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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.

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. (IEC **60730**).



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. Check that the panel has not been damaged.



In particular, check that all the internal parts of the panel (components, leads, etc.) are completely free from traces of humidity, oxide or dirt: if necessary, clean accurately and check the efficiency of all the components in the panel. If necessary, replace any parts that are not perfectly efficient.



It is indispensable to check that all the panel leads are correctly tightened in the respective clamps.



In the event of a long period of inactivity (or when any component has been replaced), it is advisable to perform on the panel all the checks indicated by standard EN 60730-1.

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

This documentation supplies the general indications for the storage, installation and use of the E.box electric panel, which has been designed and made for the control and protection of Sets of 1 or 2 pumps for: drainage (emptying), filling and pressure boosting.

WHERE TO INSTALL THE PANEL:

It is good practice to install the panel correctly, taking particular care to comply with the following indications.

- the panel must be kept in a completely dry place, far from sources of heat;
- the electric panel must be perfectly closed and isolated from the outside environment, so as to avoid the entry of insects, humidity and dust which could damage the electrical components, jeopardising their regular operation.
- Choose the sensors with a grade of protection suitable for the place in which they will be positioned.

1.1 Technical characteristics

	E.box Plus **E.box Plus D**	**E.box Basic** **E.box Basic D**
Power supply +10% - 15%	3 x 400V 3 x 230 V 1 x 230V	1 x 230V
Frequency	50/60Hz	50/60Hz
Grade of protection	IP 55	IP55
No. pumps that can be connected:	1 or 2	1 or 2
Maximum rated current of the pumps	12A	12A
Maximum rated power of the pumps	5.5kW at 3 x 400V 3.2kW at 3 x 230V 2.2kW at 1x230V	2.2kW at 1 x 230V
Environment temperature	-10 ÷ 40°C	10 ÷ 40°C
Storage temperature	-25°C ÷ 55°C	-25°C ÷ 55°C
Air relative humidity	50% at 40°C 90% at 20°C	50% at 40°C 90% at 20°C
Max. altitude:	1000 m (a.s.l.)	1000 m (a.s.l.)

Table 1: Technical data

1.2 Protections

The panel is self-protected and protects the electropumps against:

- **overloads and excess temperature with automatic reset,**
- **short circuits with fuses (only Plus model),**
- **excess currents in pumps (overload protection),**
- **abnormal voltages,**
- **lack of phase and thermal protection KK,**
- **dry operation,**
- **rapid starts,**
- **faults of the pressure sensor,**
- **inconsistency of floats and/or probes,**
- **blocking of the pumps.**

2 INSTALLATION



Strictly respect the electric supply values indicated on the electrical data plate.

- Although it has a grade of protection IP55, it is not advisable to use it in an atmosphere charged with oxidising or corrosive gases.
- The panels must be protected against the direct rays of the sun and against unfavourable weather conditions.
- Use good quality cables with a section suitable for the current required by their motors and for their length. Pay particular attention to the power cable which must carry the current for all the pipes connected.
- The sensors must be suitable for the place in which they are positioned.
- It is necessary to take suitable steps to keep the temperature inside the panel within the “limits of environment temperature use” listed below.
- High temperatures can lead to accelerated ageing of all the components, resulting in more or less severe malfunctions.
- It is also recommended that the person carrying out installation should ensure the cable clamps are watertight.
- Accurately tighten the cable clamps where the power cable enters the panel and those of any external controls, connected by the installer, so as to ensure that the cables cannot work loose from the clamps.

2.1 Electrical connections

Ensure that the main switch on the power distribution panel is in OFF position (0) and that no one can switch on the power accidentally before connecting the power cables to the terminals:



L1 - L2 - L3 - ⏚ for three-phase systems

L - N - ⏚ for single-phase systems

and to the isolating switch QS1.

Scrupulously observe all the regulations in force concerning safety and accident prevention.

Ensure that all the terminals are fully tightened, **paying particular attention to the earth screw**.



- Connect the cables to the terminal board as indicated in the wiring diagrams.
- Check that all the connecting cables are in excellent condition, with the external sheathing unbroken.
- **The system must be correctly and safely earthed as required by the regulations in force.**
- **Check that the differential switch that protects the system is of the correct dimensions.**

2.1.1 Instrumental checks to be carried out by the installer

- Continuity of the protection leads and of the main and supplementary equipotential circuits.
- Insulating resistance of the electric system between the active circuits L1-L2-L3 (short-circuited with each other) and the equipotential protection circuit.
- Testing the efficiency of the differential protection.
- Testing the voltage applied between the active circuits L1-L2-L3 (short-circuited with each other) and the equipotential protection circuit.
- Testing operation.

2.1.2 Boards and connections

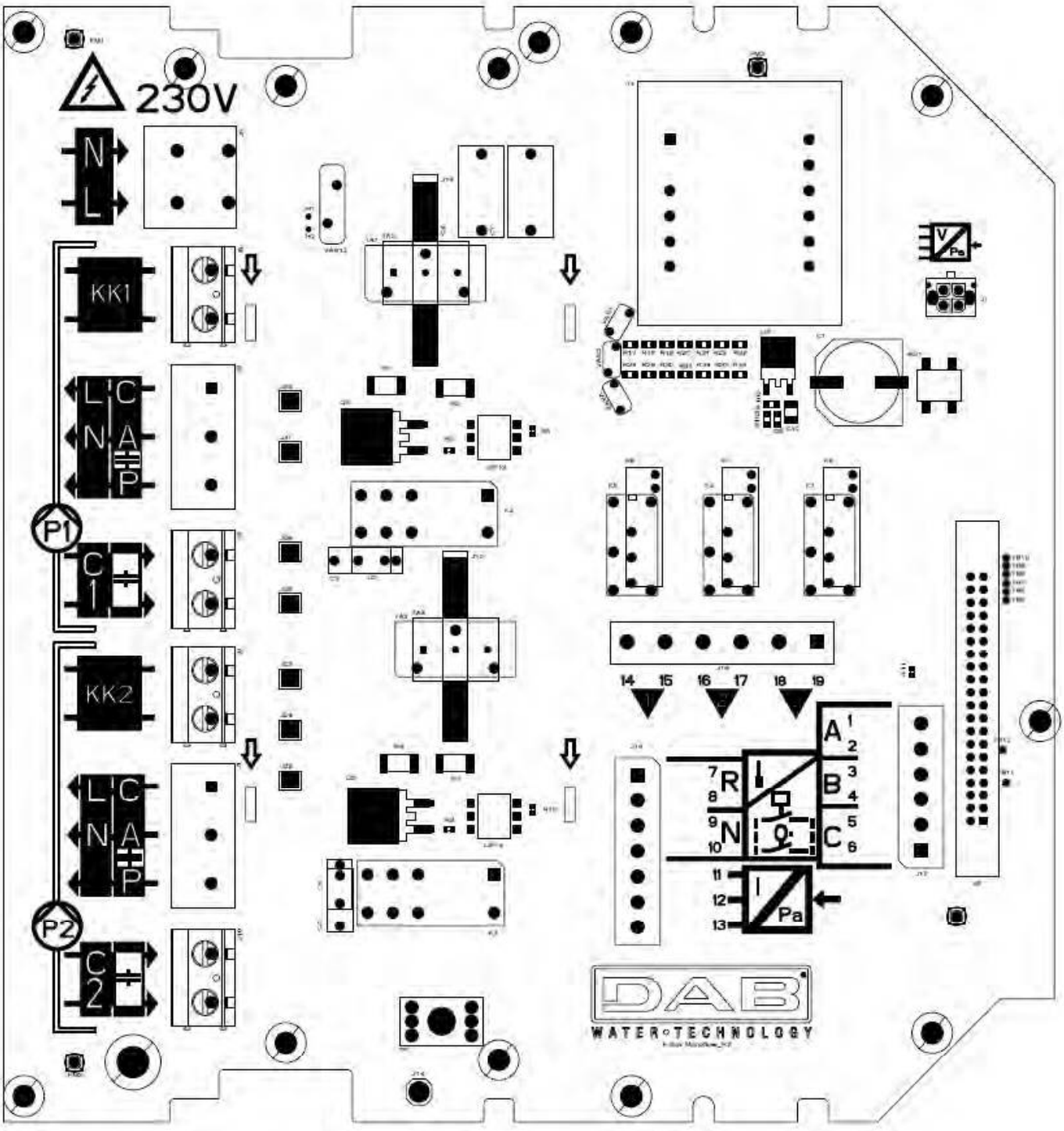


Figure 1: E.box Basic Board

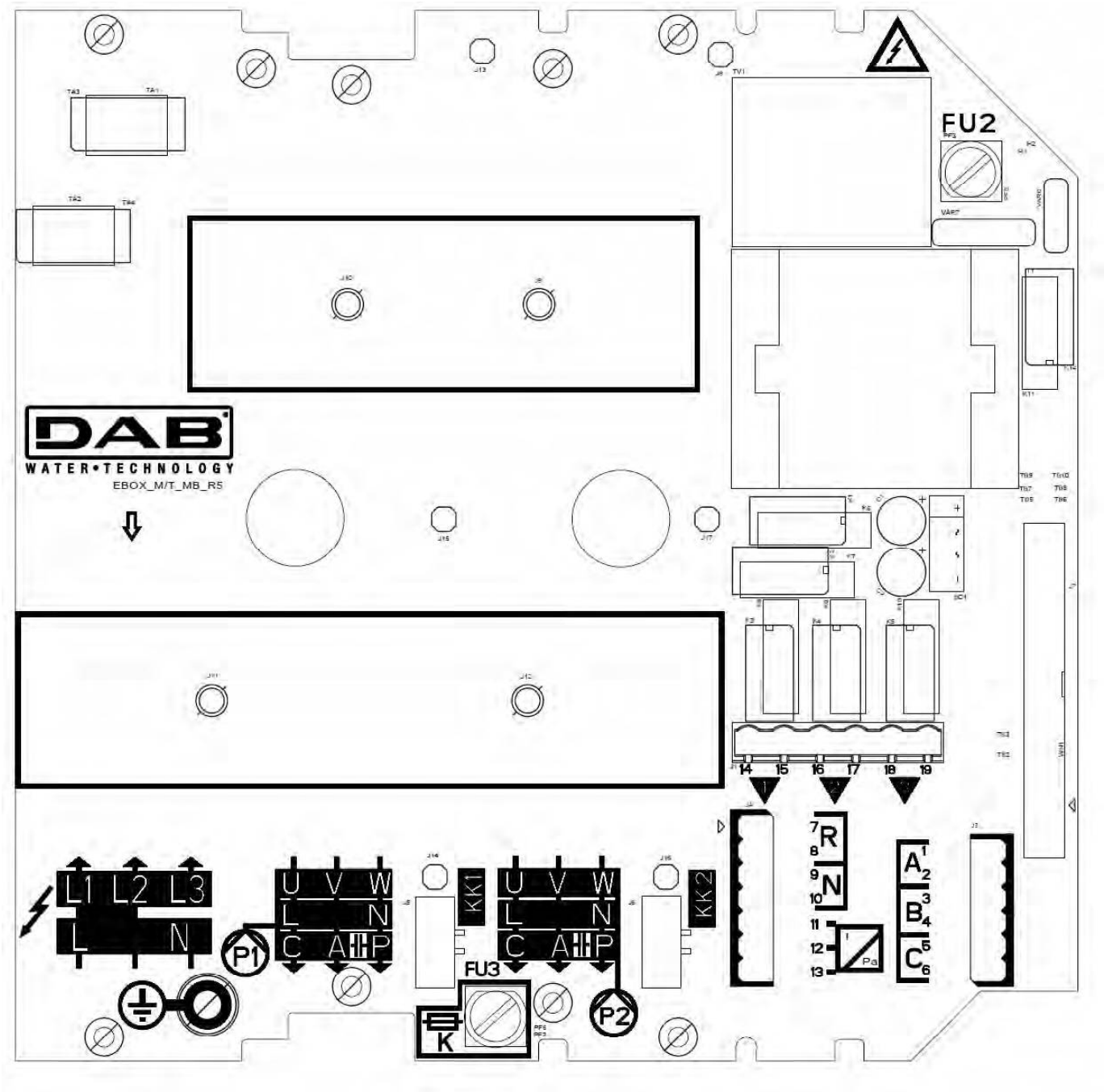


Figure 2: E.Box Plus Board

	Function
QS1	Supply line isolating switch (On the front panel of the e.box not shown in the figure)
L1 – L2 – L3	Three-phase power supply line connection
L – N	Single-phase power supply line connection
⏚	Earthing connection
U - V - W	Three-phase electrical connection of the pumps P1 and P2
L - N	Single-phase electrical connection of the pumps P1 and P2
C - A - P	Electrical connection for single-phase pumps P1 and P2 with external capacitor
C1 – C2	Electrical connection for external starting capacitor for single-phase pumps with external capacitor. For P1 and P2. Basic version only.
A - P	Electrical connection for external starting capacitor for single-phase pumps with external capacitor. For P1 and P2. Plus version only.
KK1- KK2	Thermal protection input for the motor of pumps P1 and P2
A-B-C	Terminals connecting digital inputs for level or pressure control

R-N	Terminals connecting digital alarm inputs
I: 11-12	Sensor input connection terminal
Q1: 14-15 Q2: 16-17 Q3: 18-19	Terminals connecting the alarms Q1, Q2, Q3.
FU2 - FU3	Panel protection fuses (Plus version only)
FU5	Pump P2 protection fuse (Plus version only)
FU4	Pump P1 protection fuse (Plus version only)

- The supply voltage of the E.BOX PLUS panel must be the same as that of the pumps used. For example, if the panel is fed with a supply voltage of 3~400V the pumps must be at 3~400V.
- The E.BOX BASIC panel must be fed with a supply voltage of 1~230V. The pumps must be single-phase 230V.
- Connect the earth cables of the pumps to the earth terminals in the E.Box panel! Make sure that all the cables have adequate dimensions for the currents they have to bear.
- If the single-phase pump needs an external capacitor, it can be placed inside the panel.
- If 2 pumps are used, they must be identical.
- Attention, an incorrect electrical connection could damage the E.Box panel.

2.2 Electrical connection of the pumps

Connection of three-phase pumps

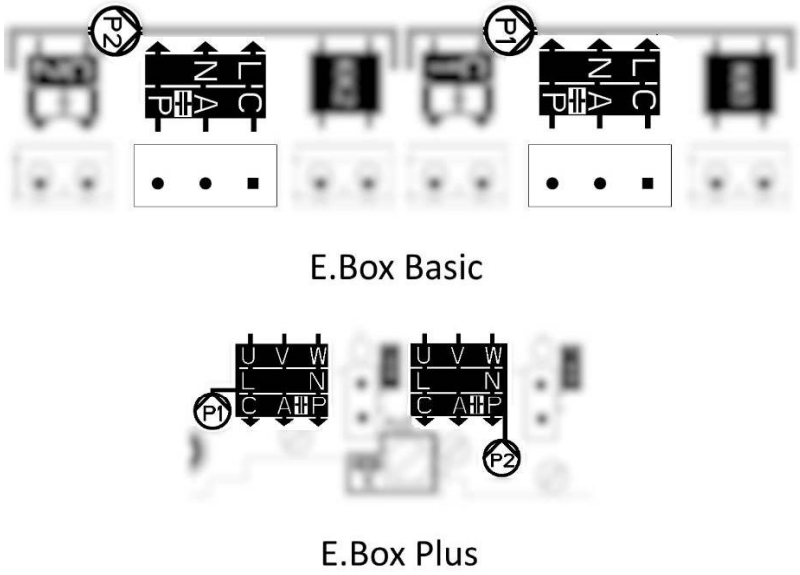


Figure 3: Electrical connection of pumps

Three-phase pumps can be connected only to the E.box Plus. They must be connected to the terminals P1 and P2 as shown in Figure 3. The correct sequence of phases U, V and W must be respected so that they turn in the correct direction.

Connection of single-phase pumps with internal capacitor.

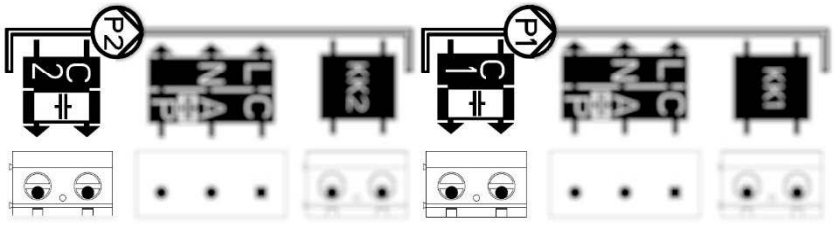
The pumps must be connected to the terminals P1 and P2 shown in Figure 3. The neutral wire must be connected to the terminal N, the phase wire must be connected to the terminal with a screenprinted L.

Connection of single-phase pumps with external capacitor.

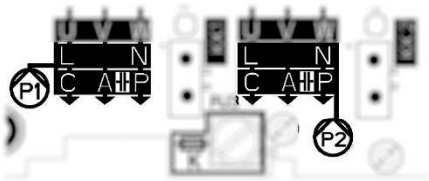
Pumps with an external capacitor must be connected to the terminals P1 and P2 shown in Figure 5. Particular care must be taken to respect the correspondence between the screenprinting and the names of the pump wires. The pump cable marked C must be connected to terminal C. The same applies to cables A and P. See Figure 3.

The pump capacitor can be placed inside the E.box panel, on the metal bracket provided.

The capacitors must be connected as shown in Figure 4. Take care because in the E.Box Plus they share the same terminal as the pump.



E.Box Basic



E.Box Plus

Figure 4: Connection of pump external capacitors

2.3 Power supply electrical connection

Before starting work, disconnect the power from the supply line. Use cables with a suitable size for the currents involved, considering that the in-line current is the total of the currents on the pumps.

In the case of single-phase power supply use terminals L and N. In the case of three phase power supply use terminals L1, L2, L3. See Figure 5 Electrical connection to the supply line.

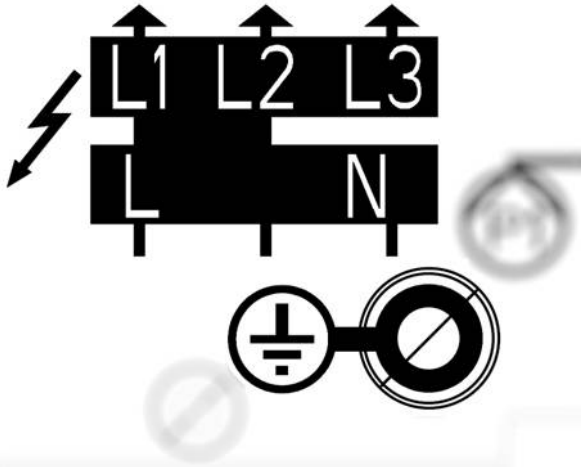


Figure 5: Electrical connection to the supply line

Connect the earth cables of the pumps to the earth terminals in the E.Box panel!

3 FRONT PANEL



Figure 6: Display label, present only on plus models

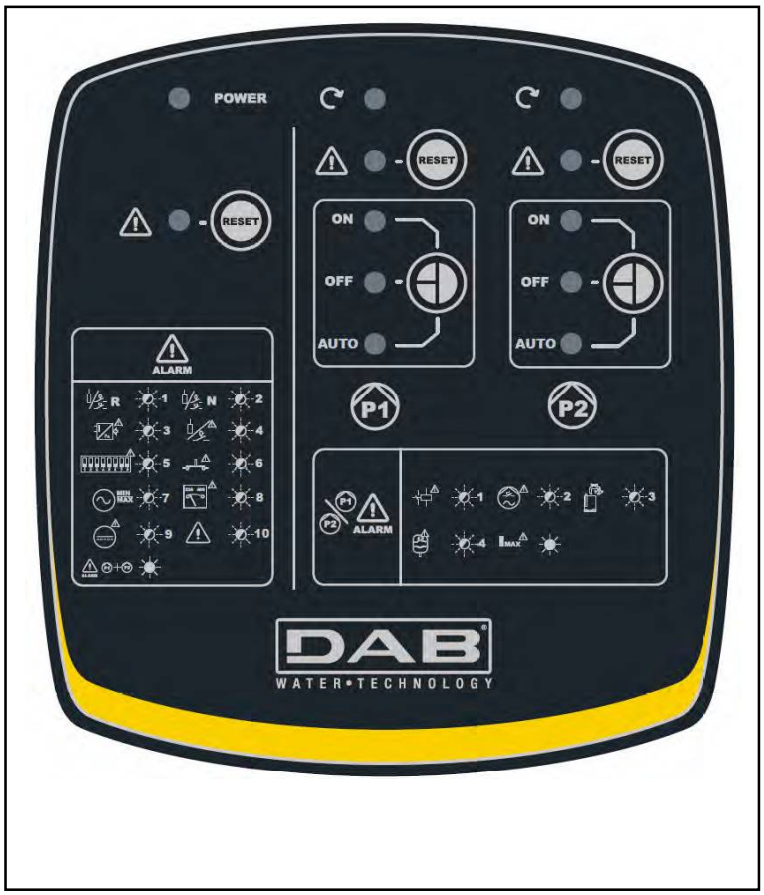
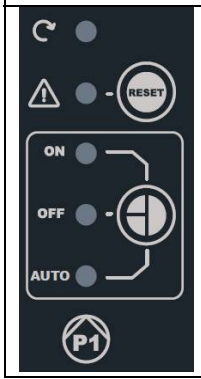
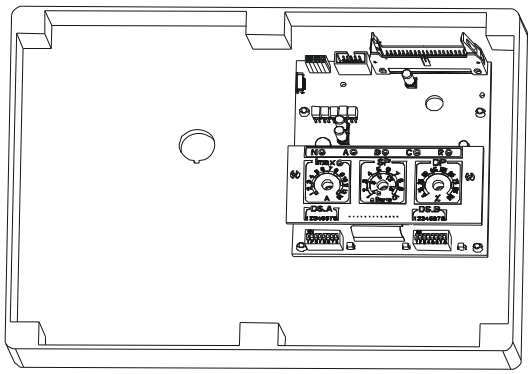


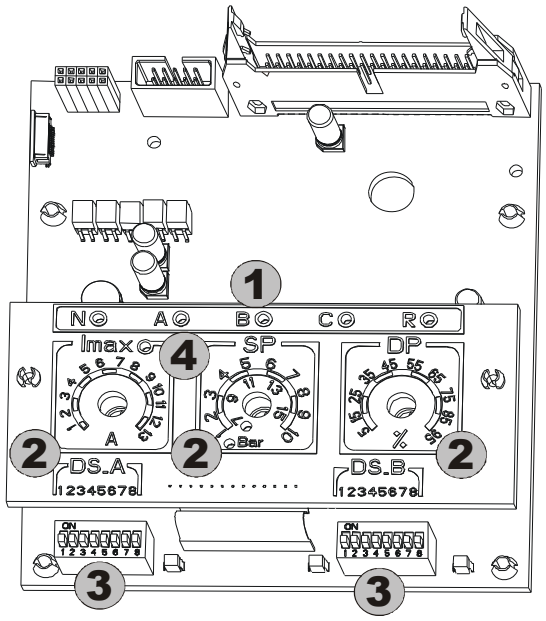
Figure 7: Front label

Section concerning the panel	
	
	White led indicating that the panel is fed
	Red alarm led of the panel with the alarm reset button next to it. The number of blinks of the led indicates the type of error, as shown in the table below.
	List of panel alarms. The number of blinks of the led indicates the type of alarm. On the display there is a complete indication of the problem. For further information, see the chapter PANEL PROTECTIONS AND ALARMS.

Section concerning the pump	
	Green led, if lit it indicates that the pump is running.
	Red alarm led of the pump with the alarm reset button next to it. The number of blinks of the led indicates the type of error, as shown in the table on the label. On the display there is a complete indication of the problem. For further information, see the chapter PANEL PROTECTIONS AND ALARMS.
	Leds indicating the type of pump operation: ON always on, OFF always off, AUTO the pump is controlled by the panel. Button for changing the pump operating mode. If held down for more than 3 seconds, it switches on the pump until the button is released. Simply pressing the button alternates the pump status from OFF to AUTO.
	Pump to which the indications refer.

4 PANEL INTERNAL REGULATING BOARD





Before starting regulation, switch off the mains power.

To access the internal panel, slacken the screws, turn the cover of the electric panel downwards and operate the commands.

Ref.	Function
1	**Warning lights for activating the digital inputs (N-A-B-C-R)**
2	Trimmer for regulating the system (Imax – SP – DP).
3	Dip-switch for selecting functions (DS_A – DS_B).
4	Led indicating current overload set at the motor data plate values. For a correct setting the Led must be off.

4.1 Trimmer for regulating the system (Imax – SP – DP)

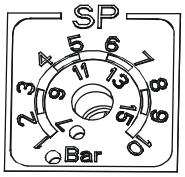
T1 – Trimmer (Imax)

Trimmer for setting the maximum current for the two electropumps P1 and P2 (0.25A –13A).
Set the Trimmer at the motor data plate value (the yellow led must be off).

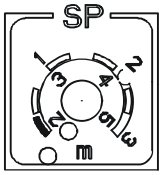
T2 – Trimmer (SP – system Set Point) / Trimmer 3 (DP – Pressure level differential)

Trimmer for setting the pressures or level of the system.

– The trimmer SP (set by DS_B5) presents a double regulating scale in bar: from 1 to 10 bar or from 7 to 15 bar corresponding to the led lit, if a pressure sensor is used in the booster sets. This scale can also be expressed in metres (as an optional version, using the plate provided): **from 1 to 3 metres** or **from 2 to 5 metres** corresponding to the led lit, if an analog level sensor is used in the filling and draining sets.



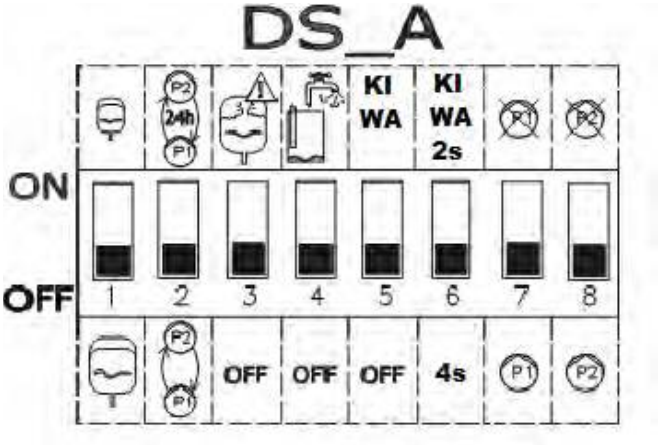
Standard regulation in bars



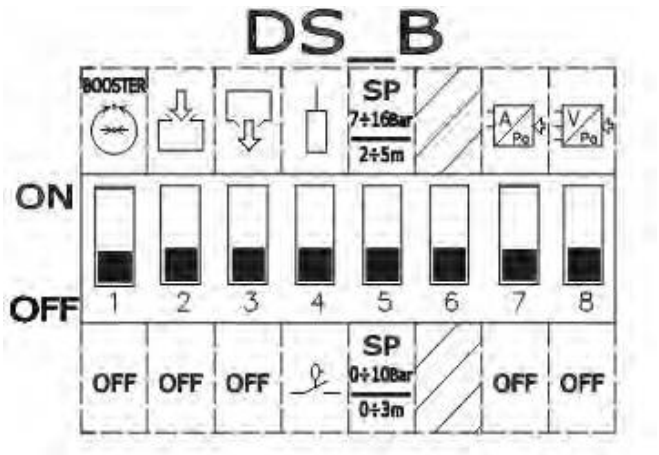
Optional regulation in metres
(plate supplied)

– The DP regulation is expressed as a percentage with respect to the value set in SP.

4.2 Dip-switch for selecting functions (DS_A – DS_B)



1. No.	ON	OFF
1	STANDARD expansion vessels, minimum 19 litres per pump. Effective only in pressure boosting and kiwa	MAXI expansion vessels, over 100 litres per pump. Effective only in pressure boosting and kiwa
2	Automatic exchange between pump P1 and P2 every 24 hours.	Automatic exchange between pump P1 and P2 at each start.
3	Checks too frequent starts and reduces them to 8 per minute per pump.	Allows all the starts requested by the system.
4	Dry operation protection active. Pressure boosting only. Indicates dry operation if the pressure falls below 0.5bar.	Dry operation protection not active.
5	Activates KIWA operating mode if pressure boosting is active.	Does not activate KIWA mode.
6	KIWA mode switch-off delay of 2 seconds.	KIWA mode switch-off delay of 4 seconds.
7 (**)	Pump P1 not available.	Pump P1 available.
8 (**)	Pump P2 not available.	Pump P2 available.



2. No.	ON status	OFF status
1 (*)	Operation as pressure boosting set.	OFF
2 (*)	Operation as filling set.	OFF
3 (*)	Operation as draining set.	OFF
4	Use of electric probes.	Use of floats.
5	Pressure set point scale: 7-16 bar / 2-5 m.	Pressure set point scale: 1-10 bar / 0-3 m.
6	Not used	Not used
7 (**)	Regulation with analog sensor with current output.	OFF
8 (**)	Regulation with analog sensor with voltage output.	OFF

(*) Only one (and at least one) of these Dip Switches can be in ON position.
(**) Only one (or none) of these Dip Switches can be in ON position.

5 PRESSURE BOOSTING FUNCTION

The E.box panel can be used for making a system to increase water pressure. As control inputs, either pressure switches on a pressure sensor can be used. To operate, the panel requires an expansion vessel.

5.1 Expansion vessel

In pressure boosting it is necessary to use an expansion vessel of at least 19 litres per pump.

5.2 Electrical connections of pump and supply

Connect the supply line and the pumps as described in the chapter ELECTRICAL CONNECTIONS.

5.3 Connection of additional protections: high pressure, low pressure and motor thermal protection

It is possible, but not necessary, to use the alarm inputs to the E.box so that the pumps stop in the case of pressure that is too high, too low, or too high motor temperature. In the case of an alarm, the pumps stop, the alarm leds blink, the corresponding alarm outputs are activated. If the display is present, the type of alarm is indicated. When the alarm conditions no longer exist, the E.box resumes normal operation.

- **Alarm, Pressure in system too high:** the pressure switch must be installed in the delivery of the set. The normally closed contact of the pressure switch must be connected to terminal R of the E.box. The pressure switch must be set at the maximum pressure that can be reached by the system. If it is not used, the contact is jumpered.
- **Alarm, Pressure in system too low:** the pressure switch can be installed either on suction or on delivery depending on the type of system. The pressure switch must be connected to terminal N of the E.box, it must be set at the minimum pressure necessary for the system to work correctly. The contact must open if the pressure falls below the minimum value. This contact may be used either to prevent blocks for lack of water or to discover burst pipes. A level probe or float can also be connected to this alarm to check the state of a tank or well. If it is not used, the contact is jumpered.

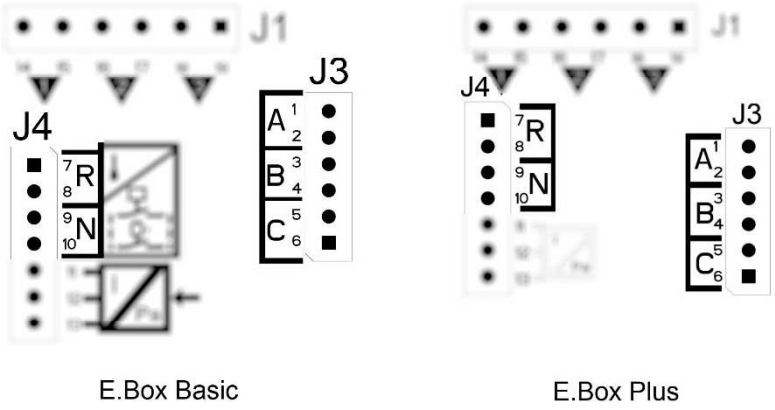


Figure 8: Inputs and outputs

- **Motor thermal protection:** the device has an input for the thermal protection of each motor. If the motor used is provided with thermal protection, this protection can be connected to the terminals KK shown in Figure 9. If there is no protection in the motor, the terminals must be jumpered.

If the alarms are not used, the corresponding inputs must be jumpered. So jumpers must be fitted on the inputs of the contacts N, R, KK1 and KK2. These jumpers are provided with the E-box.

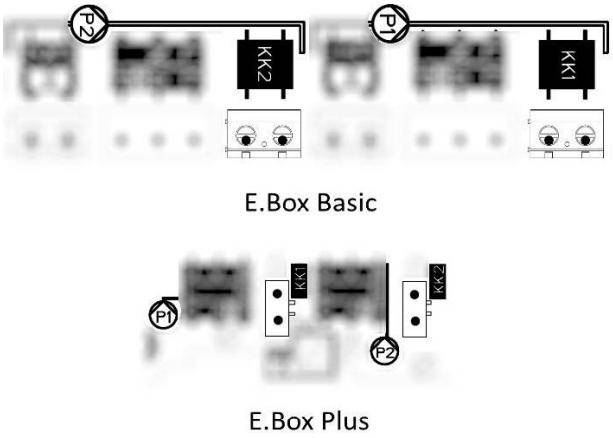


Figure 9: Thermal protection inputs KK

5.4 Connection of the alarm outputs

If alarms occur, this is indicated by the E.box in three ways:

- With the leds on the front panel, which give a number of blinks depending on the error.
- With the outputs Q1, Q2, Q3 which short circuit as specified in Table 17. The operating logic of the alarms is as follows: Q1 closes following malfunctions of pump 1, Q2 of pump 2 and Q3 for general errors.
- With the indications on the display (if present). In this case it is also possible to see the alarm log.

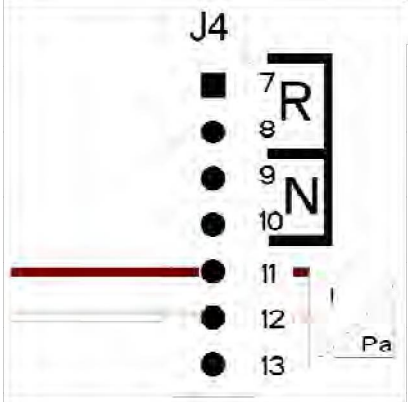
If the panel is not fed, Q1, Q2 and Q3 are closed, so they give an alarm signal.

5.5 Operation with pressure sensor (recommended choice)

It is recommended to use this operating mode, rather than pressure switches, because it allows greater flexibility in managing the system, the pressure distributed by the set can be seen, and installation is easier. In this case it will be possible to set the Set Point pressure and the pressure differential for the restarting and stopping of the pumps.

5.6 Connection of the pressure sensor

The pressure sensor must be connected to the terminal board, see Figure 10 Pressure sensor connection, according to the following diagram:



Pressure sensor connections 4..20mA	
Terminal	**Cable to be connected**
11	- OUT/GND (brown)
12	+VCC (white)

Figure 10: Pressure sensor connection 4..20Ma

5.7 Operation with pressure switches

If you decide to operate the booster set with pressure switches, they must be connected on the delivery of the booster set. The pressure switches to be used are B and C and they are connected as indicated in the next chapter.

Connection of pressure switches

The pressure switches must be connected to the contacts B and C of the terminal board shown in Figure 11.

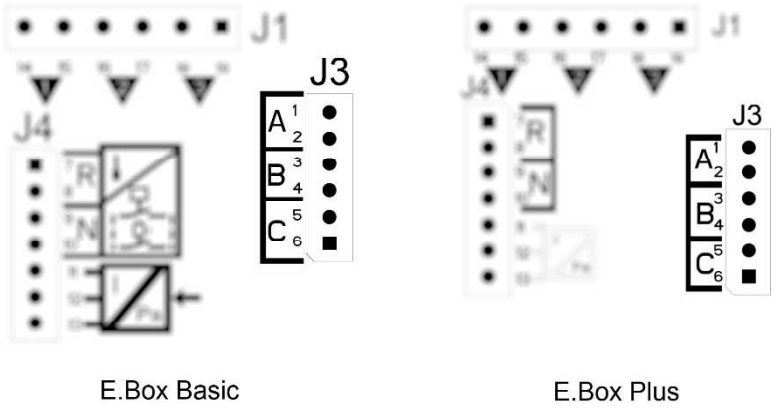


Figure 11: Terminals for connecting the pressure switches

5.8 Setting with the display, wizard

The E.box D can be configured with a simple wizard. The device asks the user for all the parameters necessary for its configuration. If necessary, it can be loaded by pressing the “set” + “+” keys when switching on. To navigate in the wizard, use the following keys:

- “mode” to accept the parameter displayed and move on to the next
- “mode” held down for more than 1 second to return to choose the parameter
- “-“ and “+” to vary the value of the parameter.

5.9 Setting with a pressure sensor



Figure 12: Configuration with a pressure sensor

5.10 Configuration with pressure switches



Figure 13: Configuration with pressure switches

5.11 Setting the E.box with dip switches

If the E.box is provided with a display, it is recommended to use the display for configuration. Otherwise it is possible to use the dip switches inside the panel and set them as shown in Figure 14 Dip switches for pressure boosting.

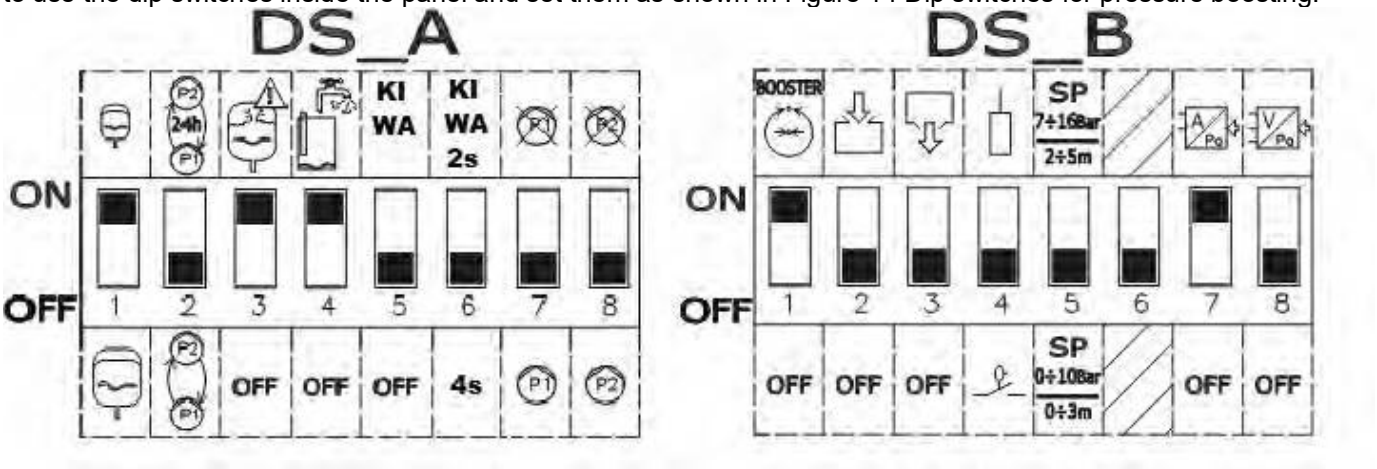


Figure 14: Dip switches for pressure boosting

The following modifications may be made during configuration:

- If the expansion vessel is larger than 100 litres, set **DS_A1** at **OFF.**
- If you want the pumps to be exchanged every 24 hours and not at each restart, set **DS_A2** at **ON.**
- If you do not want protection against too rapid restarts, set **DS_A3** at **OFF.**
- If you do not want protection against lack of water, set **DS_A4** at **OFF.**
- If you do not want to use the pump P1 set **DS_A7** at **ON.**
- If you do not want to use the pump P2 set **DS_A8** at **ON.**
- If you intend to use a set-point between 7 and 16 bar, set **DS_B5** at **ON.**
- If you intend to use pressure switches, set **DS_B7** at **OFF.**

5.12 Activation of the set

To activate the set it is necessary to enable the pumps. During the first configuration, for safety's sake, the pumps are disabled and are OFF. To change to automatic mode, just briefly press the buttons on the pumps P1 and P2. As shown in Figure 15 Enabling P1 and P2.

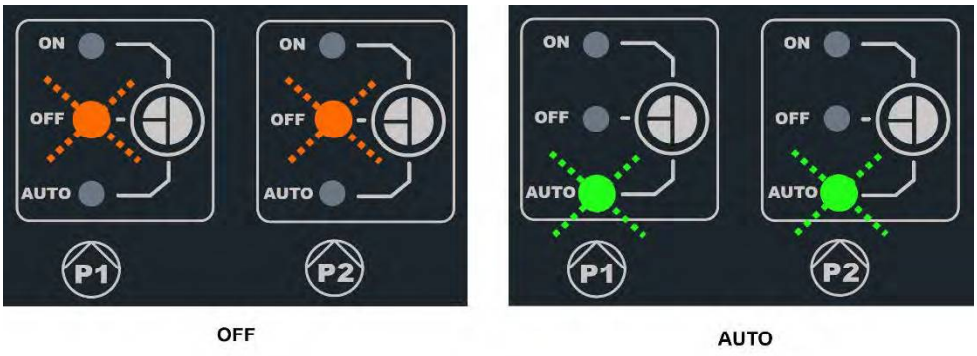


Figure 15: Enabling P1 and P2.

5.13 Regulating the rated current of the pumps (Imax), Set point (SP) and differential restarting pressure (DP)

With a straight tip screwdriver, position the indices in the centre of the graduated scales, shown in Figure 16 Regulating: Imax, SP and DP, so that:

- Imax indicates the rated current of the installed pumps, which you can find on the pump data plate.
- SP indicates the desired set point pressure.
- DP is the pressure variation, in percentage of the set point, necessary to restart the pumps.

Attention, the differential restarting pressure is calculated as SP * DP. If the set point is 4 bar and DP is 50%, the pressure differential RP is 2 bar.

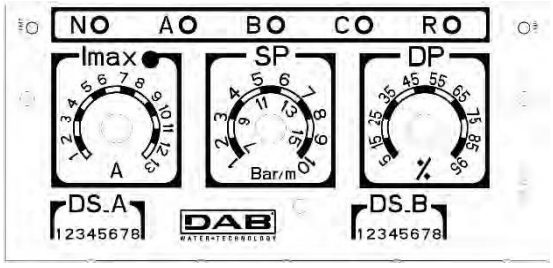


Figure 16: Regulating: Imax, SP and DP

5.14 System operation

Pressure switches:

The operating logic is the following:

Pressure boosting operation with pressure switches		
	Start	**Stop**
P1	Pressure switch B = CLOSED	Pressure switch B = OPEN
P2	Pressure switch C = CLOSED	Pressure switch C = OPEN

Table 2: Pressure boosting operation with pressure switches

- Pressure switch connected to input B starts and stops Pump 1
- Pressure switch connected to input C starts and stops Pump 2

Pressure sensor:

RP is the pressure differential, and indicates the pressure variation around the Set Point for which the pumps are switched on. In systems with a display it is set directly. In systems without a display, DP is set as a percentage of the Set Point. RP = SP*DP. For further information see Figure 17 and Figure 18.
The operating logic is the following:

Pressure boosting operation standard vessel < 100 litres		
Pumps	**Start**	**Stop**
P1	System pressure <= SP	System pressure => SP+RP
P2	System pressure <= SP – RP/2	System pressure => SP+RP

Table 3: Pressure boosting operation standard vessel < 100 litres

Operation with additional expansion vessel > 100 litres		
Pumps	**Start**	**Stop**
P1	System pressure <= SP	System pressure => SP+RP
P2	System pressure <= SP – 2%	System pressure => SP+RP

Table 4: Operation with additional expansion vessel > 100 litres

- The first pump starts when the pressure falls below the Set Point and it stops when it reaches the Set Point pressure + differential restarting pressure.
- The second pump starts when the pressure falls below the Set Point minus half the differential restarting pressure, or 2% of the Set Point if vessels over 100 litres are used. It stops when the pressure in the system reaches the Set Point pressure + differential restarting pressure.



Attention: If DIP SWITCH configuration is used, the differential restarting pressure is calculated as SP * DP. If the set point is 4 bar and DP is 50%, the restarting pressure RP is 2 bar.

The indications pump P1 and P2 are only indicative. If exchange mode is activated, the pumps P1 and P2 are alternated as specified in the exchange mode.

The two pumps will always be started alternately with a minimum interval of 2 seconds from each other.

Example of Regulation with Standard expansion vessel and Regulation with additional expansion vessel:
SP= 4 bar
RP = 2 bar Attention: if DP is set (with the trimmers) RP=SP*DP

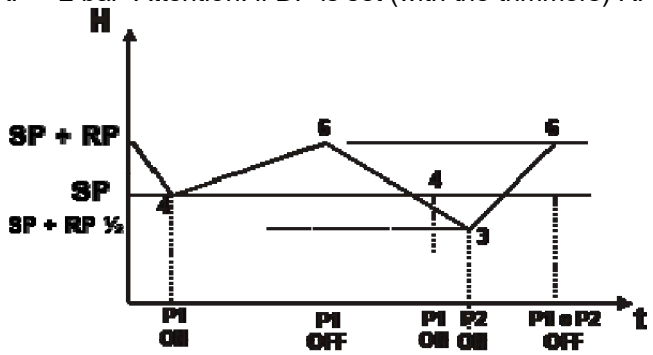


Figura 17: Regulation with expansion vessel < 100 litres

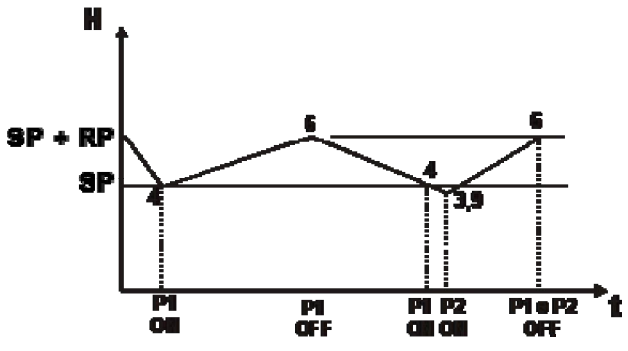


Figura 18: Regulation with expansion vessel > 100 litres

6 FILLING FUNCTION

The E.box panel can be used for making filling systems. As control inputs, any of the following may be used: floats, level probes or a depth sensor.

The general diagram is as follows:

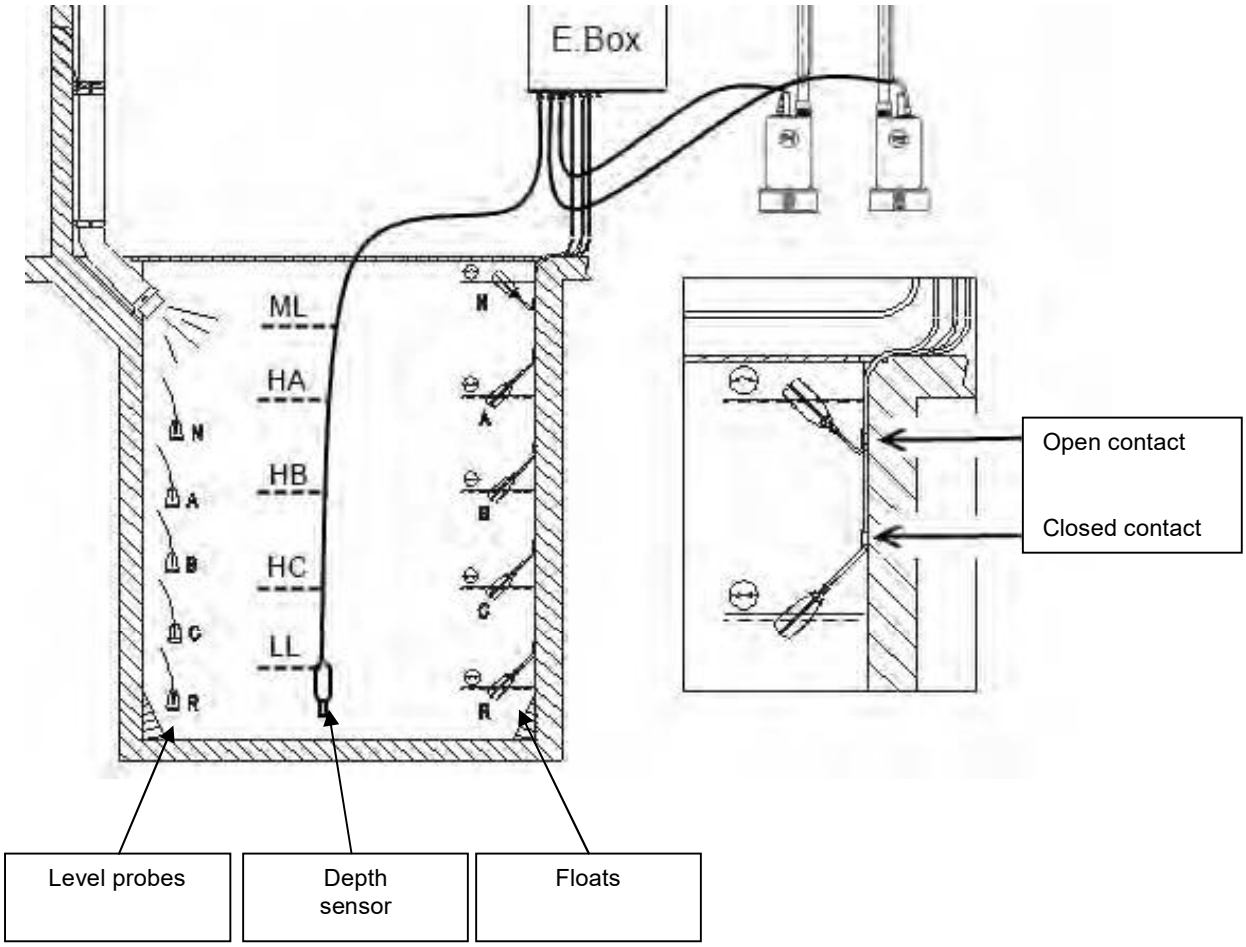


Figure 19: Diagram of filling system inputs

6.1 Electrical connections of pump and supply

Connect the supply line and the pumps as described in chapter 2.1.

6.2 Control inputs

As inputs the E.box accepts either floats, level probes or depth sensors. Particular care must be taken:

- Use floats for filling, closed contact with low water level, see Figure 19 Diagram of filling system inputs.
- Floats and level probes cannot be used at the same time.
- Level probes can only be used with clear, clean water.
- The maximum level and minimum level alarms can be generated by floats or by level probes, or, if the depth sensor is used, by thresholds of the value read by the sensor itself.

6.3 Connection of additional protections: overflow, water lack, motor thermal protection

It is possible, but not necessary, to use the alarm inputs to the E.box so that the pumps stop in the case of reaching the maximum level, or too high motor temperature. In the case of an alarm, the pumps stop, the alarm leds blink, the corresponding alarm outputs are activated.

If the minimum level is reached, the pumps are activated. The alarm leds blink, the corresponding alarm outputs are activated.

If the display is present, in all cases the type of alarm is indicated.
When the alarm conditions no longer exist, the E.box resumes normal operation.

- **Maximum level alarm**: the signal for this alarm may come from a float, from a level probe, or from the depth sensor (only for E.Box with display). The level probe or float must be connected to terminal N of the E.box and positioned in the tank in the highest point that the liquid can safely reach.

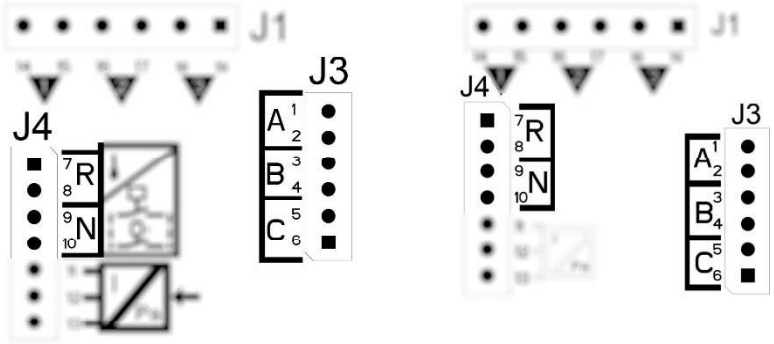
Note: if this alarm is not used, the terminal N must be jumpered except in the case where level probes are used.

If the depth sensor is used to obtain this alarm (only for E.Box with display), the threshold ML must be set at the highest level that the liquid can safely reach.

- **Minimum level alarm:** the signal for this alarm may come from a float, from a level probe, or from the depth sensor (only for E.Box with display). The level probe or float must be connected to terminal N of the E.box and positioned in the tank in the highest point that the liquid can safely reach. If the depth sensor is used to obtain this alarm, the threshold LL must be set at the lowest level that the liquid can safely reach.

Note: if this alarm is active, the pumps start automatically.

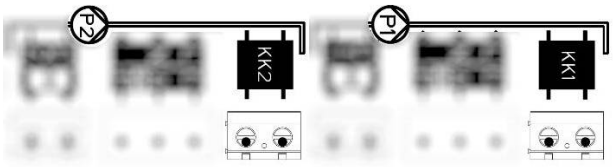
Note: if this alarm is not used, and the protection devices are level probes, the input R must be jumpered. Not in other cases.



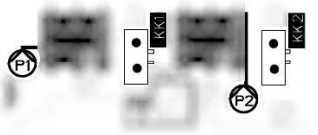
E.Box Basic E.Box Plus

Figure 20: Inputs and protections

- **Motor thermal protection**: the device has an input for the thermal protection of each motor. If the motor used is provided with thermal protection, this protection can be connected to the terminals KK. If the protection is not present in the motor, the terminals must be jumpered. The terminals can be seen in Figure 21.



E.Box Basic



E.Box Plus

Figure 21: Thermal protection inputs KK

6.4 Connection of the alarm outputs

If alarms occur, this is indicated by the E.box in three ways:

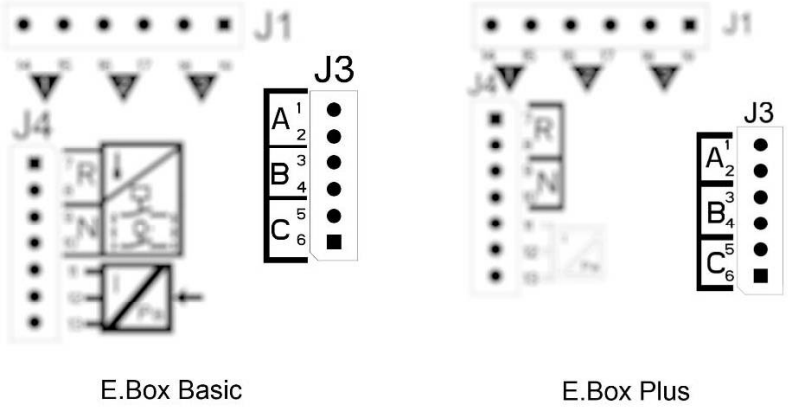
- With the leds on the front panel, which give a number of blinks depending on the error.
- With the outputs Q1, Q2, Q3 which short circuit as specified in Table 17. The operating logic of the alarms is as follows: Q1 closes following malfunctions of pump 1, Q2 of pump 2 and Q3 for general errors.
- With the indications on the display (if present). In this case it is also possible to see the alarm log.

If the panel is not fed, Q1, Q2 and Q3 are closed, so they give an alarm signal.

6.5 Connection of floats or level probes

2 or 3 control inputs can be used which must be connected as follows:

- **System with 2 floats:** in this case inputs B and C are used (A must not be used). The floats in the tank must be positioned as in Figure 19. For electrical installation, see Figure 22.
- **System with 2 level probes:** in this case inputs B and C are used (A must not be jumpered). The level probes in the tank must be positioned as in Figure 19. For electrical installation, see Figure 22.
- **System with 3 floats or level probes:** in this case inputs A, B and C are used. The floats or level probes must be positioned as in Figure 19. For electrical installation, see Figure 22.



E.Box Basic E.Box Plus

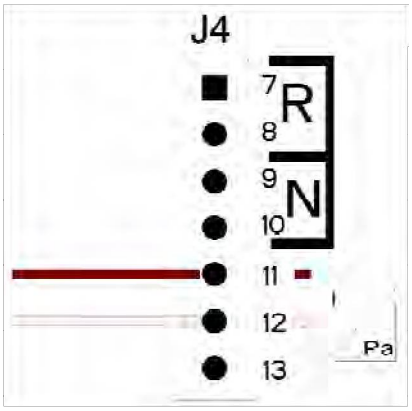
Figure 22: Inputs

Common contact of the inputs A, B, C, R, N. There is only one common contact for all the inputs and it is connected to the even terminals from 2 to 10. So, if electric probes are used, the common contact for the inputs: A, B, C, R, N must be connected to the terminals with even numbers: 2, 4, 6, 8, 10.

Level probes: they can be used only with clear, clean water.

6.6 Depth sensor connection

The E.Box may use a depth sensor as a control device. If an E.box with a display is used, the maximum or minimum level alarms can be generated with the information from the depth sensor. So it is not necessary to connect floats or level probes to the inputs R or N. If maximum reliability is desired, as well as the depth sensor 2 floats or level probes can also be used, for the alarms R and N.



Depth sensor connections 4 – 20mA	
Terminal	**Cable to be connected**
11	- OUT/GND
12	+VCC

Figure 23: Depth sensor connection

The depth sensor must be positioned near the bottom of the tank, ensuring that it is above any solid residue, present or future.

6.7 Setting with the display, wizard

The E.Box D can be configured with a simple wizard. The device asks the user for all the parameters necessary for its configuration. If necessary, it can be loaded by pressing the “set” + “+” keys when switching on. To navigate in the wizard, use the following keys:

- “mode” to accept the parameter displayed and move on to the next,
- “mode” held down for more than 1 second to return to choose the parameter,
- “-“ e “+” to vary the value of the parameter.

6.8 Configuration of floats or level probes



Figure 24: Configuration of Filling with floats or level probes

After configuration, the system status will be one of those shown depending on whether level probes or floats are used.



Figure 25: System status in filling mode, with floats or level probes as control inputs

6.9 Configuration with a depth sensor



Figure 26: A System status with depth sensor only, B depth sensor and floats, C depth sensor and level probes

6.10 Setting the E.box with dip switches

If the E.box is provided with a display, it is recommended to use the display for configuration. Otherwise it is possible to use the dip switches inside the panel and set them as shown in Figure 27.

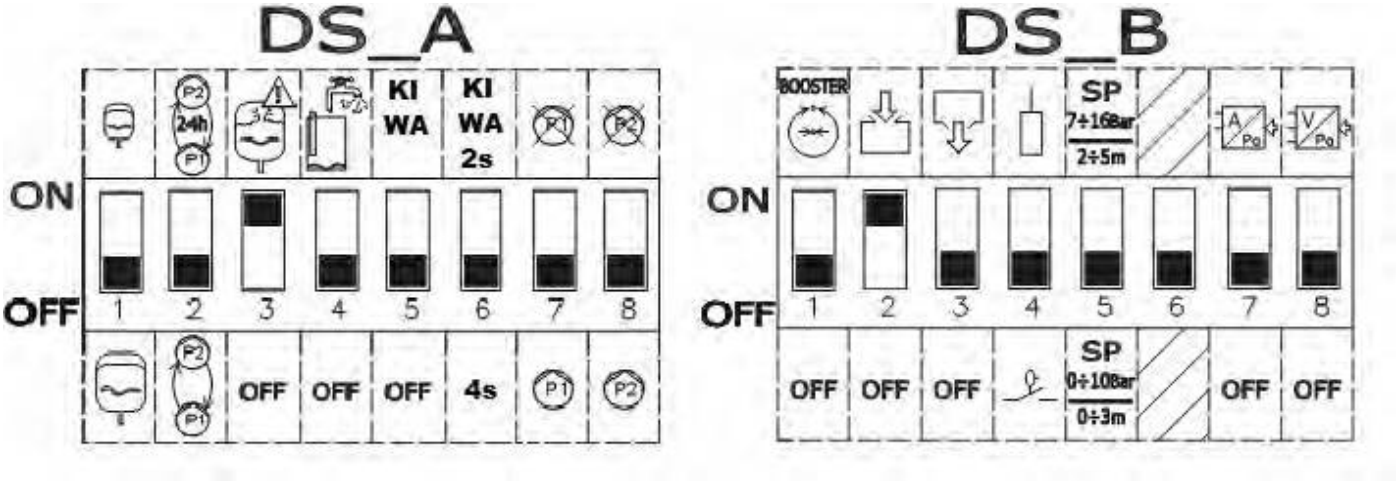


Figure 27: Setting the filling dip switches

The following modifications may be made during configuration:

- If you want the pumps to be exchanged every 24 hours and not at each restart, set **DS_A2** at **ON**.
- If you do not want protection against too rapid restarts, set **DS_A3** at **OFF**.
- If you do not want to use the pump P1 set **DS_A7** at **ON**.
- If you do not want to use the pump P2 set **DS_A8** at **ON.**
- If level probes are used and not floats, set **DS_B4** at **OFF**
- If a depth sensor is used, set **DS_B7** at **ON** and position **DS_B5** according to the desired scale.

6.11 Activation of the set

To activate the set it is necessary to enable the pumps. During the first configuration, for safety's sake, the pumps are disabled and are OFF. To change to automatic mode, just briefly press the buttons on the pumps P1 and P2. As shown in Figure 28.

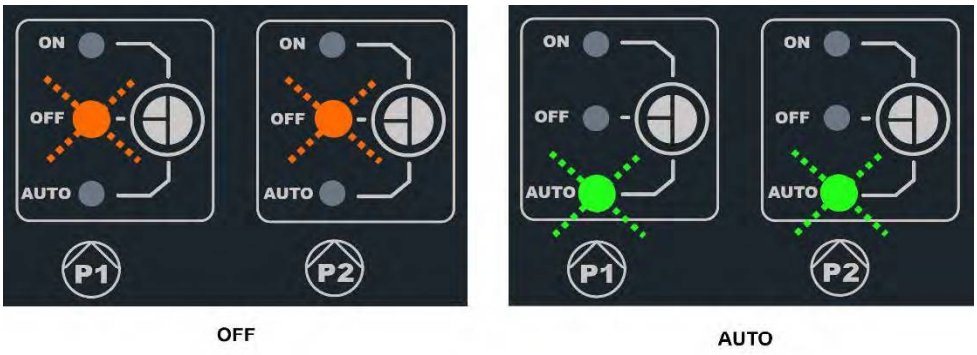


Figure 28: Enabling P1 and P2.

6.12 Regulating the rated current of the pumps (Imax) and the pump starting and stopping levels (only with depth sensor connected)

With a straight tip screwdriver, position the indices in the centre of the graduated scales, shown, so that:

- Imax indicates the rated current of the installed pumps, which you can find on the pump data plate.
- SP represents the maximum level in the tank (LMAX) that you want the water to reach during normal operation.
- DP represents the minimum level in the tank (LMIN) that you want the water to reach during normal operation. DP is expressed as a percentage of SP.

Attention, SP and DP have significance only if a depth sensor is used. For their meaning, refer to Figure 30. The scale changing label 0-3m/2-5m must be applied on SP.

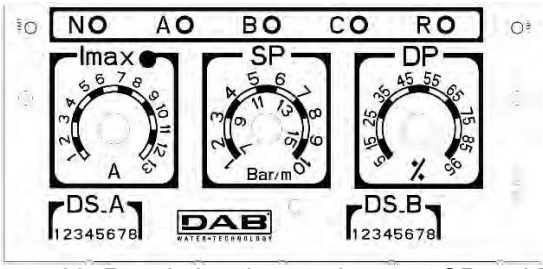


Figure 29: Regulating the rated current SP and DP

6.13 System operation:

Operation with 2 floats or level probes

The operating logic is the following:

- Float or level probe connected to input B starts pump P1 and stops both pumps.
- Float or level probe connected to input C starts pump 2.

Filling operation with 2 floats		
	Start	**Stop**
Pump P1	Float or level probe on B	Float or level probe on B
Pump P2	Float or level probe on C	Float or level probe on B

Table 5: Filling operation with 2 floats

Operation with 3 floats or level probes

The operating logic is the following:



- Float or level probe connected to input B starts pump P1.
- Float or level probe connected to input C starts pump P2.
- Both pumps are stopped on the float or level probe connected to A.

Filling operation with 3 floats		
	Start	**Stop**
Pump P1	Float or level probe on B	Float or level probe on A
Pump P2	Float or level probe on C	Float or level probe on A

Table 6: Filling operation with 3 floats



Note: the function with 3 floats is used in installations with deep narrow tanks that do not allow an ample travel of the floats!

Operation with depth sensor and display

If a depth sensor is being used, with an E.box with display, it will be possible to set independently the starting level of pump P1, of pump P2, and the stopping level of both. In particular:

- HA is the stopping level of the pumps P1 and P2.
- HB is the starting level of pump P1.
- HC is the starting level of pump P2.

It will also be possible to set the alarm level for maximum or minimum tank level.

Operation with depth sensor without display

In operation with a depth sensor, the parameters must be set with the Trimmers SP and DP:

- SP represents the maximum level in the tank (L_{MAX}) that you want the water to reach during normal operation.
- DP represents the minimum level in the tank (L_{MIN}) that you want the water to reach during normal operation. DP is expressed as a percentage of SP.

If the level in the tank is the same as or lower than DP, the pump P1 is started and, if the level continues to fall, pump P2 is also started after a delay of 4 seconds.
When level SP is reached, both pumps stop.

The following table sums up the behaviour described:

Operation with depth sensor, without display		
	STARTING	**STOPPING**
P1	Tank level <= DP	Tank level = SP
P2	Pump P1 = started for at least 4 seconds and tank <= DP	Tank level = SP

Table 7: Operation with depth sensor, without display

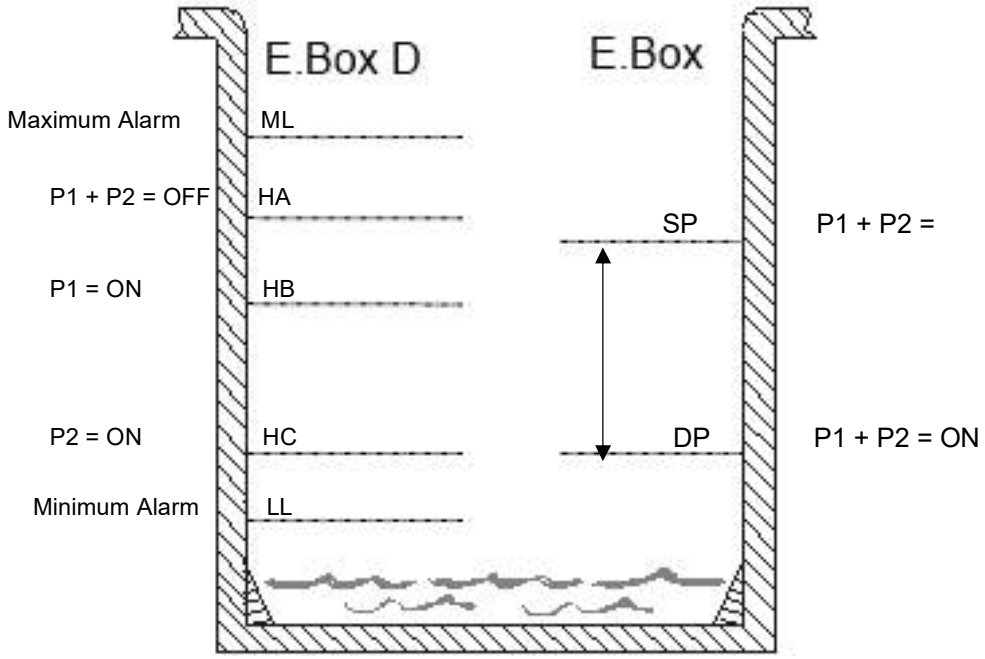


Figure 30: Filling with a depth sensor

E.box with display **E.box without display**

7 DRAINING FUNCTION

The E.box panel can be used as a control and protection panel for draining systems. As control inputs, any of the following may be used: floats, level probes or a depth sensor.

The general diagram is as follows:

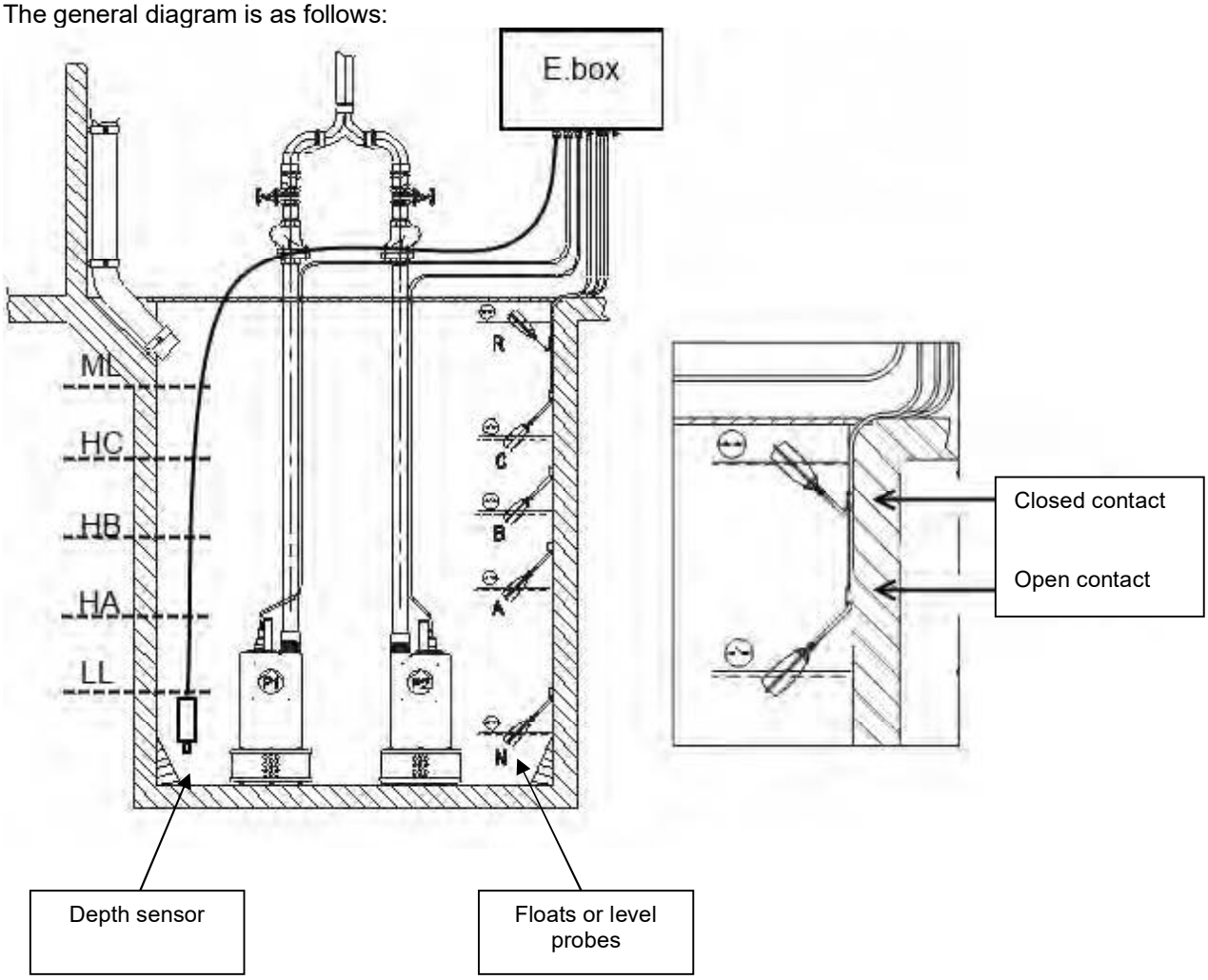


Figure 31: Draining system diagram

7.1 Electrical connections of pump and supply

Connect the supply line and the pumps as described in chapter 2.1.

7.2 Control inputs

As inputs the E.box accepts either floats, level probes or depth sensors. Particular care must be taken:

- Use floats for draining, closed contact with low water level, see Figure 31 draining.
- Floats and level probes cannot be used at the same time.
- Level probes can only be used with clear, clean water.
- If the depth sensor is being used, the maximum level and minimum level alarms can be generated by floats or by level probes, or by thresholds of the value read by the sensor itself.

7.3 Connection of additional protections: overflow, water lack, motor thermal protection

It is possible, but not necessary, to use the alarm inputs to the E.box so that the pumps stop in the case of reaching too low a level, or too high motor temperature. In the case of an alarm, the pumps stop, the alarm leds blink, the corresponding alarm outputs are activated.



If too high a level is reached, the pumps are activated. The alarm leds blink, the corresponding alarm outputs are activated.

If the display is present, in all cases the type of alarm is indicated.
When the alarm conditions no longer exist, the E.box resumes normal operation.

- **Maximum level alarm**: the signal for this alarm may come from a float, from a level probe, or from the depth sensor (only for E.Box with display). The level probe or float must be connected to terminal R of the E.box and positioned in the tank in the highest point that the liquid can safely reach.

Note: if this alarm is not used, the contacts of the terminal R are left open.

If the depth sensor is used to obtain this alarm, the parameter ML must be set at the highest level that the liquid can safely reach.

Note: if this alarm is active, the pumps start automatically.

- **Minimum level alarm:** the signal for this alarm may come from a float, from a level probe, or from the depth sensor (only for E.Box with display). The level probe or float must be connected to contact N of the E.box and positioned in the tank in the lowest point that the liquid can safely reach.

Note: in case of an alarm, the pumps stop.
If the depth sensor is used to obtain this alarm (only for E.Box with display), the parameter LL must be set at the lowest level that the liquid can safely reach.

Note: if this alarm is not used, input N must be jumpered. To identify input N, refer to Figure 32.

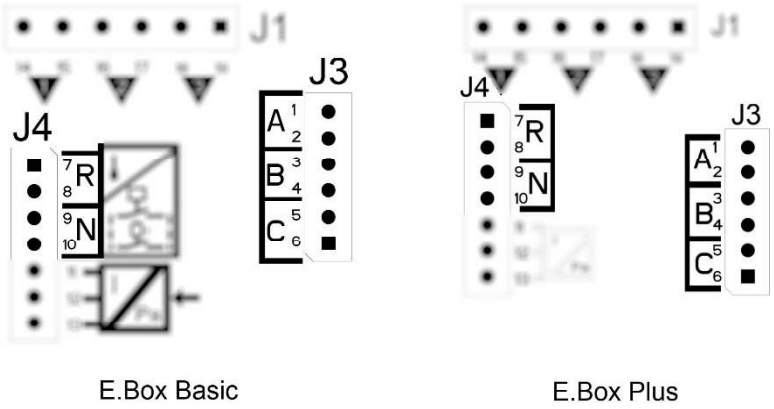


Figure 32: Position of inputs and alarms

Motor thermal protection: the E.box has an input for the thermal protection of each motor. If the motor used is provided with thermal protection, this protection can be connected to the terminals KK. If the protection is not present in the motor, the terminals must be jumpered. For the position of the terminals, see Figure 33.

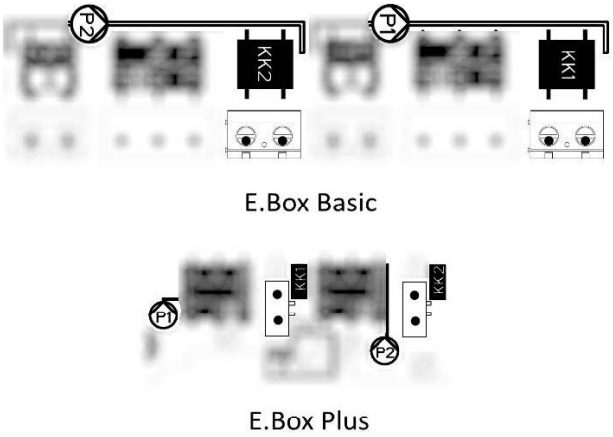


Figure 33: Thermal protection inputs KK

7.4 Connection of the alarm outputs

If alarms occur, this is indicated by the E.box in three ways:

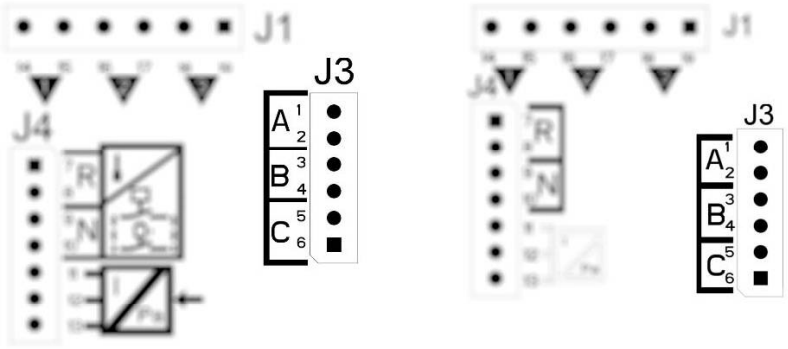
- With the leds on the front panel, which give a number of blinks depending on the error.
- With the outputs Q1, Q2, Q3 which short circuit as specified in Table 17. The operating logic of the alarms is as follows: Q1 closes following malfunctions of pump 1, Q2 of pump 2 and Q3 for general errors.
- With the indications on the display (if present). In this case it is also possible to see the alarm log.

If the panel is not fed, Q1, Q2 and Q3 are closed, so they give an alarm signal.

7.5 Connection of floats or level probes

2 or 3 control inputs can be used which must be connected as follows:

- **System with 2 floats or level probes:** in this case inputs B and C are used. Terminal A must be left free. The floats in the tank must be connected as in Figure 31. For electrical installation, see Figure 34 Inputs.
- **System with 3 floats or level probes:** in this case inputs A, B and C are used. The floats in the tank must be connected as in Figure 31: drainage system diagram. For electrical installation, see Figure 34 Inputs.



E.Box Basic E.Box Plus

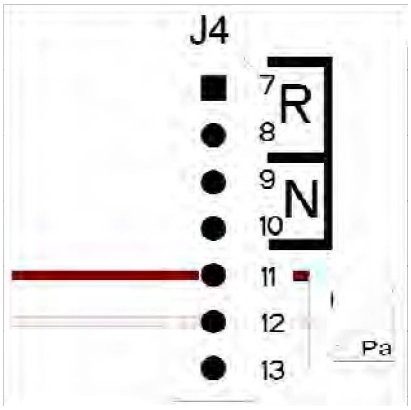
Figure 34: Inputs

Common contact of the inputs. There is only one common contact for all the inputs and it is connected to the even terminals from 2 to 10. So, if level probes or electric probes are used, the common contact for the inputs A, B, C, R, N must be connected to the terminals with even numbers: 2, 4, 6, 8, 10.

Level probes: use them only with clear, clean water.

7.6 Depth sensor connection

The E.Box may use a depth sensor as a control device. If an E.box with a display is used, the too high or too low level alarms can be read by the depth sensor. So it is not necessary to connect floats or level probes to the inputs R or N. If maximum reliability is desired, as well as the depth sensor 2 floats or level probes can also be used, for the alarms R and N.



Depth sensor connections 4 – 20mA	
Terminal	**Cable to be connected**
11	- OUT/GND
12	+VCC

Figure 35: Depth sensor connection

The depth sensor must be positioned near the bottom of the tank, ensuring that it is above any solid residue or impurities, present or future.

7.7 Setting with the display, wizard

The E.Box D can be configured with a simple wizard. The device asks the user for all the parameters necessary for its configuration. If necessary, it can be loaded by pressing the “set” + “+” keys when switching on. To navigate in the wizard, use the following keys:

- “mode” to accept the parameter displayed and move on to the next,
- “mode” held down for more than 1 second to return to choose the parameter,
- “-“ e “+” to vary the value of the parameter.

7.8 Configuration of floats or level probes



Figure 36: Configuration of Drainage floats or level probes

After configuration, the system status will be one of those shown in Figure 37, depending on whether level probes or floats are used.



Figure 37: System status in drainage mode, A with level probes. B with floats

7.9 Configuration with a depth sensor



Figure 38: Configuration with only a depth sensor

In point 7 it is possible to choose the type of signal that will generate the maximum and minimum level alarms. Floats, level probes or the data provided by the depth sensor may be used. If the depth sensor is used, the maximum ML and the minimum LL level alarm thresholds must be set in accordance with Figure 43. The installation sequence with only the depth sensor is shown.

System status and starting



Figure 39: System status in configurations: A with only depth sensor, B: depth sensor and floats, C depth sensor and level probes

7.10 Setting the E.box with dip switches

If the E.box is provided with a display, it is recommended to use the display for configuration. Otherwise it is possible to use the dip switches inside the panel and set them as shown in Figure 40 Setting dip switches for drainage.

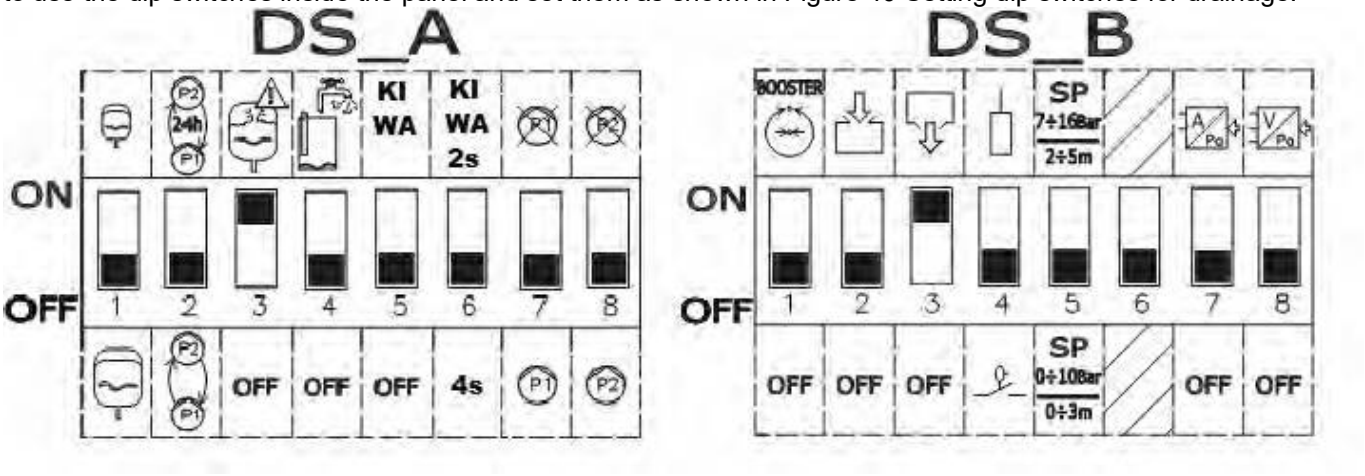


Figure 40: Setting the Drainage dip switches

7.11 Activation of the set

To activate the set it is necessary to enable the pumps. During the first configuration, for safety's sake, the pumps are disabled and are OFF. To change to automatic mode, just briefly press the buttons on the pumps P1 and P2. As shown in Figure 41.

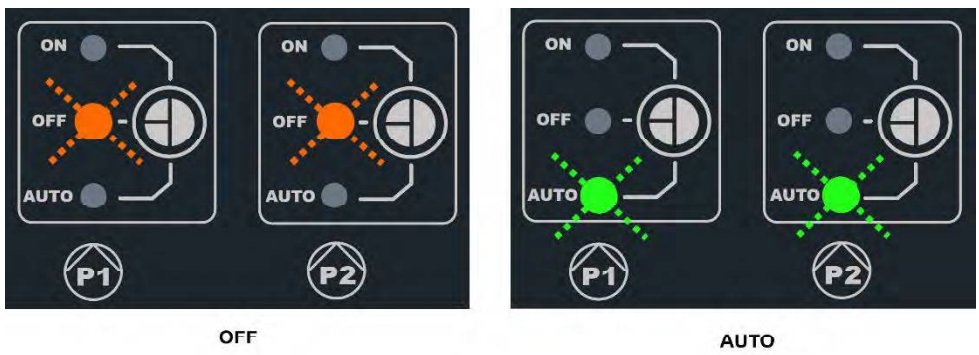


Figure 41: Enabling P1 and P2.

The following modifications may be made during configuration:

- If you want the pumps to be exchanged every 24 hours and not at each restart, set **DS_A2** at **ON.**
- If you do not want protection against too rapid restarts, set **DS_A3** at **OFF.**
- If you do not want to use the pump P1 set **DS_A7** at **ON.**
- If you do not want to use the pump P2 set **DS_A8** at **ON**.
- If level probes are used and not floats, set **DS_B4** at **OFF**
- If a depth sensor is used, set **DS_B7** at **ON** and position **DS_B5** according to the desired scale.

7.12 Regulating the rated current of the pumps (Imax) and the pump starting and stopping levels (only with depth sensor connected)

With a straight tip screwdriver, position the indices in the centre of the graduated scales, as shown, so that:

- Imax indicates the rated current of the installed pumps, which you can find on the pump data plate.
- SP represents the maximum level in the tank (LMAX) that you want the water to reach during normal operation.
- DP represents the minimum level in the tank (LMIN) that you want the water to reach during normal operation. DP is expressed as a percentage of SP.

Attention, SP and DP have significance only if a depth sensor is used. For their meaning, refer to Figure 43. The scale adapting label must be applied on SP.

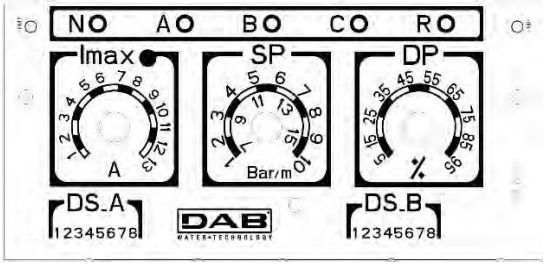


Figure 42: Regulating the rated current SP and DP

7.13 System operation:

Operation with 2 floats or level probes

The operating logic is the following:

- Float or level probe connected to input B starts P1 and stops both pumps.
- Float or level probe connected to input C starts pump P2.

Filling operation with 2 floats		
	Start	**Stop**
Pump P1	Float or level probe on B = CLOSED	Float or level probe B = OPEN
Pump P2	Float or level probe C = CLOSED	Float or level probe B = OPEN

Table 8: Filling operation with 2 floats

Operation with 3 floats or level probes

The operating logic is the following:

- Float or level probe connected to input B starts pump P1.
- Float or level probe connected to input C starts pump P2.
- Both pumps are stopped on the float or level probe connected to A.

Filling operation with 3 floats		
	Start	**Stop**
Pump P1	Float or level probe on B = CLOSED	Float or level probe on A = OPEN
Pump P2	Float or level probe C = CLOSED	Float or level probe on A = OPEN

Table 9: Filling operation with 3 floats

Note: the function with 3 floats is used in installations with deep narrow tanks that do not allow an ample travel of the floats!

Note: in the E.box version with display, the correct number of floats or level probes used is displayed automatically.

Operation with depth sensor and display

If a depth sensor is being used, with an E.box with display, it will be possible to set independently the starting level of pump P1, of pump P2, and the stopping level of both. In particular:

- HA is the stopping level of the pumps P1 and P2
- HB is the starting level of pump P1
- HC is the starting level of pump P2

It will also be possible to set the alarm levels for maximum and minimum level.

Operation with depth sensor without display

In operation with a depth sensor, the parameters must be set with the Trimmers SP and DP, see Figure 42.

- SP represents the maximum level in the tank (L_{MAX}) that you want the water to reach during normal operation.
- DP represents the minimum level in the tank (L_{MIN}) that you want the water to reach during normal operation. DP is expressed as a percentage of SP.

If the level in the tank is the same as or higher than SP, the pump P1 is started and, if the level continues to rise, pump P2 is also started after a delay of 4 seconds.
When level DP is reached, both pumps stop.
The following table sums up the behaviour described:

Drainage with depth sensor, without display		
	STARTING	**STOPPING**
P1	Tank level >=> SP	Tank level = DP
P2	Pump P1 = started for at least 4 seconds and tank => SP	Tank level = DP

Table 10: Drainage with depth sensor, without display

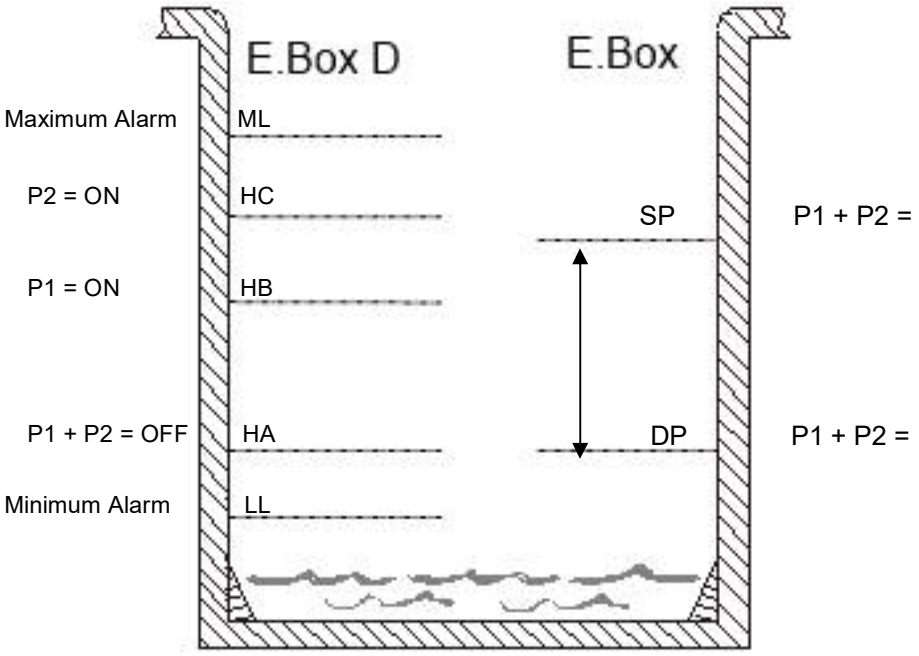


Figure 43: Drainage with a depth sensor

E.box with display **E.box without display**

8 KIWA PRESSURE BOOSTING FUNCTION

The E.box panel can be used for making a system to increase water pressure that respects the KIWA standard. This mode is available only if the language chosen is French, Dutch or English. As control inputs, either pressure switches on a pressure sensor can be used. A pressure switch for low pressure must be used to put at the intake of the set.

8.1 Expansion vessel

In KIWA pressure boosting it is necessary to use an expansion vessel of at least 19 litres per pump.

8.2 Electrical connections of pump and supply

Connect the supply line and the pumps as described in chapter 2.1.

8.3 Connection of additional protections: high pressure and motor thermal protection

It is possible, but not necessary, to use the alarm inputs to the E.box so that the pumps stop in the case of pressure that is too high or too high motor temperature. In the case of an alarm, the pumps stop, the alarm leds blink, the corresponding alarm outputs are activated. If the display is present, the type of alarm is indicated. When the alarm conditions no longer exist, the E.box resumes normal operation.

- **Alarm, Pressure in system too high:** the pressure switch must be installed in the delivery of the set. The normally closed contact of the pressure switch must be connected to terminal R of the E.box. The pressure switch must be set at the maximum pressure that can be reached by the system in safe conditions. If it is not used, the contact is jumpered.

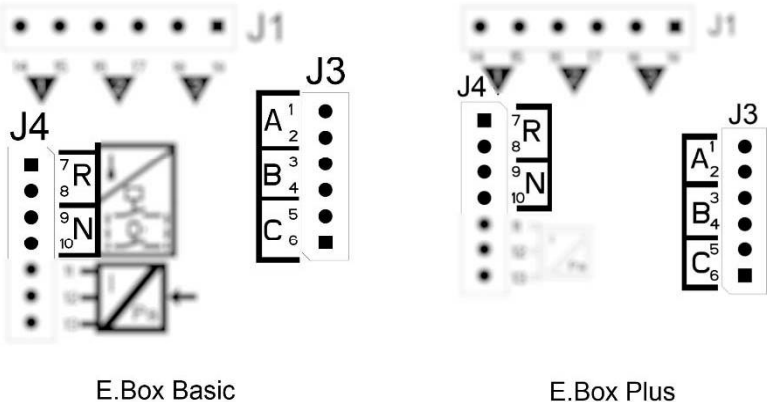


Figure 44: Inputs

- **Motor thermal protection:** the device has an input for the thermal protection of each motor. If the motor used is provided with thermal protection, this protection can be connected to the terminals KK. If the protection is not present in the motor, the terminals must be jumpered. The terminals are shown in Figure 45.



If the alarms are not used, they must be jumpered. So jumpers must be fitted on the inputs of the contacts R, KK1 and KK2.

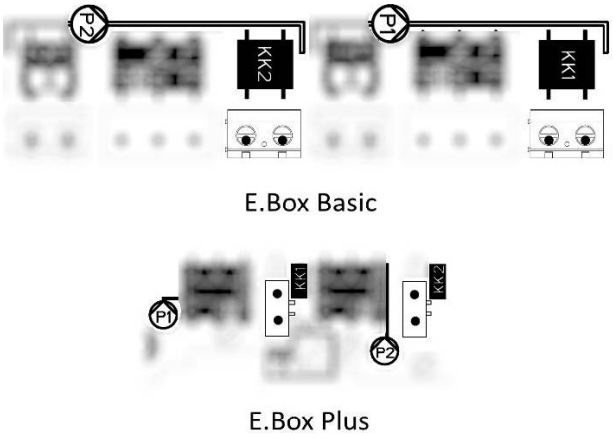


Figure 45: Thermal protection inputs KK

8.4 Connection of the alarm outputs

If alarms occur, this is indicated by the E.box in three ways:

- With the leds on the front panel, which give a number of blinks depending on the error.
- With the outputs Q1, Q2, Q3 which short circuit as specified in Table 17. The operating logic of the alarms is as follows: Q1 closes following malfunctions of pump 1, Q2 of pump 2 and Q3 for general errors.
- With the indications on the display (if present). In this case it is also possible to see the alarm log.

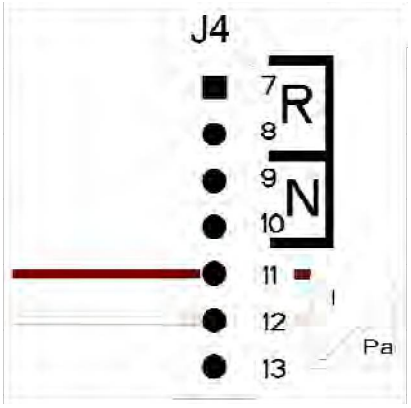
If the panel is not fed, Q1, Q2 and Q3 are closed, so they give an alarm signal.

8.5 Operation with pressure sensor (recommended choice)

It is recommended to use this operating mode, rather than pressure switches, because it allows greater flexibility in managing the system, the pressure distributed by the set can be seen, and installation is easier. In this case it will be possible to set the Set Point pressure and the pressure differential for the restarting and stopping of the pumps.

8.6 Connection of the pressure sensor

The pressure sensor must be connected to the terminal board, see Figure 46, according to the following diagram:



Pressure sensor connections 4 – 20mA	
Terminal	**Cable to be connected**
11	- OUT/GND (brown)
12	+VCC (white)

Figure 46: Connection of the pressure sensor

8.7 Operation with pressure switches

If you decide to operate the booster set with pressure switches, they must be connected on the delivery of the booster set. The pressure switches to be used are B and C and they are connected as indicated in the next paragraph.

8.8 Connection of pressure switches

The pressure switches must be connected to the contacts B and C of the terminal board shown in Figure 47.

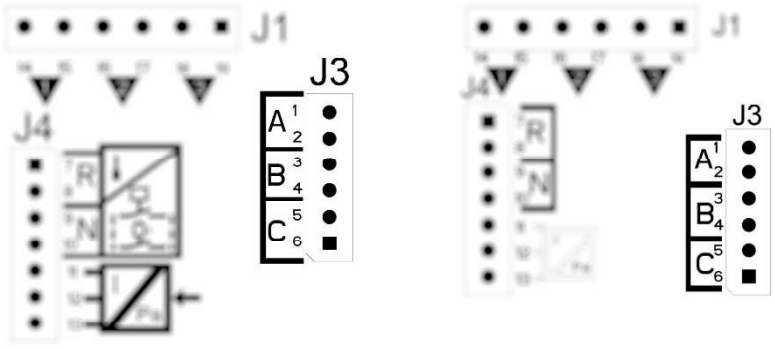


Figure 47: Pressure switch terminal board

8.9 Connecting the low-pressure pressure switch

To comply with the KIWA standard it is necessary to connect a low-pressure pressure switch on the pump intake, set at such a pressure that it intervenes in the event of water lack.
The pressure switch must be connected to contact N of the E.Box and the contact must open if the pressure falls below the minimum value. If the KIWA low pressure alarm trips, the set stops and it can be reset only manually, as required by the KIWA standard.

8.10 Setting with the display, wizard

The E.box D can be configured with a simple wizard. The device asks the user for all the parameters necessary for its configuration. If necessary, it can be loaded by pressing the “set” + “+” keys when switching on. To navigate in the wizard, use the following keys:

- “mode” to accept the parameter displayed and move on to the next,
- “mode” held down for more than 1 second to return to choose the parameter,
- “-“ e “+” to vary the value of the parameter.

8.11 Setting with a pressure sensor:



Figure 48: KIWA pressure boosting with pressure sensor

8.12 Configuration with pressure switches:



Figure 49: Kiwa configuration with pressure switches

8.13 System status in Kiwa mode

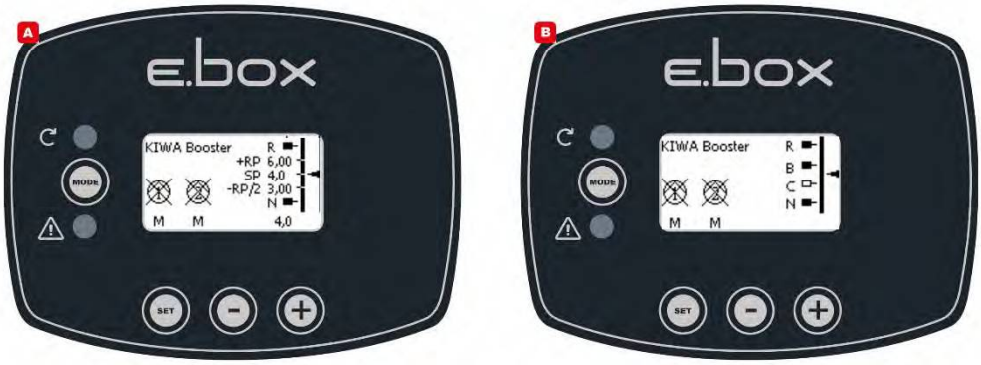


Figure 50: System status in KIWA mode

8.14 Setting the E.box with dip switches

If the E.box is provided with a display, it is recommended to use the display for configuration. Otherwise it is possible to use the dip switches inside the panel and set them as shown in Figure 51.

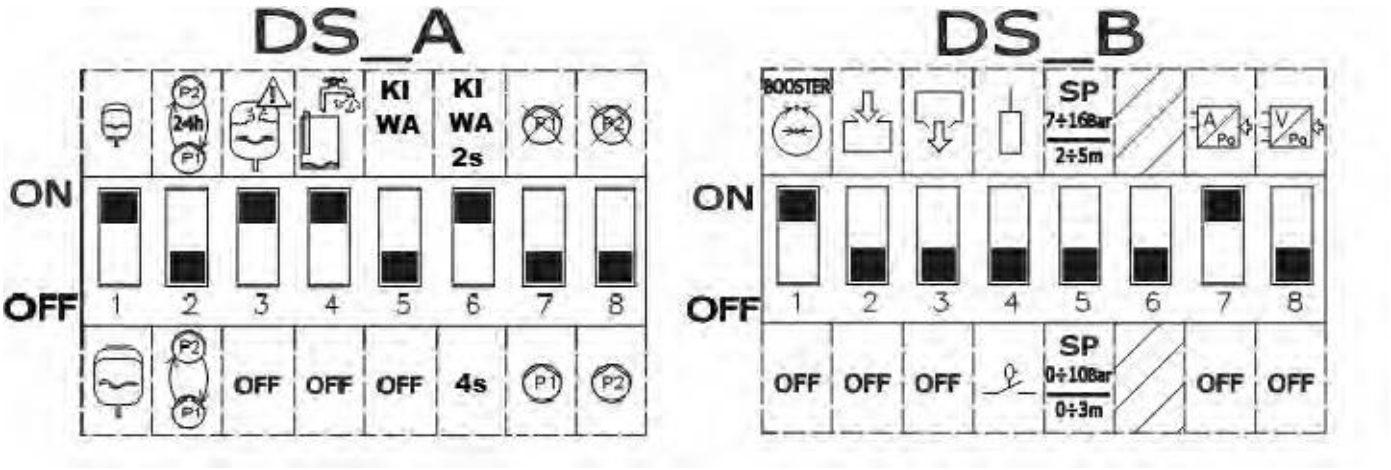


Figure 51: Dip switches for KIWA pressure boosting

8.15 Activation of the set

To activate the set it is necessary to enable the pumps. During the first configuration, for safety's sake, the pumps are disabled and are OFF. To change to automatic mode, just briefly press the buttons on the pumps P1 and P2. As shown in Figure 52.

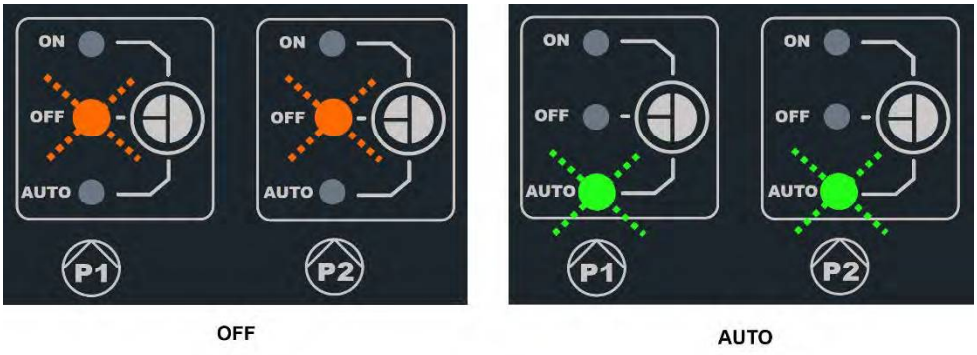


Figure 52: enabling P1 and P2

The following modifications may be made during configuration:

- If the expansion vessel is larger than 100 litres, set **DS_A1** at **OFF.**
- If you want the pumps to be exchanged every 24 hours and not at each restart, set **DS_A2** at **ON**.
- If you do not want protection against too rapid restarts, set DS_A3 at OFF.
- If you do not want protection against lack of water, set DS_A4 at OFF.
- If you want to bring the delay in switching off the pumps from 2 to 4 seconds, set DS A6 at OFF.
- If you do not want to use the pump P1 set DS_A7 at ON.
- If you do not want to use the pump P2 set DS_A8 at ON.
- If you intend to use a set-point between 7 and 16 bar, set DS_B5 at ON.
- If you intend to use pressure switches, set **DS_B7** at **OFF.**

8.16 Regulating the rated current of the pumps (Imax), Set point (SP) and differential restarting pressure (DP)

With a straight tip screwdriver, position the indices in the centre of the graduated scales, as shown in Figure 53, so that:

- Imax indicates the rated current of the installed pumps, which you can find on the pump data plate.
- SP indicates the desired set point pressure.
- DP is the pressure variation, in percentage of the set point, necessary to restart the pumps.

Attention, the differential restarting pressure is calculated as SP * DP. If the set point is 4 bar and DP is 50%, the pressure differential RP is 2 bar.

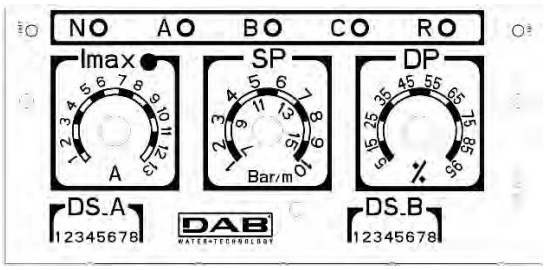


Figure 53: Regulating the rated current SP and DP

8.17 System operation

Pressure switches:

The operating logic is the following:

- Pressure switch connected to input B starts and stops Pump 1.
- Pressure switch connected to input C starts and stops Pump 2.

Pressure boosting operation with pressure switches		
	Start	**Stop**
P1	Pressure switch B = CLOSED	Pressure switch B = OPEN
P2	Pressure switch C = CLOSED	Pressure switch C = OPEN

Table 11: Pressure boosting operation with pressure switches

Pressure sensor:

RP is the pressure differential, and indicates the pressure variation around the Set Point for which the pumps are switched on. In systems with a display it is set directly. In systems without a display, DP is set as a percentage of the Set Point. RP = SP*DP. For further information see Figures 54 and 55.

The operating logic is the following:

- The first pump starts when the pressure falls below the Set Point and it stops when it reaches the Set Point pressure + RP.
- The second pump starts when the pressure falls below the Set Point minus RP, or 2% of the Set Point if vessels over 100 litres are used. It stops when the set point pressure + RP is reached in the system.

Pressure boosting operation standard vessel < 100 litres		
Pumps	**Start**	**Stop**
P1	System pressure <= SP	System pressure => SP+RP
P2	System pressure <= SP – RP	System pressure => SP+RP

Table 12: Pressure boosting operation standard vessel < 100 litres

Operation with additional expansion vessel > 100 litres		
Pumps	***Start***	***Stop***
P1	System pressure <= SP	System pressure => SP+RP
P2	System pressure <= SP – 2%	System pressure => SP+RP

Table 13: Operation with additional expansion vessel > 100 litres

Attention: If DIP SWITCH configuration is used, the differential restarting pressure is calculated as SP * DP. If the set point is 4 bar and DP is 50%, the restarting pressure RP is 2 bar.

The names pump P1 and P2 are only indicative. If exchange mode is activated, the pumps P1 and P2 are alternated as specified in the exchange mode.

The two pumps will always be started alternately with a minimum interval of 2 seconds from each other.

Example of Regulation with Standard expansion vessel and Regulation with additional expansion vessel:
SP= 4 bar
RP = 2 bar Attention: if DP is set (with the trimmers) RP=SP*DP

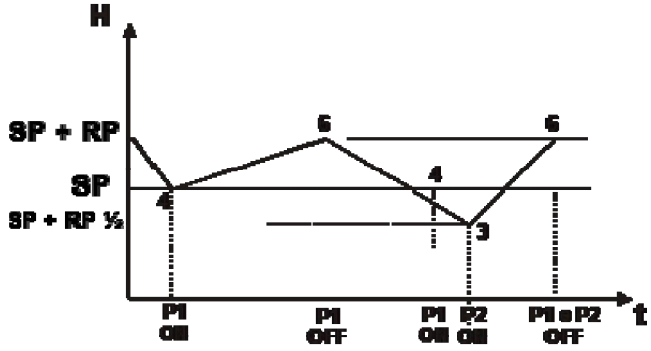


Figura 54: Regulation with expansion vessel < 100 litres

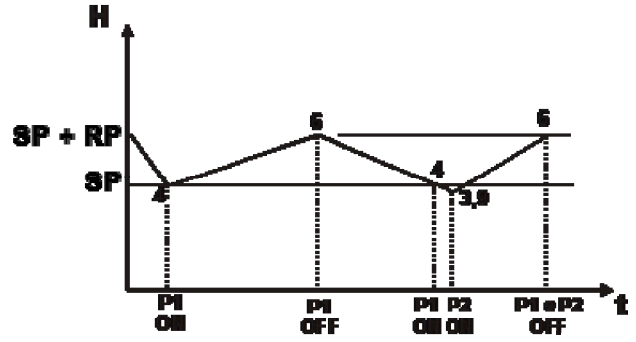


Figura 55: Regulation with expansion vessel > 100 litres

9 THE KEYPAD AND THE DISPLAY

Main display of the E.Box.



Figure 56: Label and keys

RESET	If it refers to a pump, the RESET Eliminate alarms key eliminates the errors of that pump. If it is general, it eliminates the panel errors.
	It allows you to choose the operating mode of the pumps P1 and P2. ON pump always on, OFF pump always off. In AUTO mode the panel decides when to switch the pumps on or off. To pass to ON mode, you must hold down the key for at least 3 seconds. When the key is released, the pump returns to the previous mode.

The number of blinks of the leds next to the alarm symbol represents the type of error. There is a legend on the label.



Figure 57: Label, keys and display

E.box display label. The functions of the keys are summed up in Table 14.

	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 the previous menu item.
	The SET key allows you to leave the current menu.
	Decreases the current parameter (if it is an editable parameter). The decreasing speed increases as time passes.
	Increases the current parameter (if it is an editable parameter). The increasing speed increases as time passes.

Table 14: Key functions

9.1 Status line

When viewing the parameters, at the bottom of the display, there is the system status, showing the status of the pumps, the status of the floats if present, and the status of the sensors if present. See Figure 58: Selection of the drop-down menus.

9.2 Menus

The complete structure of all the menus and of all the items of which they are composed is shown in Table 16.

9.3 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.

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 Set Point menu) and the various items in the menu are scrolled with the MODE key. Table 15 shows the menus that can be reached with the combinations of keys.

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

Table 15: Access to the menus

Main Menu	**User Menu** *mode*	**Monitor Menu** *set-minus*	**Setpoint Menu** *mode-set*	**Installer Menu** *mode-set-minus*	**Tech. Assist. Menu** *mode-set-plus*
MAIN (Main Page)	**VP** Pressure/level	**FF** Fault & Warning Log	**SP** Setpoint pressure	**RC** Rated current:	**TB** Water lack blockage time
Menu Selection	**C1** P1 phase current	**CT** Contrast	**RP** Pressure differential	**MF** Operating mode	**T1** Low pressure delay
	C2 P2 phase current	**LA** Language	**HC** P2 starting level	**MC** Control devices	**T2** Switch-off delay
	PO1 Power P1	**HS** System on hours	**HB** P1 starting level	**GS** Protection devices	**ET** Exchange mode
	PO2 Power P2	**H1** P1 on hours	**HA** Stopping level	**PR** Type of sensor used	**AL** Anti-leakage
	VE HW and SW information	**H2** P2 on hours		**MS** Measuring system	**AB** anti-blocking drainage
				SO Dry running factor	**TH** Tank height
				MP Minimum pressure threshold	**ML** Maximum level alarm
				MP Minimum pressure threshold	**LL** Minimum level alarm
				OD Expansion vessel size	**RF** Reset fault & warning
				EP Exclude pump	**PW** Change password