverter operation to the requirements of various systems. See par. 10-11-12

For the definition of the parameters SP and RP, the pressure at which the system starts has the value:
Pstart = SP – RP For example: 3.0 – 0.5 = 2.5 bar
in the default configuration

The system does not work if the utility is at a height higher than the equivalent in metres of water column of the Pstart (consider 1 bar = 10 m water column): for the default configuration, if the utility is at a height of at least 25m the system does not start.

6 - PRIMING

The priming of a pump is the phase during which the machine attempts to expel all the air from the suction pipe. The operation is successful if the

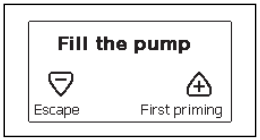
air is expelled and the machine starts working regularly: in this case it is said that the pump is primed.

Once the pump has been loaded (par. 3.2, 4.3) and the device has been configured (par. 5.2), it is possible to connect the electric power supply after having opened at least one utility on delivery.

The system starts and checks the presence of water in delivery for the first 10 seconds.

If a flow of water is detected in delivery, the pump is primed and starts its regular work. This is the typical case of installation below head (par. 3.2, 4.3). The utility opened in delivery from which the pumped water is coming out can be closed.

If a regular flow in delivery is not detected after 10 seconds, the system asks for confirmation to enter the priming procedure (typical case of installation above head par. 3.2, 4.3). Or:



When “+” is pressed the pump enters the priming procedure: it starts working for a maximum time of 5 minutes during which the safety block for dry operation is not tripped. The priming time depends on various parameters, the most influential of which are the depth of the water level from which it is drawing, the diameter of the suction pipe, the water-tightness of the suction pipe. On condition that a suction pipe is used that is no smaller than 1” and that it is well sealed (with no holes or joins from which it can take in air), the product has been studied to manage to prime in water conditions up to 8m in depth in a time of less than 5 minutes. As soon as the product detects a regular flow in delivery, it leaves the priming procedure and starts its regular work. The utility opened in delivery from which the pumped water is coming out can be closed. If after 5 minutes of the procedure the product is still not primed, the interface display sends a failure message. Disconnect the power supply, load the product adding new water, wait 10 minutes and repeat the procedure from the moment you put the plug in the socket.

Press “-“ to confirm that you do not want to start the priming procedure. The product remains in alarm status

Operation
Once the electropump is primed, the system starts regular operation according to the configured parameters: it starts automatically when the tap is turned on, supplies water at the set pressure (SP), keeps the pressure constant even when other taps are turned on, stops automatically after time T2 once the switching off conditions are reached (T2 can be set by the user, factory value 10 sec).

7 - ANTI DRY-RUN (Protection against dry running)

In the case of lack of water the pump is stopped automatically after the time T2. This is indicated by the red “Alarm” led and by the letters “BL” on the display.

After having restored the correct flow of water you can try to leave the protective block manually by pressing the “+” and “-“ keys simultaneously and then releasing them.

If the alarm status remains, or if the user does not intervene by restoring the flow of water and resetting the pump, the automatic restart will try to restart the pump.

8 - ANTI-CYCLING (Protection against continuous cycles without utility request)

SIf there are leaks in the delivery section of the plant, the system starts and stops even if no water is being drawn: even just a slight leak (a few ml) can cause a sufficient fall in pressure to start the electropump.

The electronic control of the system is able to detect the presence of the leak, identifying it as such after N identical start/stop cycles. In this case adjust the parameter RP to limit the negative effects of the leaks.

The Anti-Cycling function can also be activated in a blocking

manner (par 12.7.5): when it recognises the leak the system goes into protective block status indicated by the red “Alarm” led and by the word “ANTICYCLING” on the display. After the leak has been removed, you can manually force restart by pressing the “+” and “-“ keys simultaneously and then releasing them.

The Anti-Cycling function can be completely excluded (par 12.7.5).

9 - ANTI-FREEZE (Protection against freezing of water in the system)

The change of state of water from liquid to solid involves an increase in volume. It is therefore essential to ensure that the system does not remain full of water with temperatures close to freezing point, to avoid breakages of the system. This is the reason why it is recommended to empty any electropump that is going to remain unused during the winter. However, this system has a protection that prevents ice formation inside by activating the electropump when the temperature falls to values close to freezing point. In this way the water inside is heated and freezing prevented

The Anti-Freeze protection works only if the system is regularly fed: with the plug disconnected or in the absence of current the protection cannot work.

However, it is advised not to leave the system full during long periods of inactivity: drain the system accurately through the drainage cap (Fig.1 Face E) and put it away in a sheltered place.

10 - INVERTER ELECTRONIC CONTROL AND USER INTERFACE

The inverter makes the system work at constant pressure. This regulation is appreciated if the hydraulic plant downstream from the system is suitably sized. Plants made with pipes with too small a section introduce load losses that the equipment cannot compensate; the result is that the pressure is constant on the sensors but not on the utility.

Plants that are excessively deformable can create the onset of oscillations; if this occurs, the problem can be solved by adjusting the control parameters “GP” and “GI” (see par 13.6.4 - GP: Proportional gain coefficient and 13.6.5 - GI: Integral gain coefficient).

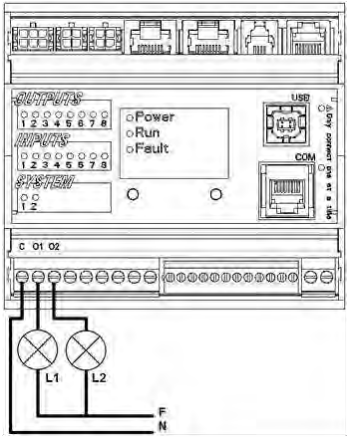
10.1 - Electrical connections of utility inputs and outputs

The device can be connected to other devices by means of the proprietary wireless channel. One of these devices is the input output control unit.
Some of the functions that it possesses are the 6 optoinsulated and 2 non optoinsulated digital inputs and the 8 outputs, also insulated.
The device connects to 4 of these inputs and 2 of the outputs so as to create interface solutions with more complex installations.
Shown in Figure 1 and Figure 2, for example, are two possible configurations of the inputs and outputs.
For the installer it will be sufficient to wire up the desired input and output contacts and to configure their functions as desired (see paragraphs 13.7.8 - Setup of the auxiliary digital inputs IN1, IN2, IN3, IN4 and 13.8 - Setup of the outputs OUT1, OUT2).

Output contacts OUT 1 and OUT 2:
The connections of the outputs listed below refer to the 9-pole terminal board on the input output control unit, indicated with screen printing O1, O2 and C.

Characteristics of the output contacts	
Type of contact	NO
Max. bearable voltage [V]	250
Max. bearable current [A]	5 -> resistive load 2,5 -> resistive load
Max. accepted cable section [mm²]	2,5

Table 1: Characteristics of the output contacts



With reference to the example proposed in Figure 1:

- L1 si accende quando la pompa è in blocco (es. "BL": blocco man canza acqua).
- L2 is lit when the pump is running ("GO").

Figure 13: Example of connection of the outputs to the I/O control unit

Input connections (photocoupled)

The connections of the outputs listed below refer to the 12-pole terminal board on the I/O control unit, indicated with screen printing I1, I2, C, GND, VS.

- I1: Pin 2 and 3
- I2: Pin 3 and 4
- I3: Pin 5 and 6
- I4: Pin 6 and 7

The inputs may be powered with either direct or alternating current at a 50-60 Hz. Shown below are the electrical characteristics of the inputs, Table 2.

Characteristics of the inputs		
	DC inputs [V]	AC inputs 50-60 Hz [Vrms]
Minimum switch-on voltage [V]	8	6
Maximum switch-off voltage [V]	2	1,5
Maximum admissible voltage [V]	36	36
Current absorbed at 12V [mA]	3,3	3,3
Max. accepted cable section [mm²]	1,5	
N.B. The inputs can be controlled with any polarity (positive or negative with respect to their earth connection)		

Table 2: Characteristics of the inputs

Figure 14 and Tabella 4 show the connections of the inputs.

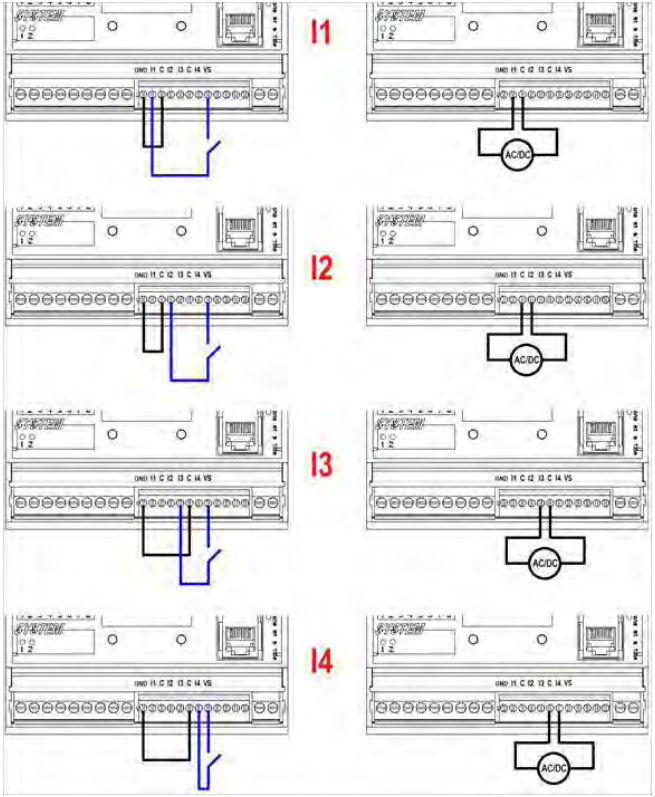


Figure 14: Example of connection of the inputs to the I/O control unit

Input wiring (J5)			
	Input connected to clean contact		Input connected to voltage signal
Input	Clean contact between pins	Jumper	Signal connection pin
I1	8 - 2	1 – 3	2 - 3
I2	8 - 4	1 – 3	3 - 4
I3	8 - 5	1 – 6	5 - 6
I4	8 - 7	1 – 6	6 - 7

Table 3: Input connection

Referring to the example proposed in Figure 2 and using the factory settings for the inputs (I1 = 1; I2 = 3; I3 = 5; I4=10) we obtain:

- When the switch closes on I1 the pump goes into block status and indicates “F1”
((e.g. I1 connected to a float, see par. 12.7.8.2 – Setting external float function)).
- When the switch closes on I2 the regulating pressure becomes “P2”.
(see par. 12.7.8.3 – Setting auxiliary pressure input function).
- When the switch closes on I3 the pump goes into block status and indicates “F3”
(see par. 12.7.8.4 – Setting system enabling and fault reset).
- When the switch closes on I4 after time T1 the pump goes into block status and indicates “F4”
(see par. 12.7.8.5 – Setting low pressure detenction (KIWA).

The example proposed in Figure 2 refers to the connection with a clean contact using the internal voltage to control the inputs (of course only the useful inputs can be used).

If you have a voltage instead of a contact, it can still be used to control the inputs: it will be sufficient not to use the VS and GND terminals and to connect the source of voltage, which respects the characteristics described in Table 2, to the desired input . If an external voltage is used to control the inputs, all the circuitry must be protected by double insulation.

ATTENTION: the pairs of inputs I1/I2 and I3/I4 have one pole in common for each pair.

11 - THE KEYPAD AND THE DISPLAY

Figure 15: Aspect of the user interface

The user interface is composed of a keypad with 128x240 pixel LCD display and with POWER, COMM, ALARM warning leds as can be seen in Figure 3.
The display shows the values and the statuses of the device, with indications on the functionality of the various parameters.
The functions of the keys are summed up in Table 4.

MODE	The MODE key allows you to move on to the next items in the same menu. Holding it down for at least 1 sec allows you to skip to previous menu item.
SET	The SET key allows you to leave the current menu.
−	Decreases the current parameter (if it is an editable parameter).
+	Increases the current parameter (if it is an editable parameter).

Table 4: Key functions

Holding down the +/- keys allows the automatic increase/decrease of the parameter selected. After the +/- key has been held down for 3 seconds, the automatic increase/decrease speed increases.

When the + key or the - key is pressed the selected value is modified and saved immediately in the permanent memory (EEprom). If the machine is switched off, even accidentally, in this phase it does not cause the loss of the parameter that has just been set.

The SET key is only for leaving the current menu and is not necessary for saving the changes made. Only in particular cases described in chapter 0 are some values updated by pressing “SET” or “MODE”.

Warning leds

• Power
White led. Lit with a fixed light when the machine is powered.
• Alarm
Red led. Lit with a fixed light when the machine is blocked by an error.
• Comunicazione
• Communication
Blue led. Lit with a fixed light when communication is used and is working correctly. It blinks with a slow frequency if, when configured to work in communication mode, communication is not available, is not detected, or there are problems. It blinks with a high frequency during association with other wireless devices. Off if communication is not used.

Menus
The complete structure of all the menus and of all the items of which they are composed is shown in Table 6.

Access to the menus
The various menus can be accessed from the main menu in two ways:

1 - Direct access with a combination of keys
2 - Access by name with a drop-down menu

11.1 DIRECT ACCESS WITH A COMBINATION OF KEYS
The desired menu can be accessed directly by pressing simultaneously the appropriate combination of keys (for example MODE SET to enter the Setpoint menu) and the various items in the menu are scrolled with the MODE key.

Table 5 shows the menus that can be reached with the combinations of keys.

MENU NAME	DIRECT ACCESS KEYS	HOLD-DOWN TIME
User	MODE	On releasing the button
Monitor	SET −	2 Sec
Setpoint	MODE SET	2 Sec
Manual	SET − +	5 Sec
Installer	MODE SET −	5 Sec
Technical assistance	MODE SET +	5 Sec
Reset factory values	SET +	2 sec after switching on appliance
Reset	MODE SET − +	2 Sec

Table 5: Access to the menus

Reduced menu (visible)			*Extended menu (direct access or password)*			
Main Menu	**User Menu** **mode**	**Monitor Menu** set-minus	**Setpoint Menu** **mode-set**	**Manual Menu** set-minus-plus	**Installer Menu** mode-set-minus	**Tech. Assist. Menu** mode-set-plus
MAIN (Main Page)	**STATUS** **RS** Revs per minute **VP** Pressure **VF** Display of flow **PO** Power absorbed by pump **C1** Pump phase current	**CT** Contrast	**SP** Setpoint pressure	**STATO** **RI** Speed setting **VP** Pressure **VF** Display of flow **PO** **Power absorbed by pump** **C1** Pump phase current **RS** Revs per minute **TE** Dissipator temperature	**RP** Decrease pressure for restart	**TB** Block time for water lack.
Menu Selection		**BK** Back lighting	**P1** Auxiliary pressure 1		**OD** Type of plant	**T1** Delay in switching off KIWA function
		TK Backlight switch-on time	**P2** Auxiliary pressure 2		**AD** Address	**T2** Delay in switching off
		LA Language	**P3** Auxiliary pressure 3		**MS** Measuring system	**GP** Proportional gain.
	HO Hours Run Meter	**TE** Dissipator temperature	**P4** Auxiliary pressure 4		**AS** Wireless communica-tion settings	**GI** Integral gain
	NR Numero di avvii				**PR** Remote pressure sensor	**RM** Maximum speed
	PI Istogramma della potenza					**NA** Active devices
	SM System Monitor					**NC** Max. simultaneous devices
	VE Versions i HW & SW					**IC** Device configuration

	FF Fault & Warning Log					**ET** Max. exchange time
						AY Anti Cycling
						AE Anti-blocking
						AF AntiFreeze
						I1 Function input 1
						I2 Function input 2
						I3 Function input 3
						I4 Function input 4
						O1 Function output 1
						O2 Function output 2
						RF Reset fault & warning
						PW Set Password

Key	
Identifying colours	Modification of parameters in multi-pump assemblies
	Set of sensitive parameters. These parameters must be aligned so that the multi-pump system can start. The modification of one of these on any devices results in automatic alignment on all the other devices without any question.
	Parameters of which the alignment is allowed in facilitated mode by only one device, broadcasting it to all the others. It is tolerated that they may be different from one device to another.
	Set of parameters that may be aligned in broadcast mode by only one device.
	Setting parameters that are significant only locally.
	Read-only parameters.

Table 6: Menu structure

11.2 - Access by name with a drop-down menu

The selection of the various menus is accessed by name. From the main menu you access menu selection by pressing either of the + or – keys. The names of the menus that can be accessed appear on the menu selection page and one of the menus is highlighted by a bar (see Figure 16). Shift the highlighting bar using the + and – keys to select the menu you want and enter it by pressing MODE.

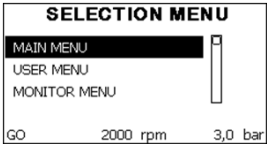


Figure 16: Selection of the drop-down menus

The items available are MAIN, USER, MONITOR, followed by a fourth item, EXTENDED MENU; this item allows the number of menus displayed to be extended. When EXTENDED MENU is selected a pop-up appears asking you to type in an access key (PASSWORD). The access key (PASSWORD) coincides with the combination of keys used for direct access and allows the extended display of the menus from the menu corresponding to the access key to all those with a lower priority.
The order of the menus is: User, Manual Setpoint, Manual, Installer, Technical Assistance.
When an access key is selected, the menus released remain available for 15 minutes or until they are disabled manually by means of the item “Hide forward menus” which appears on the menu selection when using an access key.
Figure 17 shows an operating diagram for selecting the menus.
The menus are in the centre of the page, from the right you reach them by means of direct selection with a combination of keys, while from the left you reach them by means of the selection system with drop-down menu.

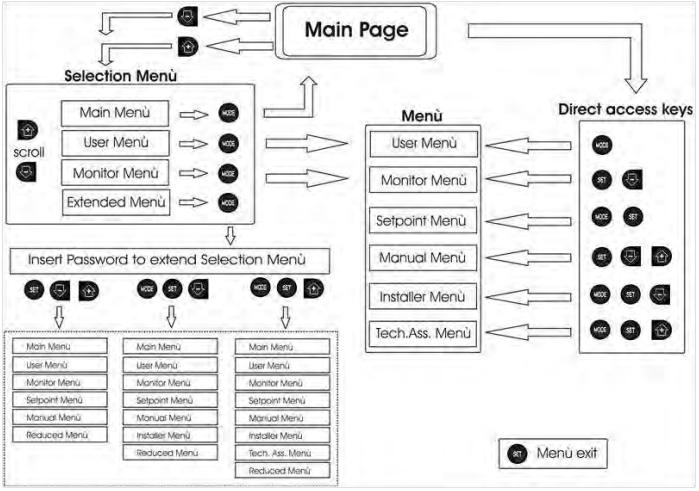


Figure 17: Diagram of possible menu accesses

11.3 - Structure of the menu pages

When switched on, some presentation pages are displayed showing the name of the product and the logo, after which the main menu appears. The name of each menu, whichever it may be, is always at the top of the display.

The following always appear on the main page:

Status: operating status (e.g. standby, go, Fault, input functions)
Revs per minute: value in [rpm]
Pressure: value in [bar] or [psi] depending on the set unit of measure.
Power: value in [kW] of the power absorbed by the device.

If the case occurs the following may appear:
Fault indications
Warning indications
Indications of the functions associated with the inputs
Specific icons

The error or status conditions that can be seen on the main page are listed in Table 7.

Error or status conditions shown on the main page	
Identifying code	**Description**
GO	Motor running
SB	Motor stopped
BL	Blockage due to water lack
LP	Blockage due to low supply voltage
HP	Blockage due to high internal supply voltage
OC	Blockage due to overcurrent in the electropump motor
SC	Blockage due to short circuit on the output phases
OT	Blockage due to overheating of the power stages
BP	Blockage due to fault of the pressure sensor
NC	Pump not connected
F1	Float function status / alarm
F3	System disable function status / alarm
F4	Low pressure signal function status / alarm
P1	Operating status with auxiliary pressure 1
P2	Operating status with auxiliary pressure 2
P3	Operating status with auxiliary pressure 3
P4	Operating status with auxiliary pressure 4

Com. icon with number	Operating status in multi-pump communication with the address indicated
Com. icon with E	Error status of communication in the multi-pump system
E0...E16	Internal error 0...16
EE	Writing and reading the factory settings on EEprom
WARN. Low voltage	Warning due to lack of supply voltage

Table 7: Status and error messages on the main page

The other menu pages vary with the associated functions and are described later by type of indication or setting. Once you have entered any menu, the bottom of the page always shows a summary of the main operating parameters (running status or any fault, current speed and pressure).
This allows a constant view of the machine's fundamental parameters.

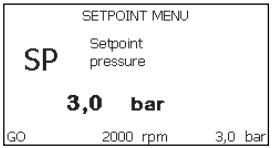


Figure 18: Display of a menu parameter

Indications on the status bar at the bottom of each page	
Identifying code	**Description**
GO	Motor stopped
SB	Motor stopped
rpm	Motor revs per minute
bar	Plant pressure
FAULT	Presence of an error preventing operation of the electropump

Table 8: Indications on the status bar

The following may appear on the pages that show parameters: numerical values and units of measure of the current item, values of other parameters linked to the setting of the current item, graphic bar, lists; see Figure 18.

11.4 - Blocking parameter setting by Password

The device has a password-enabled protection system. If a password is set, the parameters of the device will be accessible and visible but it will not be possible to change them.
The password management system is in the "technical assistance" menu and is managed by means of the parameter PW

11.5 - Enabling and disabling the motor

Pressing "+" and "-" causes the blocking/release of the motor (self-holding even after switching off) unless there is a fault, in which case it resets the fault.

12 - MEANING OF THE INDIVIDUAL PARAMETERS

12.1 - User Menu

From the main menu, pressing the MODE key (or using the selection menu and pressing + o -), gives access to the USER MENU. In the menu the MODE key allows you to scroll through the various menu pages. The values shown are the following.

12.1.1 - Status:
Displays the pump status.

12.1.2 - RS: Rotation speed display
Motor rotation speed in rpm.

12.1.3 - VP: Pressure display
Plant pressure measured in [bar] or [psi] depending on the measuring system used.

12.1.4 - VF: Flow display
Displays the instantaneous flow in [litres/min] or [gal/min] depending on the set measuring system.

12.1.5 - PO: Absorbed power display
Power absorbed by the electropump in [kW].
A flashing round symbol may appear under the symbol of the measured power PO. This symbol indicates the pre-alarm for exceeding the allowed maximum power

12.1.6 - C1: Phase current display
Motor phase current in [A].
A flashing round symbol may appear under the symbol of the phase current C1. This symbol indicates the pre-alarm for exceeding the allowed maximum current. If it flashes at regular intervals it means that the motor overload protection is about to trip and it will very probably go into protection status

12.1.7 - HO: Operating hours
Indicates on two lines the hours that the device has been switched on and the working hours of the pump.

12.1.8 - SN: Number of starts
Shows the number of motor starts.

12.1.9 - SM: System monitor
Displays the system status when in the presence of a multi-pump installation. If communication is not present, an icon depicting communication absent or interrupted is displayed. If there are several devices connected to one another, an icon is shown for each of them. The icon has the symbol of a pump under which are characters indicating the pump status. Depending on the operating status it will display as in Table 9.

System display		
Status	**Icon**	**Status information under the icon**
Motor running	Symbol of pump turning	speed in three figures
Motor stopped	Symbol of static pump	SB
Device faulty	Symbol of static pump	F

Table 9: Display of the system monitor SM

If the device is configured as reserve the top part of the icon depicting the motor is coloured, the display remains similar to Table 9 with the exception that, if the motor is stopped, it shows F instead of SB.

To leave for space for displaying the system the name of the parameter SM does not appear, but just the word “system” centrally placed under the name of the menu.

12.1.10 - VE: Version display
Hardware and software version with which the appliance is equipped.

12.1.11 - PI: Power histogram
A histogram of the power delivered is displayed on 5 vertical bars. The histogram indicates how long the pump has been on at a given power level. On the horizontal axis are the bars at the various power levels; on the vertical axis, the time for which the pump has been on at the specific power level (% of the time with respect to the total).

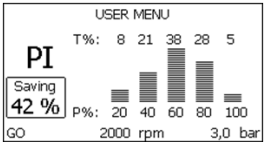


Figura 18: Power histogram display

12.1.12- FF: Fault log display
Chronological display of the faults that have occurred during system operation.

Under the symbol FF appear two numbers x/y indicating respectively the fault displayed and the total number of faults present; to the right of these numbers is an indication of the type of fault displayed.

The + and – keys scroll through the list of faults: pressing the – key goes back through the log and stops at the oldest fault present, pressing the + key goes forward in the log and stops at the most recent fault.

The faults are displayed in chronological order starting from the one that appeared farthest back in time x=1 to the most recent x=y. The maximum number of faults that can be shown is 64; when that number is reached, the log starts to overwrite the oldest ones.

This item on the menu displays the list of faults, but does not allow reset. Reset can be carried out only with the dedicated control from item RF on the TECHNICAL ASSISTANCE MENU.

The fault log cannot be deleted with a manual reset, by switching off the appliance, or by resetting the factory values, unless the procedure described above has been followed.

12.2 - Monitor Menu

From the main menu, by holding down simultaneously for 2 sec the keys “SET” and “-“ (minus), or using the selection menu and pressing + or -, you can access the MONITOR MENU.
In this menu, by pressing the MODE key, the following values are displayed in sequence

12.2.1 - CT: Display contrast
Adjusts the display contrast.

12.2.2 - BK: Display brightness
Adjusts the backlighting of the display on a scale from 0 to 100.

12.2.3 - TK: Backlight switch-on time
Sets the time that the backlight is lit since the last time a key was pressed.

Values allowed: ‘0’ always off; from 10 sec to 10 min or ‘--‘ always on.
When the backlight is off, the first time any key is pressed has the sole effect of restoring the backlighting.

12.2.4 - LA: Language
Display in one of the following languages:
- Italian
- English
- French
- German
- Spanish
- Dutch
- Swedish
- Turkish
- Slovak
- Romanian

12.2.5 - TE: Dissipator temperature display

12.3 - Setpoint Menu

From the main menu, hold down simultaneously the “MODE” and “SET” keys until “SP” appears on the display (or use the selection menu pressing + or -).
The + and – keys allow you respectively to increase and decrease the plant boosting pressure.
Press SET to leave this menu and return to the main menu.
The range of adjustment is 1-6 bar (14-87 psi).

12.3.1 - SP: Setting the setpoint pressure
Pressure at which the plant is pressurised if there are no active auxiliary pressure regulating functions.

12.3.2 - Setting the auxiliary pressures
The device has the possibility of varying the setpoint pressure according to the status of the inputs, up to 4 auxiliary pressures can be set for a total of 5 different setpoints. For the electrical connections see paragraph Input connections (photocoupled), for the software settings see para-

graph 13.7.8.3 - Setting auxiliary pressure input function.

If several auxiliary functions associated with several inputs are active at the same time, the device will set the lowest pressure of all the active ones.

The auxiliary setpoints can be used only through the I/O control unit.

12.3.2.1 - P1: Setting auxiliary pressure 1
Pressure at which the system is pressurised if the auxiliary pressure function is activated on input 1.

12.3.2.2 - P2: Setting auxiliary pressure 2
Pressure at which the system is pressurised if the auxiliary pressure function is activated on input 2.

12.3.2.3 - P3: Setting auxiliary pressure 3
Pressure at which the system is pressurised if the auxiliary pressure function is activated on input 3.

12.3.2.4 - P4: Setting auxiliary pressure 4
Pressure at which the system is pressurised if the auxiliary pressure function is activated on input 4.

The pump restarting pressure is linked not only to the set pressure (SP, P1, P2, P3, P4) but also to RP. RP expresses the decrease in pressure, with respect to “SP” (or to an auxiliary pressure if activated), caused by the pump starting.

For example:
SP = 3.0 [bar]; RP = 0.5 [bar]; no active auxiliary pressure function:
During normal operation the system is pressurised at 3.0 [bar].
The electropump restarts when the pressure falls below 2.5 [bar].

Setting a pressure (SP, P1, P2, P3, P4) that is too high for the pump performance may cause false water lack errors BL; in these cases lower the set pressure

12.4 - Manual Menu

From the main menu, hold down simultaneously the “SET” and “+” and “-“ keys until the manual menu page appears (or use the selection menu pressing + or -).
The menu allows you to view and modify various configuration parameters: the MODE key allows you to scroll through the menu pages, the + and – keys allow you respectively to increase and decrease the value of the parameter concerned. Press SET to leave this menu and return to the main menu.

Entering the manual menu by pressing the SET + - keys puts the machine into forced STOP condition. This function can be used to force the machine to stop. The Stop condition is memorised and reproposed even switching off the machine and switching it on again

In the main menu, irrespective of the parameter displayed, it is always possible to perform the following controls:
Temporary starting of the electropump.
Pressing the MODE and + keys at the same time causes the pump to start at speed RI and this running status remains as long as the two keys are held down.
When the pump ON of pump OFF command is given, a communication appears on the display.

Starting the pump
Holding down the MODE - + keys simultaneously for 2 sec. causes the pump to start at speed RI. The running status remains until the SET key is pressed. The next time the SET key is pressed the pump leaves the manual menu.
When the pump ON of pump OFF command is given, a communication appears on the display.

12.4.1 - Status:
Displays the pump status.

12.4.2 - RI: Speed setting
Sets the motor speed in rpm. Allows you to force the number of revolu-

tions at a predetermined value.

12.4.3 - VP: Pressure display
Plant pressure measured in [bar] or [psi] depending on the measuring system used.

12.4.4 - VF: Flow display
If the flow sensor is selected it allows you to display the flow in the chosen measuring unit. The measuring unit may be [l/min] o [gal/min] vedi par. 13.5.4 - Measuring system.

12.4.5 - PO: Absorbed power display
Power absorbed by the electropump in [kW].
A flashing round symbol may appear under the symbol of the measured power PO. This symbol indicates the pre-alarm for exceeding the allowed maximum power.

12.4.6 - C1: Phase current display
Motor phase current in [A].
A flashing round symbol may appear under the symbol of the phase current C1. This symbol indicates the pre-alarm for exceeding the allowed maximum current. If it flashes at regular intervals it means that the motor overload protection is about to trip and it will very probably go into protection status.

12.4.7 - RS: Rotation speed display
Motor rotation speed in rpm.

12.4.8 - TE: Dissipator temperature display

12.5 - Installer Menu

From the main menu, hold down simultaneously the “MODE” and “SET” and “-“ keys until the first parameter of the installer menu appears on the display (or use the selection menu pressing + or -). The menu allows you to view and modify various configuration parameters: the MODE key allows you to scroll through the menu pages, the + and – keys allow you respectively to increase and decrease the value of the parameter concerned. Press SET to leave this menu and return to the main menu.

12.5.1 - RP: Setting the pressure fall to restart
Expresses the fall in pressure with respect to the SP value which causes restarting of the pump.
For example if the setpoint pressure is 3.0 [bar] and RP è 0.5 [bar] the pump will restart at 2.5 [bar].
RP can normally be set from a minimum of 0.1 to a maximum of 5 [bar].
In particular conditions (for example in the case of a setpoint lower than the RP) it may be limited automatically.
To assist the user, on the RP setting page the actual restarting pressure also appears highlighted under the RP symbol, see Figure 19.

Figura 19: Setting the restart pressure

12.5.2 - OD: Type of plant
VPossible values 1 and 2 referring to a rigid system and an elastic system. The device leaves the factory with mode 1 suitable for the majority of systems. In the presence of swings in pressure that cannot be stabilised by adjusting the parameters GI and GP, change to mode 2.

IMPORTANT: The regulating parameters GP and GI also change in the two configurations. In addition the GP and GI values set in mode 1 are stored in a different memory from the GP and GI values set in mode 2. So, for example, when passing to mode 2, the GB value of mode 1 is replaced by the GB value of mode 2 but it is kept and will reappear again when returning to mode 1. The same value shown on the display has a different weight in one mode or in the other because the control algorithm is different.

12.5.3 - AD: Address configuration

This is significant only in a multi-pump connection. Set the communication address to be assigned to the device. The possible values are: automatic (default) or manually assigned address.

The addresses set manually can have values form 1 to 4. The configuration of the addresses must be the same for all the devices that make up the group: either all automatic or all manual. Setting the same addresses is not allowed.

Both in the case of assigning mixed addresses (some manual and some automatic) and in the case of duplicate addresses, an error signal is given. The error signal is given by displaying a flashing E in the place of the machine address.

If the chosen assignment is automatic, whenever the system is switched on addresses are assigned that may be different from the previous time, but this does not affect correct operation.

12.5.4 - MS: Measuring system

Set the measuring system, choosing between metric and imperial units. The quantities displayed are shown in Table 10.

Units of measurement displayed		
Quantity	**Metric units**	**Imperial units**
Pressure	bar	psi
Temperature	°C	°F
Flow rate	l / min	gal / min

Table 10: Measuring system

12.5.5 - AS: Association of devices

Allows connection/disconnection with the following devices

- E.sybox Other E.sybox pump for operation in a pump set
- composed of max 4 elements
- COM PWM Com communication control unit
- TERM PWM Term remote control terminal
- I/O E.sybox I/O input output control unit
- RPR Remote pressure sensor
- DEV Any other compatible devices

Connections menu

The icons of the various connected devices are displayed with below them an acronym and the respective power of signal reception by the device.

An icon lit with a fixed light means that the device is connected and working correctly;

a flashing icon means that the device is connected but not currently detected in the network

Pressing +/- allows you to select a device that is already connected (function active on release) making the respective icon appear in reverse; when the device is selected, a description of the selected device appears.

All the devices present over the air are not displayed on this page but only the devices that have been associated with our network.

Seeing only the devices in your own network allows the operation of several similar networks existing within the radius of action of the wireless without creating ambiguity; in this way the user does not see the elements that do not belong to his pumping system.

From this menu page it is possible to associate and disassociate an element from your personal wireless network.

When the machine starts the AS menu item does not show any connection because no device is associated. Only an action by the operator can allow devices to be added or removed with the operations of association and disassociation.

Association of devices
Pressing '+' for 5 sec puts the machine into the mode where it searches for wireless association, communicating this status by the blinking of the icon (related to the device on which the action is carried out) and of the COMM leds at regular intervals. As soon as two machines in a working communication range are put into this status, if possible, they are associated with each other. If the association is not possible for one or both machines, the procedure ends and a pop-up appears on each machine saying "association not possible". An association may not be possible because the device you are trying to associate is already present in the maximum number or because the device to be associated is not recognised.

The search status for association remains active until the device to be associated is detected (irrespective of the result of association); if not device can be seen within the space of 1 minutes, the machine automatically leaves association status. You can leave the search status for wireless association at any time by pressing SET or MODE.

Disassociation of devices
To disassociate an element you must first select it with the +/- keys, then press - for 5 s; this puts the system into device disassociation mode in which the icon of the selected device and the COMM led start to flash rapidly, indicating that the device chosen will be cancelled. The next time - is pressed the device will be disassociated; instead, if you press any key or let more than 30 sec elapse from entering disassociation mode, the procedure will be terminated.

12.6 - Technical Assistance Menu

Advanced settings to be made only by skilled personnel or under the direct control of the service network.
From the main menu, hold down simultaneously the "MODE" and "SET" keys until "SP" appears on the display (or use the selection menu pressing + or -). The menu allows you to view and modify various configuration parameters: the MODE key allows you to scroll through the menu pages, the + and – keys allow you respectively to increase and decrease the value of the parameter concerned. Press SET to leave this menu and return to the main menu.

12.6.1 - TB: Water lack blockage time
Setting the reaction time of the water lack blockage allows you to select the time (in seconds) taken by the device to indicate the lack of water. The variation of this parameter may be useful if there is known to be a delay between the moment the motor is switched on and the moment it actually begins to deliver. One example may be a plant where the suction pipe is particularly long and there are some slight leaks. In this case the pipe in question may be discharged and, even though water is not lacking, the electropump will take a certain time to reload, supply the flow and put the plant under pressure.

12.6.2 - T1: Switch-off time after low pressure signal
Sets the time when the inverter switches off after receiving the low pressure signal (see Setting low pressure detection par. 13.7.6.5). The low pressure signal can be received on each of the 4 inputs by suitably configuring the input (see Setup of auxiliary digital inputs IN1, IN2, IN3, IN4 par 13.7.6).
T1 can be set between 0 and 12 s. The factory setting is 2 s.

12.6.3 - T2: Delay in switching off
Sets the delay with which the inverter must switch off after switch-off conditions have been reached: plant under pressure and flow rate lower than the minimum flow.
T2 can be set between 5 and 120 s. The factory setting is 10 s.

12.6.4 - GP: Proportional gain coefficient
Generally the proportional term must be increased for systems characterised by elasticity (for example with PVC pipes) and lowered in rigid systems (for example with iron pipes).
To keep the pressure in the system constant, the inverter performs a type PI control on the measured pressure error. Depending on this error the inverter calculates the power to be supplied to the motor. The behaviour of this control depends on the set GP and GI parameters. To cope with the different behaviour of the various types of hydraulic plants where the system can work, the inverter allows the selection of parameters different

from those set by the factory. For nearly all plants the factory-set GP and GI parameters are optimal. However, should any problems occur in adjustment, these settings may be varied.

12.6.5 - GI: Integral gain coefficient

IIn the presence of large falls in pressure due to a sudden increase of the flow or a slow response of the system, increase the value of GI. Instead, if there are swings in pressure around the setpoint value, decrease the value of GI.

IMPORTANT: To obtain satisfactory pressure adjustments, you generally have to adjust both GP and GI

12.6.6 - RM: Maximum speed

ISets a maximum limit on the number of pump revolutions.

12.7 - Setting the number of devices and of reserves

12.7.1 - NA: Active devices

Sets the maximum number of devices that participate in pumping.
It may have values between 1 and the number of devices present (max 4). The default value for NA is N, that is the number of devices present in the chain; this means that if devices are added to or removed from the chain, NA always has the value of the number of devices present, automatically detected. If a number different from N is set, this fixes the maximum number of devices that can participate in pumping at the number set.
This parameter is used in cases where there is a limit on the pumps you can or want to be able to keep running, and if you want to keep one or more devices as a reserve (see 13.7.3 IC: Configuration of the reserve and other examples below).
On the same menu page you can also see (but not change) the other two system parameters linked to this, that is N, the number of devices present, read automatically by the system, and NC, the maximum number of simultaneous devices.

12.7.2 NC: Simultaneous devices

Sets the maximum number of devices that can work at the same time. It may have values between 1 and NA. The default value of NC is NA, this means that even if NA increases, NC will have the value NA. If a number different from NA is set, this releases you from NA and fixes the maximum number of simultaneous devices at the number set. This parameter is used in cases where there is a limit on the pumps you can or want to be able to keep running (see 13.7.3 IC: Configuration of the reserve and other examples below).
On the same menu page you can also see (but not change) the other two system parameters linked to this, that is N, the number of devices present, read automatically by the system, and NA, the number of active devices.

12.7.3 IC: Configuration of the reserve

Configures the device as automatic or reserve. If set on auto (default) the device participates in normal pumping, if configured as reserves, minimum starting priority is associated with it, this means that the device with this setting will always start last. If a number of active devices is set that is one lower than the number of devices present and if one element is set as reserve, the effect obtained is that, if there are no problems, the reserve device does not participate in regular pumping; instead, if one of the devices that participates in pumping develops a fault (maybe loss of power supply, tripping of a protection, etc.), the reserve device will start.
The state of configuration as a reserve can be seen as follows: on the SM page, the top of the icon is coloured; on the AD and main pages, the communication icon representing the address of the device appears with the number on a coloured background. There may be more than one device configured as reserve in a pumping system.
Even though the devices configured as reserve do not participate in normal pumping, they are nevertheless kept efficient by the anti-stagnation algorithm. The anti-stagnation algorithm changes the starting priority once every 23 hours and allows the accumulation of at least one continuous minute of supply of flow from each device. The aim of this algorithm is to avoid the deterioration of the water inside the impeller and to keep the moving parts efficient; it is useful for all devices and especially for

those configured as reserve, which do not work in normal conditions.

12.7.3.1 - Examples of configuration for multipump systems

Example 1:
A pump set composed of 2 devices (N=2 detected automatically) of which 1 set active (NA=1), one simultaneous (NC=1 or NC=NA since NA=1) and one as reserve (IC=reserve on one of the two devices).
The result obtained is the following: the device not configured as a reserve will start and work by itself (even though it does not manage to bear the hydraulic load and the pressure achieved is too low). If it has a fault, the reserve device steps in.

Example 2:
A pump set composed of 2 devices (N=2 detected automatically) in which all the devices are active and simultaneous (factory settings NA=N and NC=NA) and one as reserve (IC=reserve on one of the two devices).
The result obtained is the following: the device that is not configured as reserve always starts first, if the pressure detected is too low the second device, configured as reserve, also starts. In this way we always try to preserve the use of one device in particular (the one configured as reserve), but this may be useful in case of necessity when a greater hydraulic load occurs.

Example 3:
A pump set composed of 6 devices (N=6 detected automatically) of which 4 set active (NA=4), 3 simultaneous (NC=3) and 2 one as reserve (IC=reserve on two devices),
The result obtained is the following: at the most 3 devices will start at the same time. The operation of the 3 that can work simultaneously will take place in rotation among 4 devices so as to respect the maximum work time of each ET. If one of the active devices develops a fault no reserve starts up because more than three devices cannot start at one time (NC=3) and there are still three active devices present. The first reserve intervenes as soon as another of the remaining three develops a fault, the second reserve starts up when another of the remaining three (including the reserve) develops a fault.

12.7.4 - ET: Exchange time

Sets the maximum continuous working time of a device in a set. It is significant only on pump sets with interconnected devices. The time can be set between 10 s and 9 hours, or at 0; the factory setting is 2 hours.

When the ET of a device has elapsed the system starting order is reassigned so as to give minimum priority to the device on which the time has elapsed. The aim of this strategy is to use less the device that has already worked and to balance the working time between the various machines that make up the set. If the hydraulic load still requires the intervention of the device, even though it has been put last in starting order, it will start to guarantee pressure boosting of the system.

The starting priority is reassigned in two conditions based on the ET time:

1. Exchange during pumping: when the pump remains on without interruption until the absolute maximum pumping time has been exceeded
2. Exchange to standby: when the pump is on standby but 50% of the ET time has been exceeded

If ET has been set at 0 there will be exchange to standby. Whenever a pump in the set stops, a different pump will start first next time it is restarted.

If the parameter ET (maximum work time) is set at 0, there will be exchange at each restart, irrespective of the pump's actual work time.

12.7.5 - AY: Anti Cycling

As described in paragraph 9, this function is for avoiding frequent switching on and off in the case of leaks in the system. The function can be enabled in 2 different modes, normal and smart. In normal mode the electronic control blocks the motor after N identical start/stop cycles. In smart mode it acts on the parameter RP to reduce the negative effects due to leaks. If set on "Disable", the function does not intervene.

12.7.6 - AE: Enabling the anti-block function

This function is for avoiding mechanical blocks in the case of long inactivity; it acts by periodically rotating the pump.
When the function is enabled, every 23 hours the pump performs an unblocking cycle lasting 1 min.

12.7.7 - AF: Enabling the anti-freeze function

If this function is enabled the pump is automatically rotated when the temperature reaches values close to freezing point, in order to avoid breakages of the pump.

12.7.8 - Setup of the auxiliary digitali inputs IN1, IN2, IN3, IN4

This paragraph shows the functions and possible configurations of the inputs of the I/O control unit, connected by wireless to the device, by means of the parameters I1, I2, I3, I4. For the electrical connections see paragraph connections (photocoupled)
The inputs IN1..IN4 are all the same and all the functions can be associated with each of them. The desired function is associated with the i-th input by means of the parameter I1..I4.

Each function associated with the inputs is explained in greater detail below in this paragraph. Table 12 sums up the functions and the various configurations.

The factory configurations can be seen in Table 11.

Factory configurations of the digital inputs IN1, IN2, IN3, IN4	
Input	**Value**
1	1 (float NO)
2	3 (P aux NO)
3	5 (enable NO)
4	10 (low pressure NO)

Table 11: Factory configurations of the inputs

Table summarising the possible configurations of the digital inputs IN1, IN2, IN3, IN4 and their operation		
Value	**Function associated with general input i**	**Display of the active function associated with the input**
0	Input functions disabled	
1	Water lack from external float (NO)	F1
2	Water lack from external float (NC)	F1
3	Auxiliary setpoint Pi (NO) for the input used	F2
4	Auxiliary setpoint Pi (NC) for the input used	F2
5	General enabling of motor by external signal (NO)	F3
6	General enabling of motor by external signal (NC)	F3
7	General enabling of motor by external signal (NO) + Reset of resettable blocks	F3
8	General enabling of motor by external signal (NC) + Reset of resettable blocks	F3
9	Reset of resettable blocks NO	
10	Low pressure signal input NO, automatic and manual reset	F4
11	Low pressure signal input NC, automatic and manual reset	F4
12	Low pressure input NO only manual reset	F4
13	Low pressure input NC only manual reset	F4

Table 12: Configurazioni degli ingressi

12.7.8.1 - Disabling the functions associated with the input
Setting 0 as the configuration value of an input, each function associated with the input will be disabled irrespective of the signal present on the input terminals.

12.7.8.2 - Setting external float function
The external float can be connected to any input, for the electrical connections see paragraph connections (photocoupled).

The float function is obtained, setting one of the values in Table 13 on the parameter Ix, for the input to which the float has been connected.

The activation of the external float function generates the block of the system. The function is conceived for connecting the input to a signal arriving from a float which indicates lack of water.

When this function is active the symbol F1 is shown on the STATUS line of the main page.

For the system to block and give the error signal F1, the input must be activated for at least 1 sec.

When it is in error condition F1, the input must have been deactivated for at least 30 sec before the system can be unblocked. The behaviour of the function is summed up in Table 13.

When several float functions are configured at the same time on different inputs, the system will indicate F1 when at least one function is activated and will remove the alarm when none is activated.

Behaviour of the external float function depending on INx and on the input				
Value of Parameter Ix	**Input configuration**	**Input status**	**Operation**	**Shown on display**
1	Active with high signal on input (NO)	Absent	Normal	None
		Present	System block for water lack by external float	F1
2	Active with low signal on input (NC)	Absent	System block for water lack by external float	F1
		Present	Normal	None

Table 13: External float function

12.7.8.3 - Setting auxiliary pressure input function
The signal that enables an auxiliary setpoint may be supplied on any one of the 4 inputs, (for the electrical connections see paragraph Input connections (photocoupled).
The auxiliary setpoint function is obtained, setting the parameter Ix, for the input to which the connection has been made, according to Table 14.

The auxiliary pressure function modifies the system setpoint from pressure SP (see par. 13.3 – Setpoint Menu) to pressure Pi (For the electrical connections see paragraph connections (photocoupled) where is represents the input used. In this way, as well as SP, four other pressures are available, P1, P2, P3, P4.

When this function is active the symbol Pi is shown on the STATUS line of the main page.

For the system to work with the auxiliary setpoint, the input must be active for at least 1 sec.

When you are working with the auxiliary setpoint, to return to working with setpoint SP, the input must not be active for at least 1 sec. The behaviour of the function is summed up in Table 14.

When several auxiliary pressure functions are configured at the same time on different inputs, the system will show Pi when at least one function is activated. For simultaneous activations, the pressure achieved will be the lowest of those with the active input. The alarm is removed when no input is activated.

Behaviour of the auxiliary pressure function depending on Ix and on the input				
Value of Parameter Ix	**Input configuration**	**Input status**	**Operation**	**Shown on display**
3	Active with high signal on input (NO)	Absent	i-th auxiliary setpoint not active	None
		Present	i-th auxiliary setpoint active	Px
4	Active with low signal on input (NC)	Absent	i-th auxiliary setpoint active	Px
		Present	i-th auxiliary setpoint not active	None

Table 14: Auxiliary setpoint

12.7.8.4 - Setting system enabling and fault reset

The signal that enables the system can be supplied to any input (for the electrical connections see paragraph connections (photocoupled)
The enabling function is obtained, setting one of the values in Table 15 on the parameter Ix, for the input to which the enabling signal has been connected.

When the function is active the system is completely disabled and F3 is shown on the STATUS line of the main page.

When several system disabling functions are configured at the same time on different inputs, the system will indicate F3 when at least one function is activated and will remove the alarm when none is activated.
For the system to work with the disable function, the input must be active for at least 1 sec.

When the system is disabled, for the function to be deactivated (re-enabling the system), the input must not be active for at least 1 sec. The behaviour of the function is summed up in Table 15.

When several disable functions are configured at the same time on different inputs, the system will show F3 when at least one function is activated. The alarm is removed when no input is activated

Behaviour of the system enabling and fault reset function depending on Ix and on the input				
Value of Parameter Ix	**Input configuration**	**Input status**	**Operation**	**Shown on display**
5	Active with high signal on input (NO)	Absent	Motor enabled	None
		Present	Motor disabled	F3
6	Active with low signal on input (NC)	Absent	Motor disabled	F3
		Present	Motor enabled	None
7	Active with high signal on input (NO)	Absent	Motor enabled	None
		Present	Motor disabled + reset blocks	F3
8	Active with low signal on input (NC)	Absent	Motor disabled + reset blocks	F3
		Present	Motor enabled	None
9	Active with high signal on input (NO)	Absent	Motor enabled	None
		Present	Reset blocks	None

Table 15: Abilitazione sistema e ripristino dei fault

12.7.8.5 - Setting low pressure detection (KIWA)

The minimum pressure switch that detects low pressure can be connected to any input (for the electrical connections see paragraph Input connections (photocoupled).
The low pressure detecting function is obtained, setting one of the values in Table 16 on the parameter INx, for the input to which the enabling

signal has been connected.

The activation of the low pressure detecting function generates the blocking of the system after the time T1 (see par. 13.6.2 - T1: Switch-off time after low pressure signal). The function has been conceived to connect the input to the signal arriving from a pressure switch which indicates too low a pressure on the pump intake.

When this function is active the symbol F4 is shown on the STATUS line of the main page.

When it is in error condition F4, the input must have been deactivated for at least 2 sec before the system can be unblocked. The behaviour of the function is summed up in Table 16.

When low pressure detection functions are configured at the same time on different inputs, the system will indicate F4 when at least one function is activated and will remove the alarm when none is activated.

Behaviour of the system enabling and fault reset function depending on Ix and on the input				
Value of Parameter Ix	Input configuration	Input status	Operation	Shown on display
10	Active with high signal on input (NO)	Absent	Normal	None
		Present	Block of system for low pressure on intake, Automatic + Manual reset	F4
11	Active with low signal on input (NC)	Absent	Block of system for low pressure on intake, Automatic + Manual reset	F4
		Present	Normal	None
12	Attivo con segnale alto sull'ingresso (NO)	Absent	Normal	None
		Present	Block of system for low pressure on intake. Manual reset	F4
13	Attivo con segnale basso sull'ingresso (NC)	Absent	Block of system for low pressure on intake. Manual reset	F4
		Present	Normal	None

Table 16: Detecting the low pressure signal (KIWA)

12.8 - Setup of the outputs OUT1, OUT2

This paragraph shows the functions and possible configurations of the inputs OUT1 and OUT2 of the I/O control unit, connected by wireless to the device, by means of the parameters O1 and O2.
For the electrical connections see par. Output connections OUT1 and OUT 2. .
The factory configurations can be seen in Table 17.

Factory configurations of the outputs	
Uscita	**Value**
OUT 1	2 (fault NO closes)
OUT 2	2 (Pump running NO closes)

Table17: Factory configurations of the outputs

12.8.1 - O1: Setting output 1 function

Output 1 communicates an active alarm (it indicates that a system block has occurred). The output allows the use of a normally open clean contact.

The values and functions indicated in Table 18 are associated with the parameter O1.

12.8.2 - O2: Setting output 2 function

Output 2 communicates the motor running status. The output allows the use of a normally open clean contact.
The values and functions indicated in Table 18 are associated with the parameter O2.

Configuration of the functions associated with the outputs				
Output configuration	OUT1		OUT2	
	Activation condition	Output contact status	Activation condition	Output contact status
0	No associated function	Contact always open	No associated function	Contact always open
1	No associated function	Contact always closed	No associated function	Contact always closed
2	Presence of blocking errors	In the case of blocking errors the contact closes	Output activation in case of blocking errors	When the motor is running the contact closes
3	Presence of blocking errors	In the case of blocking errors the contact opens	Output activation in case of blocking errors	When the motor is running the contact opens

Table 18: Configuration of the outputs

12.9 - RF: Fault and warning log reset

Holding down the + and – keys together for at least 2 seconds deletes the history of faults and warnings. The number of faults present in the log is indicated under the symbol RF (max 64).
The log can be viewed from the MONITOR menu on page FF.

12.10 - PW: Setting the password

The device has a password-enabled protection system. If a password is set, the parameters of the device will be accessible and visible but it will not be possible to change them.

When the password (PW) is “0” all the parameters are unlocked and can be edited.

When a password is used (value of PW different from 0) all modifications are blocked and “XXXX” is displayed on the page PW.

If the password is set it allows to navigate through all the pages, but at any attempt to edit a parameter a pop-up appears, asking you to type in the password. When the correct password is typed in the parameters are unlocked and can be edited for 10’.

If you want to cancel the password timer, just go to page PW and hold down + and – together for 2”.

When the correct password is typed in a padlock is shown opening, while if the wrong password is given a flashing padlock appears.

If the wrong password is typed in more than 10 times the same wrong password padlock appears with inverted colours and no password can be accepted until the appliance has been switched off and on again. After resetting the factory values the password is set back at “0”.

Each change of the password takes effect when Mode or Set is pressed and each subsequent change of a parameter implies typing in the new password again (e.g. the installer makes all the settings with the default PW value = 0 and lastly sets the PW so as to be sure that the machine is already protected without any further action).

If the password is lost there are 2 possibilities for editing the parameters of the device:

- Make a note of the values of all the parameters, reset the device with the factory values, see paragraph 0. The reset operation cancels all the parameters of the device, including the password.
- Make a note of the number present on the password page, send a mail with this number to your service centre, in a few

days you will be sent the password to unlock the device.

12.10.1 - Password for multipump systems

The PW parameter is one of the sensitive parameters, so for the device to work it is necessary for PW to be the same for all the devices. If there is already a chain with an aligned PW and a device is added with PW=0, the request to align the parameters will be made. In these conditions the device with PW=0 can assume the configuration including the Password, but it cannot propagate its own configuration.

In the case of sensitive parameters that are not aligned, to help the user understand whether a configuration can be propagated, the key parameter with respective value is displayed on the parameter alignment page.

The key represents a coding of the password. Depending on the correspondence of the keys, it can be understood whether the devices in a chain can be aligned.

Key equal to - -

- the device can receive configuration from all
- it can propagate its own configuration to devices with key equal to - -
- it cannot propagate its own configuration to devices with key different from - -

Key greater than or equal to 0

- the device can receive configuration only from devices that have the same key
- it can propagate its own configuration to devices with the same key or with key = - -
- it cannot propagate its own configuration to devices with a different key.

When the PW is typed in to unlock a device in a set, all the devices are unlocked.

When the PW is changed on a device in a set, all the devices receive the change.

When activating protection with a PW on a device in a set (+ and – on page PW when PW≠0), the protection is activated on all the devices (to make any change you are asked for the PW).

13 - PROTECTION SYSTEMS

IThe device is equipped with protection systems to preserve the pump, the motor, the supply line and the inverter. If one or more protections trip, the one with the highest priority is immediately notified on the display. Depending on the type of error the motor may stop, but when normal conditions are restored the error status may be cancelled immediately or only after a certain time, following an automatic reset.

In the case of blockage due to water lack (BL), blockage due to motor overload (OC), blockage, blockage due to direct short circuit between the motor phases (SC), you can try to exit the error conditions manually by simultaneously pressing and releasing the + and – keys. If the error condition remains, you must take steps to eliminate the cause of the fault.

Alarm in the fault log	
Display indication	**Description**
PD	Irregular switching off
FA	Problems in the cooling system

Table 19: Alarms

Blockage conditions	
Display indication	**Description**
BL	Blockage due to water lack
BP1	Blockage due to reading error on the internal pressure sensor
BP2	Blockage due to reading error on the remote pressure sensor
LP	Blockage due to low supply voltage
HP	Blockage due to high internal supply voltage
OT	Blockage due to overheating of the power stages

OC	Blockage due to motor overload
SC	Blockage due to short circuit between the motor phases
ESC	Blockage due to short circuit to earth
PB	Blockage due to abnormal voltage
NC	Blockage due to motor disconnected
Ei	Blockage due to i-th internal error
Vi	Blockage due to i-th internal voltage out of tolerance

Table 20: Indications of blockages

13.1 - Description of blockages

13.1.1 - "BL" Blockage due to water lack
In conditions where flow is absent, if the set adjustment pressure cannot be reached, a water lack is indicated and the system switches off the pump. The time that it can remain in absence of pressure and flow is set by the TB parameter on the TECHNICAL ASSISTANCE menu.

If the parameter SP is not correctly set, the protection against water lack may not work correctly.

13.1.2 - "BP1" Blockage due to fault of the internal pressure sensor
If the device detects a fault in the pressure sensor the pump remains blocked and the error signal "BP1" is given. This status begins as soon as the problem is detected and ends automatically when correct conditions have been restored.

13.1.3 - "BP2" Blockage due to reading error on the remote pressure sensor
BP2 indicates a warning on the remote pressure sensor connected to the I/O control unit.

13.1.4 - "LP" Blockage due to low supply voltage
This occurs when the line voltage at the supply terminal falls below the minimum allowed voltage. It is reset only automatically when the voltage at the terminal returns to normal.

13.1.5 - "HP" Blockage due to high internal supply voltage
This occurs when the internal supply voltage reaches values outside the specifications. It is reset only automatically when the voltage returns within the allowed values. It may be due to extremes of the supply voltage or to too sudden stopping of the pump.

13.1.6 - "SC" Blockage due to short circuit between the motor phases
The device is provided with protection against the direct short circuit which may occur between the motor phases. When this blockage is indicated you can attempt to restore operation by simultaneously holding down the + and – keys, but this will not have any effect until 10 seconds have passed since the moment the short circuit occurred.

13.2 - Manual reset of error conditions

In error status, the user can cancel the error by forcing a new attempt, pressing and then releasing the + and – keys.

13.3 - Self-reset of error conditions

For some malfunctions and blockage conditions, the system attempts automatic self-reset.
The auto self-reset procedure concerns in particular:

"BL"	Blockage due to water lack
"LP"	Blockage due to low supply voltage
"HP"	Blockage due to high internal voltage
"OT"	Blockage due to overheating of the power stages
"OC"	Blockage due to motor overload
"BP"	Blockage due to fault of the pressure sensor

For example, if the system is blocked due to water lack, the device automatically starts a test procedure to check whether the machine is really left definitively and permanently dry. If during the sequence of operations an attempted reset is successful (for example, the water comes back), the procedure is interrupted and normal operation is resumed.

Table 21 shows the sequences of the operations performed by the device for the different types of blockage.

Automatic resets of error conditions		
Display indication	**Description**	**Automatic reset sequence**
BL	Blockage due to water lack	- One attempt every 10 minutes for a total of 6 attempts - One attempt every hour for a total of 24 attempts - One attempt every 24 hours for a total of 30 attempts
LP	Blockage due to low supply voltage	- It is reset when it returns to a specific voltage
HP	Blockage due to high internal supply voltage	- It is reset when it returns to a specific voltage
OT	Blockage due to overheating of the power stages (TE > 100°C)	- It is reset when the temperature of the power stages returns below 85°C
OC	Blockage due to motor overload	- One attempt every 10 minutes for a total of 6 attempts - One attempt every hour for a total of 24 attempts - One attempt every 24 hours for a total of 30 attempts

Table 21: Self-reset of blockages

14 - RESET AND FACTORY SETTINGS

14.1 - General system reset

To reset the system, hold down the 4 keys simultaneously for 2 sec. This operation does not delete the settings saved by the user.

14.2 - Factory settings

The device leaves the factory with a series of preset parameters which may be changed according to the user's requirements. Each change of the settings is automatically saved in the memory and, if desired, it is always possible to restore the factory conditions (see Restoring the factory settings par 14.3 – Restoring the factory settings).

14.3 - Restoring the factory settings

To restore the factory values, switch off the device, wait until the display has switched off completely, press and hold down the "SET" and "+" keys and turn on the power; release the two keys only when the letters "EE" appear.
This restores the factory settings (a message and a rereading on EEPROM of the factory settings permanently saved in the FLASH memory). Once all the parameters have been set, the device returns to normal operation.

NOTE: Once the factory values have been restored it will be necessary to reset all the parameters that characterise the system (gains, setpoint pressure, etc.) as at the first installation.

Factory settings			
Identifying code	**Description**	**Value**	**Installation Memo**
TK	Backlight lighting T	2 min	
LA	Language	ENG	
SP	Setpoint pressure [bar]	3,0	
P1	Setpoint P1 [bar]	2,0	
P2	Setpoint P2 [bar]	2,5	
P3	Setpoint P3 [bar]	3,5	
P4	Setpoint P4 [bar]	4,0	

RI	Revs per minute in manual mode [rpm]	2400	
OD	Type of plant	1 (Rigido)	
RP	Pressure decrease to restart [bar]	0,5	
AD	Address	0 (Auto)	
PR	Remote pressure sensor	Disabilitato	
MS	Measuring system	0 (Internazionale)	
TB	Blockage time for water lack [s]	10	
T1	Delay in switching off KIWA function [s]	2	
T2	Delay in switching off [s]	10	
GP	Proportional gain coefficient	0,6	
GI	Integral gain coefficient	1,2	
RS	Maximum speed [rpm]	3000	
NA	Active devices	N	
NC	Simultaneous devices	NA	
IC	Configuration of the reserve	1 (Auto)	
ET	Exchange time [h]	2	
AE	Anti-blocking function	1(Abilitato)	
AF	Antifreeze	1(Abilitato)	
I1	Function I1	1 (Galleggiante)	
I2	Function I2	3 (P Aux)	
I3	Function I3	5 (Disable)	
I4	Function I4	10 (Bassa press)	
O1	Function output 1	2	
O2	Function output 2	2	
PW	Set Password	0	

Table 22: Factory settings

15 - PARTICULAR INSTALLATIONS

15.1 - Inhibiting self-priming

The product is made and supplied with the capacity of being self-priming. With reference to par. 6, the system is able to prime and therefore operate in whatever installation configuration chosen: below head or above head. However there are cases in which the self-priming capacity is not necessary, or areas where it is forbidden to use self-priming pumps.
During priming the pump obliges part of the water already under pressure to return to the suction part until a pressure value is reached at delivery whereby the system can be considered primed. At this point the recirculating channel closes automatically. This phase is repeated each time the pump is switched on, even already primed, until the same pressure value that closes the recirculating channel is reached (about 1 bar).
When the water arrives at the system intake already under pressure (maximum allowed 2 bar) or when the installation is always below head, it is possible (and mandatory where local regulations require it) to force the closure of the recirculating pipe, losing the self-priming capacity. This obtains the advantage of eliminating the clicking noise of the pipe shutter each time the system is switched on.
To force closure of the self-priming pipe, proceed as follows:

1 - disconnect the power supply;
2 - empty the system (unless you decide to inhibit self-priming at the first installation);
3 - remove the drainage cap anyway, taking care not to drop the O-ring (Fig.20-A);
4 - take the rubber spacer accessory from the bottom tray of the

packaging or from wherever it has been put away (Fig.20-B);
5 - with horizontal system: position the spacer in the centre of the cap, on the inside (Fig.20-C); with vertical system: position the spacer, fitting it onto the pin in the centre of the pipe (Fig.20-D);
6 - screw the cap back onto the system, ensuring that the O-ring is always correctly in place (Fig.20-D);
7 - fill the pump, connect the power supply, start the system.

Figure 20

15.2 - Wall installation

This product is already set up for installation hanging on the wall with the DAB accessory kit, to be purchased separately. The wall installation appears as in Fig.21.

Figure 21

15.3 - Installation with quick connection

DAB supplies an accessory kit for Quick Connection of the system. This is a quick coupling base on which to make the connections to the plant and from which the system can be simply connected or disconnected. Advantages:

- possibility of making up the plant on-site, testing it, but removing the actual system until the moment of delivery, avoiding possible damage (accidental blows, dirt, theft, …);
- it is easy for the Assistance service to replace the system with a “spare” in the event of special maintenance.

The system mounted on its quick connection interface appears as in Fig.22.

Figure 22

15.4 - Multiple Sets

15.4.1 - Introduction to multipump systems
By multipump systems we mean a pump set made up of a number of pumps whose deliveries all flow into a common manifold. The devices communicate with one another by means of the connection provided (wireless).
The group may be made up of a maximum of 4 devices.
A multipump system is used mainly for:

- Increasing hydraulic performance in comparison with a single device
- Ensuring continuity of operation in the event of a device developing a fault
- Sharing out the maximum power

15.4.2 - Making a multipump system
The hydraulic plant must be created as symmetrically as possible to obtain a hydraulic load uniformly distributed over all the pumps.
The pumps must all be connected to a single delivery manifold:

For operation of the pressure boosting set, the following must be the same for each device:
- hydraulic connections
- maximum speed

15.4.3 - Wireless communication
The devices communicate with each other and send the flow and pressure signals by wireless communication.

15.4.4 - Connection and setting of the photocoupled inputs
The inputs of the I/O control unit are used to activate the float, auxiliary pressure, system disabling and low suction pressure functions. The functions are indicated respectively by the messages F1, Paux, F3, F4. If activated, the Paux function boosts the pressure in the system to the set pressure see par. 12.7.8.3 - Setting auxiliary pressure input function. The functions F1, F3, F4 stop the pump for 3 different reasons, see par 12.7.8.2, 12.7.8.4, 12.7.8.5.

The parameters for setting the inputs I1, I2, I3, I4 are part of the sensitive parameters, so setting one of these on any device means that they are automatically aligned on all the devices. As the setting of the inputs not only selects the function, but also the type of polarity of the contact, the function associated with the same type of contact will perforce be found on all the devices. For the above reason, when using independent contacts for each device (as is possible for the functions F1, F3, F4), these must all have the same logic for the various inputs with the same name; that is, for the same input, either normally open contacts are used for all the devices or normally closed ones.

Parameters linked to multipump operation
The parameters shown on the menu for multipump operation are classified as follows:

- Read-only parameters
- Parameters with local significance
- Multipump system configuration parameters

which in turn are divided into

- Sensitive parameters
- Parameters with optional alignment

15.4.5 Parameters concerning multipump

Parameters with local significance
These are parameters that can be divided among the various devices and in some cases it is necessary for them to be different. For these parameters it is not allowed to align the configuration automatically among the various devices. For example, in the case of manual assignment of the addresses, these must absolutely be different one from the other.
List of parameters with local significance for the device:

- CT Contrast
- BK Brightness
- RI Revs/min in manual mode
- AD Address
- IC Reserve configuration
- RF Reset fault and warning
- PW Set Password

Sensitive parameters
These are parameters which must necessarily be aligned over the whole chain for adjustment reasons.
List of sensitive parameters:

- SP Setpoint pressure
- P1 Auxiliary pressure input 1
- P2 Auxiliary pressure input 2
- P3 Auxiliary pressure input 3
- P4 Auxiliary pressure input 4
- RP Pressure decrease to restart
- ET Exchange time
- NA Number of active devices
- NC Number of simultaneous devices
- TB Dry run time
- T1 Switch-off time after low pressure signal
- T2 Switch-off time
- GI Integral gain
- GP Proportional gain
- RM Maximum speed
- I1 Input 1 setting
- I2 Input 2 setting
- I3 Input 3 setting
- I4 Input 4 setting
- OD Type of system
- PR Remote pressure sensor

Automatic alignment of sensitive parameters
When a multipump system is detected, the compatibility of the set parameters is checked. If the sensitive parameters are not aligned among all the devices, a message appears on the display of each device asking whether you want to propagate the configuration of that particular device to the whole system. If you accept, the sensitive parameters of the device on which you answered the question will be distributed to all the devices in the chain.
If there are configurations that are not compatible with the system, these devices are not allowed to propagate their configuration.
During normal operation, changing a sensitive parameter of a device results in the automatic alignment of the parameter on all the other devices without asking for confirmation.

NOTE: *The automatic alignment of the sensitive parameters has no effect on all the other types of parameters.*

In the particular case of inserting a device with factory settings in the chain (a device replacing an existing one or a device on which the factory configuration has been restored), if the present configurations with the exception of the factory configurations are compatible, the device with factory configuration automatically assumes the sensitive parameters of the chain.

Parameters with optional alignment
These are parameters for which it is tolerated that they may not be

aligned among the various devices. At each change of these parameters, when you come to press SET or MODE, you are asked if you want to propagate the change to the entire communication chain. In this way, if all elements of the chain are the same, it avoids setting the same data on all the devices

List of parameters with optional alignment:

- LA Language
- MS Measuring system
- AE Anti-blocking
- AF AntiFreeze
- O1 Function output 1
- O2 Function output 2

15.4.6 First start of the multipump system
Make the electric and hydraulic connections of the whole system as described in par 3.1, 4.1 and par 5.1.
Switch on the devices and create the associations as described in paragraph 12.5.5 – AS: Association of devices.

15.4.7 Multipump adjustment
When a multipump system is switched on, the addresses are automatically assigned and an algorithm selects one device as the adjustment leader. The leader decides the speed and starting order of each device in the chain.
The adjustment mode is sequential (the devices start one at a time). When starting conditions occur, the first device starts, when it has reached maximum speed the next one starts, and then the others in sequence. The starting order is not necessarily in ascending order according to the machine address, but it depends on the working hours done see 12.7.4 - ET: Exchange time

15.4.8 - Assigning the starting order
Each time the system is switched on a starting order is associated with each device. Depending on this, the sequential starts of the devices are decided.

The starting order is modified during use as necessary by the following two algorithms:

- Reaching the maximum work time
- Reaching the maximum inactivity time

15.4.9 - Maximum work time
Depending on the parameter ET (maximum work time), each device has a run time counter, and depending on this the starting order is updated with the following algorithm:

- if at least half of the ET value has been exceeded, the priority is exchanged the first time the inverter switches off (exchange to standby).
- if the ET value is reached without ever stopping, the inverter is switched off unconditionally and is taken to minimum restarting priority (exchange during running).

If the parameter ET (maximum work time) is set at 0, there is an exchange at each restart.

See 12.7.4 - ET: Exchange time.

15.4.10 - Reaching the maximum inactivity time
The multipump system has an anti-stagnation algorithm, the aim of which is to keep the pumps in perfect working order and to maintain the integrity of the pumped fluid. It works by allowing a rotation in the pumping order so as to make all the pumps supply at least one minute of flow every 23 hours. This happens whatever the device configuration (enabled or reserve). The exchange of priority requires that the device that has been stopped for 23 hours be given maximum priority in the starting order. This means that as soon as it is necessary to supply flow, it will be the first to start. The devices configured as reserve have precedence over the others. The algorithm ends its action when the device has supplied at least one minute of flow.

When the intervention of the anti-stagnation algorithm is over, if the device is configured as reserve, it is returned to minimum priority to

preserve it from wear.

15.4.11 - Reserves and number of devices that participate in pumping
The multipump system reads how many elements are connected in communication and calls this number N.

Then depending on the parameters NA and NC it decides how many and which devices must work at a certain time.

NA represents the number of devices that participate in pumping. NC represents the maximum number of devices that can work at the same time.

If there are NA active devices in a chain and NC simultaneous devices with NC smaller than NA, it means that at the most NC devices will start at the same time and that these devices will exchange with NA elements. If a device is configured with reserve preference, it will be the last in the starting order, so for example if I have 3 devices and one of these is configured as reserve, the reserve will be the third element to start, whereas if I set NA=2 the reserve will not start unless one of the two active ones develops a fault.

See also the explanation of the parameters

12.7.1 - NA: Active devices;
12.7.2 NC: Simultaneous devices;
12.7.3 IC: Configuration of the reserve.

In the DAB catalogue there is a Kit for the integrated creation of a booster set of 2 systems. The booster made with the DAB kit appears as in Fig.23
.

Figura 23

15.4.12 - Wireless Control
As described in par. 15.4.3, the device can be connected to other devices by means of the proprietary wireless channel. There is therefore the possibility of controlling particular operations of the system through signals received in remote mode: for example, depending on a tank level supplied by a float it is possible to order it to be filled; with the signal arriving from a timer it is possible to vary the setpoint from SP to P1 to supply irrigation; ...

These signals entering or leaving the system are managed by an I/O control unit that can be bought separately from the DAB catalogue.

16. MAINTENANCE

Disconnect the power supply before starting any work on the system.

The system requires no routine maintenance operations.

However, below are the instructions for performing the special maintenance operations that may be necessary in particular cases (e.g. emptying the system to put it away during a period of inactivity).

16.1 - Accessory tool

With the product DAB supplies an accessory tool that is useful for carrying out the operations contemplated on the system during installation and any special maintenance operations.
The tool is housed in the technical compartment. It is composed of 3 keys:

1 - metal key with a hexagonal section (Fig.24 – 1);
2 - flat plastic key (Fig.24 – 2);
3 - cylindrical plastic key (Fig.17 – 3).

Key “1” is in turn inserted in the end “D” of key “3”. At the first use you must separate the 2 plastic keys “2” and ”3”, which are supplied joined by a bridge (Fig.24 – A):

break the bridge “A”, taking care to remove the cutting residue from the 2 keys so as not to leave any sharp bits that could cause injuries.

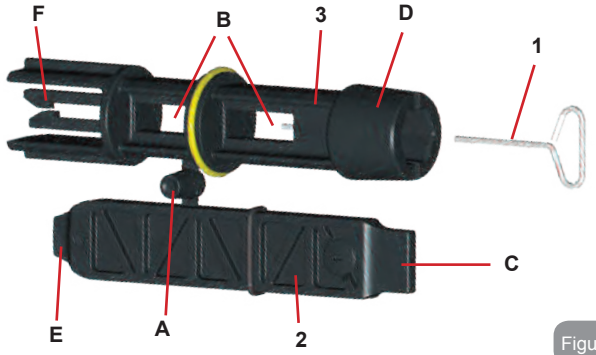


Figure 24

Use the key “1” for the orientation of the interface panel as described in par 4.2. If the key is lost or damaged, the operation can be done using a standard 2mm allen wrench.

Once the 2 plastic keys have been separated they can be used by inserting “2” in one of the holes “B” in key “3”: whichever hole is most convenient, depending on the operation. At this point you obtain a multifunction cross key, with a use corresponding to each of the 4 ends.

Figure 25

To use the cross key you must put the unused key “1” away in a safe place so that it does not get lost, or else put it back in its seat inside key “3” at the end of operations.

Use of end “C”:
this is practically a straight tip screwdriver of the correct size for manoeuvring the caps of the main connections of the system (1” and 1”1/4). To be used at the first installation to remove the caps from the mouths on which you want to connect the system; for the filling operation in the case of horizontal installation; to access the non-return valve, … If the key is lost or damaged, the same operations can be performed using a straight tip screwdriver of a suitable size.

Figure 26

Use of end “D”:
hexagonal socket head suitable for removing the cap to perform filling in the case of vertical installation. If the key is lost or damaged, the same.

Figura 27

Use of end “E”:
this is practically a straight tip screwdriver of the correct size for manoeuvring the motor shaft access cap and, if the interface for quick connection of the system has been installed (par. 15.3), for access to the key for disengaging the connection. If the key is lost or damaged, the same operations can be performed using a straight tip screwdriver of a suitable size.

Figura 28

Use of end “F”:
the function of this tool is dedicated to maintenance of the non-return valve and it is better described in the respective paragraph 16.3.

16.2 - Emptying the system

If you want to drain the water out of the system, proceed as follows:

1 - disconnect the power supply;
2 - turn on the delivery tap closes to the system so as to remove pressure from the system and empty it as much as possible;
3 - if there is a check valve immediately downstream from the system (always recommended), close it so as not to let out the water that is in the plant between the system and the first turned on tap;
4 - interrupt the suction pipe in the point closest to the system (it is always recommended to have a check valve immediately upstream from the system) so as not to drain the whole suction system;
5 - remove the drainage cap (fig.1 face E) and let out the water inside (about 2.5 litres);
6 - the water that is trapped in the delivery system downstream from the non-return valve integrated in the system can flow out at the time of disconnecting the system, or on removing the cap of the second delivery (if not used).

Though essentially drained, the system is unable to expel all the water that it contains.
During handling of the system after emptying it, some small amounts of water may probably leak out from the system.

16.3 - Non-return valve

The system has an integrated non-return valve which is necessary for correct operation. The presence of solid bodies or sand in the water could cause malfunctioning of the valve and therefore of the system. Although it is recommended to use fresh water and eventually fit filters on input, if you notice abnormal operation of the non-return valve it can be extracted from the system and cleaned and/or replaced by proceeding as follows:

1- remove the valve access cap (Fig.29);
2- insert the accessory cross key in end “F” (par. 16.1) so as to catch the perforated tab with the hooks (Fig.29);
3- extract without rotating: the operation may require a certain effort. A cartridge is extracted which also holds the valve to be serviced. The cartridge remains on the key (Fig.29);
4- disengage the cartridge from the key: the hooks are released by pushing the cartridge and the key against each other, at this point slip the cartridge off the side (Fig.29);
5- clean the valve under running water, ensure that it is not damaged and replace it if necessary;
6- put the complete cartridge back in its seat: the operation requires the force necessary to compress the 2 O-rings. If necessary, use end “D” of the cross key to help you push. Do not use end “F” or the hooks will again engage the tab of the cartridge and it will be impossible to release them (Fig.29);
7- Screw on the cap till snug: if the cartridge has not been pushed correctly in place, screwing on the cap will complete its positioning (Fig.29).

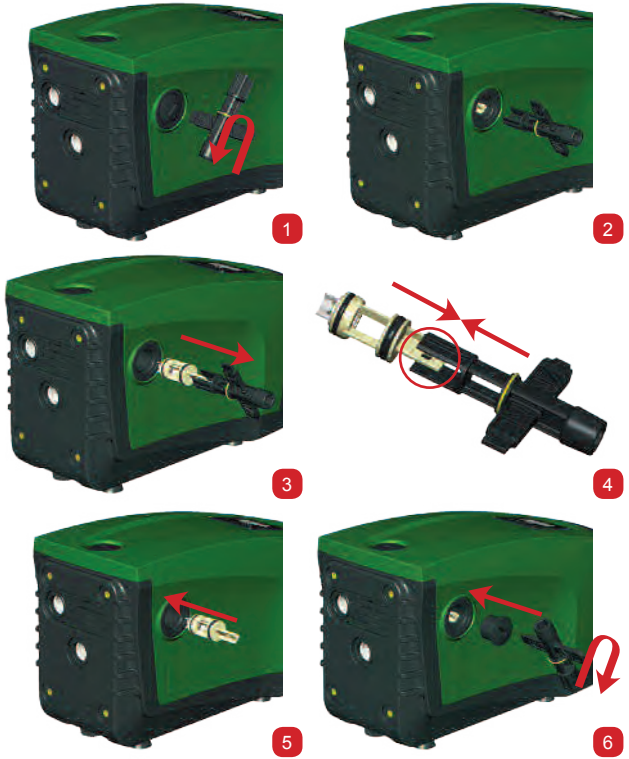


Figura 29

Due to the cartridge remaining in its seat for a long time and/or to the presence of sediment, the force needed to extract the cartridge might be such as to damage the accessory tool. In this case it is intentional, because it is preferable to damage the

tool rather than the cartridge. If the key is lost or damaged, the same operation can be performed with pliers.

Should one or more O-rings be lost or damaged during maintenance operations on the non-return valve, they must be replaced. Otherwise the system might not work correctly.

16.4 - Motor shaft

The electronic control of the system ensures smooth starts so as to avoid excessive stress on the mechanical parts and thus prolong the life of the product. In exceptional cases this characteristic could cause problems in starting the pump: after a period of inactivity, perhaps with the system drained, the salts dissolved in the water could have settled and formed calcification between the moving part (motor shaft) and the fixed part of the pump, thus increasing the resistance on starting. In this case it may be sufficient to help the motor shaft by hand to detach itself from the calcifications. In this system the operation is possible because access to the motor shaft from outside is guaranteed and a groove is provided at the end of the shaft. Proceed as follows:

1- remove the motor shaft access cap as in Fig.29;
2- insert a straight tip screwdriver in the groove on the motor shaft and manoeuvre, turning in 2 directions;
3- if it turns freely, the system can be started;
4- if rotation is blocked it cannot be removed by hand, call the assistance service.

16.5 - Expansion Vessel

See paragraph 1.2 for the operations to check and adjust the air pressure in the expansion vessel and to replace it if it is broken.

17 - TROUBLESHOOTING

Before starting to look for faults it is necessary to disconnect the power supply to the pump (take the plug out of the socket).

Solving typical problems

Fault	LED	Probable Causes	Remedies
The pump does not start.	Red: off White: off Blue: off	No electric power.	Check whether there is voltage in the socket and insert the plug again.
The pump does not start.	Red: on White: on Blue: off	Shaft blocked.	See paragraph 16.4 (motor shaft maintenance).
The pump does not start.	Red: off White: on Blue: off	Utility at a level higher than the system restarting pressure level (par. 5.2).	Increase the system restarting pressure level by increasing SP or decreasing RP.
The pump does not stop.	Red: off White: on Blue: off	1. Leak in the system. 2. Impeller or hydraulic part clogged. 3. Air getting into the suction pipe. 4. Faulty flow sensor	1. Check the system, find and eliminate the leak. 2. Dismantle the system and remove the obstructions (assistance service). 3. Check the suction pipe, find and eliminate the cause of air getting in. 4. Contact the assistance centre.

Insufficient delivery	Red: off White: on Blue: off	1. Suction depth too high. 2. Suction pipe clogged or diameter insufficient. 3. Impeller or hydraulic part clogged.	1. As the suction depth increases the hydraulic performance of the product decreases (*Description of the Electropump*). Check whether the suction depth can be reduced. Use a suction pipe with a larger diameter (but never smaller than 1”). 2. Check the suction pipe, find the cause of choking (obstruction, dry bend, counterslope, …) and remove it. 3. Dismantle the system and remove the obstructions (assistance service).
The pump starts without utility request.	Red: off White: on Blue: off	1. Leak in the system. 2. Faulty non-return valve.	1. Check the system, find and eliminate the leak. 2. Service the non-return valve as described in par. 16.3.
The water pressure when turning on the utility is not immediate.	Red: off White: on Blue: off	Expansion vessel empty (insufficient air pressure) or has broken diaphragm.	Check the air pressure through the valve in the technical compartment. If water comes out when checking, the vessel is broken: assistance service. Otherwise restore the air pressure according to the equation par. 1.2.
When the utility is turned on the flow falls to zero before the pump starts	Red: off White: on Blue: off	Air pressure in the expansion vessel higher than the system starting pressure.	TCalibrate the expansion vessel pressure or configure the parameters SP and/or RP so as to satisfy the equation par.1.2.

The display shows BL	Red: on White: on Blue: off	1. No water. 2. Pump not primed.	1-2. Prime the pump and check whether there is air in the pipe. Check whether the suction or any filters are blocked.
The display shows BP1	Red: on White: on Blue: off	1. Faulty pressure sensor.	1. Contact the assistance centre.
The display shows OC	Red: on White: on Blue: off	1. Excessive absorption. 2. Pump blocked.	1. Fluid too dense. Do not use the pump for fluids other than water. 2. Contact the assistance centre.
The display shows LP	Red: on White: on Blue: off	1. Supply voltage too low. 2. Excessive drop in voltage on the line.	1. Check the presence of the correct supply voltage. 2. Check the section of the power supply cables.
The display shows: Press + to propagate this config	Red: off White: on Blue: off	One or more devices have sensitive parameters not aligned.	Press the + key on the device which we are sure has the most recent and correct configuration of the parameters.

18 - DISPOSAL

This product or its parts must be disposed of in an environment-friendly manner and in compliance with the local regulations concerning the environment; use public or private local waste collection systems.

19 - GUARANTEE

Any use of faulty material or manufacturing defects of the appliance will be eliminated during the guarantee period contemplated by the law in force in the country where the product is purchased, by repair or replacement, as we decide.

The guarantee covers all substantial defects that can be assigned to manufacturing faults or to the material used if the product has been used correctly, in accordance with the instructions.

The guarantee is void in the following cases:

- attempts to repair the appliance,
- technical alterations to the appliance,
- use of non original spare parts,
- tampering.
- inappropriate use, for example industrial use.

Excluded from the guarantee:

- parts subject to rapid wear.

When making a request under guarantee, apply to an authorised technical assistance service, presenting proof of purchase of the product.

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