DUTYPOINT

PUMPS | SYSTEMS | SERVICING | KNOW-HOW

MICROBOOST® MAX

Installation, use and maintenance manual

DUTYPOINT.COM

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CE UK CA

CONTENTS

1. INTRODUCTION

1.1. PURPOSE OF THE MANUAL

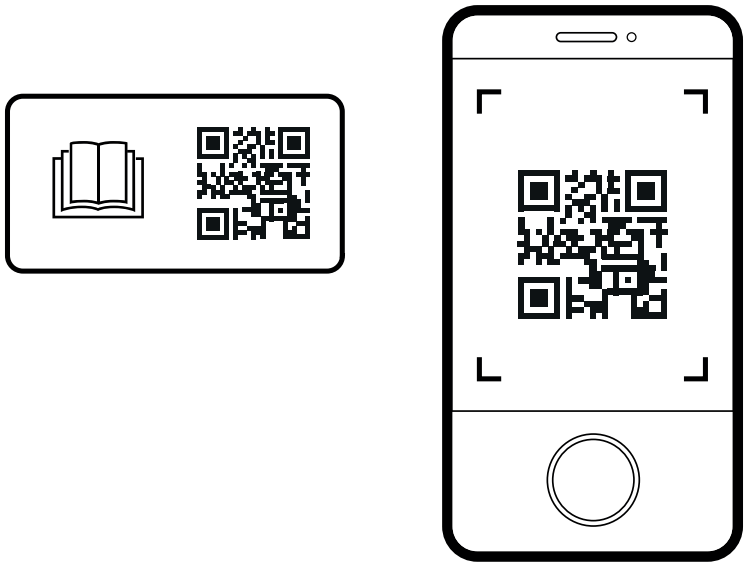
The purpose of this manual is to provide users with detailed information on the installation, operation, and maintenance of the product, with special regard to safety regulations.

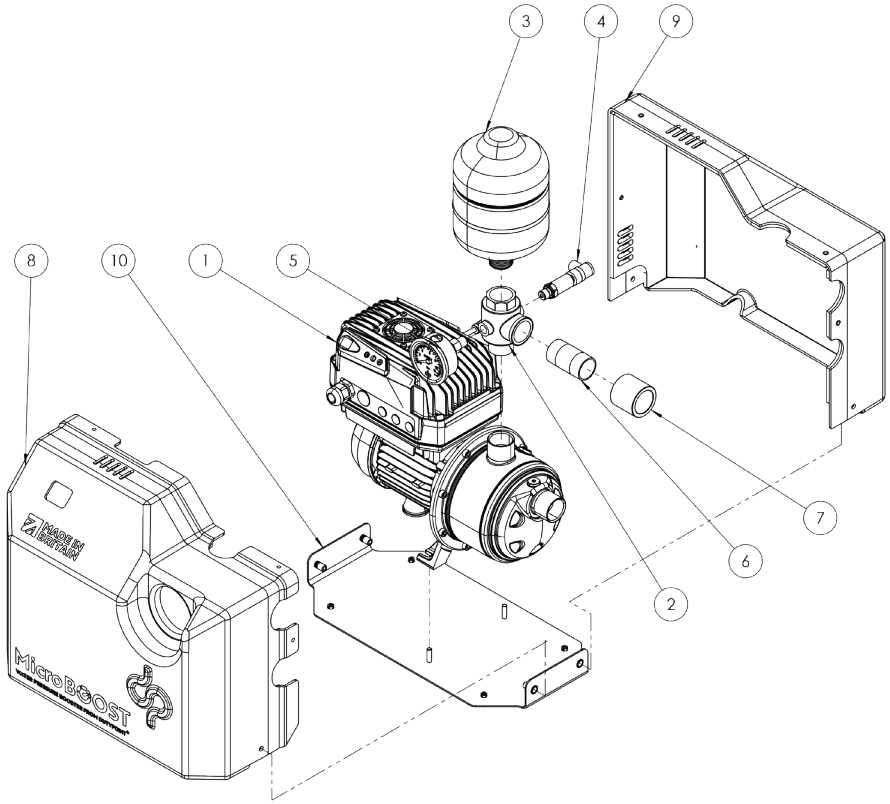
WARNING
Read the manual carefully before installing and using the product.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

NOTE
Store the manual in a protected and easily accessible place next to the installation location for possible consultation. A digital copy of this manual can be downloaded from the manufacturer's website or via the QR code shown on the product itself.

The complete installation, use and maintenance manual of the product, constantly updated in its contents, can be downloaded by scanning the QR code shown in the product with the smartphone camera and following the relative link.





Item Number	Description
1	Pump and Inverter Assembly
2	5 Way Adaptor with Check Valve
3	Pressure Vessel
4	Pressure Transducer
5	Pressure Gauge
6	Barrel Nipple 1" BSP
7	Socket 1" BSP
8	Acoustic Enclosure (Front)
9	Acoustic Enclosure (Back)
10	Base Plate

2. SAFETY

2.1. PURPOSE OF THE MANUAL

TIP
This symbol indicates a TIP or recommendation.

NOTE
This symbol indicates a NOTE or an indication or concept to be emphasised.

CAUTION
This symbol indicates CAUTION, a hazardous situation which, if not avoided, could result in minor or moderate injury or damage to property.

WARNING
This symbol indicates a WARNING, a hazardous situation which, if not avoided, could result in serious injury or damage to property.

DANGER
A hazardous situation which, if not avoided, will result in death or serious injury.

ELECTRICAL HAZARD
This symbol indicates an ELECTRICAL HAZARD, which if not avoided will result in death or electrocution.

2.2. QUALIFIED PERSONNEL

WARNING
The installation, use and maintenance of the product are strictly for qualified personnel who have undergone appropriate training. Any use by unqualified personnel must be carried out under the approval, responsibility, and close monitoring of the latter.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

WARNING
Keep out of the reach of children.

2.3. SAFETY WARNINGS

WARNING
During installation and use of the product, comply with the general safety regulations, working in a clean, dry environment, free of hazardous substances and using the appropriate accident prevention tools (gloves, helmet, goggles, shoes, and whatever else is necessary).

WARNING
The product is suitable for installation in industrial environments. In case of installation in a residential environment, it is recommended to adopt all the safety precautions required by local regulations.

WARNING
The unsuitable use of the product, non-original spare parts or tampering with the hardware and/or firmware of the product may lead to serious damage to property or persons in addition to the loss of warranty. The manufacturer waives all liability due to the improper use of its products.

WARNING
Before commissioning the product, ensure that the installation is safe and in accordance with local regulations.

ELECTRICAL HAZARD
Comply with the provisions to meet EMC requirements.

WARNING
Use cables of the appropriate type and cross-section according to the electrical characteristics of the load, the ambient temperature and local regulations.

WARNING
Any insulation tests may only be performed in accordance with the manufacturer's instructions. Failure to do so may result in damage to the unit.

ELECTRICAL HAZARD
Electronic boards and components may be damaged by electrostatic discharge. We therefore, recommend to don't touch the components.

ELECTRICAL HAZARD
Take care during installation and electrical connection that no foreign bodies enter into the device.

ELECTRICAL HAZARD
During the entire period in which the device is powered, regardless of whether it is operated or remains in stand-by (digital shutdown), high voltage is present inside the device and at the input and output terminals.

DANGER
The device, previously in stand-by condition, may suddenly start up following the reset of an alarm or changed system conditions. This may result in serious mechanical and electrical danger to the operator who, upon seeing the device stopped, may have intervened on it, on the load or on the system in which it is installed.

ELECTRICAL HAZARD
Disconnect the device from the power supply, check that the load is completely stopped and wait at least 5 minutes before intervening on it or on the load applied to it.

ELECTRICAL HAZARD
If the motor is of the permanent magnet type, the device may be energized by the passive rotation of the motor. In this case, both the power supply and the load should be disconnected before working on the device itself.

DANGER
Ensure that the device is fully closed and all fixing screws are properly tightened before supplying power. Do not remove the protective parts for any reason while the device is powered on.

ELECTRICAL HAZARD
It is recommended to install the appropriate protection devices upstream of the device, such as a circuit breakers, fuses and a residual current device (RCD).

ELECTRICAL HAZARD
Make sure that the device and the loads connected to it are properly grounded with the appropriate connection terminals before commissioning. Ensure that the grounding system is compliant and refer to local regulations for grounding devices. Each load must be fitted with its own earthing cable, the length of which must be as short as possible. Do not make interconnected grounding connections. Leakage currents may exceed 3.5 mA. It is recommended to use the reinforced ground connection if necessary.

CAUTION
During operation, some surfaces may reach high temperatures that may cause burns upon contact with skin. Be very careful when touching the device!
Avoid contact with flammable products.

WARNING
Do not start the pump for any reason unless it is completely filled with water.
Failure to do so may cause serious damage to the pump and the warranty will be void.

2.4. ACOUSTIC EMISSION

This device has an acoustic emission:
<70 dBA

2.5. CERTIFICATION

The product has the following certification:

- CE

3. MAINTENANCE

3.1.1 PURPOSE OF THE MANUAL

WARNING
Before carrying out any work on the device, carefully read the chapter Safety [5] in the manual.

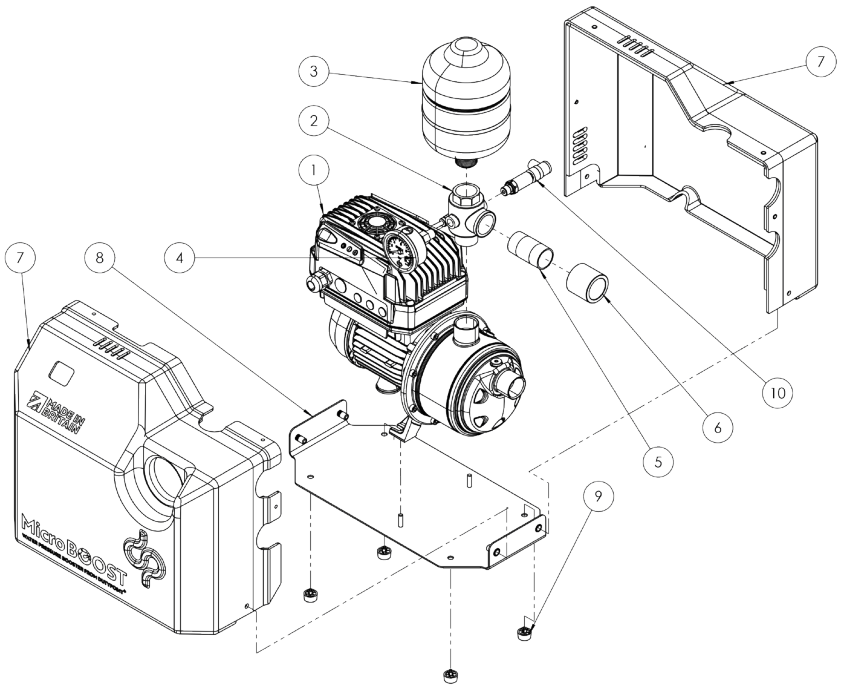
WARNING
Failure to comply with the instructions may lead to loss of warranty.

The device requires the following maintenance:

Intervention	Interval
Check the flow rate and pressure of the pumped liquid	Every 6 months or following an alarm
Check that the device cools down correctly	Every 6 months, or following a temperature alarm
Check the suction filter	Every 12 months
Check for any leaks	Every 12 months
Check for alarms	Every 12 months
Check the correct tightening of the power terminals	Every 12 months
Verify the maintenance of the protection rating (ingress of dust or water) by checking the tightening of the screws in the mechanical closing parts, the gaskets, and the cable glands.	Every 12 months

WARNING
In the event of long periods of inactivity, the pump should be emptied completely to avoid blocking and freezing the hydraulic part.

3.2. SPARE PARTS



Item Number	Description	Part Number
1	MicroBOOST® MAX booster pump and drive assembly	31-009260-000
2	5 way adapter with check valve SS304 self colour 1" BSP	41-007819-000
3	GWS PWB-2LX pressure vessel	41-008418-000
4	0-11 BAR ¼" back entry glycerine filled gauge	41-008108-000
5	1in BSP barrel nipple stainless steel	BN16
6	1in BSP full socket stainless steel	S16
7	MicroBOOST® MAX thermoformed acoustic enclosure assembly	30-005954-000
8	MicroBOOST® MAX enclosure base bracket 407X203X45	31-009954-000
9	20mm rubber foot - anti vibration mount	41-007925-000
10	10 bar pressure transducer G ¼, 8.5 - 36 V DC, IP67, IP69K	41-006287-000

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

3.3. DISASSEMBLY AND REPAIR

If it is necessary to disassemble and repair the device, it is recommended that the safety instructions be strictly observed.

WARNING
The installation, use and maintenance of the product are strictly for qualified personnel who have undergone appropriate training. Any use by unqualified personnel must be carried out under the approval, responsibility, and close monitoring of the latter.

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

WARNING
Failure to comply with the instructions may lead to loss of warranty.

3.4. DISPOSAL

Devices marked with this symbol cannot be disposed of in household waste but must be disposed of at appropriate waste drop-off centres. It is recommended to contact the Waste Electrical and Electronic Equipment drop-off centres (WEEE) in the area. If not disposed of properly, the product may have potential harmful effects on the environment and on human health due to certain substances present within. Illegal or incorrect disposal of the product is subject to severe administrative and/or criminal penalties.

4. TRANSPORT AND STORAGE

4.1. TRANSPORT

Avoid subjecting the product to severe shocks or extreme weather conditions during transport. The packaging must remain dry and at a temperature between -20°C (-4°F) and +70°C (+158°F). Do not stack packages without first checking feasibility with the manufacturer.

TIP
It is advisable to always indicate FRAGILE on the packaging.

4.2. INSPECTION ON DELIVERY

Upon receipt of the product, check:

- The integrity of the packaging
- The integrity of the content
- The presence of all components

In case of problems, notify the forwarder immediately

WARNING
The manufacturer declines all responsibility for damage to the product due to transport.

4.3. HANDLING

The product must be handled by hand or using suitable lifting equipment in relation to its weight and the regulations in force. If necessary, use dedicated handling equipment (cranes, ropes, trolleys), using the lifting points provided in the product.

During handling it is recommended to:

- Handle with care
- Keep away from suspended loads
- Always wear accident prevention equipment
- Be careful not to damage electrical cables

Do not handle the product using electrical cables as lifting gear

WARNING
Failure to follow the instructions may result in damage to the product, the system in which it is installed and, in the worst cases, damage to property or persons with even fatal consequences.

4.4. STORAGE

The product must be stored in its packaging in a dry place, without sudden changes in humidity and temperature and protected from mechanical (weights, vibrations), thermal and chemical agents.

The temperature of the storage environment must be between -20°C (-4°F) and 70°C (+158°F) with a maximum relative humidity of 85% (non-condensing).

If the product remains in stock for more than 24 months from the manufacturing date shown on the packaging, it is necessary to check the mechanical integrity of its parts and supply power to it at least once every 12 months.

If the product is put back into storage after it has been used, it is advisable to contact the manufacturer for further information on storage.

In particular, store the pump in a place with a minimum temperature that is not below 4 °C (40 °F).

5. TECHNICAL FEATURES

5.1. TECHNICAL DATA

Electrical specifications by model:

Model	Vin AC [VAC]	I in [A]	P1 [W]	Max RPM
MicroBOOST® MAX	1 x 190 - 265	Max 7	Max 1600	4200

General electrical specifications:

Power supply frequency	50 - 60 Hz (+/- 2%)
EMC compliance	EN61800-3 C2
Winding insulation class	Class F

ELECTRICAL HAZARD
If the device is powered by a generator set, make sure that:

- The generator set supplies the required voltage and is equipped with an electronic voltage regulator (AVR)
- The power of the generator set is at least 50% higher than the rated electrical power of the device
- The device is connected to the generator set only after the same has started
- The device is disconnected from the generator set before the same is stopped
- The device is not connected to the generator set when it is about to shut down due to lack of fuel

Electrical specifications by model:

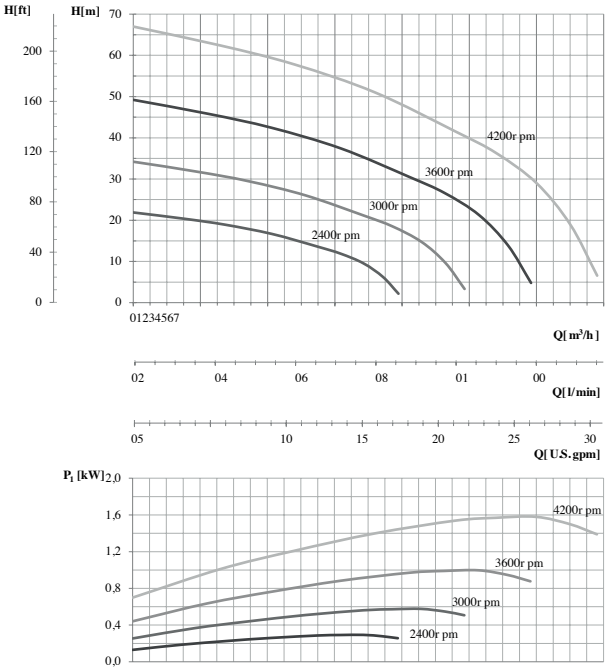
Relative humidity of the operating environment	5 - 95 % non-condensing
Workplace temperature	from -10 °C (14 °F) to 60 °C (140 °F)
Maximum workplace temperature at nominal load	50°C (122 °F)
Power derating beyond maximum temperature	-2.5% every °C (-1.4% every °F)
Maximum altitude at nominal load	1000 m (3280 ft)
Power derating beyond maximum altitude	- 1% every 100 m (328 ft)
Characteristics of the pumped liquid	Clean, non-corrosive, non-explosive, free of solid particles and fibers, with a maximum sand content of 50 g / m^3
Maximum temperature of the pumped liquid	40 °C (104 °F)

Mechanical specifications:

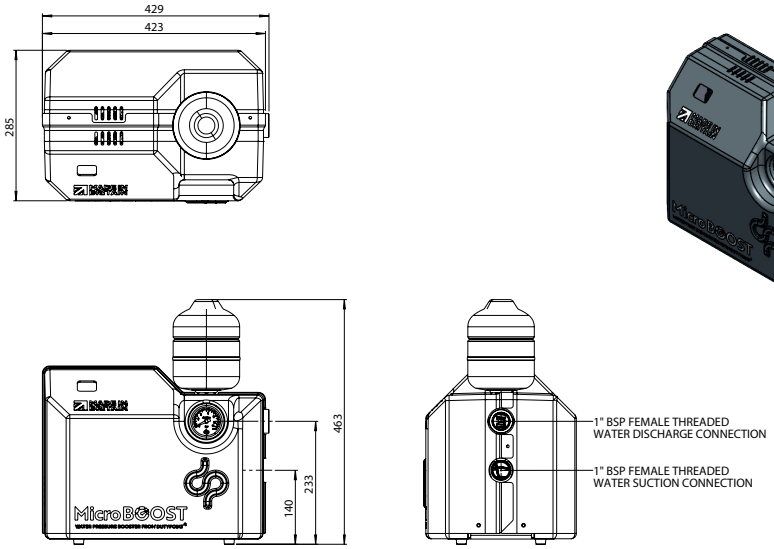
Protection rating	IP55 (NEMA 4)
Resistance to vibrations	EN60068-2-6:2008, EN60068-2-27:2009, EN60068-2-64:2008,
Maximum operating pressure	8.5 bar
Maximum suction head	1.5 m
Materials	AISI 304 stainless steel pump, aluminum motor and inverter

5.2. PERFORMANCE

Figure 1. MicroBOOST® MAX



5.3. DIMENSIONS AND WEIGHT



Model	A [mm]	B [mm]	E[mm]	F[mm]	H1[mm]	H2[mm]	L[mm]	M[mm]	N[mm]	DNA	DNM	Weight [kg]
MicroBOOST® MAX	167	103	140	178	128	192	367	191	278	1" G	1" G	11.2

5.4. CABLES ENTRY

Cable gland	Tightening torque [Nm]	Cable diameter [mm]	Size 1
M12	2.7	3,5-7	3
M20	7	7-13	2

6. MECHANICAL INSTALLATION

WARNING
Read the safety chapter carefully before continuing.

6.1. INSTALLATION ENVIRONMENT

WARNING
The environmental specifications stated in the technical data of the product must be strictly complied with.

WARNING
Do not install the device in environments at a risk of explosion, flooding, or in the presence of flammable fluids or solids. Ensure sufficient ventilation in the room. Refer to local regulations when selecting the appropriate installation location.

WARNING
The degree of protection of the device is only ensured if, at the end of the installation, the cover screws and the cable glands have been properly tightened. Close the holes of unused cable glands with the appropriate plugs.

Device	Tightening torque of the screws between the base and the heatsink
Size 1	3 Nm - 2,2 ftlbs

Protect the device from direct exposure to weather and sunlight.
Do not leave the device installed without cover or with the cable glands open, even if not connected to the power supply. The infiltration of dust, water or humidity may irreparably damage the device.

WARNING
To ensure uninterrupted operation, the device can gradually and automatically reduce performance before shutting down following over-temperature. However, prolonged operation above the rated temperature leads to a reduction in the life of the device.

6.2. COOLING

The motor and the inverter on-board are cooled by special fans through forced air circulation. In order to ensure correct cooling, it is necessary that:

- The ambient temperature complies with the environmental specifications
- The temperature of the pumped liquid complies with the environmental specifications
- A distance of at least 150 mm is maintained between the ventilation holes and any surrounding walls

WARNING
In constant pressure operating mode, check that by closing the system delivery valve (zero flow) the pump stops within a few seconds. If not, prolonged operation without flow (no cooling) may cause premature deterioration of the mechanical and electronic parts of the pump and motor as well as damage to the pumping system.

6.3. HYDRAULIC CONNECTIONS

The delivery and suction pipes must be correctly supported so as not to weigh down on the pump connections.

6.4. PRIMING

In case of installation under the water level, fill the pump by slowly opening the gate valve in the suction line by keeping the delivery gate open to let the air out. In the case of above-head installation, unscrew the two upper filling caps and fill the pump by pouring water into one of the filling holes and letting the air escape from the second hole until the pump is completely filled. Once filling is complete, screw on the filler caps. Check that the pump is properly primed before operating it. Prolonged operation with an unprimed pump can lead to damage to the pump.

7. ELECTRICAL INSTALLATION

WARNING
Read the safety chapter carefully before continuing.

7.1. GROUNDING

ELECTRICAL HAZARD
Make sure that the device and the loads connected to it are properly grounded with the appropriate connection terminals before commissioning. Ensure that the grounding system is compliant and refer to local regulations for grounding devices. Each load must be fitted with its own earthing cable, the length of which must be as short as possible. Do not make interconnected grounding connections. Leakage currents may exceed 3.5 mA. It is recommended to use the reinforced ground connection if necessary.

Use the following minimum cross-sections for ground cables:

- Cross-section equal to the mains power cable cross-section up 16 mm^2 (6 AWG)
- 16 mm^2 (6 AWG) for mains power cable cross-section between 16 mm^2 (6 AWG) and 35 mm^2 (1 AWG)
- Cross-section equal to half the cross-section of the power supply cable when the latter is greater than 35 mm^2 (1 AWG)

7.2. PROTECTION DEVICES

ELECTRICAL HAZARD
It is recommended to install the appropriate protection devices upstream of the device, such as a circuit breakers, fuses and a residual current device (RCD).

Fuses and switches.

The control device can protect the motor from overloads by digitally controlling the absorbed current against the set rated current. Install on the AC supply:

Supply voltage	Model	Recommended fuse gG	Recommended circuit breaker ABB MCB S200
1 x 230 VAC	MicroBOOST® MAX	10	S201-C10

Residual Current Devices (RCD)

For inverter devices with single-phase power supply, use AC-sensitive RCD devices of both sine and pulse types. The devices listed are, in order of priority:

- Type F, marked with the symbols  capable of detecting high-frequency currents up to 1 kHz.
- Type A-APR, marked with the symbols  APR characterized by a slight intervention delay.
- Type A, marked with the symbols 

7.3. CONNECTING CABLES

ELECTRICAL HAZARD
The connecting cables must comply with local regulations, feature the appropriate cross-section, and meet the requirements for voltage, current, and temperature.

7.3.1. POWER CABLE

Maximum cross-section of the input cable with ground	Cable tightening torque [Nm]	Ground cable tightening torque [Nm]
3 x 2,5 mm^2	-	-

ELECTRICAL HAZARD
Always use cables with appropriate cable lugs, which may be supplied with the product.

7.3.2. CONTROL CABLES

Model	Maximum cross-section of the control cables	Ground cable tightening torque [Nm]
Control terminals of all models	1 mm^2 (16 AWG)	0,5 Nm (0,37 ftlbs)

ELECTRICAL HAZARD
Use shielded cable for control cables.

ELECTRICAL HAZARD
Always use cables with appropriate cable lugs, which may be supplied with the product.

7.4. ELECTROMAGNETIC COMPATIBILITY (EMC)

The device meets the requirements of electromagnetic compatibility according to the EN61800-3 standard. However, to ensure the electromagnetic compatibility of the system in which it is installed, it is necessary:

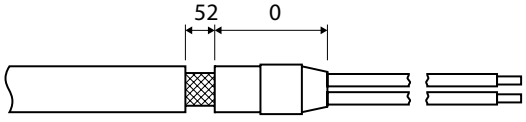
- Use ground connection cables that are as short as possible.
- Use shielded signal cables with the shield connected at one end only.

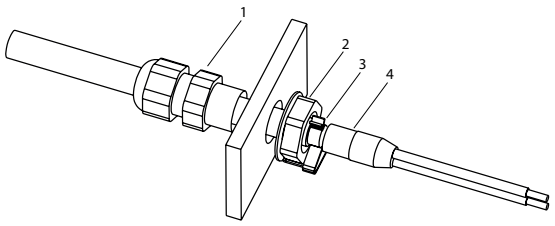
ELECTRICAL HAZARD
Install signal, motor, and power cables separately from each other at a distance of at least 30 cm (11,8”). If the signal cables meet the power cables, cross them perpendicularly.

ELECTRICAL HAZARD
It is possible to remove the connection of the filter capacitors Cy to the ground by removing the screws marked with the EMC symbol. In this way, the ground leakage currents caused by the filter are reduced, but the intrinsic EMC compatibility of the device is no longer valid and must therefore be guaranteed externally in another way. In case of installation in an IT system, it is recommended to remove the screws marked with the EMC symbol and install an external insulation controller. Photovoltaic systems fall into the IT category.

EMC CLIP FOR CABLE GLANDS

To ensure correct grounding of the shield when using shielded cables, it is recommended to use the appropriate EMC clips as shown below.



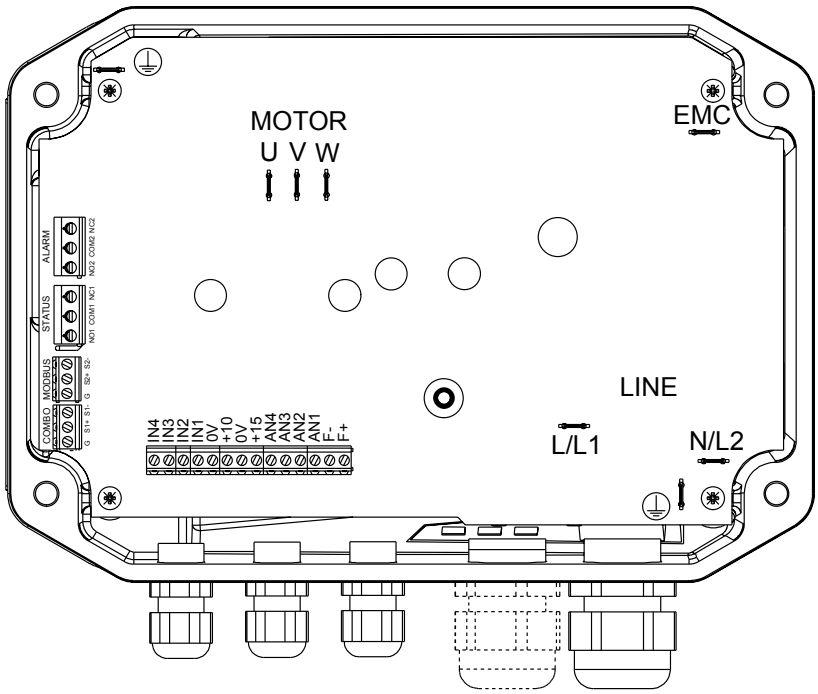


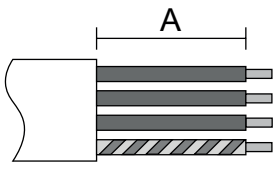
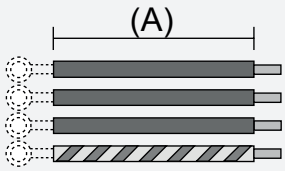
1: Cable gland
2: Lock nut
3: EMC clip
4: Shielded cable

7.5. ELECTRICAL CONNECTIONS

7.5.1. POWER CONNECTIONS

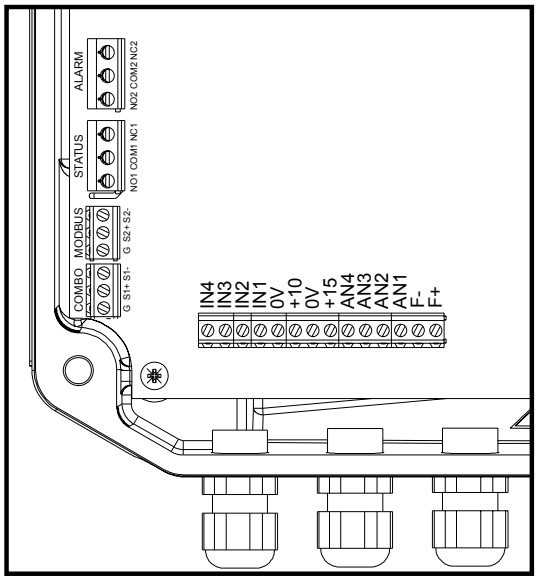
SINGLE PHASE POWER SUPPLY



		A [mm]	Pre-insulated cable lug	Stripping diagram
AC Power Supply **LINE**	L1/L	70	6.3 x 0.8 mm female Faston	
	L2/N	70	6.3 x 0.8 mm female Faston	
	P.E. ⏚	70	6.3 x 0.8 mm female Faston	
Motor **MOTOR**	U	200	6.3 x 0.8 mm female Faston	
	V	200	6.3 x 0.8 mm female Faston	
	W	200	6.3 x 0.8 mm female Faston	
	P.E. ⏚	200	6.3 x 0.8 mm female Faston	

ELECTRICAL HAZARD
In order to guarantee the correct direction of rotation of the motor, respect the connections of the output phases: U - white, V - red, W - brown.

7.5.2. CONTROL CONNECTIONS



ELECTRICAL HAZARD

The access of the signal (control) cables in the size 1 devices is allowed only through the three M12 cable glands as they are positioned in the SELV isolated area of the device delimited by the dotted line shown on the printed circuit.

The access of the signal cables through the two M20 cable glands, positioned in the sulated POWER area, exposes them to the risk of contact with live parts, compromising the user's safety and causing possible damage to the device.

If it is therefore necessary to access the signal cables through one of the M20 cable glands, it is the installer's responsibility to ensure reinforced insulation (double insulation) of the signal cables at least up to the dotted SELV insulated area.

Type		Description	Functionality	Comments
1 x 230 VAC	AN1	4-20 mA	S201-C10	-
	AN2	4-20 mA		-
	AN3	0-10 V		-
	AN4	0-10 V		-
Power Supply	+15V	15 VDC, max 100 mA	Power supply for 4-20 mA analog inputs	Do not use as a power supply for the digital inputs!
Power Supply	+10V	10 VDC, max 3 mA	Power supply for 0-10 V analog inputs	Do not use as a power supply for the digital inputs!
Signal GND	0V	Insulated	Signal GND for analog and digital inputs	-
Digital inputs	IN1	Active low	Motor start and stop	Programmable as Normally Open or Normally Closed.
	IN2	Active low	Motor start and stop Switching of set value 1 and 2 Switching of work frequency 1 and 2	Programmable as Normally Open or Normally Closed.
	IN3	Active low	Motor start and stop Switching of sensors 1 and 2	Programmable as Normally Open or Normally Closed.
	IN4	Active low	Alarms reset Motor start and stop Switch between main and auxiliary control modes	Programmable as Normally Open or Normally Closed.
Relay outputs	NO1	Normally open	STATUS relay NO1, COM1: closed contact with motor running.	Potential-free contacts Max 250 VAC, 2 A Max 30 VDC, 2 A
	COM1	Common		

Type		Description	Functionality	Comments
	NC1	Normally Closed	NC1, COM1: closed contact with motor stopped.	-
Relay outputs	NO2	Normally open	ALARM relay NO2, COM2: closed contact without alarm. NC2, COM2: closed contact with alarm or without power supply.	Potential-free contacts Max 250 VAC, 2 A Max 30 VDC, 2 A
	COM2	Common		
	NC1	Normally closed		
Power Supply Power Supply Signal GND	S1+	Positive		-
	S1-	Negative	Communication COMBO	-
	G	Serial GND		-The serial GND is isolated from the signal GND
Digital inputs	S2+	Positive		-
	S2-	Negative	Communication MODBUS RTU BACnet (if available)	-
	G	Serial GND		The serial GND is isolated from the signal GND

8. COMMISSIONING

8.1. PRELIMINARY CHECKS

Before supplying power to the device, carry out the following electrical and mechanical checks:

- Verify proper grounding of the device, of the load, and of the entire system
- Check the correct connection of the power supply cable and the motor cable, paying particular attention to any connection reversal
- Check the correct connection of the power and signal cables, paying particular attention to any polarity
- Check that the connection terminals of the power and signal cables are correctly tightened
- Check the implementation of electromagnetic compatibility (EMC) regulations and the correct connection of cable shields
- Check that the protective devices are present and correctly installed
- Check that the mechanical installation is correct, sturdy and complies with environmental and cooling requirements
- Check that the seals are intact and correctly positioned in their seats
- Check that the cable glands and screws are properly tightened
- Check that the device is completely closed and that live parts are not accessible

NOTE
The pump may contain traces of water used for the final tests of the product. Before commissioning, rinse with fresh water. Under no circumstance should solvents or other chemical products be used to clean any part of the product.

8.2. POWERING

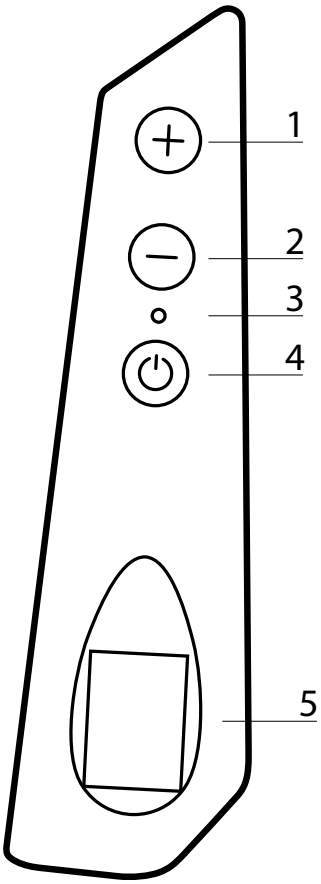
ELECTRICAL HAZARD
Before supplying power to the device, make sure you have read, understood and implemented all the safety, mechanical, and electrical installation instructions.

At the end, it shall be possible to:

- Power up the device
- Verify the correct switching on and the absence of alarm messages
- Perform programming
- Start the motor

9. USE AND PROGRAMMING

9.1. KEYBOARD AND DISPLAY



CAUTION
Protect the keyboard and display from shocks. Press with fingers only on the keys and never on the display. Excessive pressure on the display and surrounding area can lead to damage.

1. +: parameter scrolling/parameter editing
Use the + key to increase the set value or frequency. In order to allow the set value to be edited, it is necessary to hold down the + or - button for more than 5 seconds until the set value to be edited starts flashing. To confirm the set value, simply wait 5 seconds or press the START/STOP button.

2. -: parameter scrolling/parameter editing
Use the - key to decrease the set value or frequency. In order to allow the set value to be edited, it is necessary to hold down the + or - button for more than 5 seconds until the set value to be edited starts flashing. To confirm the set value, simply wait 5 seconds or press the START/STOP button.

3. Signaling LEDs:
- RED on: the device is powered with the correct supply voltage and is in stand-by
- GREEN: motor running
- YELLOW flashing: alarm condition

4. START / STOP: motor start/stop

5. DISPLAY

Keep the START / STOP key pressed down for at least 5 seconds to activate the START/STOP key lock function through which it is only possible to scroll and view the operating parameters, using the + and - keys; this does not allow starting or stopping the motor. Press the START/STOP button again for at least 5 seconds to deactivate the lock. Keep the + and - keys pressed for at least 5 seconds to reverse the display.

9.2. CONTROL VIA APP

The device can be controlled using a smartphone or tablet equipped with BTLE connectivity and with the App UNYCONNECT installed. The App is available for Android and iOS and may be downloaded, free of charge, from the respective online stores.

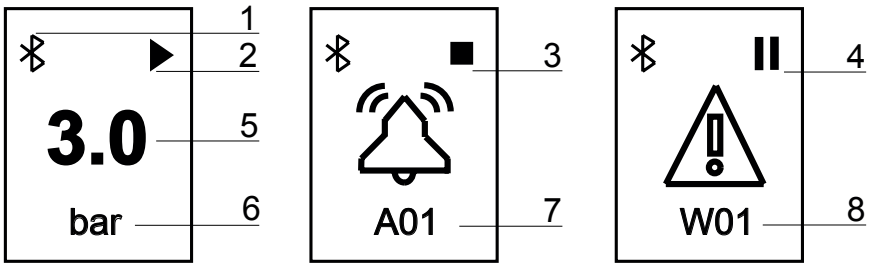
Android	iOS

Through the application it is possible to:

- Monitor multiple operating parameters simultaneously
- Obtain energy consumption statistics and check alarm history
- Run reports with the possibility of adding notes, images and send them by e-mail or store them in the digital archive
- Create schedules, save them in the archive, copy them to other devices, and share them among multiple users
- Control a device remotely, via Wi-Fi or GSM, using a smartphone placed nearby as a modem
- Access manuals and additional technical documentation
- Receive online help on parameters and alarms

9.3. INITIAL DISPLAY

When the device is switched on, the control firmware version (CTRL = X.XX), the power firmware version (INV = X.XX) and the hardware version (HW = X.XX) are communicated to the user. Next, the initial view opens.



1: BTLE on. Flashing during communication
2: Motor running
3: Motor stopped
4: Stand-by
5: Value read
6: Units of measurement
7: Alarm
8: Warning

Parameter	Description
XX.X [bar]	Measured pressure value.
XXX.X [Hz]	Frequency with which the inverter is powering the motor.
XXX [VAC]	Inverter power supply voltage. This appears only while the motor is in the OFF state. In the ON state, the current absorbed by the motor is displayed instead of the supply voltage.
XX.X [A]	Current absorbed by the motor.
X.XX [cosø]	Cosine of the ø phase displacement angle between voltage and current. It is also called the motor power factor.
XX.X [kW]	Estimate of the active electrical power absorbed by the motor.
X [INV]	Device address when COMBO functionality is enabled.
AXX	Alarm XX.
WXX	Warning XX.

The App allows monitoring other parameters and consult the alarm log.

9.4. MENU

Access to the menus is password-protected at two levels:

- Installer level: Allows editing the parameters related to pump operation in the hydraulic system on which it is installed. Password 1, default 001.
- Advanced level: Allows editing of critical parameters that can affect the life of the device, the pump, and the system if they are set incorrectly. Password 2, default 002.

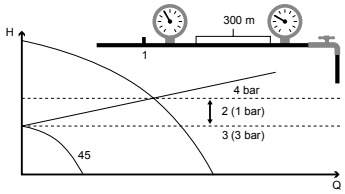
Within each menu, it is possible to change the relative access password.

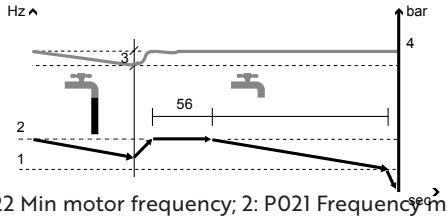
NOTE
When an incorrect password is entered to access both the installer and advanced level, the parameters can only be displayed but not edited. In case of loss of the password, contact the technical support service to obtain the universal password.

Parameter	Description	Level	Default password
Control parameters	Menu of parameters for controlling the pump in the hydraulic system in which it is installed.	Installer	001
Motor parameters	Menu of parameters for motor control	Advanced	002
IN/OUT parameters	Menu of parameters for analog and digital inputs and outputs	Installer	001
Connectivity parameters	Menu of parameters for connectivity and external communication.	Installer	001

9.5. CONTROL PARAMETERS

Parameter	Default	Description	1	2	3	4	5
P018 Control mode 1. Constant value 2. Fix speed 3. Constant value 2 set 4. Fix speed 2 values 5. External speed	Constant value	The following control modes can be selected: 1. Constant value: the device varies the speed of the pump in such a way as to keep the set value constant regardless of water consumption. 2. Fix speed: the device powers the pump at the set frequency. 3. Constant value 2 set: two desired values can be selected by opening or closing digital input 2. 4. Fix speed 2 values: two desired frequency values can be selected by opening or closing digital input 2. 5. External speed: it is possible to control the motor frequency through an analog signal connected to analog input 4.	X	X	X	X	X
P112 Control mode aux XXXXXXXX	Constant value	Operate on digital input 4 to switch from the main control mode to the auxiliary control mode and vice versa.	X	X	X	X	X
P061 Max alarm value p = XX.X [bar]	10 bar	Value that can be reached in the system beyond which, even in constant frequency operating mode, the pump is stopped and an alarm signal is emitted. The pump is restarted only after the measured value has dropped below the maximum alarm value for more than 5 seconds.	X	X	X	X	X
P016 Min alarm value p = XX.X [bar]	0	Minimum value that can be reached in the system below which, even in constant frequency operating mode, the pump is stopped and an alarm signal is emitted. The pump is restarted only after the measured value has risen above the minimum alarm value for more than 5 seconds.	X	X	X	X	X
P115 Pipe fill ramp XXX [s]	= P009 Ramp up time	Ramp time to follow after a start if the measured value is lower than the minimum alarm value. The piping filling ramp expires after the set time or if the measured value reaches the set value. In COMBO mode, only one unit is enabled to operate as long as the filling ramp is active.	X		X		
P047 External set enabling ON/OFF	OFF	Enabling the setting of the set value via analog input 3.	X		X		
P002 Set value p = XXX.X [bar]	3 bar	Value that you want to keep constant.	X				

Parameter	Default	Description	1	2	3	4	5
P091 Compensation p = XXX.X [bar]	0	Compensation at the maximum frequency. The sign can be reversed via the green key.  1 : sensor; 2: P091 Compensation ; 3: P002 Set value ; 4: P022 Min motor frequency; 5: P039 Max motor frequency In the case of a group of pumps in COMBO mode, the compensationmust be referred to each pump.	X				
P013 Set value 2 p = XXX.X [bar]	3 bar	Value that you want to keep constant.			X		
P092 Compensation set 2 p = XX.X [bar]	0	Compensation at the maximum frequency. The sign can be reversed via the green key.			X		
P059 Value set update t = XX [s]	5 s	Time interval for updating the set value according to the compensation.	X		X		
P006 Operating frequency f = XXX [Hz]	= P039 Max motor frequency	Frequency used by the device to power the motor.	X		X		
P040 Operating frequency 2 f = XXX [Hz]	= P039 Max motor frequency	Frequency used by the device to power the motor.			X		
P021 Frequency min control fmin = XXX [Hz]	= P039 Max motor fre-quency	Minimum frequency below which the pump must try to stop following the control ramp (P085 Control ramp).	X		X		
P060 Stop delay t = XX [s]		Delay during which an attempt is made to stop the pump below the minimum control frequency (P021 Frequency min control).	X		X		
P085 Control ramp t = XX [s]		Time in which the device decreases the motor power frequency from the minimum control frequency (P021 Frequency min control) to the minimum motor frequency (P022 Min motor frequency). If during this time the measured value falls below P002 Set value - P087 Delta control, the device restarts the motor. If not, the device will stop the motor completely following the control ramp (P085 Control ramp).	X		X		
P003 Delta start p = XXX.X [bar]		This parameter communicates by how much the measured value must fall from the set value for the previously stopped pump to be restarted.	X		X		

Parameter	Default	Description	1	2	3	4	5
P087 Delta control p = XXX.X [bar]	0.1 bar (2 psi)	This parameter communicates by how much the measured value must fall in relation to the set value so that the pump, during shutdown in control ramp, is restarted.  1: P022 Min motor frequency; 2: P021 Frequency min control; 3:P087 Delta control; 4: P002 Set value ; 5: P060 Stop delay; 6:P085 Control ramp	X		X		
P058 Delta stop p = XX.X [bar]	0.5 bar (8 psi)	This parameter represents the increment of the measured value with respect to the set value that must be exceeded so that a forced shutdown of the pump according to the stop ramp can occur.	X		X		
P015 Ki XXX	50	Integral coefficient used in constant value adjustment.	X		X		
P014 Kp XXX	5	Proportional coefficient used in constant value adjustment.	X		X		
P049 COMBO ON/OFF	OFF	Enable the function P049 COMBO for the combined operation of several pumps in parallel. Read the dedicated chapter.	X		X		
P062 Address COMBO XX	01	Device address when in COMBO mode: • 0: master • 01 to 07: slave	X		X		
P050 Alternance ON/OFF	ON	Enabling the alternation between units in COMBO and D.O.L. The order of priority of operation is alternated based on the previous start-up of each pump in order to obtain an almost uniform wear of the pumps.	X		X		
P101 Alternance period - t = XX [h]	0	Maximum difference in operating hours between multiple devices in the unit. 0 means 5 minutes.	X		X		
P055 COMBO synchrony ON/OFF	OFF	Through this parameter it is possible to activate the synchronous operation of the pumps in COMBO. Read the dedicated chapter. However, it is necessary to lower parameter P021 Frequency min control accordingly.	X		X		
P057 Start delay AUX - t = XX [s]	00	Time delay with which the pumps in a group start up after the variable speed pump has reached the maximum motor frequency and the measured value has fallen below the difference P002 Set value - P087 Delta control.	X		X		
P056 PI control Direct/Reverse	DIRECT	PI control mode: • Direct: as the pump speed increases, the measured value increases. • Reverse: as the pump speed increases, the measured value decreases.	X		X		

Parameter	Default	Description	1	2	3	4	5
P089 Periodic autorun t = XX [h]	00	Periodic pump start-up after X hours of inactivity. The value 0 disables the function.	X	X	X	X	X
P020 Dry run cosphi cosphi = X.XX		If the motor is of the synchronous type with permanent magnets, this parameter represents the percentage with respect to the rated current set below which the device stops the motor and generates the no-water alarm.	X	X	X	X	X
P132 - Dry run delay t = XXX [s]	5 s	Delay time in the intervention of the dry running protection.	X	X	X	X	X
P014 Kp XXX	5	Proportional coefficient used in constant value adjustment.	X	X	X	X	X
P088 Restarts delay t = XX [min]	10 min	Time base that establishes the delay of attempts to restart the pump following a no-water alarm. With each attempt, the delay time is doubled. The maximum number of attempts is 5.	X	X	X	X	X
Change password1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).	X	X	X	X	X

9.6. MOTOR PARAMETERS

Parameter	Default	Description
P008 Voltage boost V = XX.X [%]	00	Motor starting voltage increase to favor the starting torque. Contact the motor manufacturer for more information.
P039 Max motor frequency f = XXX [Hz]	140 Hz (120 Hz)	Maximum frequency intended to power the motor. Reducing the maximum motor frequency reduces the maximum current consumption.
P022 Min motor frequency f = XXX [Hz]	40 Hz	Minimum motor frequency.
P009 Ramp up time t = XX [sec]	3 s	Motor start ramp from minimum frequency (P022 Min motor frequency) to maximum frequency (P039 Max motor frequency). Slower ramps cause less strain on the motor and pump and therefore promote longer life. On the other hand, response times are longer. Excessively fast start-up ramps may lead to an overload in the inverter.
P010 Ramp down t = XX [sec]	3 s	Motor stop ramp from maximum frequency (P039 Max motor frequency) to minimum frequency (P022 Min motor frequency). Slower ramps cause less strain on the motor and pump and therefore promote longer life. On the other hand, response times are longer. Excessively fast stop ramps may lead to an overvoltage in the inverter due to the regenerative effect.
P043 Autorestart ON/OFF	ON	By selecting ON, when the mains power is restored after a power failure, the device will return to the same state it was in before the power failure: this means that if the pump was working, it will start working again
Change password2 Press ENT		By pressing the ENT key it is possible to change the advanced level password (level 2) (default 002).

9.7. IN/OUT PARAMETERS

Parameter	Default	Description
P083 Unit XXXXX	bar	Units of measurement [bar,%, ft, in, cm, m, K, F, C, gpm, l / min, m^3 / h, atm, psi].
P004 Full scale sensor p = XXX.X [bar]	10 bar (145 psi)	Full scale of the sensor.
P084 Min value sensor p = XXX.X [bar]	0	Minimum sensor value.
P019 Offset AN1 XX.X [%]	20%	Zero correction for analog input 1 (4-20 mA). (20 mA x 20% = 4 mA).
P019 Offset AN2 XX.X [%]	20%	Zero correction for analog input 2 (4-20 mA). (20 mA x 20% = 4 mA).
P081 Offset AN3 XX.X [%]	0%	Zero correction for analog input 3. 0-10 V : 10V x 0% = 0 V
P082 Offset AN4 XX.X [%]	20%	Zero correction for analog input 4. 0-10 V : 10V x 0% = 0 V
P090 AN1, AN2 function XXXXXXXX	Independent	Operating logic of analog inputs AN1, AN2: • Independent. The active sensor is relative to analog input 1, while the sensor connected to analog input 2 serves as an auxiliary in case of failure of the sensor or of analog input 1. • Selectable. The active sensor may be selected via digital input 3. • Difference 1-2. The digital difference in absolute value is performed between the measurements of analog input 1 and analog input 2. • Higher value. The maximum value between the measurements of the two sensors is considered. • Lower value. The minimum value between the measurements of the two sensors is considered.

Parameter	Default	Description
P063 Digital input 1 N.O./N.C.		If N.O.(Normally Open) is selected, the device will continue to operate the motor if digital input 1 is open. Conversely, it will stop the motor if digital input 1 is closed. If N.C. (Normally Closed) is selected, the device will continue to operate the motor if digital input 1 is closed. Conversely, it will stop the motor if digital input 1 is open.
P064 Digital input 2 N.O./N.C.	N.O.	If N.O.(Normally Open) is selected, the device will continue to operate the motor if digital input 2 is open. Conversely, it will stop the motor if digital input 2 is closed. If N.C. (Normally Closed) is selected, the device will continue to operate the motor if digital input 2 is closed. Conversely, it will stop the motor if digital input 2 is open. Digital input 2 is also used to select set value 1 or set value 2 in the control mode Constant value 2 set or to select working frequency 1 or 2 in the control mode Fix speed 2 values.
P065 Digital input 3 N.O./N.C.	N.O.	If N.O.(Normally Open) is selected, the device will continue to operate the motor if digital input 3 is open. Conversely, it will stop the motor if digital input 3 is closed. If N.C. (Normally Closed) is selected, the device will continue to operate the motor if digital input 3 is closed. Conversely, it will stop the motor if digital input 3 is open. Digital input 3 is also used to select sensor 1 or sensor 2 when the parameter P090 AN1, AN2 function is set to Selectable.
P066 Digital input 4 N.O./N.C.	N.O.	If N.O.(Normally Open) is selected, the device will continue to operate the motor if digital input 4 is open. Conversely, it will stop the motor if digital input 4 is closed. If N.C.(Normally Closed) is selected, the device will continue to operate the motor if digital input 4 is closed. Conversely, it will stop the motor if digital input 4 is open. Digital input 4 is also used to select the main or auxiliary control mode in case they are different. Digital input 4 also serves as alarm reset.
P071 Man reset In Dig 1	OFF	Enabling or disabling the manual reset of the digital input.
P071 Man reset In Dig 2	OFF	Enabling or disabling the manual reset of the digital input.
P071 Man reset In Dig 3	OFF	Enabling or disabling the manual reset of the digital input.
P071 Man reset In Dig 4	OFF	Enabling or disabling the manual reset of the digital input.
P079 Dig. input 2/3 delay t = XX [s]	1	Delay of digital inputs 2 and 3. Digital inputs 1 and 4 have a fixed delay of 1 second.
Change password1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).

9.8. CONNECTIVITY PARAMETERS

Parameter	Default	Description
P125 Communication	MODBUS	• MODBUS • BACNET
P126 Max master	1	Maximum number of master units (only for BACNET) from 1 to 127.
P098 Address RS-485 XXX	1	Address from 1 to 247
P099 Baudrate XXXXX	9600	Baudrate from 1200 bps to 57600 bps
P100 Data format XXXXX	N81	Data format: N81, N82, E81, O81
P024 EEPROM write ON/OFF	OFF	Setting the writing mode of the parameters transmitted via: ON: the datum is saved in EEPROM OFF: the datum is not saved in EEPROM
Change password1 Press ENT		By pressing the ENT key it is possible to change the installer level password (level 1) (default 001).

9.9. CONTROL BY FLOW SWITCH

In control mode MPPT , a flow switch can be connected to the device to stop the operation of the pump in the presence of zero flow or in conditions of low irradiation, when the head developed by the pump is not sufficient, or when the delivery is closed. The flow switch, potential-free contact, must be connected to digital input 2 or to terminals 0V, IN2.

The programming of the device, needed to implement the flow switch control, is based on the following parameters:

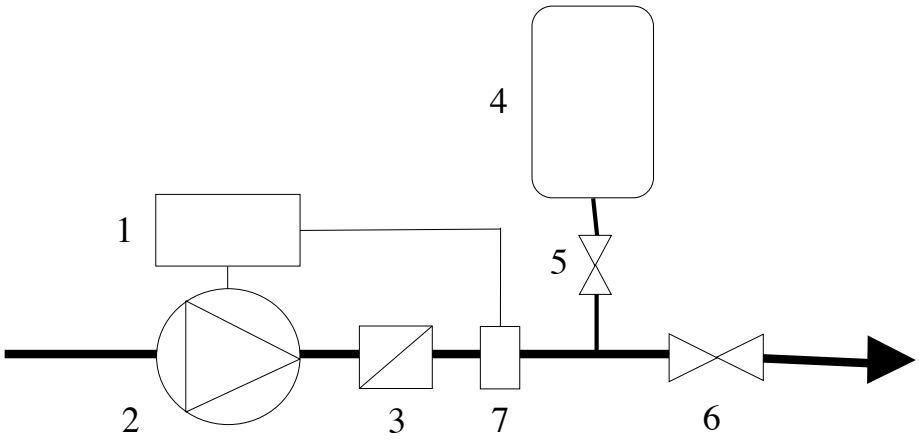
Menu	Parameter	Description
IN/OUT parameters	P064 Digital input 2	Configuration of digital input 2, to which the flow switch is connected, as Normally Open (pump running with open contact) or Normally Closed (pump running with closed contact).
IN/OUT parameters	P079 Dig. input 2/3 delay	By setting a value higher than 30 seconds, the device will stop the pump if the flow is zero for more than XX seconds. The pump will restart as soon as the flow switch detects new flow.
CONTROL parameters	P088 Restarts delay	Every XX minutes (default 5 minutes) the inverter will try to restart the pump even if the flow switch detects no flow. If flow is re-established, the pump will continue to run. If the flow remains zero for longer than the delay set for digital input 2, the inverter will stop the pump again.

10. CONSTANT PRESSURE OPERATION

10.1. INTRODUCTION

The MicroBOOST® MAX can manage the running speed of the pump in such a way as to keep the pressure constant as the water demand changes. A pressure sensor placed as close as possible to the pump is used for this purpose.

1: Inverter
2: Pump
3: Check valve
4: Pressure vessel
5: Gate valve
6: Gate valve
7: Pressure sensor



10.2. THE PRESSURE VESSEL

In water systems equipped with inverters, the function of the pressure vessel is to compensate for losses (or minimum water consumption) and maintain pressure when the pump is stopped, thus avoiding excessively frequent start/stop cycles.

The pre-charge pressure of the pressure vessel must be approx. 80% of the operating pressure.

Example

If the set pressure in the inverter is 4 bar, the pre-charge pressure of the pressure vessel should be approx. 3.2 bar.

If the set pressure in the inverter is 60 psi, the pre-charge pressure of the pressure vessel should be approx. 48 psi

NOTE
The pre-charge pressure must be adjusted with the system completely unpressurised.

10.3. ELECTRICAL CONNECTIONS

The MicroBOOST® MAX system is pre-fitted with a linear pressure sensor with 4-20MA output

The pressure sensor is connected via the terminals of the analogue input 1, i.e:

- AN1: 4-20 mA signal (-)
- +15V: 15 VDC power supply (+)

The device supports the installation of a second pressure sensor for:

- Operating at constant differential pressure (read the dedicated chapter)
- Automatic replacement of the main pressure sensor in case of failure
- Change of active pressure sensor via digital input

The secondary pressure sensor is connected via the terminals of the analogue input 2, i.e:

- AN2: 4-20 mA signal (-)
- +15V: 15 VDC power supply (+)

10.4. ADJUSTING THE PRESSURE VESSEL PRE-CHARGE PRESSURE

- Turn the MicroBOOST® MAX off
- Close the suction isolation valve (between tank and pump)
- Drain the discharge pipework to the point that the pressure gauge is showing zero pressure
- Remove black protective cap on top of the pressure vessel to expose the schrader valve
- Using a suitable pressure gauge (or pump with gauge), check the pre-charge pressure of the vessel
- Release or add air as necesssary to adjust to the required pre-charge pressure
- Replace protective air valve cap
- Ensure the suction isolation valve is opened again before turning the pump back on

NOTE
If the pump is drained of water during the process, it may need re-priming (refer to section 6.4).

NOTE
In case there is a failure of the analog input AN1 and the parameter P090 AN1, AN2 function is set to value Independent, it is possible to connect the pressure sensor to the analog input AN2 to restore the functioning of the system.

11. CONNECTING MULTIPLE MICROBOOST® MAX'S IN PARRALLEL

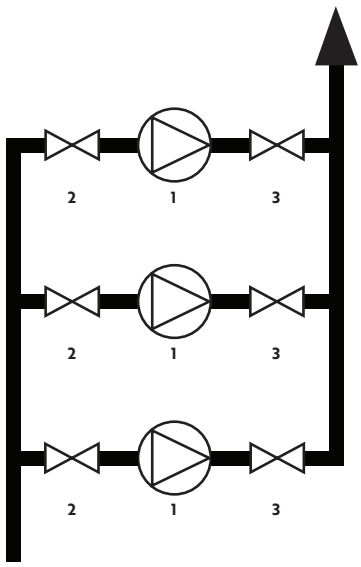
11.1. INTRODUCTION

In applications where a standby pump is required, or more than one pump is required to acheive the required flow rate, multiple MicroBOOST® MAX's can be connected to work together in parallel.

To achieve this, a mode called 'COMBO' is used. This enables the connection of up to 8 pumps in parallel.

The COMBO connection between the MicroBOOST® MAX's will automatically alternate operation between the pumps to even out the wear, and in case of failure of one MicroBOOST® MAX, the remaining units of the group will continue their operation.

1: MicroBOOST® MAX
2: Suction Isolation Valve
3: Discharge Isolation Valve



11.2. VARIABLE SPEED PUMPING UNIT WITH TWO OR MORE PUMPS IN COMBO MODE

The unit consists of two or more pumps (up to 8) each controlled by an inverter, and each equipped with its own pressure sensor. The inverters are connected to each other via RS485 serial port.
One inverter is configured as master (address 00) whereas the others are configured as slaves (addresses 01 to 07).

NOTE
Each inverter must be equipped with its own pressure sensor.

11.2.1. CASCADE OPERATING PRINCIPLE

Cascade operation is the default operation in COMBO mode. When water is required, a pump is started at variable speed according to the demand. As the demand increases and the maximum frequency is reached, a second pump is started. An additional water demand, leads to an increase in the pump frequency until, having reached its maximum frequency, a third pump is started and so on. In case of reduced demand, the last pump started decreases its frequency until it switches off.

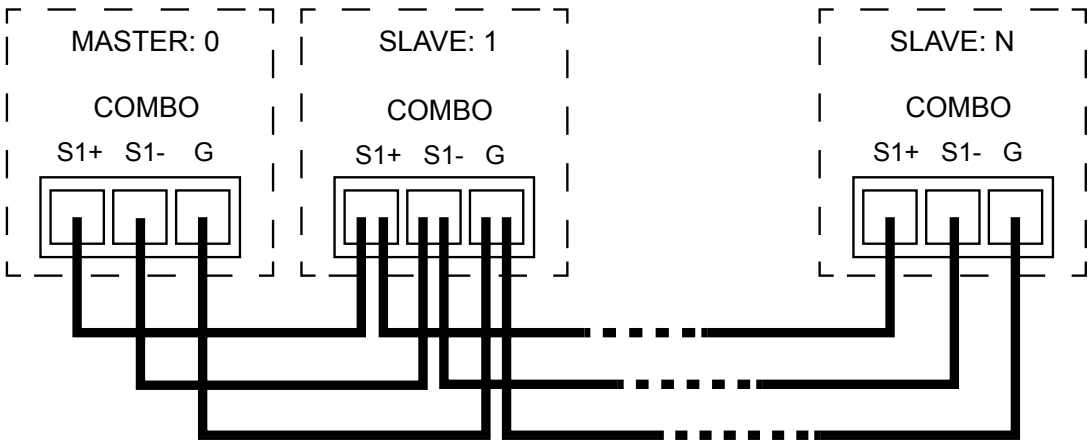
11.2.2. SYNCHRONOUS OPERATING PRINCIPLE

If parameter P055 COMBO synchrony is set to ON, synchronous operation is achieved. This operating mode provides additional energy savings over cascade operation. When water is required, a pump is started at variable speed according to the demand. When the demand increases and the maximum frequency is reached, a second pump is started and the two pumps run at the same speed to satisfy the water demand. A further request leads to an increase in the frequency of the two pumps until, having reached their maximum frequency, a third pump is started and so on. In case of reduced demand, all the pumps of the unit reduce their frequency and, once reached the minimum frequency, the pump that was started last switches off.

NOTE
To ensure correct synchronous operation, parameter P021 Frequency min control must be set appropriately, i.e. two or three Hz above the working frequency at zero flow.

NOTE
If parameter P050 Alternance is set to ON, the start priority of the pumps in COMBO mode is established according to the operating hours, and parameter P101 Alternance period establishes the number of hours of continuous operation after which the pumps in the unit are forced to alternate.

11.2.3. ELECTRICAL CONNECTIONS



ELECTRICAL HAZARD
Respect the polarity of the connections.

NOTE
To make communication more immune to disturbances, it is recommended to:

- Use a braided, shielded cable with the shield connected to the G terminal
- Install between S+ and S-, on the first and last node of the system, a termination resistor with avalue equal to the cable impedance

11.2.4. PROGRAMMING THE MASTER UNIT

Menu	Parameter	Value
Control parameters	P049 COMBO	ON to activate.
Control parameters	P062 Address COMBO	00
Control parameters	P050 Alternance	ON to activate / OFF to deactivate.
Control parameters	P101 Alternance period	Establishes the number of hours of continuous operation after which the pumps in the unit are forced to alternate. The value 0 means 5 minutes.
Control parameters	P055 COMBO synchrony	ON to activate / OFF to deactivate.
Control parameters	P057 Start delay AUX	We recommend setting 0 s.

11.2.5. PROGRAMMING OF SLAVE UNITS

Menu	Parameter	Value
Control parameters	P049 COMBO	ON to activate.
Control parameters	P062 Address COMBO	from 01 to 07.
Control parameters	P050 Alternance	ON to activate / OFF to deactivate. It is possible to determine which devices are included in the alternation and which are not. Devices excluded from the alternation will receive a starting priority based on their address.

NOTE
To start or stop a unit in COMBO mode, simply press the START or STOP button on the master unit only.

NOTE
To change the operating parameters of a COMBO unit, operate on the unit's master. When the Master Menu is exited, the remote programming of the connected slave units is required. In this manner, all parameters set in the master are also copied to the slaves with the exception of parameter P062 Address COMBO.

CAUTION
When the master menu is accessed, the communication with the slave units is interrupted and the A13 No communication alarm is produced. Communication is automatically re-established by exiting the Master Menu.

ELECTRICAL HAZARD
In case of pumps in COMBO mode, it is recommended to make the connections to the motor respecting the same phase sequence. In this manner, it will be ensured that by copying parameter P044 Rotation sense from the master unit to the slave units, all the pumps in the unit will maintain the correct running direction.

11.2.6. AUTOMATIC MASTER REPLACEMENT

In COMBO mode, if a slave or the pump connected to it should fail or enter an alarm state, the unit will continue to operate with the remaining units.
In case the master or the pump connected to it should break down or enter an alarm state, the unit will stop for about 30 seconds generating the A13 No communication alarm in the slaves. After the waiting time has elapsed, the slave with address 1 will become the master, thus allowing the unit to resume operation.

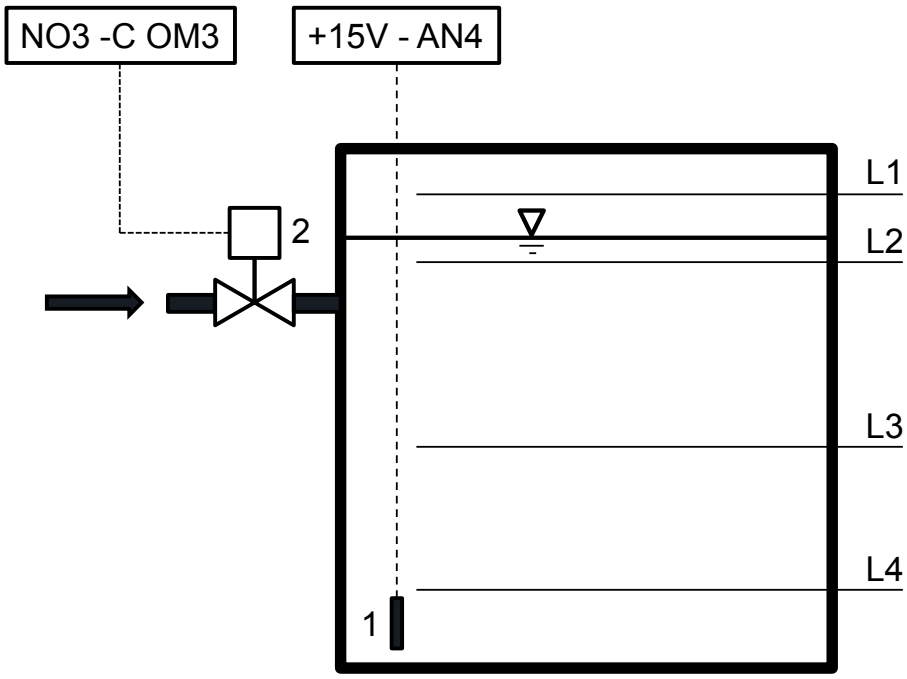
If the master reappears in the unit, the latter will stop again for about 30 seconds, generating the A12 Address error alarm in the master and in the slave 1.
After the waiting time has elapsed, the master will assume address 0 and the slave address 1, thus allowing the unit to resume operation.

CAUTION
In order to enable automatic master changeover, parameter P043 Autorestart must be set to ON. Do not touch the keypad of the devices during the master replacement process, otherwise the master change process will be interrupted.

12. SMARTTANK OPERATION

12.1. INTRODUCTION

The SmartTANK operating makes possible to manage the operation of one or two pumps in COMBO and the tank filling based on the level measured by a level sensor (1) connected to analogue input AN4.



12.2. ELECTRICAL CONNECTIONS

The level sensor to be used must be of 4-20 mA analog type with a power supply voltage such as to include the 15 VDC voltage with which the device powers the sensor.

The level sensor must be connected to analogue input 4 :

- AN4: 4-20 mA signal (-)
- + 15V: power supply 15 VDC (+)

NOTE
Check that the analog input AN4 is correctly configured as a 4-20 mA analog input via jumper on the control board (if available) or via resistor 511 Ohm 1%, 600 mW connected between terminals AN4 and 0V.

In case it' s required to control the opening and closing of a solenoid valve (2) to fill the tank, it is necessary to command its opening and closing by means of NO3, COM3 contact of the output relay 3. If output relay 3 is not available in the device, the opening and closing of the solenoid valve (2) will be controlled via the NO1, COM1 contact of output relay 1. When SmartTANK operation is active, the relay output 1 therefore loses its functionality as a relay to signal the motor status (START/STOP).

12.3. PROGRAMMING

Menu	Parameter	Value
IN/OUT parameters	P082 Offset AN4	Set to 20%
	P116 Unit AN4	Specify a unit among: m, cm, ft, in.
	P117 Full scale sensor AN4	Specify the full scale of the level sensor.
	P118 High Level Alarm	Specify the level (L1) at which it's required to show the warning message W28 HIGH LEVEL and produce a change in the state of alarm relay 2. The pumping system will still continue to operate.
	P119 Fill OFF Level	Specify the level (L2) at which it's required to stop filling the tank by controlling the solenoid valve by opening the NO3, COM3 contact of output relay 3.
	P120 Fill ON Level	Specify the level (L3) at which it's required to start filling the tank by controlling the solenoid valve by closing the NO3, COM3 contact of output relay 3.
	P121 Low Level Alarm	Specify the level (L4) at which it's required to stop the pumping system, show the alarm message A21 LOW LEVEL and produce a change of state of alarm relay 2.
	P134 Level control min freq.	If the value set for the parameter P134 Level control min freq.is lower than the parameter value P039 Max motor frequency, the device will automatically limit the maximum frequency of the motor if the level drops below the value set for the parameter P135 Freq. control max level. In particular, the frequency will be limited to the value set for the parameter P134 Level control min freq. when the level reaches the value set for the parameter P136 Freq. control min level. In the interval between P135 Freq. control max level And P136 Freq. control min level the motor frequency will be limited proportionally between P039 Max motor frequency And P134 Level control min frequency.
	P135 Freq. control max level	
	P136 Freq. control min level	
Control parameters	P057 Start delay AUX	In the case of two pumps in COMBO, if the value of this parameter is set to 0 (default), the stop of a pump for A21 LOW LEVEL it also involves stopping the other pump. In the case of two pumps in COMBO, if the value of this parameter is set greater than 0, the stop of a pump for A21 LOW LEVEL does not involve stopping the other pump.

12.4. WARNINGS

Warning	Description
W28 HIGH LEVEL	The measured level has reached the value set for the parameter P118 High Level Alarm

12.5. ALARMS

Warning	Description
A21 LOW LEVEL	The measured level has dropped below the value set for the parameter P121 Low Level Alarm

13. ALARMS

WARNING
Immediate remedies must be implemented in case of alarms to safeguard the integrity of the device itself and of the system in which it is installed.

Alarm	Description	Possible solutions
A01 Overcurrent motor	The current absorbed by the motor exceeds the maximum allowed value. Reset mode: • Automatic reset after 10 seconds for up to 7 attempts, after which you must wait for 60 minutes. • Disconnecting the power supply.	• Check that motor parameters are correctly set. • Check that the pump is turning in the correct direction. • Make sure that the motor is free to rotate and check for any mechanical issues. • Adjust parameter P008 Voltage boost
A02 Sensor fault	The current value read by the analog input is less than 4 mA. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	• Check that the connections on the device side and on the sensor side are correct. • Check that the sensor is fed the correct power. • Check that the sensor is working properly. • If only one sensor is connected to analog input 1, try to connect it to analog input 2.

Alarm	Description	Possible solutions
A03 Over temperature inverter	The temperature reached by the device is higher than the maximum allowed value. Reset mode: • Automatic reset	• Check that the ambient temperature is within the allowed limits. • Make sure the device is protected from direct exposure to sunlight or heat sources. • Check that both the external and internal cooling fans (if present) are working properly. • Check that the dissipation channels are clean. • Check that the device is cooled as indicated in the dedicated chapter. **NOTE** To ensure uninterrupted operation, the inverter automatically reduces the maximum frequency (i.e. power) when the internal temperature reaches a certain threshold. If such frequency reduction is not sufficient to keep the temperature above the maximum permitted value, the inverter will stop the motor and trigger the alarm A03 Over temperature inverter.
A04 Dry run	The warning W26 No water appeared 5 consecutive times following the automatic reset attempts. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	**WARNING** When the warning W26 No water appears, the device will automatically restart the load after a time equal to the value set in the parameter P088 Restarts delay multiplied by the number of attempts made. At the end of the fifth attempt, the device will definitively stop the load producing the alarm A04 Dry run. The alarm must be reset manually.
A05 Under voltage	• Supply voltage below the minimum allowed value. • Insufficient input power to power the device. Reset mode: • Automatic reset if parameter P043 Autorestart = ON	• Check the value of the power supply voltage both under no load and load conditions. • Verify that the source has enough power to power the load.
A06 Over voltage	The power supply voltage or the voltage inside the device exceeds the maximum allowed value. Reset mode: • Automatic reset if parameter P043 Autorestart = ON	• Check the value of the power supply voltage both under no load and load conditions. • Check for regeneration from the load. • Increase parameter P010 Ramp down • Increase parameter P012 Ramp freq. min motor • In the case of a permanent magnet motor, check that the load is not subjected to passive movement.

Alarm	Description	Possible solutions
A07 Max value alarm	The value read by the analog input is higher than the value set for the parameter P061 Max alarm value. Reset mode: • Automatic reset	• Check the value set for the parameter. • Check the hydraulic causes that lead to the alarm condition. • Check that the sensor is working properly.
A08 Locked rotor	The automatic frequency limitation created by the inverter following an excessive absorption by the motor (beyond the value set in the parameter P017 Rated motor current) causes a reduction of the frequency below the average value between P022 Min motor frequency and P039 Max motor frequency. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	Check the possible solutions for the alarm A01 Overcurrent motor
A09 Overload inverter	The current absorbed by the load exceeds the rated current of the device. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	• Make sure that the motor is free to rotate and check for any mechanical issues. • Increase the value of the parameter P009 Ramp up time. • Increase the value of the parameter P012 Ramp freq. min motor. • Adjust parameter P008 Voltage boost • Check the value of the power supply voltage both under no load and load conditions.

Alarm	Description	Possible solutions
A10 IGBT trip alarm	The current absorbed by the load instantaneously exceeds the maximum current protection of the device's power module. Reset mode: • Automatic reset after 10 seconds for up to 3 attempts, after which you must wait for 60 minutes. • Disconnecting the power supply	• Check the possible solutions for alarms A01 Overcurrent motor and A09 Overload inverter. • Check for short circuits between the output phases and the ground insulation. • Check that the system is properly grounded. • Check for electrical noise from other devices connected to the system.
A11 No load	The current absorbed by the load is too low in relation to the parameter P017 Rated motor current. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	Check the possible solutions for the alarm A01 Overcurrent motor
A12 Address error	In COMBO mode, multiple devices in the group have the same address. Reset mode: • Automatic reset	• Restore the correct value of parameter P062 Address COMBO in all the devices in the group. • Verify which situation triggers the alarm. • If the alarm is triggered after a master replacement, check that the parameter P043 Autorestart is activated. • Check the electrical connection between the slave unit and the master, and the presence of possible disturbances.
A13 No communication	In COMBO mode, the communication between the slave unit and the master has been interrupted. Reset mode: • Automatic reset	• Check the electrical connection between the slave unit and the master, and the presence of possible disturbances. • Exit the master programming menu. • Attempt a manual reset of the alarm. **CAUTION** Keep signal cables separate and never parallel to power cables. If it is necessary to cross them, make sure that they cross perpendicularly.
A14 Min value alarm	The value read by the analog input is lower than the value set for the parameter P016 Min alarm value. Reset mode: • Automatic reset	• Check the value set for the parameter. • Check the hydraulic causes that lead to the alarm condition. • Check that the sensor is working properly.

Alarm	Description	Possible solutions
A15 Keyboard fault	One of the keys of the keyboard was held down for more than 30 seconds. Reset mode: • Alarm reset by STOP key. • Disconnecting the power supply	Check that the keys are mechanically free.
A16 CPU alarm	Communication error between the control part and the power part or error in the CPU. Reset mode: • Automatic reset	• Check the value of the power supply voltage both under no load and load conditions. • Check for electrical noise from other devices connected to the system. • Check the integrity of the communication cable between the control board and the power board.
A12 Address error	In COMBO mode, multiple devices in the group have the same address. Reset mode: • Automatic reset	• Restore the correct value of parameter P062 Address COMBO in all the devices in the group. • Verify which situation triggers the alarm. • If the alarm is triggered after a master replacement, check that the parameter P043 Autorestart is activated. • Check the electrical connection between the slave unit and the master, and the presence of possible disturbances.
A19 Out of step	Reset mode: • Automatic reset with a 3-minute delay.	Check the possible solutions for the alarm A01 Overcurrent motor
A22 ALL. TEMP. MOT.	The temperature measured by the PT100 or PT1000 probe has reached the value set in the parameter P129 PT alarm and the device stops the motor. Reset mode: • Automatic reset when the temperature falls below the parameter P130 PT restart.	• Check that the motor is cooled correctly. • Check the value set for the parameter P129 PT alarm.

14. WARNINGS

Warning	Description	Possible solutions
W01 Digital input active 1	Digital input 1 has been activated.	Check the configuration and connections to digital input 1.
W02 Digital input active 2	Digital input 2 has been activated.	Check the configuration and connections to digital input 2.
W03 Digital input active 3	Digital input 3 has been activated.	Check the configuration and connections to digital input 3.
W04 Digital input active 4	Digital input 4 has been activated.	Check the configuration and connections to digital input 4.
W20 Temp. derate	The inverter is limiting the maximum motor frequency to keep the inverter temperature below the maximum limit.	Check the possible solutions for the alarm A03 Over temperature inverter.
W21 Overload 15V	15V power supply overload.	Check the absorption of the loads and any short circuits connected to the 15V power supply.
W22 EEPROM COM.	No communication with EEPROM.	Contact the technical support service.
W23 EEPROM fault	Failure in EEPROM.	Contact the technical support service.
W25 Alarm slave X	In control mode P049 COMBO, the master has detected an alarm in the X slave.	Check the status of the XX slave unit indicated by the master.
W26 No water	The power factor (cosphi) of the motor read by the device is permanently below the value set in the parameter P020 Dry run cosphi.	• Check that the pump is properly primed. • Check that the pump is turning in the correct direction. • Check that the parameter P020 Dry run cosphi is set correctly.
W27 START/STOP block	The START/STOP buttons have been locked.	Press the START or STOP button for at least 5 seconds to release the lock.
W29 FREQ. RESTARTS	The motor has been restarted periodically too many times. This warning does not involve stopping the motor, but simply serves as an indication for checking the system.	• Check that there are no leaks in the system. • Check the correct volume and pre-charge pressure of the expansion tank. • Check the correct setting of the parameters P003 Delta start, P087 Delta control, P058 Delta stop, P085 Control ramp.
W30 MOT. TEMP. DERATE	The temperature measured by the PT100 or PT1000 probe has reached the value set in the parameter P128 PT Warning and the device reduces the motor frequency to keep the temperature down.	• Check that the motor is cooled correctly. • Check the value set for the parameter P128 PT Warning.

15. UKCA & CE DECLARATION OF CONFORMITY

We: Dutypoint Limited. **Of**: Quedgeley West Business Park, Gloucester, Gloucestershire, United Kingdom in accordance with the following directives and Statutory Instruments where applicable:

- 2006/42/EC: Machinery Directive
- S.I. 2008:1597: The Supply of Machinery (Safety) Regulations 2008
- 2014/68/EU: Pressure Equipment Directive
- S.I. 2016:1105: Pressure Equipment (Safety) Regulations 2016
- 2014/30/EU: Electromagnetic Compatibility Directive
- S.I. 2016:1091: Electromagnetic Compatibility Regulations 2016
- 2014/35/EU: Low Voltage Directive
- S.I. 2016:1101: Electromagnetic Compatibility Regulations 2016
- 2014/53/EU: Radio Equipment Directive
- S.I. 2017:1206: Radio Equipment Regulations 2017
- 2011/65/EU: Restriction of Hazardous Substances in EEE (RoHS) Directive
- 2015/863/EU: (RoHS) 2 Directive
- S.I. 2012:3032: Restriction of Certain Hazardous Substances in EEE Regulations 2012

Hereby declare that the equipment:
Product range: MicroBOOST® MAX
Is in conformity with the applicable (in scope) requirements of the following documents:

- EN 809+A1:2009: Pumps and pump units for liquids - Common safety requirements
- BS EN 61000-6-1:2019, BS EN 61000-6-3:2021, BS EN 61000-3-2:2019 + A1:2021
- BS EN 61800-3:2018, BS EN 62233:2008, BS EN 62311:2020, BS EN 60335-2-41:2021+A11:2021, BS EN 50581:2012
- ETSI EN 301 489-17 V3.1.1:2017, ETSI EN 301 489-1 V2.1.1:2017, ETSI EN 300 328 V2.1.1:2016-11
- BS EN 60529:1991+AC:1993+A1:2000+A2:2013+AC:2016+AC:2019, BS EN 60335-1:2012+A11+A13+A1+A14+A2+A15:2021

I hereby declare that the equipment described above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable essential requirements of the directives.

Nigel Freeman, Director
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TALK TO THE TEAM

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