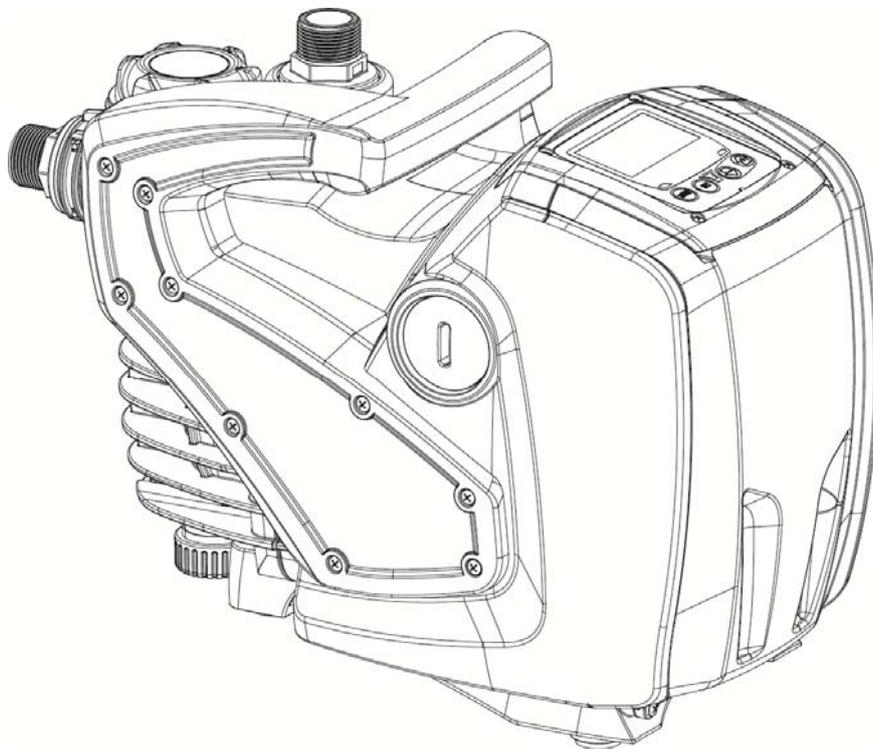

INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE (GB)
ISTRUZIONI PER L'INSTALLAZIONE E LA MANUTENZIONE (IT)
INSTALLATIONS- UND WARTUNGSANLEITUNGEN (DE)
INSTRUCTIONS POUR L'INSTALLATION ET LA MAINTENANCE (FR)
INSTRUCCIONES DE INSTALACIÓN Y MANTENIMIENTO (ES)
NÁVOD K INSTALACI A ÚDRŽBĚ (CZ)
ASENNUS- JA HUOLTO-OHJEET (FI)
INSTRUCTIES VOOR INSTALLATIE EN ONDERHOUD (NL)
ИНСТРУКЦИИ ПО МОНТАЖУ И ТЕХОБСЛУЖИВАНИЮ (RU)
POKYNY K INŠTALÁCII A ÚDRŽBE (SK)



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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 all this documentation carefully before installation.



Never touch the water when the pump plug is in the socket, even if the pump is not working. Take out the plug before any intervention. Absolutely avoid dry operation: the pump must be activated exclusively when it is immersed in water. If the water is finished, the pump must be deactivated immediately, taking the plug out of the socket.



Protect the electropump against inclement weather



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.

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

1. GENERAL

Applications

For fixed or portable installation in water supply and pressurisation systems for domestic use, small scale agriculture, vegetable plots and gardening, domestic emergencies and the hobbies industry in general.

ENGLISH

The product is an integrated system consisting of a self-priming, multi-stage centrifugal motor pump, an electronic circuit for control (inverter) and a filter to remove any incoming impurities.

With reference to Fig.1, the system has the following user interface points:

1. Suction connection (inlet)
2. Delivery connection (outlet)
3. Port for filling and filter maintenance
4. Drainage port
5. Port for bleeding and extraordinary maintenance Non-return valve
6. Control panel and status Display
7. Grip for lifting and transport
8. Port for extraordinary maintenance Motor Shaft

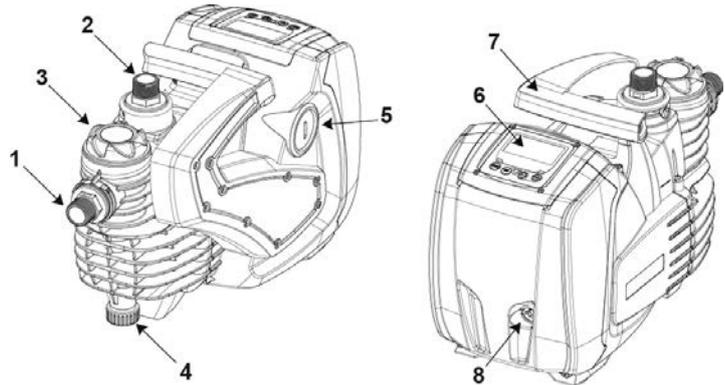


Figure 1

1.1 Built-in 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.

For the configuration of the parameters see chapters 4-5.

1.2 Integrated electropump

The system has a built-in centrifugal electropump of the multi-impeller type 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.2 shows the curve of the hydraulic performance.

By automatically modulating the rotation speed of the electropump, the inverter allows it to shift its work point according to necessities to any part of the area subtended by its curve, to keep the set pressure valve constant. The red curve highlights the behaviour of the system with setpoint 3.0 bar.

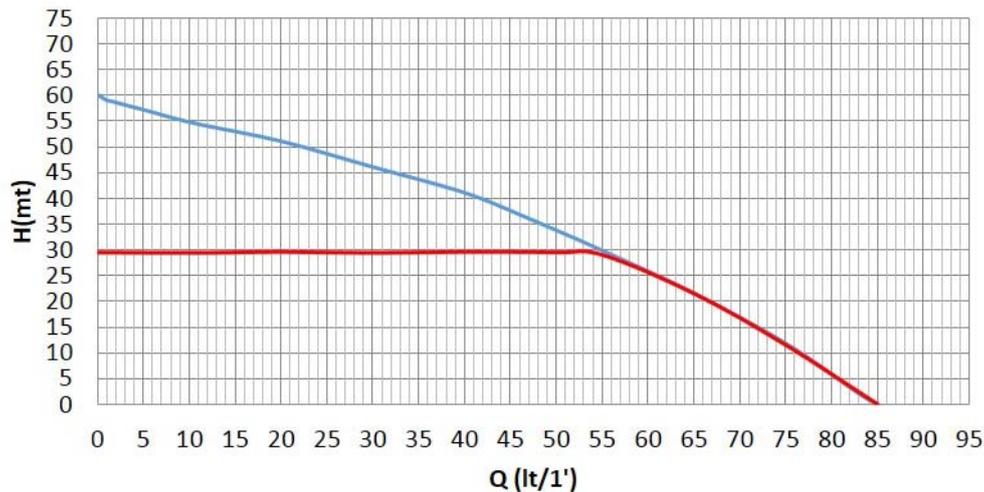


Figure 2

This means that, with SP = 3.0 bar, the system is able to ensure a constant pressure to utilities that require flow rates between respectively 0 and 55 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 the limits described above, 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 Built-in filter

The system incorporates a built in filter cartridge at the pump infeed to prevent any suspended impurities in the water. The filter cartridge is of the mesh type, with washable 0.5 mm mesh. The filler port (3-Fig.1) allows access to the filter cartridge for its routine maintenance operations (Sect.9.2). The transparent part of the filler port makes it possible to check whether the cartridge needs to be washed.

1.4 Technical characteristics

Topic	Parameter	Value 1000
ELECTRIC POWER SUPPLY	Voltage	1 ~ 220-240 VAC
	Frequency	50/60 Hz
	Maximum power	1000 W
	Maximum current	4.8 [Arms]
	Current dispersed to the ground	<3 [mArms]
STRUCTURAL CHARACTERISTICS	Overall dimensions	483 x 236 x H322 mm
	Empty weight (excluding packaging)	12.3 kg
	Protection class	IP X4
	Insulation class of the motor	F
HYDRAULIC PERFORMANCE	Maximum head	60 m
	Maximum flow rate	85 l/min
	Priming	<5min a 8m
	Maximum working pressure	6 bar
WORKING CONDITIONS	Max liquid temperature	40 °C
	Max environment temperature	50 °C
	Environment temperature of storage	-10÷60 °C
FUNCTIONALITY AND PROTECTIONS	Constant pressure	
	Protection against dry running	
	Antifreeze protection	
	Anticycling protection	
	Anti-locking protection	
	Motor overload protection	
	Protection against abnormal supply voltages	

Table 1

2. INSTALLATION



The system is designed for use “in a closed place”: the system is not designed for fixed installation outdoors and/or directly exposed to atmospheric agents. It can be used outdoors as a non-fixed application: transported to the site for use and stored indoors at the end of the operation.



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. 5.6.8 “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 suck up water with a level that does not exceed the depth of 8 m (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 differential circuit-breaker sized according to the features indicated in Table 1.

- Earth connection must be ensured.



The system cannot support the weight of the piping which must therefore be provided with other kind of support.

It is always good practice to position the system as close as possible to the liquid to be pumped.

The system must be operated only when positioned horizontally and resting stably on its rubber feet.

In case of fixed installation, make sure the position selected ensures access and visibility to the command and control panel (6-Fig.1).

In case of fixed installation, make sure sufficient space is provided to allow for routine maintenance of the built-in filter (Sect. 9.2).

In case of fixed installation, fit an On/Off valve on the suction side as well as the delivery side. This makes it possible to easily close the line upline and/or downline of the system for any maintenance and cleaning or for shutdown periods.

In case of fixed installation, the use of an expansion tank is recommended, to be connected on the delivery piping, so as to make the system elastic and protect it from water hammer. The capacity of the expansion tank is not binding (1 litre is sufficient), the recommended precharge is 1 bar less than the set point.

If the water is particularly loaded with foreign bodies and the number of cleaning operations on the built-in filter is to be reduced, install an additional external filter at the system infeed to stop the 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).

2.1 Hydraulic connections

The system ensures the declared performances only if piping with diameter not less than those of the openings of the system (1") are used at the inlet and outlet.

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 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. For suction depths of over four metres or with long horizontal stretches it is advisable to use an intake hose with a diameter larger than that of the intake aperture of the pump. If the suction pipe is made of rubber or flexible material, always check that it is of the reinforced vacuum-resistant type to avoid shrinkage due to suction.

If the installation is of the "positive suction head" type, avoid "goosenecks" and siphons in the suction piping and make sure it is water-tight.

The suction and delivery ducts must be connected to the system by means of the threads provided: 1 inch male thread on swivel connector made of technopolymer.



When making the connection airtight by adding material (e.g. Teflon, hemp,...) make sure you avoid excessive use of the gasket. Under the action of a suitable tightening torque (e.g. long-handle pipe wrench), the excess material may exert abnormal forces on the technopolymer connector, damaging it permanently.

The swivel connectors make it easier to install the system.

2.2 Loading Operation

Installation above head and below head

Installation "above head" (par. 2.1): remove the Filler cap (3-Fig.1) by unscrewing it manually or using the tool provided, also remove the breather cap (5-Fig.1) using a screwdriver or the tool provided; then fill the system with clean water through the filler port (approx. 1 liter). As soon as the water starts flowing through the bleeding port, carefully screw the cap back on, top up further through the filler port and screw the filler cap back on until it comes to a mechanical stop. 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

Installation "below head" (par. 2.1.): 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. Then slacken the breather cap (5-fig.1) just enough to release the trapped air; this allows the system to get filled completely. Supervise the operation and close the bleeding port as soon as the water flows out (it is advisable to provide an On/Off valve in the suction piping section and use it to control the filling operation with the cap open). Alternatively, if an On/Off valve is present on the suction piping, the filling operation can be carried out in a manner similar to that described for the suction lift installation.

3. COMMISSIONING

3.1 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 circuit breaker for protection of the plant must be sized correctly according to the features shown in Table 1. Use an F type differential circuit breaker for protection from sudden tripping. If the indications given in the Manual are in contrast to the regulatory standards in force, take the standard as reference.



The thermal magnetic circuit breaker must be correctly sized (see Technical Features).

3.2 Configuration of the Integrated Inverter

The system is configured by the manufacturer to satisfy most installation cases operating at constant pressure. The main parameters set in the factory are:

- Set-Point (desired value of constant pressure); SP = 3.0 bar/43.5 psi.
- Reduction of pressure to restart RP = 0.3 bar / 4.3 psi.
- Anti-cycling function: Disabled.

However, these parameters and others can be set by the user according to the system. See par. 4-5 for the specifications.



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 – 0.3 = 2.7 bar in the default configuration.

The system will not work if the utility is at a height greater than the equivalent in water-column-metres of the Pstart (consider 1 bar = 10 m.c.a.): for the default configuration, if the utility is at a height of at least 27m above the level of the system, the system will not start.

3.3 Priming

The priming of a pump is the phase during which the machine attempts to fill the body and the suction pipe with water. If the operation is successful the machine can work regularly.

Once the pump has been filled (par. 2.2) and the device has been configured (par. 3.2), it is possible to connect the electric power supply after having opened at least one utility on delivery for the first 10 seconds.

The system starts up and checks for the presence of water at the delivery.

The pump is considered as primed when a water flow is detected at the delivery. This is the typical case of positive suction head installation (Sect.2.1). The utility open at the delivery from which the water pumped flows out can be closed. If, after 10 seconds, no regular flow is detected at the delivery, the system signals dry running (BL alarm). During the next manual reset of the blocks (“+” and “-“ keys) the priming procedure starts up (typical case of suction lift installation Sect. 2.1

The procedure makes it possible to operate for a maximum time of 5 minutes during which the safety block for dry running is not activated. 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.

Except for the use of a suction duct not less than 1” and sealed airtight (there are no holes or joints through which air can be taken in), the system is designed to be able to prime itself in water conditions up to a depth of 8m of water, in less than 5 minutes. As soon as the system detects a continuous flow at the delivery, it leaves the priming procedure and starts working regularly. The utility open at the delivery from which the water pumped flows out can be closed. If the pump has not yet primed after 5 minutes of the procedure, the display shows the dry running message. In this case, disconnect the power supply, wait for 10 minutes and repeat the priming.

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).

4. THE KEYPAD AND THE DISPLAY

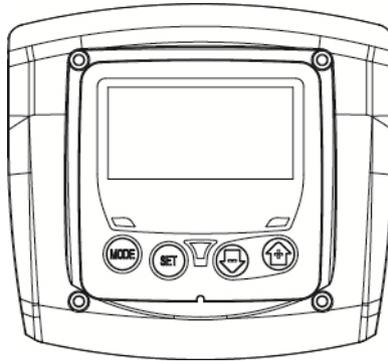


Figure 3: Aspect of the user interface

The user interface consists of a keypad with LCD display and POWER, COMMUNICATION and ALARM LEDs as 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 1.

	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.
	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 2: Key functions

Holding down the “+” key or the “-” key allows the automatic increase/decrease of the parameter selected. After the “+” key or 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 the following paragraphs are some values updated by pressing “SET” or “MODE”.

Warning leds

- Power
White led. Lit with a fixed light when the machine is powered. Blinking when the machine is disabled.
- Alarm
Red led. Lit with a fixed light when the machine is blocked by an error.

Menus

The complete structure of all the menus and of all the items of which they are composed is shown in Table 4.

4.1 Access to menus

The desired menu can be accessed directly by pressing simultaneously the appropriate combination of keys for the required time (for example MODE SET to enter the Setpoint menu) and the various items in the menu are scrolled with the MODE key.

Table 3 shows the menus that can be reached with the combinations of keys.

ENGLISH

MENU NAME	DIRECT ACCESS KEYS	HOLD-DOWN TIME
User 		On releasing the button
Monitor 	 	2 Sec
Setpoint 	 	2 Sec
Manual 	  	3 Sec
Settings 	  	3 Sec
Advanced settings 	  	3 Sec
Reset factory values	 	2 Sec after switching on appliance
Reset	   	2 Sec

Table 3: Access to the menus

Main Menu	User Menu mode	Monitor Menu set-minus	Setpoint Menu mode-set	Manual Menu set-minus-plus	Settings menu mode-set-less	Advanced Settings menu mode-set-plus
MAIN (Main Page)	RS Revs per minute	CT Contrast	SP Setpoint pressure	RI Speed setting	RP Decrease pressure for restart	TB Block time for water lack.
	VP Pressure	BK Back lighting		VP Pressure	OD Type of plant	T2 Delay in switching off
	VF Display of flow	TK Backlighting switch-on time		VF Display of flow	MS Measuring system	GP Proportional gain
	PO Power absorbed by pump	TE Dissipator temperature		PO Power absorbed by the line	FY Enabling dispensed volume block	GI Integral gain
	C1 Pump phase current			C1 Pump phase current	TY Enabling pumping time block	RM Maximum speed
	HO On time counter				FH Dispensed volume	AY Anticycling
	HW Running time counter				TH Pumping time	AE Anti-blocking
	NR Number of starts					AF AntiFreeze
	EN Energy countet					FW Firmware update
	ES Saving					RF Ripristino fault & warning
	FC Flow counter					
	VE Information HW e SW					
	FF Fault & Warning (Log)					

Table 4: Menu structure

4.2 Structure of the menu pages

When the system is switched on the main page is displayed. Various combinations of keys (see Sect. 4.1 Access to menus) allow access to the machine menus. The icon relative to the current menu appears at the top of the display.

The following always appear on the main page:

Status: operating status (e.g. standby, go, Fault)

Pressure: value in [bar] or [psi] depending on the set unit of measure

Power: value in [kW] of the power absorbed by the device

Fault indications

Warning indications

Specific icons

The error conditions are indicated in Table 9. The other displays are indicated in Table 5.

Error or status conditions shown on the main page	
Identifying code	Description
	Motor running
	Motor stopped
	Motor status manually disabled
	Presence of an error preventing operation of the electropump
EE	Writing and reading the factory settings on EEPROM
	Warning due to lack of supply voltage
	Priming

Table 5: 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. . In every page of the menu, the plant pressure is always displayed at the bottom while the symbols at the top indicate the current menu.

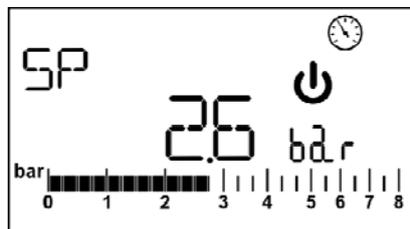


Figure 4: Display of a menu parameter

The pages showing the parameters may display: the numeric values and unit of measurement of the current item, values of other parameters linked to the setting of the current item see Figure 4.

In all the menu pages, except for those forming part of the user menu, a function is active which automatically restores the display of the main page 3 minutes after a key was last pressed.

4.3 Enabling and disabling the motor

In normal operating conditions, pressing and then releasing both the “+” and “-” keys causes the blocking/release of the motor (self-holding even after switching off). If an alarm is present, the operation described above resets the alarm. The motor disabled status is shown by the flashing white LED.

This command can be activated from any menu page except RF.

5. MEANING OF THE INDIVIDUAL PARAMETERS



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 5.6.3 - GP: Proportional gain coefficient and 5.6.4 - GI: Integral gain coefficient)

5.1 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.

5.1.1 RS: Rotation speed display

Motor rotation speed in rpm.

5.1.2 VP: Pressure display

Plant pressure measured in [bar] or [psi] depending on the measuring system used.

5.1.3 VF: Flow display

Displays the instantaneous flow in [litres/min] or [gal/min] depending on the set measuring system.

5.1.4 PO: Absorbed power display

Power absorbed by the electropump in [kW].

If the maximum power absorbed is exceeded and power limitation is activated, the PO parameter symbol flashes.

5.1.5 C1: Phase current display

Motor phase current in [A].

If the maximum current supplied is temporarily exceeded, the C1 symbol flashes to indicate that an overcurrent is being delivered on the motor and if operation continues in these conditions, the overload protection will be activated.

5.1.6 HO: On time counter

Indicates the number of hours of electric supply to the device. The total and partial On time counts are displayed alternately at 2 minute intervals. A "T" appears alongside the unit of measurement to display the total count and a "P" displays the partial count. The partial count can be reset by pressing the "-" key for at least 2 sec.

5.1.7 HW: Motor pump operating hours count

Indicates the number of hours of working of the pump. The total and partial time counts of the motor pump are displayed alternately at 2 minute intervals. A "T" appears alongside the unit of measurement to display the total count and a "P" displays the partial count. The partial count can be reset by pressing the "-" key for at least 2 sec.

5.1.8 NR: Number of start ups

Indicates the number of motor start ups.

5.1.9 EN: Energy absorbed counter

Indicates the energy absorbed from the mains in kW. The total and partial energy counts are displayed alternately at 2 minute intervals. A "T" appears alongside the unit of measurement to display the total count and a "P" displays the partial count. The partial count can be reset by pressing the "-" key for at least 2 sec.

5.1.10 ES: Saving

Indicates the percentage saving compared to the same pump controlled with an on/off system instead of inverter. The value calculated can be reset by pressing the "-" key for at least 2 sec.

5.1.11 FC: Pumped fluid volume count

Indicates the volume of fluid pumped by the system. The total and partial fluid volume counts are displayed alternately at 2 minute intervals. A "T" appears alongside the unit of measurement to display the total count and a "P" displays the partial count. The partial count can be reset by pressing the "-" key for at least 2 sec.

5.1.12 VE: Version display

Hardware and software version with which the appliance is equipped.

5.1.13 FF: 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. The reset can be done only by means of the command from RF of the ADVANCED SETTINGS 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.

5.2 Monitor Menu

Keep the "SET" and "-" (minus) keys pressed simultaneously for 2 sec from the main menu to access the MONITOR MENU. In this menu, by pressing the MODE key, the following values are displayed in sequence.

5.2.1 CT: Display contrast

Adjusts the display contrast

5.2.2 BK: Display brightness

Adjusts the backlighting of the display on a scale from 0 to 100.

5.2.3 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 20 sec to 10 min or 'always on'. With the backlight setting always ON, the display shows "ON". When the backlight is off, the first time any key is pressed has the sole effect of restoring the backlighting.

5.2.4 TE: Dissipator temperature display

5.3 Setpoint Menu

From the main menu, hold down simultaneously the "MODE" and "SET" keys until "SP" appears on the display.

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 1-5 bar (14-80 psi).

5.3.1 SP: Setting the setpoint pressure

Pressure at which the system is pressurised



The pump restarting pressure is linked not only to the set pressure SP but also to RP. RP expresses the decrease in pressure, with respect to "SP" caused by the pump starting.

For example: SP = 3,0 [bar]; RP = 0,3 [bar];

During normal operation the system is pressurised at 3.0 [bar]. The electropump restarts when the pressure falls below 2,7[bar].



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

5.4 Manual Menu



In manual operation, the sum of the input pressure and the maximum pressure that can be supplied must not be greater than 6 bar.

From the main menu, hold down simultaneously the "SET" and "+" and "-" keys until the manual menu page appears. 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.

In the main menu, irrespective of the parameter displayed, it is always possible to perform the following controls:

- Temporary starting of the electropump.
- Permanent pump start up.
- Modification of number of pump rotations in manual mode.

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 or 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 or pump OFF command is given, a communication appears on the display.

In case of operation in this mode for more than 5' without the presence of hydraulic fluid, the machine stops, giving the PH alarm.

Once the PH error condition is no longer present, the alarm will be reset automatically only. The reset time is 15'; if the PH error occurs more than 6 times consecutively, the reset time increases to 1h. Once it has reset further to this error, the pump will remain in stop status until the user restarts it using the "MODE" "-" "+" keys.

5.4.1 RI: Speed setting

Sets the motor speed in rpm. Allows you to force the number of revolutions at a predetermined value.

If the rotations made differ from the rotation setting "RI", the number of rotations set and the number of rotations made are displayed alternately. When the number of rotations made is displayed, an "A" appears alongside the unit of measurement. Each time the "+" or "-" is pressed to modify the RI, the display automatically shows the number of rotations set.

5.4.2 VP: Pressure display

Plant pressure measured in [bar] or [psi] depending on the measuring system used.

5.4.3 VF: Flow display

Displays the flow in the chosen unit of measure. The measuring unit may be [l/min] o [gal/min] vedi par. 5.5.3 - MS: Measuring system

5.4.4 PO: Absorbed power display

Power absorbed by the electropump in [kW].

If the maximum power absorbed is exceeded and power limitation is activated, the PO parameter symbol flashes.

5.4.5 C1: Phase current display

Motor phase current in [A].

If the maximum current supplied is exceeded temporarily, the C1 symbol flashes to indicate that the motor overload protection is being activated and if operation continues in this condition, the overload protection is activated.

5.5 Settings menu

From the main menu, keep the “MODE” & “SET” & “-“ keys pressed simultaneously until the first parameter of the settings menu appears on the display.

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.

5.5.1 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 be set from a minimum of 0.1 to a maximum of 1 [bar]. In particular conditions (for example in the case of a setpoint lower than the RP) it may be limited automatically.

5.5.2 OD: Type of plant

Possible values “R” and “E” referring to a rigid system and an elastic system.

The device leaves the factory with mode “R” 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.

5.5.3 MS: Measuring system

Set the measuring system, choosing between metric and imperial units. The quantities displayed are shown in Table 6.

NOTE: The flow in English-speaking units (gal/min) is indicated adopting a conversion factor of 1 gal = 4.0 litres, corresponding to the metric gallon.

Quantity	Units of measurement displayed	
	Metric units	Imperial units
Pressure	bar	psi
Temperature	°C	°F
Flow rate	lpm	gpm

Table 6: Measuring system

Acronyms lpm and gpm indicate litres/min and gallons/min, respectively.

5.5.4 FY: Enabling dispensed volume block

Enables the block function on the fluid volume dispensed FH.

5.5.5 TY: Enabling pumping time block

Enables the block function on the pumping time TH.

5.5.6 TY: FH: Dispensed volume

Sets the fluid volume reached at which the pumping is stopped. If the function is enabled (parameter FY), see Sect. 5.5.4, the inverter measures the fluid volume dispensed and when the FH volume set by the user is reached, pumping is disabled. The system remains in block until it is reset manually. Reset can be done from any page of the menu by pressing the “+” and “-“ keys simultaneously and then releasing them. The count and block status are saved in memory and will therefore be retained even after the system is switched off and then switched on again. When the dispensed volume block is activated, the relative count is displayed in the main page and it decreases from the preset value to 0. When the count reaches zero, the system stops and the count starts flashing. The count starts the moment the FY is

ENGLISH

enabled or the moment of the last FH setting or from the moment the block was reset by pressing the "+" and "-" keys. The block generated is not recorded in the fault queue. FH may be set between 10 litres (2.5 gal) and 32000 litres (8000 gal).

5.5.7 TH: Pumping time

Sets the pumping time after which the pumping stops. If the function is enabled (parameter TY), see Sect. 5.4.5, the inverter measures the pump operating time and when the TH value set by the user is reached, pumping is disabled. The system remains in block until it is reset manually. Reset can be done from any page of the menu by pressing the "+" and "-" keys simultaneously and then releasing them. The count and block status are saved in memory and will therefore be retained even after the system is switched off and then switched on again. When the pumping time block is activated, the relative count is displayed in the main page and it decreases from the preset value to 0. When the count reaches zero, the system stops and the count starts flashing. The count starts the moment the TY is enabled or the moment of the last TH setting or from the moment the block was reset by pressing the "+" and "-" keys and is counted only if pumping is active. The block generated is not recorded in the fault queue. TH may be set between 10 sec and 9h.

5.6 Advanced Settings 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.

5.6.1 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.

5.6.2 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 2 and 120 s. The factory setting is 10 s.

5.6.3 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.

5.6.4 GI: Integral gain coefficient

In 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.

5.6.5 RM: Maximum speed

Sets a maximum limit on the number of pump revolutions.

5.6.6 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.

5.6.7 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.

5.6.8 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.

5.7 RF: Fault and warning 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

6. PROTECTION SYSTEMS

The 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 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.

In the event of blocking due to one of the internal errors E18, E19, E20, E21 it is necessary to wait 15 minutes with the machine powered until the blocked status is automatically reset.

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

Table 7: Alarms

Blockage conditions	
Display indication	Description
PH	Block due to excessive operating time without hydraulic flow
BL	Blockage due to water lack
BP1	Blockage due to reading error on the delivery pressure sensor
PB	Blockage due to supply voltage outside specifications
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
HL	Hot liquid
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
EY	Block for cyclical abnormal detected on the system

Table 8: Indications of blockages

6.1 Description of blockages

6.1.1 “BL” Anti Dry-Run (Protection against dry running)

In the case of lack of water the pump is stopped automatically after the time TB. 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.



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

6.1.2 Anti-Cycling (Protection against continuous cycles without utility request)

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

The electronic control of the system is able to detect the presence of the leak, based on its recurrence.

The Anti-Cycling function can be excluded or activated in Basic or Smart mode (par 5.6.6).

In Basic mode, once the condition of recurrence is detected the pump stops and remains waiting to be manually reset. This condition is communicated to the user by the lighting of the red “Alarm” led and the appearance of the word “ANTICYCLING” on the display. After the leak has been removed, you can manually force restart by simultaneously pressing and releasing the “+” and “-“ keys.

In Smart mode, once the leak condition is detected, the parameter RP is increased to decrease the number of starts over time.

6.1.3 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 and put it away in a sheltered place.

6.1.4 “BP1” Blockage due to fault of the delivery pressure sensor (system pressurisation)

If the device detects a fault in the delivery 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.

6.1.5 “PB” Blockage due to supply voltage outside specifications

This occurs when the allowed line voltage at the supply terminal assumes values outside the specifications. It is reset only automatically when the voltage at the terminal returns within the allowed values.

6.1.6 “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.

6.2 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.

6.3 Self-reset of error conditions

For some malfunctions and blockage conditions, the system attempts automatic self-reset.

- “BL” Blockage due to water lack
- “PB” Blockage due to line voltage outside specifications
- “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 9 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	<ul style="list-style-type: none"> - 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.
PB	Blockage due to line voltage outside specifications	It is reset when it returns to a specific voltage.
OT	Blockage due to overheating of the power stages	It is reset when the temperature of the power stages returns within the specifications.
OC	Blockage due to motor overload	<ul style="list-style-type: none"> - 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 9: Self-reset of blockages

7. RESET AND FACTORY SETTINGS

7.1 General system reset

To reset the system, hold down the 4 keys simultaneously for 2 sec. This operation is the same as disconnecting the power, waiting for it to close down completely and supplying power again. The reset does not delete the settings saved by the user.

7.2 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 par 7.3 - Restoring the factory settings).

7.3 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
CT	Contrast	15	
BK	Backlighting	85	
TK	T. backlighting On	2 min	
SP	Setpoint pressure [bar]	3,0	
RI	Revs per minute in manual mode [rpm]	4000	
OD	Type of plant	R (Rigid)	
RP	Pressure decrease to restart [bar]	0,3	
MS	Measuring system	I (International)	
FY	FH limit enabling	OFF	
TY	TH limit enabling	OFF	
FH	Limit for pumped volume	100 [l]	
		25 [gal]	
TH	Limit for pumping time	10 min	
TB	Blockage time for water lack [s]	10	
T2	Delay in switching off [s]	10	
GP	Proportional gain coefficient	0,5	
GI	Integral gain coefficient	1,2	
RM	Maximum speed [rpm]	7000	
AY	Anticycling Function	OFF (Disabled)	
AE	Anti-blocking function	ON(Enable)	
AF	Antifreeze	ON(Enable)	

Table 10: Factory settings

8. PARTICULAR INSTALLATIONS

8.1 – e18

The product is made and supplied with the capacity of being self-priming. With reference to par. 4, 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 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;
3. remove the drainage cap, taking care to make sure the O-Ring does not fall (Fig. 5) (Fig.5);
4. with the aid of pliers take the shutter out of its seat. The shutter will be extracted together with the O-Ring and the metal spring with which it is assembled;
5. remove the spring from the shutter; insert the shutter in its seat again with the respective O-Ring (side with gasket towards the inside of the pump, stem with cross-shaped fins towards the outside);

6. screw on the cap after having positioned the metal spring in side so that it is compressed between the cap itself and the with cross-shaped fins of the shutter stem. When repositioning the cap ensure that the respective O-Ring is always correctly in its seat;
7. fill the pump, connect the power supply, start the system.



If the system is installed on a plant, it is advisable to force closure of the self-priming duct before use the first time, or, in any case, before connecting the system to the plant. With the electric power supply disconnected, follow points 3. to 7. listed above (Sect. 8.1).

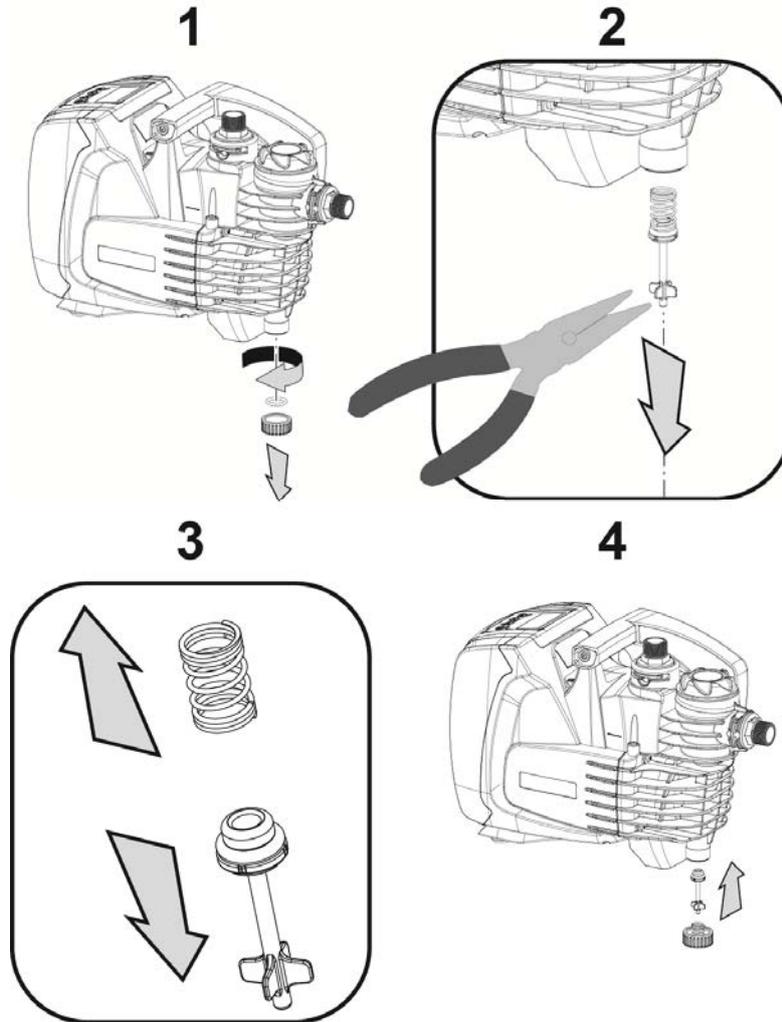


Figure 5

9. MAINTENANCE



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

The only routine maintenance operation required involves cleaning the built-in filter (section 9.2). Instructions are also given for carrying out extraordinary maintenance operations that may be necessary in special cases (e.g. draining the system before storing it during shutdowns).

9.1 Accessory tool

Together with the product, DAB supplies an accessory for removing the filler and breather caps.

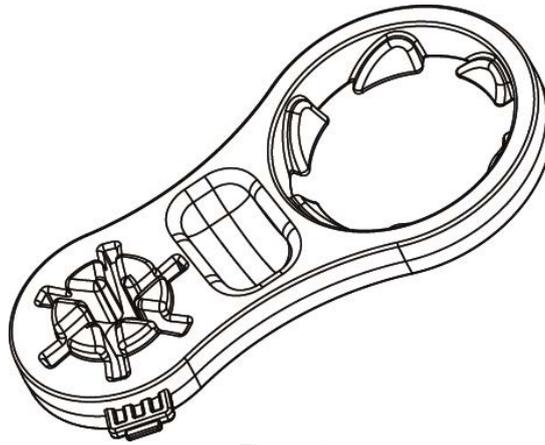


Figure 6

9.2 Cleaning the Built-in Filter

For correct working of the system and achieving the declared performance, clogging of the filter must be prevented. Check the filter cartridge periodically through the transparent cover and, if necessary, clean it as described below.

1. disconnect the electric supply and wait for 10 minutes;
2. if the system is installed with positive suction head, close the On/Off valve at the suction end;
3. remove the filler cap by unscrewing it manually or use the tool included in the supply;
4. remove the cartridge without rotating it. the relative filter cup-support is also released;
5. empty the cup and wash the cartridge under running water;
6. refit the cartridge back in place taking care to make sure it fits in the cup by means of a bayonet coupling;
7. close the filler cap so that it comes to a mechanical stop.

If the system is to be reused, and not stored away, restore the pump suction and repeat the filling (Sect.2.2) and priming (Sect.3.3) operations, preferably before point 7. in case of suction lift installation.

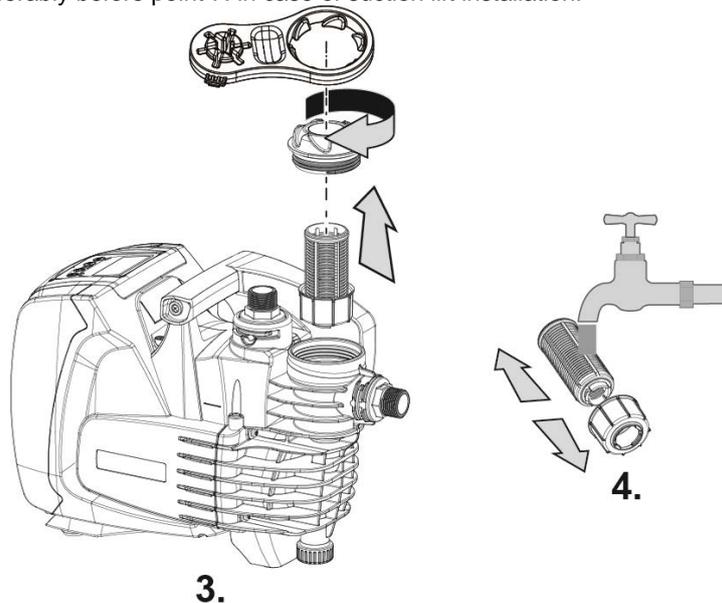


Figure 7

9.2 Emptying the system

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

1. disconnect the electric supply and wait for 10 minutes;
2. if the system is installed on a plant, cut off the suction duct at the point nearest to the system (it is advisable to have an On/Off valve immediately upline of the system) so that the entire suction system is also not discharged;
3. if the system is installed on a plant, open the nearest delivery tap to discharge pressure to the plant and drain it as much as possible;
4. If the system is installed on a plant, if an On/Off valve is present immediately downline (it is always advisable to have one), close this to prevent the quantity of water from flowing back to the plant between the system and the first tap open;
5. disconnect the pump from the plant;
6. remove the drainage cap (4-Fig.1) and drain out the water inside;
7. refit the drainage cap back in place, taking care to make sure the O-Ring is positioned properly inside it;
8. the water trapped in the delivery system downline of the non-return plant integrated in the system can flow back only the moment the system is disconnected.



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.



It is always advisable to use a three-piece connector at the suction as well as delivery to be able to execute point 5 easily.

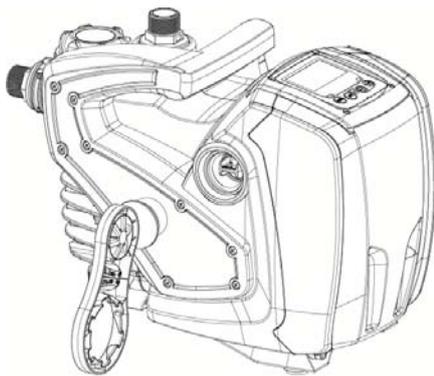
9.3 Non-return valve

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 the use of clear water and the presence of a filter at the inlet is recommended, if the non-return valve is seen to operate abnormally, it can be removed from the system and cleaned and/or replaced by proceeding as follows:

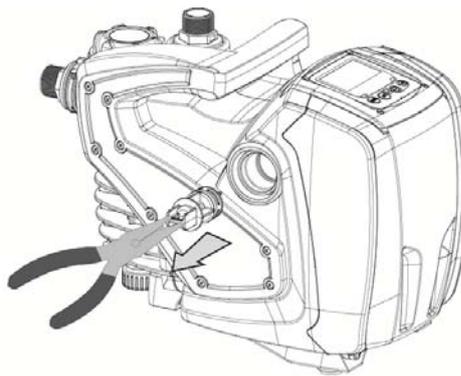
1. drain the system by following points 1 to 6. of Section 9.2;
2. using a screwdriver or special accessory meant for the purpose remove the breather cap to be able to access the non-return valve (Fig. 8);
3. using pliers, extract the cartridge of the non-return valve without rotating it, gripping it by the jumper provided for the purpose (Fig.8): the operation may require a certain effort;
4. clean the valve under running water, ensure that it is not damaged and replace it if necessary;
5. put the complete cartridge back in its seat: the operation requires the force necessary to compress the 2 O-Rings (Fig.8);
6. screw the breather cap to fit flush: if the cartridge has not been pushed correctly into place, screw the cap in to position it completely (Fig. 8).



To remove the non-return valve, the delivery piping section should be drained completely.



2.



3.



4.

Figure 8



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.

9.4 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. using a 10mm hexagonal key, remove the motor shaft access cap (fig.9);
2. insert a straight tip screwdriver in the groove on the motor shaft and manoeuvre, turning in 2 directions (fig. 9);
3. if it is turning freely the system can be started, after having replaced the cap and cover that have been removed;
4. if rotation is blocked and it cannot be removed by hand, call the assistance service.

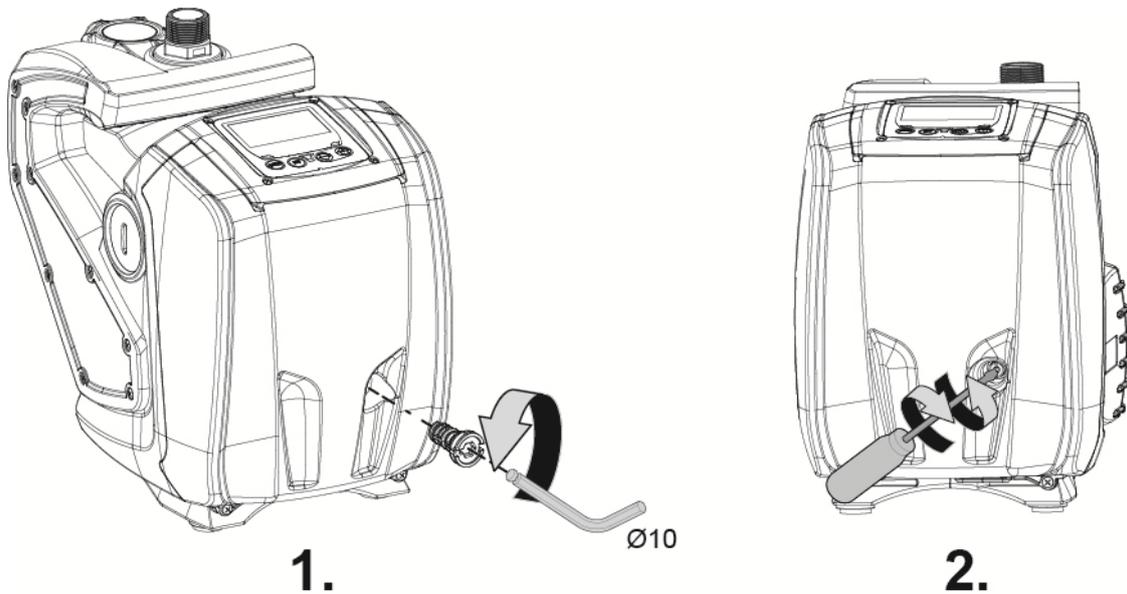


Figure 9

10. 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)

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 9.4 (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. 3.2).	Increase the system restarting pressure level by increasing SP or decreasing RP.
The pump does not stop.	Red: off White: on Blue: off	<ol style="list-style-type: none"> 1. Leak in the system. 2. Impeller or hydraulic part clogged. 3. Air getting into the suction pipe. 4. Faulty flow sensor. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Suction depth too high. 2. Suction pipe clogged or diameter insufficient. 3. Impeller or hydraulic part clogged. 	<ol style="list-style-type: none"> 1. As the suction depth increases the hydraulic performance of the product decreases. 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.

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			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. 9.3.
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 in the expansion vessel. If water is found to flow out during the inspection, it means the tank is broken Otherwise restore the air pressure according to equation $P = \text{SetPoint} - 1\text{bar}$.
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.	Set the expansion tank pressure or configure the SP and/or RP parameters in such a manner as to satisfy the equation $P = \text{SetPoint} - 1\text{bar}$.
The display shows BL.	Red: on White: on Blue: off	1. No water. 2. Pump not primed. 3. Setpoint not reachable with the set RM value.	1-2. Prime the pump and check whether there is air in the pipe. Check whether the suction or any filters are blocked. 3. Set a RM value that allows the setpoint to be reached.
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 PB.	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.

(*). In case of installation of an expansion tank.

11. 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.

12. GUARANTEE

Any modification made without prior authorisation relieves the manufacturer of all responsibility. All the spare parts used in repairs must be authentic and all accessories must be authorised by the manufacturer, in order to ensure maximum safety of the machines and of the systems in which they may be installed.

This product is covered by a legal guarantee (in the European Community for 24 months from date of purchase) against all defects that can be assigned to manufacturing faults or to the material used.

The product under guarantee may, at discretion, either be replaced with one in perfect working order or replaced free of charge if the following conditions are observed:

- the product has been used correctly in compliance with the instructions and no attempt has been made to repair it by the buyer or by third parties.
- the product has been consigned to the outlet where it was purchased, attaching a document as proof of purchase (invoice or cash register receipt) and a brief description of the problem found.

The impeller and parts subject to wear are not covered by the guarantee. Intervention under guarantee does not extend the initial guarantee period in any way.