

Additional Installation, Operation
and Programming Instructions



hydrovar X Series

HVX+ Smart Controller
Control system for frequency converters

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1 Introduction and safety

1.1 Introduction

Purpose of this manual

The purpose of this manual is to provide the necessary information for working with the HVX+ Smart Controller (hereinafter unit).

Read this manual carefully before starting any work.

Acronyms used in the manual

Acronym	Meaning
EEE	Electrical and Electronic Equipment
AWG	American Wire Gauge
BMS	Building Management System
CE	European Conformity Marking
CRC	Cyclic redundancy frame control
CSA	Canadian Standards Association
EEPROM	Electrically erasable programmable read-only memory
ENCLOSURE Type	Enclosure protection degree according to UL standards
IP	Enclosure protection degree according to IEC and EN standards
LRC	Longitudinal redundancy frame control
MAC	Media Access Control
MS/TP	Master-Slave / Token-Passing
NPSH	Net positive suction head
NPT	National Pipe Thread
PE	Safety grounding
PELV	Protection Extra-Low Voltage
PLC	Programmable logic controller
PM	Unit version for installation in an electric panel (EN IEC 61010-2-201: Panel Mounted Equipment)
WEEE	Waste Electrical and Electronic Equipment
RTU	Remote terminal unit
EU	European Union
UE/SEE	European Union and European Economic Area
UL	Underwriters Laboratories
VFD	Frequency converter
WM	Wall mounting unit version

1.2 Hazard levels and safety symbols

Before using the unit, the user must read, understand and comply with the indications of the danger warnings in order to avoid the following risks:

- Injuries and health hazards
- Damage to the product
- Unit malfunction.

Hazard levels

Hazard level	Indication
 DANGER:	It identifies a dangerous situation which, if not avoided, causes serious injury, or even death.
 WARNING:	It identifies a dangerous situation which, if not avoided, may cause serious injury, or even death.
 CAUTION:	It identifies a dangerous situation which, if not avoided, may cause small or medium level injuries.
NOTE:	It identifies a situation which, if not avoided, may cause damage to property but not to people.

Complementary symbols

Symbol	Description
	Electrical hazard
	Explosive atmosphere hazard
	Ionizing radiation hazard

1.3 User safety

Strictly comply with current health and safety regulations.

Qualified personnel

The installation, operation, maintenance and troubleshooting of the unit are reserved for qualified personnel only. Qualified users are people able to recognise the risks and avoid dangers during installation, use, maintenance and troubleshooting of the unit.

Personal protective equipment

During handling, installation, operation, maintenance and troubleshooting, use personal protective equipment as required. Examples of personal protective equipment include, but are not limited to, helmet, gloves and safety shoes.

Sites exposed to ionizing radiations



WARNING: Ionizing radiation hazard

If the unit has been exposed to ionizing radiations, implement the necessary safety measures for the protection of people. If the unit needs to be dispatched, inform the carrier and the recipient accordingly, so that appropriate safety measures can be put in place.

1.4 Protection of the environment

Packaging material and product disposal

Comply with the current regulations on sorted waste disposal, see **Disposal**.

2 Handling and storage

2.1 Precautions

Before starting any work, make sure to read and understand all the safety instructions in **Introduction and safety**.



WARNING: Cutting and crushing hazards

Always wear personal protective equipment.

2.2 Unit inspection upon delivery

Package inspection

1. Check that quantity, descriptions and product codes match the order.
2. Check the packaging for any damage or missing components.
3. In case of immediately detectable damage or missing parts:
 - Accept the goods with reserve, indicating any findings on the transport document, or
 - Reject the goods, indicating the reason on the transport document.In both cases, promptly contact Xylem or the Authorised Distributor from whom the product was purchased.

Unpacking and inspection of the unit

1. Remove the packaging.
2. Ensure sorting of all packaging materials in accordance with the applicable regulations.
3. Release the unit by removing the screws and/or cutting the straps, if fitted.
4. Check the unit for integrity and to make sure that there are no missing components.
5. In case of damage or missing components, promptly contact Xylem or the Authorised Distributor.

2.3 Storage

Storage of the packed unit

The unit must be stored:

- In a covered and dry place
- Away from heat sources
- Protected from dirt
- Protected from vibrations
- At an ambient temperature between -40°C and +70°C (-40°F and 158°F), and maximum relative humidity of 90% at 30°C (86°F).

NOTE:

- Do not place heavy loads on top of the unit.
 - Protect the unit from collisions.
-

3 Product description

3.1 Construction features

Designation

Control system (Programmable Logic Controller) for frequency converters (hereinafter converters), with analogue and digital inputs and outputs, RS485 and wireless functions.

Series name

hydrovar X+ Smart Controller.

Versions

Version	Installation	Power Supply Voltage
WM	Wall installation	• 24 V direct current • 115-240 V alternating current
PM	In an electric panel	24 V direct current

Intended use

- Product intended for commercial, entrepreneurial, craft or professional use, for controlling a frequency converter of one or more pumps.
- Product not intended for use by a "consumer" (for the definition of "consumer," refer to Regulation (EU) 2023/988).
- Always observe the operating limits in Specifications.



DANGER: Potentially explosive atmosphere hazard

It is prohibited to start the unit in environments with potentially explosive atmospheres or with combustible dusts.

Incorrect use



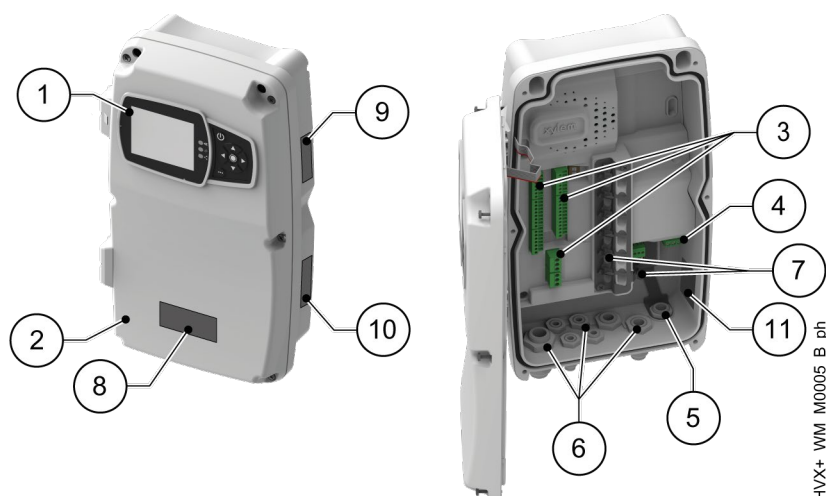
Control of equipment that is not included in the intended use.

WARNING: Physical hazard

Any use other than the intended use may compromise the prevention and protection measures put in place by the manufacturer.

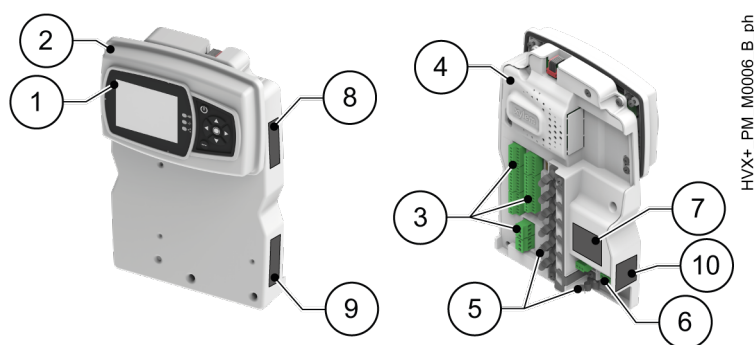
3.2 Part names

WM



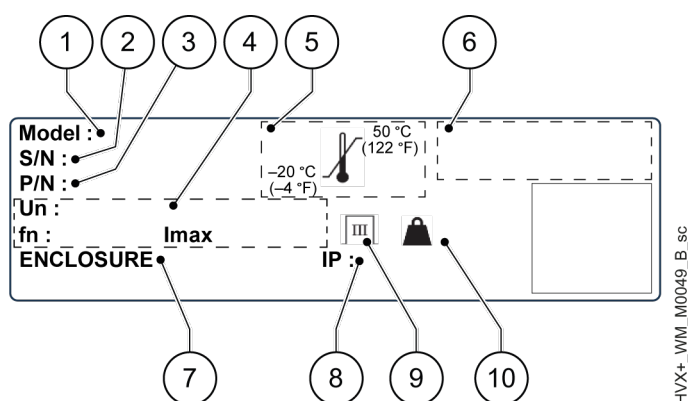
1. Control display
2. Cover
3. Auxiliary connections terminals
4. Power supply terminals
5. Electric power supply cable input
6. Signal cable inputs
7. Shielding springs
8. Warning sticker
9. Data plate
10. Sticker showing extra-EU/EEA approvals as radio equipment, if applicable
11. Power supply cable temperature warning sticker

PM



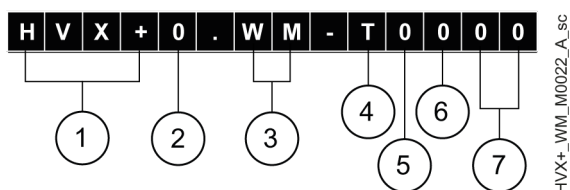
1. Control display
2. External part of the unit
3. Auxiliary connections terminals
4. Internal part of the unit
5. Shielding springs
6. Power supply terminals
7. Warning sticker
8. Data plate
9. Sticker showing extra-EU/EEA approvals as radio equipment, if applicable
10. Power supply cable temperature warning sticker

3.3 Data plate



1. Identification code
2. Serial number and manufacturing date
3. Product code
4. Voltage, power supply type, maximum power consumption
5. Minimum and maximum ambient operating temperature
6. Space for conformity and approval symbols and marks
7. UL protection degree
8. IP protection degree
9. Overvoltage category
10. Weight

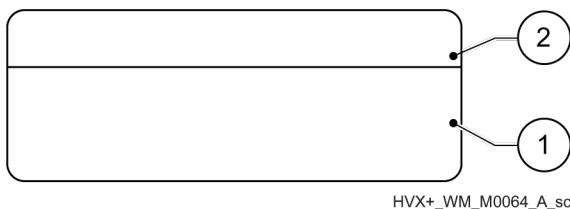
Identification code



1. +3, model denomination
2. Power supply voltage with 24 V [0] direct current or 1~ 115-240 V 50/60 Hz [1] alternating current
3. Wall [WM - wall mounting] or electric panel [PM - panel mounting] installation
4. IP66 protection degree for the WM version [T]; or IP66 for the external part and IP20 for the internal part for the PM [U] version
5. Protocol add-on module not available [0]
6. LCD Display [0]
7. Assigned by the manufacturer

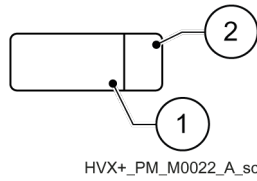
3.4 Stickers

Warning sticker, WM



1. Specific warnings for the United States and Canadian markets
2. Warnings for other countries

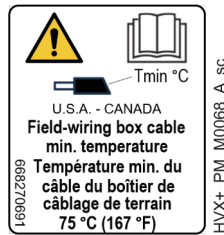
Warning sticker, PM



HVX+_PM_M0022_A_sc

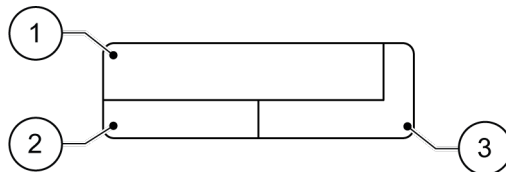
1. Specific warnings for the United States and Canadian markets
2. Warnings for other countries

Minimum power supply cable temperature warning sticker



HVX+_PM_M0068_A_sc

Sticker showing approval as radio equipment, if applicable



HVX+_WM_M0065_A_sc

1. Approvals for the United States market
2. Approvals for the Canadian market
3. Approvals for other countries

4 Contents of the packaging

WM

The packaging includes:

- 1 × "Safety and other information" manual
- 1 × "Quick Startup Guide"
- 1 × HVX+ Smart Controller unit
- 1 × M12 × 1.5 cable gland
- 1 × M16 × 1.5 cable gland
- 1 × ½" NPT adapter
- 1 × drilling template.

PM

The packaging includes:

- 1 × "Safety and other information" manual
- 1 × "Quick Startup Guide"
- 1 × external part of the HVX+ Smart Controller unit
- 1 × internal part of the HVX+ Smart Controller unit
- 1 × 4×50-PH2 screw
- 3 × 4×20-PH2 screws
- 1 × M4×40-TX20 screw + nut + washer
- 3 × M4×20-TX20 screws + nuts + washers
- 1 × drilling template.

5 Installation

5.1 Precautions

Before starting any work, make sure to read and understand all the safety instructions in **Introduction and safety**.



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.



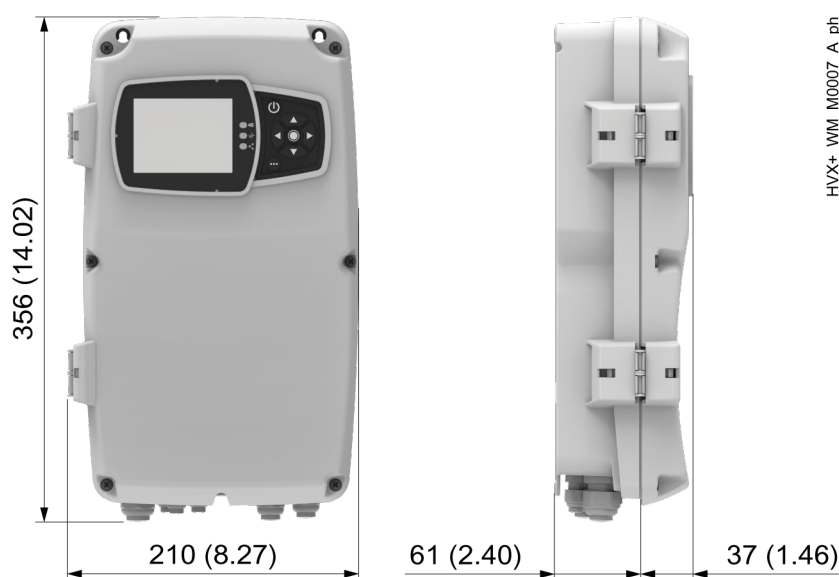
WARNING: Physical hazard

Always wear personal protective equipment.

5.2 WM version installation

5.2.1 Dimensions and weight

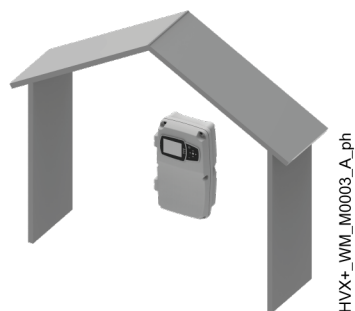
The figure shows the dimensions of the unit in mm (in).



Weight: 1.6 kg (3.5 lb).

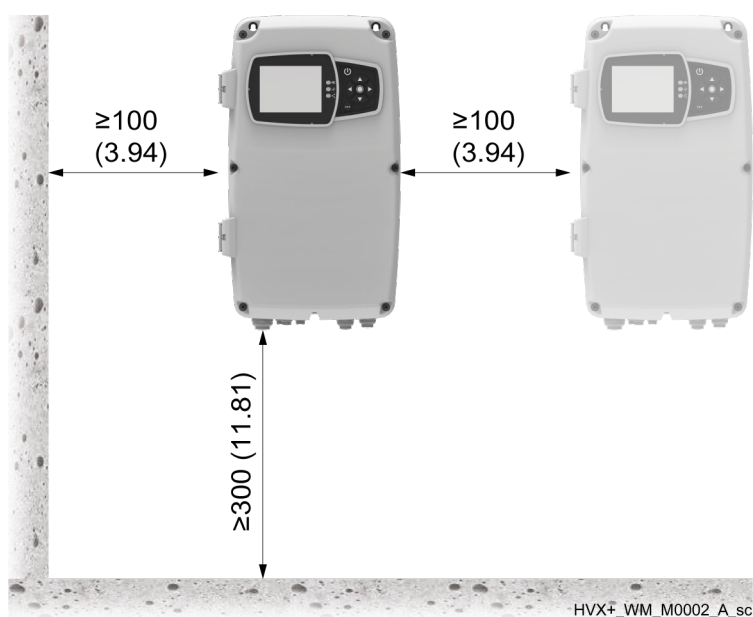
5.2.2 Installation area

1. Follow the provisions in **Operating environment** on page 120.
2. Fix the unit to a wall or a sufficiently strong and heavy support, see also **Dimensions and weight**.
3. Make sure that any leaks will not cause flooding to the installation area or submerge the unit.
4. When installing outdoors, protect the unit from direct sunlight and weather with a suitable cover.



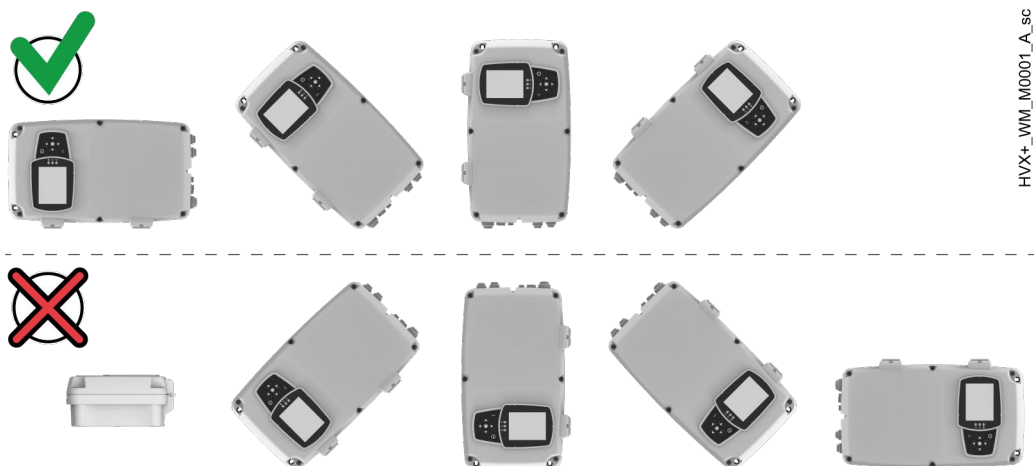
Clearance around the unit

The figure shows the minimum distances to be observed between the unit and any objects or other units, in order to ensure the possibility of opening the cover and feed the electric cables, in mm (in).



Installation positions

The figure shows the permitted and non-permitted installation positions.



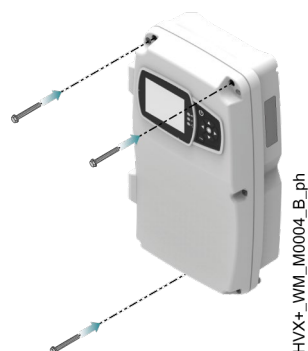
5.2.3 Fastening

1. Place the template on the wall and mark the position of the fasteners.
2. Secure the unit with fastening systems suitable for the support material:

Support material	Fastening system	Tightening torque Nm (lbf·in)
Concrete	3 dowels 6x30 (1/4"x3/16") + 3 screws 4.5x40 (#8x1.5")	2 (18)
Metal	3 bolts M5X15 min. (10-32x5/8" min.)	

Notes:

- The heads of the screws must have a flat base, not conical or countersunk.
- During fastening, keep the unit cover closed.

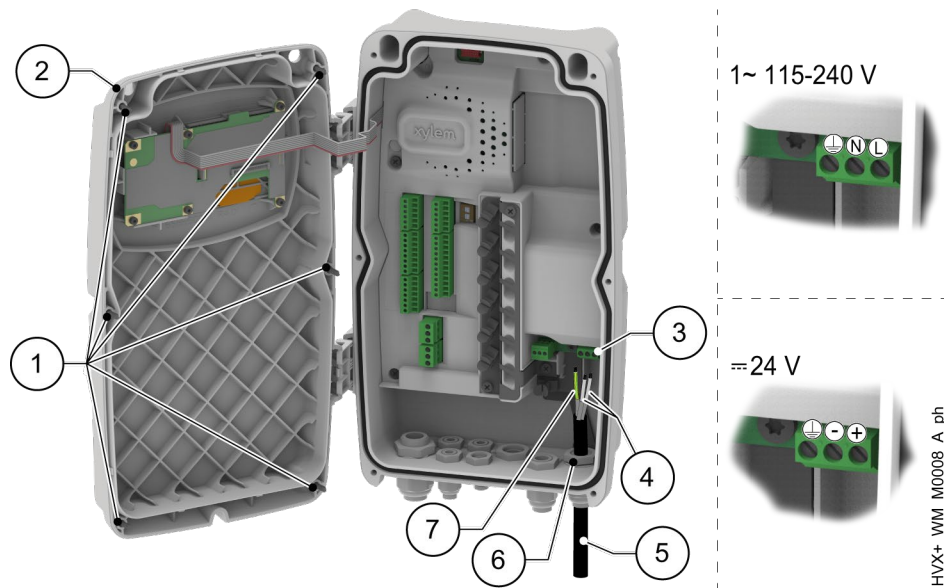


5.2.4 Electrical connection

Requirements

1. In the 24 V DC version, the power supply line must:
 - Be of the protection extra-low voltage type (hereinafter PELV)
 - Provide at least 350 mA.
2. In the 115-240 V AC version, the power supply line must:
 - Be protected by a short-circuit protection device with overvoltage category III and threshold current set at 1 A or, alternatively, by a 2A delayed fuse
 - Have a mains disconnection device with contact opening distance ensuring complete disconnection for overvoltage III category conditions.
3. The power supply terminals allow the use of conductors as follows:
 - Rigid with cross-section from 0.2 to 4 mm²
 - Flexible with cross-section from 0.2 to 2.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 2.5 mm², with (recommended) or without plastic collar
 - AWG 24-12 UL/CSA.
4. Check that the field-wiring box cable minimum temperature is 75°C (167°F) and is protected against:
 - High temperature
 - Vibrations
 - Collisions
 - Liquids.

Connection



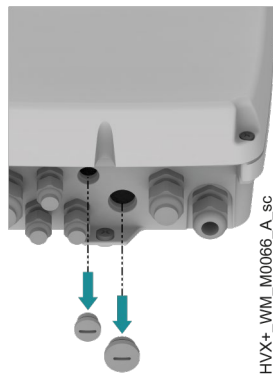
1. Cover closing screws
2. Cover
3. Power supply terminals
4. Phase conductors
5. Electric power supply cord
6. Power supply M16 cable gland
7. Protection conductor (ground)



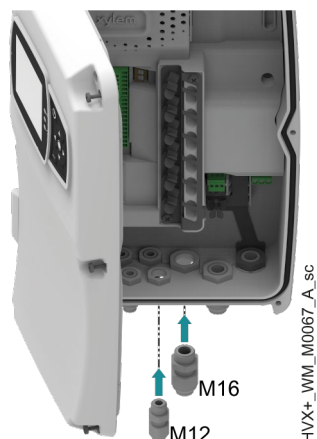
DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.

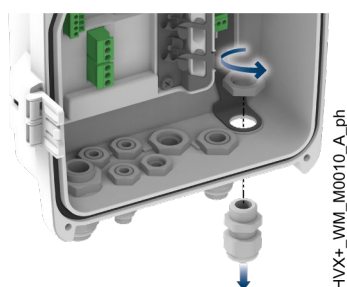
1. Remove the M12 and M16 plugs.



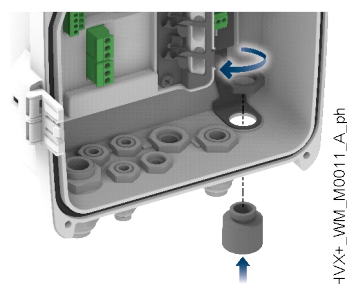
2. Open the unit cover by unscrewing the 6 screws.
3. Install the supplied M12 and M16 cable glands, tightening the nut to a torque of 1.5 Nm (13.3 lbf·in) and 2.5 Nm (22.1 lbf·in) respectively.



4. If necessary, replace the power supply M16 cable gland with the ½" NPT standard adapter supplied:
 - Remove the cable gland.



- Insert the adapter and secure it by tightening the nut to a torque of 2.5 Nm (22.1 lbf·in).



5. Insert the cable into the cable gland or adapter.
6. Ensure that the protection conductor is longer than the phase or power supply conductor.
7. Strip the conductors to a length of 8 mm (0.31 in).
8. Connect the conductors to the terminals by tightening the screws with a torque of 0.6 Nm (5.3 lbf·in).
9. Tighten the cable gland, if fitted.
Tightening torque: 2.5 Nm (22.1 lbf·in) ± 15%.
10. Close the cover and tighten the screws.
Tightening torque: 1.5 Nm (13.3 lbf·in) ± 15%.

5.2.5 Connecting the signal cables

Requirements

- The terminals for the auxiliary connections allow the use of conductors as follows:
 - Rigid or flexible with cross-section from 0.14 to 1.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 0.5 mm² with plastic collar (recommended), or cross-section from 0.25 to 1.5 mm² without collar
 - AWG 28-16 UL/CSA.
- The terminals of the auxiliary relays allow the use of conductors as follows:
 - Rigid or flexible with cross-section from 0.2 to 2.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 2.5 mm², with or without plastic collar
 - AWG 24-12 UL/CSA.
- Conductors must be protected against:
 - High temperature
 - Vibrations
 - Collisions
 - Liquids.

Connection



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.

1. Open the unit cover by unscrewing the 6 screws.
2. Insert the signal cables into the cable glands.

Cable gland size	Cable diameter, min. - max., mm (in)
M12	3 to 6 (0.1 to 0.24)
M16	5 to 9.5 (0.2 to 0.4)
M20	8 to 13 (0.3 to 0.5)

3. Strip the end of the conductors to a length of 6 - 7 mm (0.2 - 0.3 in).
4. Connect the conductors to the terminals by tightening the screws with the torque shown in the table:

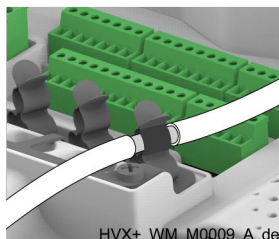
Terminal number	Tightening torque, Nm (lbf·in) ± 15%
1 to 39 and 49 to 51	0.2 (1.7)
40 to 45	0.5 (4)



DANGER: Electrical hazard

If relay 1 is connected to a voltage higher than 30 V, disconnect and do not use the terminals of relay 2.

5. Grounding of the cable shields is recommended:
 - Strip the cables to a length of approx. 12 mm (0.5 in)
 - Insert the stripped section into the springs.



6. Tighten the cable glands.

Cable gland size	Tightening torque, Nm (lbf·in) $\pm 15\%$
M12	1.5 (13.3)
M16	2.5 (22.1)
M20	3.5 (31)

7. Close the cover and tighten the screws.
Tightening torque: 1.5 Nm (13.3 lbf·in) $\pm 15\%$.

5.3 PM version installation

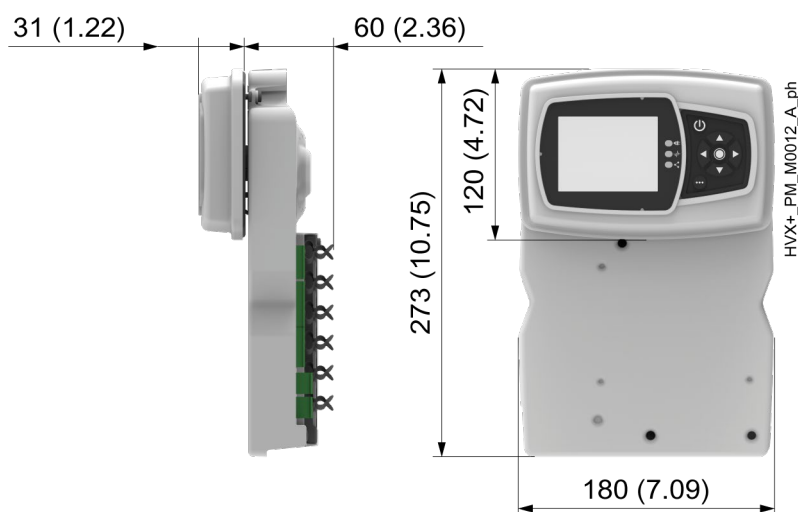


WARNING: Physical and electrical hazards

The installer must ensure safety when integrating the unit with the electric panel. Ensure that the installation and all connections are completed correctly in accordance with current safety regulations, to avoid the risk of electric shocks, short circuits or other physical dangers.

5.3.1 Dimensions and weight

The figure shows the dimensions of the unit in mm (in).



Weight: 0.9 kg (2 lb).

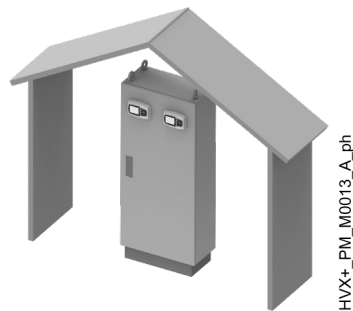
5.3.2 Installation area

- Follow the provisions in **Operating environment** on page 120.
- Install the unit in a metal or plastic electric panel.
- Ensure that the surface where the unit is to be fixed is 1 to 4 mm (0.04 to 0.16 in) thick and that it is:
 - Rigid
 - Smooth or textured
 - Clean and free of solid parts that could compromise the IP protection degree (Enclosure type).

NOTE:

The IP protection degree of the unit is limited by that of the electric panel, unless the panel itself provides equivalent protection.

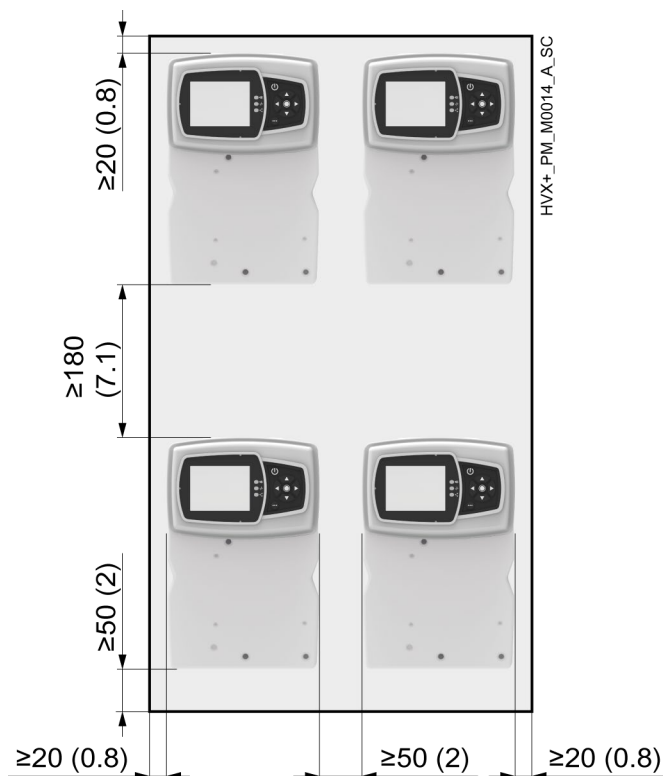
4. Place the unit in a raised position in relation to the floor.
5. Make sure that any leaks will not cause flooding to the installation area or submerge the unit.
6. In case of outdoor installation:
 - protect the unit from direct sunlight and weather with a suitable cover
 - Please refer to the installation instructions for the electric panel.



Clearance around the unit

The figure shows the minimum distances to be observed between the internal part of the unit and other units or the edges of the electric panel, in mm (in).

Note: The distances are the same also when the internal unit is installed rotated by 180° with respect to the control display.



Installation positions

The figure shows the permitted and non-permitted installation positions, also applicable when the internal unit is installed rotated by 180° with respect to the control display.



5.3.3 Fastening

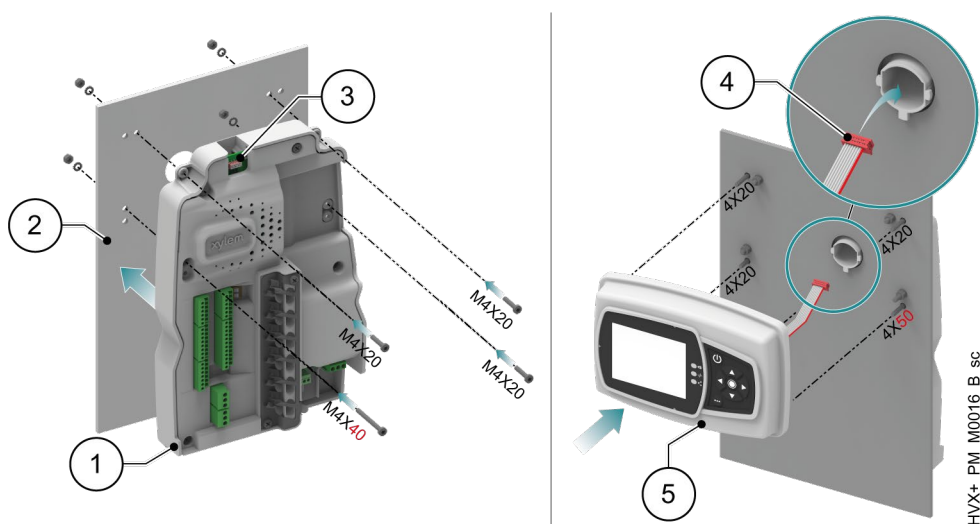


Figure 1: Fastening of the unit

1. Internal part of the unit
2. Electric panel wall
3. J9 connector
4. Flat cable
5. External part of the unit



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.

1. Drill the electric panel using the supplied template: use side A of the template if drilling from the inside, side B if drilling from the outside.
2. Secure the internal part of the unit with the 3 M4X20 bolts and the M4X40 bolt supplied. Tightening torque: 3 Nm (26.6 lbf·in) ± 15%.

NOTE:

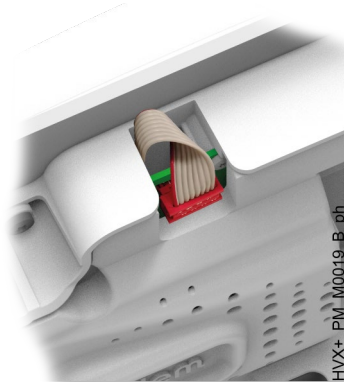
Make sure that the position of the M4X40 bolt is as shown in figure 1.

3. Insert the flat cable into the hole and secure the external part of the unit with the 3 4X20 screws and the 4X50 screw supplied.
Tightening torque: 2.5 Nm (22.1 lbf·in) $\pm$ 15%.

NOTE:

Make sure that the position of the 4X50 screw is as shown in figure 1.

4. On the internal part of the unit, attach the flat cable to connector J9 as shown in the figure below.

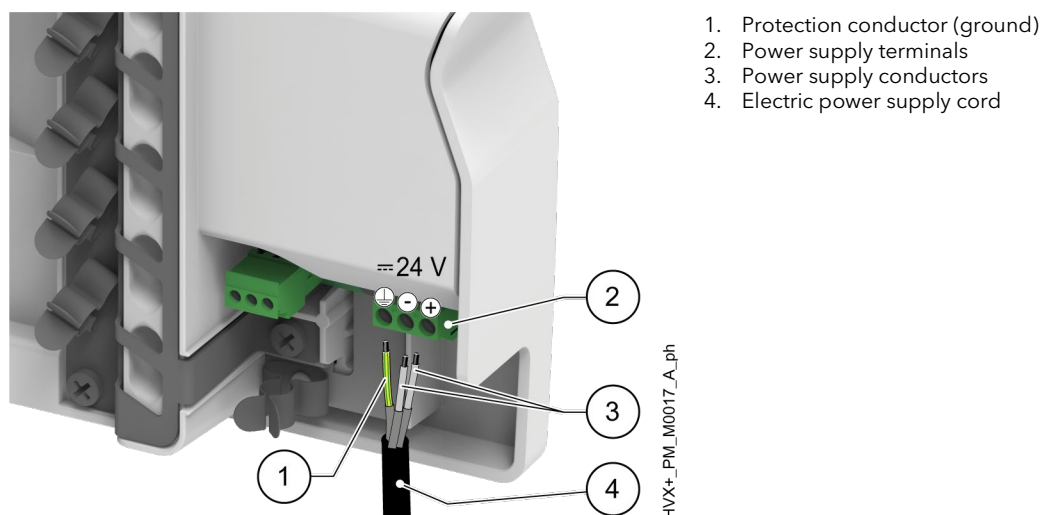


5.3.4 Electrical connection

Requirements

- The power supply line must:
 - Be of the protection extra-low voltage type (hereinafter PELV)
 - Provide at least 350 mA.
- The power supply terminals allow the use of conductors as follows:
 - Rigid with cross-section from 0.2 to 4 mm²
 - Flexible with cross-section from 0.2 to 2.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 2.5 mm², with (recommended) or without plastic collar
 - AWG 24-12 UL/CSA.
- Check that the field-wiring box cable minimum temperature is 75°C (167°F) and is protected against:
 - High temperature
 - Vibrations
 - Collisions
 - Liquids.

Connection



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.

1. Open the electric panel.
2. Ensure that the protection conductor is longer than the power supply conductors.
3. Strip the conductors to a length of 8 mm (0.31 in).
4. Connect the conductors to the terminals by tightening the screws with a torque of 0.6 Nm (5.3 lbf·in).
5. Close the electric panel.

5.3.5 Connecting the signal cables

Requirements

- The terminals for the auxiliary connections allow the use of conductors as follows:
 - Rigid or flexible with cross-section from 0.14 to 1.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 0.5 mm² with plastic collar (recommended), or cross-section from 0.25 to 1.5 mm² without collar
 - AWG 28-16 UL/CSA.
- The terminals of the auxiliary relays allow the use of conductors as follows:
 - Rigid or flexible with cross-section from 0.2 to 2.5 mm²
 - If with terminal sleeve with ferrule, cross-section from 0.25 to 2.5 mm², with or without plastic collar
 - AWG 24-12 UL/CSA.
- Conductors must be protected against:
 - High temperature
 - Vibrations
 - Collisions
 - Liquids.

Connection



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.

1. Strip the end of the conductors to a length of 6 - 7 mm (0.2 - 0.3 in).
2. Connect the conductors to the terminals by tightening the screws with the torque shown in the table

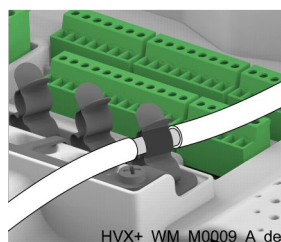
Terminal number	Tightening torque, Nm (lbf·in) $\pm$ 15%
1 to 39 and 49 to 51	0.2 (1.7)
40 to 45	0.5 (4)



DANGER: Electrical hazard

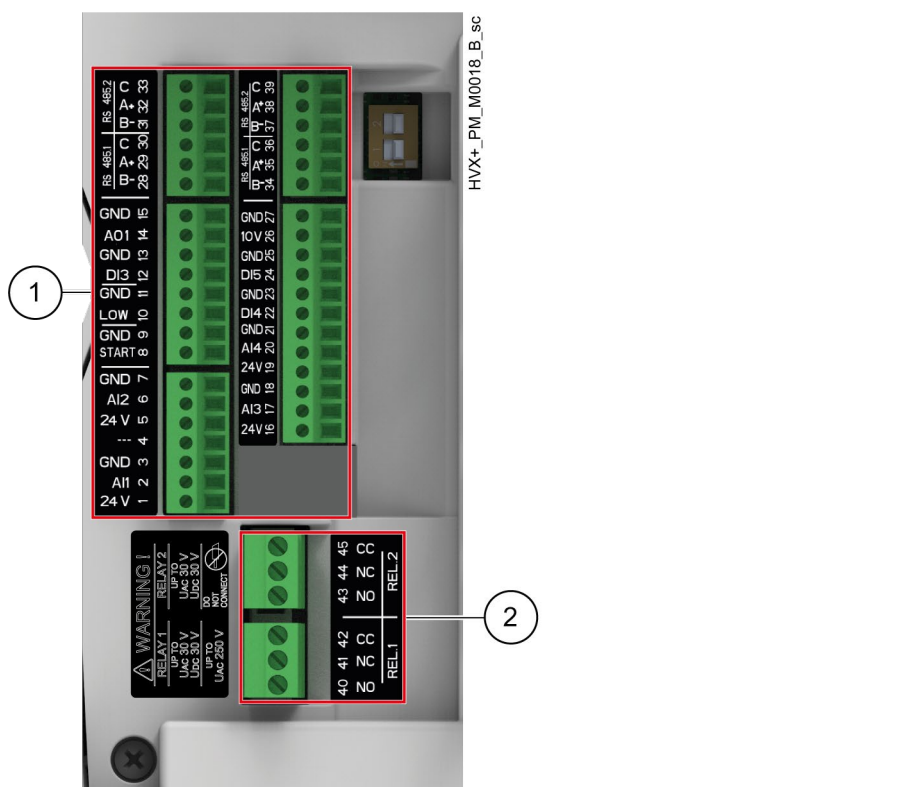
If relay 1 is connected to a voltage higher than 30 V, disconnect and do not use the terminals of relay 2.

3. Grounding of the cable shields is recommended:
 - Strip the cables to a length of approx. 12 mm (0.5 in)
 - Insert the stripped section into the springs.



5.4 Auxiliary connections

The figure shows the position of the auxiliary connection terminals.



1. Analogue and digital inputs and outputs
2. Relay

Analogue and digital inputs and outputs

Terminal	Name	Description	Default setting
1	Analogue input 1	Power supply +24 V, max. 60 mA (total, terminals 1 + 5)	Pressure sensor 1
2		Configurable analogue input 1	
3		Electronic GND	
4	Reserved	For internal use, do not connect	-
5	Analogue input 2	Power supply +24 V, max. 60 mA (total, terminals 1 + 5)	Not selected
6		Configurable analogue input 2	
7		Electronic GND	
8	External Start/Stop	Digital start/stop input, internal pull-up +24 V, contact current 6 mA	-
9		Electronic GND	
10	External Lack of Water	Low water level digital input, internal pull-up +24 V, contact current 6 mA	-
11		Electronic GND	
12	Digital Input 3	Configurable digital input 3, internal pull-up +24 V, contact current 6 mA	Start at maximum speed (RUN ONLY)
13		Electronic GND	

Terminal	Name	Description	Default setting
14	Analogue output	Configurable analogue output	Motor Speed
15		Electronic GND	
16	Analogue input 3	Power supply +24 V, max. 60 mA (total, terminals 16 and 19)	Not selected
17		Configurable analogue input 3	
18		Electronic GND	
19	Analogue input 4	Power supply +24 V, max. 60 mA (total, terminals 16 and 19)	Not selected
20		Configurable analogue input 4	
21		Electronic GND	
22	Digital Input 4	Configurable digital input 4, internal pull-up +24 V, contact current 6 mA	Not selected
23		Electronic GND	
24	Digital Input 5	Configurable digital input 5, internal pull-up +24 V, contact current 6 mA	Not selected
25		Electronic GND	
26	10 VDC power supply	Power supply +10 V, max. 3 mA	-
27		Electronic GND	
28	Communication Bus 1	RS485 port 1: RS485-1B N (-)	Multipump
29		RS485 port 1: RS485-1A P (+)	
30		RS485 port 1: RS485-COM	
31	Communication Bus 2	RS485 port 2: RS485-2B N (-)	Modbus
32		RS485 port 2: RS485-2A P (+)	
33		RS485 port 2: RS485-COM	
34	Communication Bus 1	RS485 port 1: RS485-1B N (-)	Multipump
35		RS485 port 1: RS485-1A P (+)	
36		RS485 port 1: RS485-COM	
37	Communication Bus 2	RS485 port 2: RS485-2B N (-)	Modbus
38		RS485 port 2: RS485-2A P (+)	
39		RS485 port 2: RS485-COM	

Relay

Terminal	Name	Description	Default setting
40	Relay 1	Configurable relay 1: normally open	Error Reporting
41		Configurable relay 1: normally closed	
42		Configurable relay 1: common contact	
43	Relay 2	Configurable relay 2: normally open	Motor run
44		Configurable relay 2: normally closed	
45		Configurable relay 2: common contact	

5.5 Connection with a frequency converter

The unit can be connected and control one of the following converters:

- Xylem Aquavar IPC
 - Danfoss VLT AQUA Drive FC 202
 - ABB ACQ 580
- or a generic model.



DANGER: Electrical hazard

- Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the converter, the control panel and the auxiliary control circuit.
- After disconnecting the system from the power supply, wait a few minutes for any residual voltage left in the converter to dissipate. Please refer to the converter manual.

Connection

1. Depending on the unit version:
 - WM, open the unit cover, see **Electrical connection** on page 17, or
 - PM, open the electric panel and access the internal part of the unit.
2. Open the converter cover; refer to the converter manual.
3. Connect the terminals of the unit with those of the converter, following the wiring diagrams shown in the figures below.

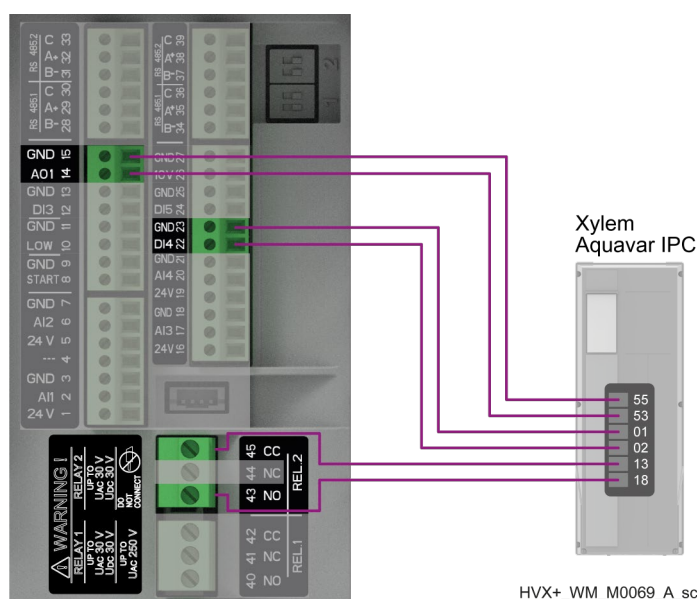


Figure 2: Connection of the unit with Xylem Aquavar IPC

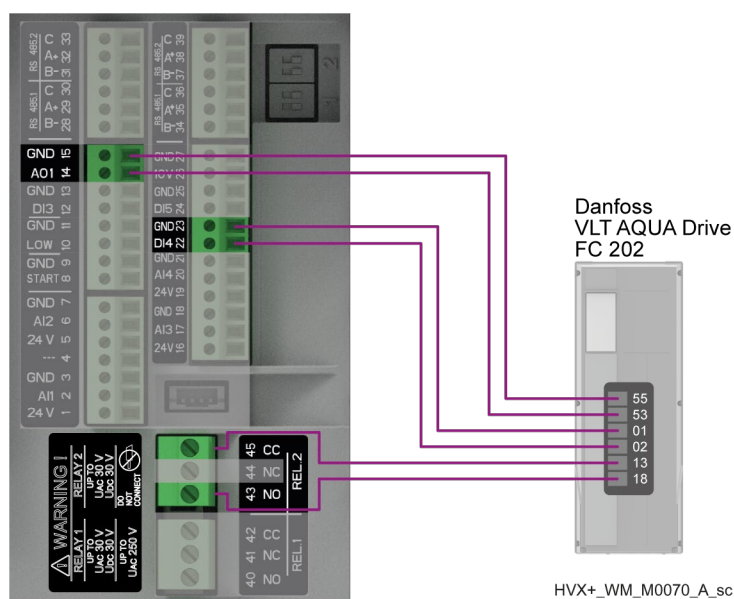


Figure 3: Connection of the unit with Danfoss VLT AQUA Drive FC 202

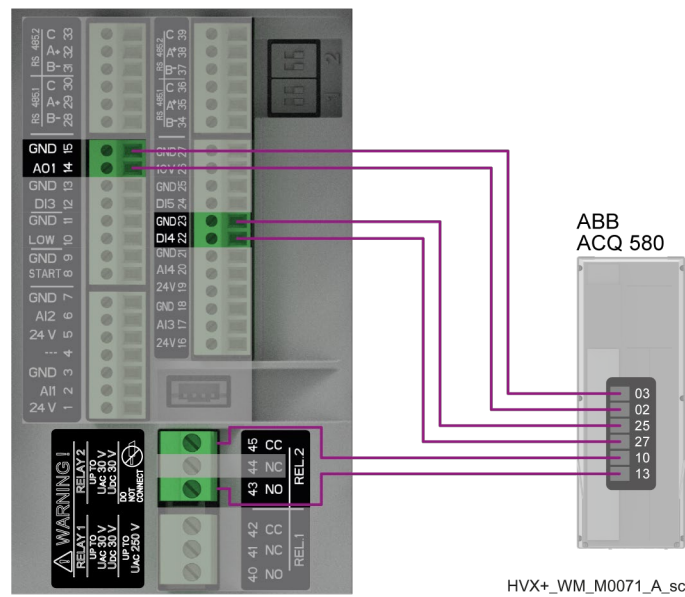


Figure 4: Connection of the unit with ABB ACQ 580

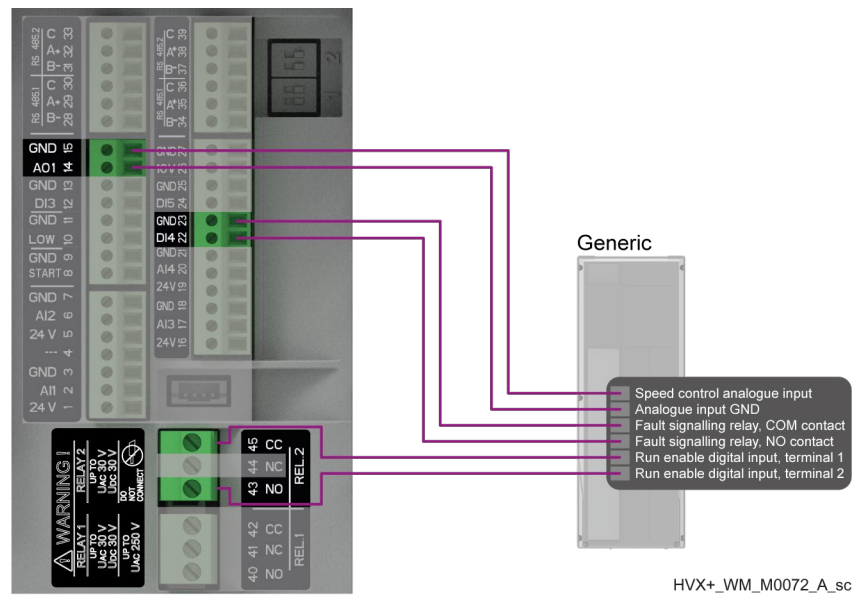


Figure 5: Connection of the unit with a generic converter

Tightening torques:

- Terminals 1 to 39 and 49 to 51 → 0.2 Nm (1.7 lbf-in) ± 15%
- Terminals 40 to 45 → 0.5 Nm (4 lbf-in) ± 15%
- Converter terminals → refer to the converter manual.

4. Close the converter cover.

5. Depending on the unit version:

- WM, close the unit cover, see **Electrical connection** on page 17, or
- PM, close the electric panel.

6 Use and operation

6.1 Precautions

Before using the unit, make sure that the safety instructions in **Introduction and safety** have been read and understood and that the instructions in chapter **Installation** have been followed correctly.



WARNING: Physical and thermal hazards

Always wear personal protective equipment.

6.2 Switching on the unit and the frequency converter



DANGER: Electrical hazard

Before switching on the unit and the converter, check that:

- The unit cover
 - The converter cover
 - The control panel door are closed.
-

6.2.1 Switching on the WM version

24 V DC, unit powered by the converter

1. Locate the switch protecting the converter power supply line.
2. Turn the switch ON.

24 V DC, unit not powered by the converter

1. Locate and switch on the device that supplies the 24 V DC power supply.
2. Locate the switch protecting the converter power supply line.
3. Turn the switch ON.

115-240 V alternating current

1. Locate the switch protecting the unit power supply line.
2. Locate the switch protecting the converter power supply line.
3. Set both switches to ON.

6.2.2 Switching on the PM version

Set the switch of the electric panel to ON.

6.3 Frequency converter configuration

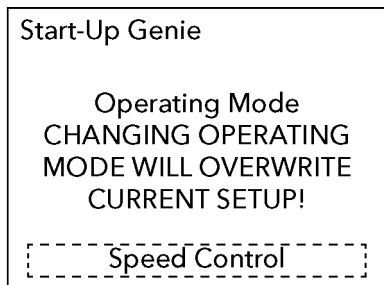
NOTE:

The instructions in the following paragraphs may not be up-to-date or may not apply to the specific product due to updates or changes made after the publication of this manual. It is recommended to refer to the latest converter manual provided by the manufacturer or consult technical support for any clarifications.

6.3.1 Xylem Aquavar IPC

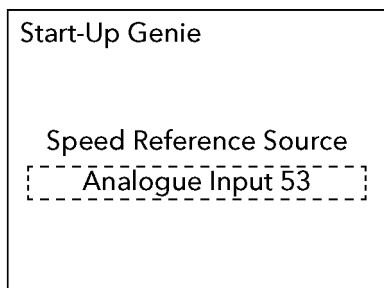
Please refer to the Xylem Aquavar IPC Quick Start Guide.

1. In case of first start, the converter display shows the quick start menu START-UP GENIE: go to step 3.
2. In case of a new start:
 - Press the QUICK MENU button on the converter control display
 - Select Q4 SMART START.
3. Select SPEED CONTROL.



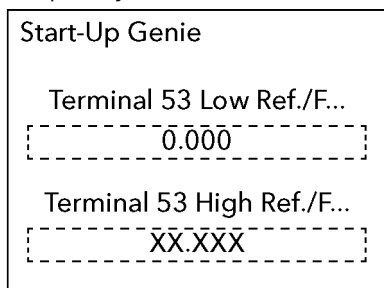
HVX+_WM_M0023_A_tc

4. Select ANALOGUE INPUT 53.



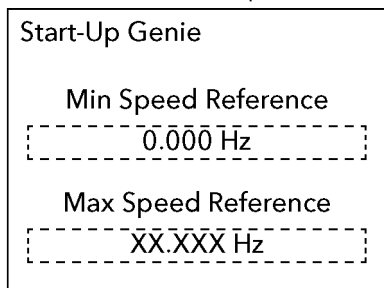
HVX+_WM_M0024_A_tc

5. Enter the references LOW and HIGH of input 53. HIGH must be equal to the maximum frequency of the motor.



HVX+_WM_M0025_A_tc

6. Enter the MIN and MAX SPEED REFERENCE of input 53. The values must be the same as those entered in step 5.



HVX+_WM_M0026_A_tc

7. Enter the PUMP PROTECTION CONFIGURATION menu.

8. Set in sequence the parameters as shown in the figures below.

Start-Up Genie

Continue to Pump
Protection Setup

HVX+_WM_M0050_A_tc

Start-Up Genie

Sleep mode

HVX+_WM_M0051_A_tc

Start-Up Genie

No water/Loss of Prime
Fault

HVX+_WM_M0052_A_tc

Start-Up Genie

Suction Input

HVX+_WM_M0053_A_tc

Start-Up Genie

Set Up Low Suction
Protection Through Digital
Input 27?

HVX+_WM_M0054_A_tc

Start-Up Genie

Set Up Low Suction
Protection Through Digital
Input 29?

HVX+_WM_M0055_A_tc

Start-Up Genie

Set Up Pump Protection
Through Digital Input 19?

HVX+_WM_M0056_A_tc

Start-Up Genie

Set Up Pump Protection
Through Digital Input 27?

HVX+_WM_M0057_A_tc

Start-Up Genie

Set Up Pump Protection
Through Digital Input 29?

HVX+_WM_M0058_A_tc

Start-Up Genie

Continue to Digital Input
Setup

HVX+_WM_M0059_A_tc

Start-Up Genie

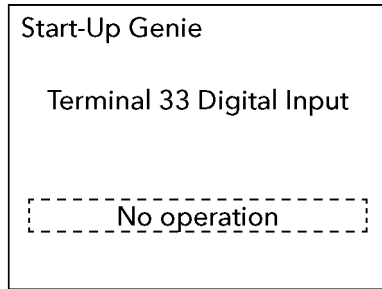
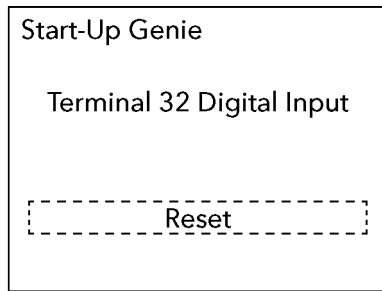
Terminal 19 Digital Input

HVX+_WM_M0060_A_tc

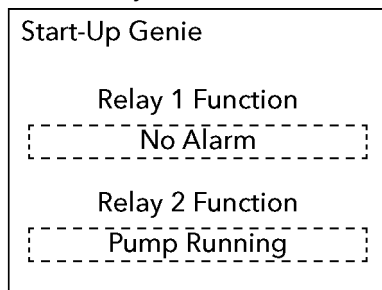
Start-Up Genie

Terminal 29 Digital Input

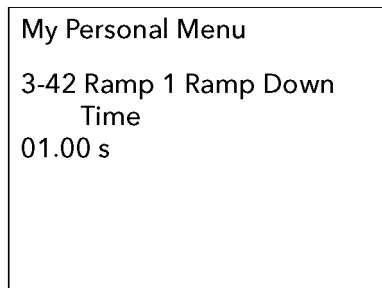
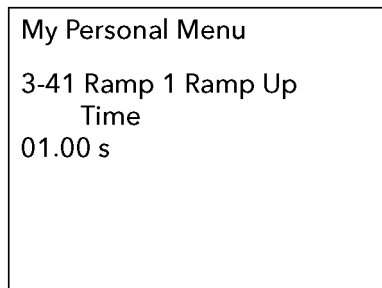
HVX+_WM_M0061_A_tc



9. Select relay functions 1 and 2.



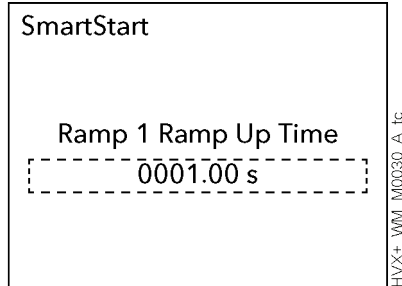
- 10.Exit the menu START-UP GENIE.
- 11.Press the QUICK MENU button and select Q1 MY PERSONAL MENU.
- 12.Set the acceleration and deceleration times of ramp 1.



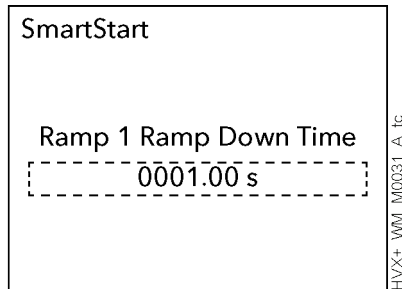
6.3.2 Danfoss VLT AQUA Drive FC 202

Please refer to the Danfoss VLT AQUA Drive FC 202 Operating Instructions.

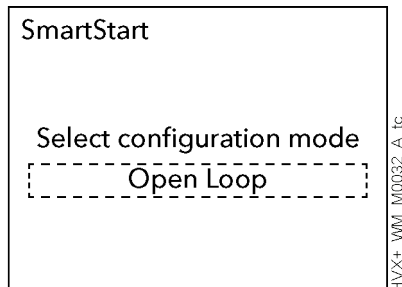
1. In case of first start, the converter display shows the quick start menu SMARTSTART: go to step 3.
2. In case of a new start:
 - Press the QUICK MENU button on the converter control display
 - Select 04 SMARTSTART.
3. To configure the motor parameters follow the indications shown on the display.
4. Set the acceleration time of ramp 1.



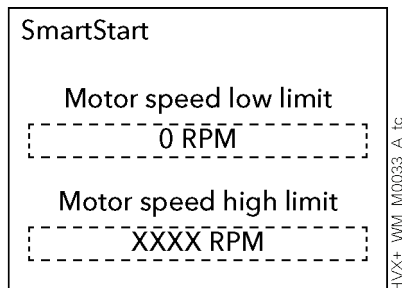
5. Set the deceleration time of ramp 1.



6. Select the configuration OPEN LOOP.



7. Set the low and high speed limits of the motor.



8. Select reference source ANALOG 4-20 mA on AI53.

SmartStart

Select reference source

Analog 4-20 mA on AI53

HVX+_WM_M0034_A.tc

9. Enter the references LOW and HIGH of input 53. The values must be the same as those entered in step 6.

SmartStart

Terminal low reference

0.000

Terminal high reference

XXXX.000

HVX+_WM_M0035_A.tc

10. Enter the MIN and MAX SPEED REFERENCE of input 53. The values must be the same as those entered in steps 6 and 8.

SmartStart

Min. speed reference

0.000 RPM

Max. speed reference

XXXX.000 RPM

HVX+_WM_M0036_A.tc

11. Exit the menu SMARTSTART.
 12. Press the MAIN MENU button.
 13. Select GROUP 5.
 14. Select function [160] NO ALARM of relay 1.

Relay 1

5-40 Function Relay

[160] No Alarm

HVX+_WM_M0037_A.tc

15. Select function [5] RUNNING of relay 2.

Relay 2

5-40 Function Relay

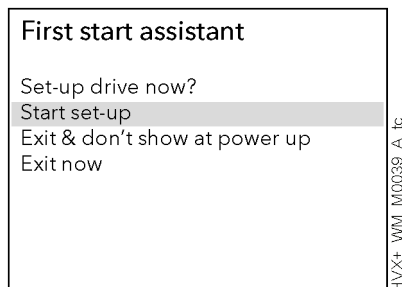
[5] Running

HVX+_WM_M0038_A.tc

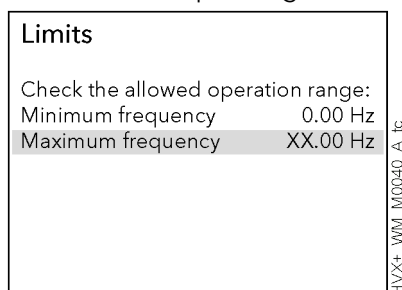
6.3.3 ABB ACQ 580

Refer to the ABB ACQ 580 Instruction Manual.

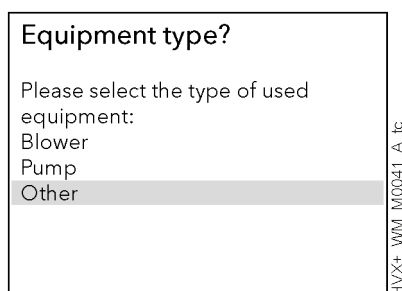
1. In case of first start, the converter display shows the quick start menu FIRST START ASSISTANT: go to step 3.
2. In case of a new start, access the FIRST START ASSISTANT menu.
3. Select START SET-UP.



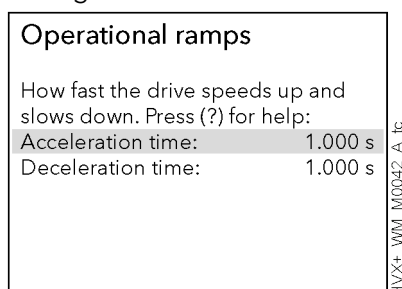
4. To configure the motor parameters follow the indications shown on the display.
5. Set the motor operating limits.



6. Select OTHER.



7. Configure the acceleration and deceleration ramps.



8. Enter the acceleration and deceleration times.

Acceleration time:

0001.000 s

HVX+_WM.M0043_A.tc

Deceleration time:

0001.000 s

HVX+_WM.M0044_A.tc

9. Select YES.

Control setup

Do you want to set up control setting now?

Yes

No

HVX+_WM.M0045_A.tc

10. Select DIRECT CONTROL VIA I/O.

How do you control

Press (?) for help.

SCADA

Direct control via I/O

Direct control fieldbus comm.

PID control, single motor

HVX+_WM.M0046_A.tc

11. Set the frequency converter analogue control signal and the minimum and maximum frequency references of the motor.

Reference (AI1) scaling

Adjust the scaling of AI1 signal if required:

AI1 input range: 4-20 mA

Frequency when AI1 at.... 0.000 Hz

Frequency when AI1 at.... XX.XXX Hz

HVX+_WM.M0047_A.tc

12. Set the digital relay outputs.

Relay outputs	
Set relay outputs sources:	
R01 source	Ready run
R02 source	Running
R03 source	Fault (-1)

HVX+_WM.M0048_A.tc

6.3.4 Generic

Please refer to the converter's instruction manual and observe the following guidelines:

- Set the control mode to SPEED CONTROL, or equivalent.
- The range of the 4-20 mA analogue signal must be equal to the motor speed range from zero to maximum. Do not set a minimum speed.
- Set the error signalling relay to NC (normally closed) if there is no fault, i.e. a fault causing the motor to stop. Ignore all fault signals that do not cause the motor to stop.
- Set the acceleration and deceleration ramps with a time of 1 s.
- Configure the digital input to which the enabling of the operation of the converter is connected, to prevent the operation of the motor in the event of an open contact.

NOTE: Risk of water hammer

Ensure that in the event of a fault or opening of the enabling contact the converter stops the motor in a controlled manner (no coasting).

- It is advisable to enable auto-reset of the fault signal, if available, to avoid having to perform a manual error reset.

6.4 First unit start-up with GENIE wizard

For information on how to use the control display, see chapter **Control** on page 41.

1. Check:
 - Electrical connections between the unit and frequency converter, see section 5.5 on page 28
 - For the correct configuration of the frequency converter, see section 6.3 on page 31.
2. Follow the GENIE configuration wizard.

Repeat the wizard

If necessary, it is possible to repeat the GENIE configuration wizard.

1. From the HOME PAGE, press the multifunctional button and enter the password to access the MENU (default: 066).
2. Set the parameters:
 - P09.3.05 FACTORY RESTORE to YES or
 - P09.3.06 COMMISSIONING COMPLETED to NO.
3. Switch the unit off and on again.

7 Control

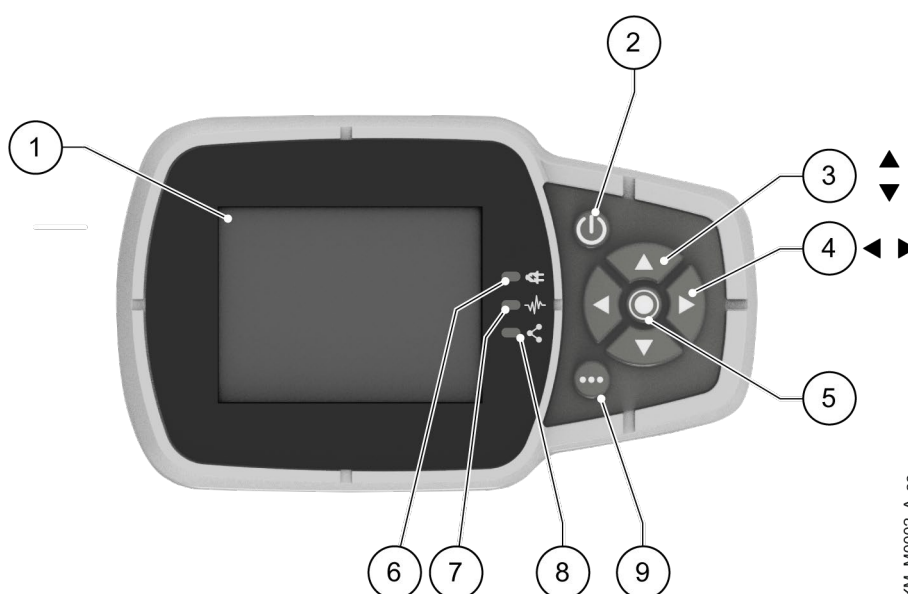
7.1 Precautions



DANGER: Electrical hazard

If the control display is damaged, contact Xylem or the Authorised Distributor.

7.2 Control display

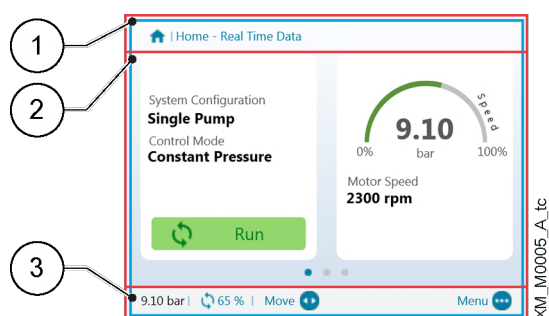


XM_M0002_A_sc

Position number	Name	Function
1	Display	
2	ON/OFF button	- Start and stop the unit - Reset the errors by pressing for 5 seconds.
3	UP and DOWN arrow keys	- Move vertically between menu options - Perform a manual switch-over on a multi-pump system by pressing the DOWN arrow (extended pressure) - Rotate the display 180° by simultaneously pressing ENTER and the UP arrow (extended pressure).
4	RIGHT and LEFT arrow keys	- Move horizontally to navigate home screens and menus - Lock and unlock the display by simultaneously pressing the RIGHT and LEFT arrows (extended pressure).

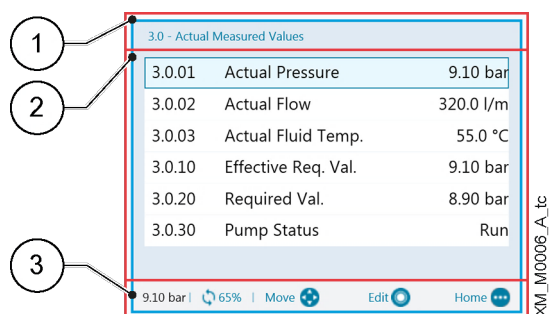
Position number	Name	Function
5	SEND button	- Advancing through the menu levels - Confirm the selection of a parameter - Confirm the value of a parameter.
6	Unit LED on	Indicate that the unit is powered.
7	Unit status LED	Indicate: - Motor not powered (off) - Alarm active and motor stopped (yellow) - Unit error and motor stopped (red) - Motor started (green) - Alarm active and motor started (yellow alternating green).
8	Connection status LED	Indicate: - Building Management System (hereinafter BMS) communication not operational (switched off) - BMS communication active (green) - Wireless communication with mobile device established (fixed blue) - Wireless communication with mobile device being established (flashing blue) - Wireless communication and BMS communication active (blue alternating green).
9	Multifunction button	- Access the parameter menu or additional functions according to the screen on the display. - Enable wireless connection (extended pressure).

7.2.1 Graphic display



Position number	Name	Description
1	Header bar	It shows static information and messages relating to the operating conditions, such as: - Alarms - Errors - Multi-pump operation.
2	Main screen	It shows the main information and allows the operating parameters to be changed. There are up to 5 screens, which can be navigated by pressing the RIGHT and LEFT arrow keys. The symbol  next to an entry indicates an editable parameter.
3	Lower bar	Show: - On the left, the essential operating information, such as the actual adjustment value and the speed percentage at which the unit is operating - On the right, the buttons available for interaction in the main screen.

7.2.2 Parameters menu



Position number	Name	Description
1	Header bar	It shows the parameter path at menu and submenu level.
2	Parameter list	Show: • The index, • The name, • The preview of the value of the parameters for the current menu level. To advance a level or change the value, press SEND or the RIGHT arrow key.
3	Lower bar	Show: • On the left, the essential operating information, such as the actual adjustment value and the speed percentage at which the unit is operating • On the right, the buttons available for interaction in the main screen.

The menu is split into 3 levels:

- Main
- Submenu
- Parameters.

To display or change a parameter:

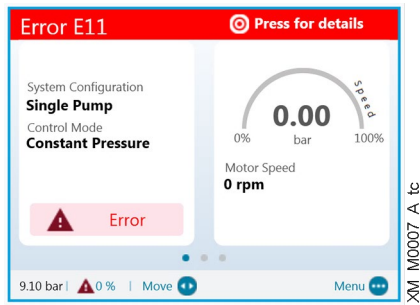
1. Press the function button in the main screen.
2. Enter the password using the arrow keys.
3. Press SEND.
Note: after 10 minutes of inactivity, the password must be re-entered.
4. Press the RIGHT arrow key or SEND to advance between levels, or the LEFT arrow key to return.

7.2.3 Operating mode change

To change parameters and advanced features, access the configuration menu.

1. Press the multi-function button.
2. Enter the password using the arrow keys.
3. Press SEND.
4. Navigate through the menus to locate the parameter or function to be changed.

7.2.4 Error reset



In the event of an error, the unit automatically makes several attempts to reset itself, where permitted: if the attempts are unsuccessful, the unit stops and the display shows the error code.

To eliminate the error:

1. Open the first main screen by pressing SEND.
2. Read the description of the error in the screen.
3. Identify the cause and follow the instructions in **Troubleshooting**.
4. Reset the error by pressing and holding down ON/OFF for 3 seconds: the unit returns to the status before the error.

7.3 Xylem X App

Introduction

Available for mobile devices with wireless technology operating system.

Use the App to:

- Check the status of the unit
- Configure parameters
- Interact with the unit and obtain data during installation and maintenance
- Generate a work report
- Contact the assistance service.

Download the App and connect the mobile device with the unit

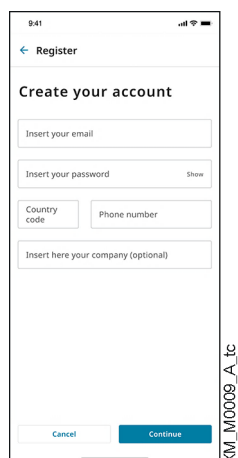
1. Download the Xylem X App to the mobile device from App Store¹ or Google Play² by scanning the QR code:



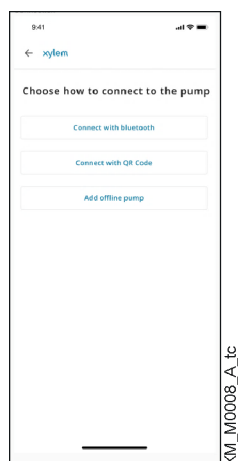
¹ Compatible with iOS® operating systems with version 11.0 and above

² Compatible with Android operating systems with version 8.0 and above

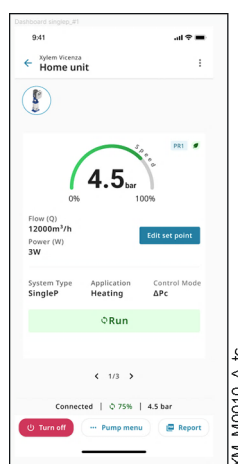
2. Complete the registration.



3. On the control display, press the wireless communication button.
4. Add the unit to the user profile.



5. When the connection has been established, the connection light turns blue steady: it is now possible to control the unit using the mobile device.



8 Programming

Firmware version

The firmware version can be displayed through parameter P03.4.19.

Symbols used

Symbol	Description
(G)	Global. The change of this parameter in one unit of a multi-pump system is transmitted to all other units.
(R)	Read only. The parameter cannot be changed. If the symbol is not present, the parameter can be changed.
	The parameter only affects the unit on which it is displayed, even if part of a multi-pump system.

8.1 M01 Home menu

Frequently used parameters or their aliases.

8.1.1 S01.0 Application

Parameter	Type	Name	Description	Value
P01.0.01		Language	Select the display language.	Default = English
P01.0.05	(G)	System Type	Select the system type. 0-Pressurization: for open-loop systems, i.e. boosting water to a high building 1-Circulation (HV legacy): for Circulation HVAC systems using Hydrovar Ramps Control 2-Circulation: for Circulation HVAC systems using PI control	Default = Pressurization
P01.0.06	(G)	Control Mode	Select the control mode for the pump. 0-Actuator: The unit operates as a constant speed actuator. It can only be used for one unit in single operation. 1-Constant Pressure: The unit maintains constant pressure regardless of flow variation. 2-Prop. Press.: The unit increases the pressure setpoint linearly proportional to the flow. 3-Prop. Quad. Press.: The unit increases the pressure setpoint (actual demand value) quadratically proportional to the flow. 4-Constant Flow: The unit varies the motor speed to keep the flow constant. 5-Constant Temp: The unit varies the motor speed to keep the temperature constant. 6-Constant Level: The unit varies the motor speed to keep the level constant (for example in a tank or well). 7-Generic: The unit varies its speed to maintain a constant generic measured quantity.	Default = Constant Pressure

Parameter	Type	Name	Description	Value
P01.0.10	(G)	System Configuration	Select system configuration. 0-Single Pump: The unit is set up to operate on its own, with no interactions with other units. 1-Serial Cascade: In this configuration, several units work together, connected via the RS485 interface. Only the last started unit varies its speed, while the already running units operate at maximum speed. 2-Synchronous Cascade: In this configuration, several units work together, connected via the RS485 interface. All running units operate at the same variable speed.	Default = Single Pump
P01.0.11		Multipump Address	Select the pump address in a multipump system. In a multipump system each unit has a unique address, with value from 1 to 8.	Min = 1 Max = - Default = 1
P01.0.15	(G)	Start Value	Define the start value after system stop for no demand, in percentage of the setpoint. In a pressurization system type, if the setpoint is met and there is no more consumption, the pump stops. The pump starts again when the pressure drops below the Restart Value (e.g. if the setpoint is set to 10 bar, a Restart Value set to 90% makes the pump start at 9 bar). Attention: If the value is set too low, (e.g. lower than the incoming pressure) the pump will not start. Value 100% makes this parameter not effective.	Min = 0 % Max = 100 % Default = 100 %
P01.0.20	(G)	Lack Of Water Delay	Select the delay time of the lack of water (LOW) protection. This delay is the time that passes between the opening of the LOW contact and the actual activation of the error "E21 Lack of water (LOW)".	Min = 1 s Max = 100 s Default = 2 s
P01.0.31	(G)	Pressure - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.11 Max = P05.0.12 Default = 0 bar
P01.0.32	(G)	Flow - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min
P01.0.33	(G)	Temperature - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = - Max = - Default = -50 °C
P01.0.34	(G)	Level - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.41 Max = P05.0.42 Default = 0 m
P01.0.35	(G)	Generic - Min. Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.0.40	(G)	Minimum Threshold Delay	Select the delay time of the minimum threshold protection. This delay is the time given to the system to reach the minimum threshold value: if not reached the unit stops giving the error "E22 Minimum threshold".	Min = 1 s Max = 100 s Default = 2 s
P01.0.45	(G)	Auto Start	Select the status of the pump following a power disconnection. 0-No: at the power return the unit is set to OFF. 1-Yes: at the power return, the unit is set to the status that was active prior of the power disconnection.	Default = Yes
P01.0.46		On/Off Set	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	Default = Off
P01.0.50	(G)	Date	Select the unit calendar date.	
P01.0.51	(G)	Time	Set the unit clock.	

8.1.2 S01.1 Sensors

Parameter	Type	Name	Description	Value
P01.1.00	(G)	Measuring Unit Selection	Select the measuring unit set used by the unit. 0-SI Units 1-Imperial Units	Default = SI Units
P01.1.01		Actuator - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 0 rpm
P01.1.02		Actuator - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 3600 rpm
P01.1.11	(G)	Pressure - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -5 bar ^{*)} Max = 10 bar ^{*)} Default = 0 bar ^{*)}
P01.1.12	(G)	Pressure - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 bar ^{*)} Max = 100 bar ^{*)} Default = 10 bar ^{*)}
P01.1.21	(G)	Flow - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 l/min ^{*)} Max = 9999 l/min ^{*)} Default = 0 l/min ^{*)}
P01.1.22	(G)	Flow - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 l/min ^{*)} Max = 9999 l/min ^{*)} Default = 100 l/min ^{*)}
P01.1.31	(G)	Temperature - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 0 °C
P01.1.32	(G)	Temperature - Full Scale	Select the full range of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 100 °C
P01.1.41	(G)	Level - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -999 m ^{*)} Max = 9999 m ^{*)} Default = 0 m ^{*)}
P01.1.42	(G)	Level - Full Scale	Select the full range of the regulation feedback sensor.	Min = -999 m ^{*)} Max = 9999 m ^{*)} Default = 10 m ^{*)}
P01.1.51	(G)	Generic - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -1000 Max = 1000 Default = 0
P01.1.52	(G)	Generic - Full Scale	Select the full range of the regulation feedback sensor.	Min = -1000 Max = 1000 Default = 100
P01.1.61	(G)	SPS Pressure Zero Value	Select the zero value of the pressure sensor used for the Setpoint Shift function.	Min = -1 bar Max = 99 bar Default = 0 bar
P01.1.62	(G)	SPS Pressure Full Scale	Select the full scale of the pressure sensor used for the Setpoint Shift function.	Min = 0 bar Max = 999 bar Default = 10 bar

^{*)} Depending on motor power

8.1.3 S01.2 Setpoints

Parameter	Type	Name	Description	Value
P01.2.01	(G)	Speed Setpoint 1	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P01.2.02	(G)	Speed Setpoint 2	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P01.2.03	(G)	Speed Setpoint 3	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P01.2.04	(G)	Speed Setpoint 4	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P01.2.11	(G)	Pressure Setpoint 1	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P01.2.12	(G)	Pressure Setpoint 2	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P01.2.13	(G)	Pressure Setpoint 3	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P01.2.14	(G)	Pressure Setpoint 4	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P01.2.21	(G)	Flow Setpoint 1	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P01.2.22	(G)	Flow Setpoint 2	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P01.2.23	(G)	Flow Setpoint 3	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P01.2.24	(G)	Flow Setpoint 4	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P01.2.31	(G)	Temp. Setpoint 1	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P01.2.32	(G)	Temp. Setpoint 2	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P01.2.33	(G)	Temp. Setpoint 3	Select the value for Setpoint.	Min = - Max = - Default = 25 °C

^{*)} Depending on motor power

Parameter	Type	Name	Description	Value
P01.2.34	(G)	Temp. Setpoint 4	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P01.2.41	(G)	Level Setpoint 1	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P01.2.42	(G)	Level Setpoint 2	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P01.2.43	(G)	Level Setpoint 3	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P01.2.44	(G)	Level Setpoint 4	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P01.2.51	(G)	Generic Setpoint 1	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.52	(G)	Generic Setpoint 2	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.53	(G)	Generic Setpoint 3	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.54	(G)	Generic Setpoint 4	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51

^{*)} Depending on motor power

8.1.4 S01.3 Actual Measured Values

Parameter	Type	Name	Description	Value
P01.3.01	(R)	Actual Pressure	Current measured PRESSURE value	-
P01.3.02	(R)	Actual Flow	Current measured FLOW value	-
P01.3.03	(R)	Actual Fluid Temperature	Current measured FLUID TEMPERATURE value	-
P01.3.04	(R)	Actual Level	Current measured LEVEL value	-
P01.3.05	(R)	Actual Generic	Current measured GENERIC value	-
P01.3.10	(G) (R)	Effective Required Value	Current calculated setpoint. This value is the result of proportional or quadratic pressure control, head losses compensation and Setpoint Shift function.	-

8.1.5 S01.4 Jog mode

Parameter	Type	Name	Description	Value
P01.4.01		Jog Speed	Select the speed for the Jog mode. Jog mode is used to run the pump at a specific speed for priming or minimum speed verification.	Min = 0 rpm Max = P04.2.32 Default = 0 rpm
P01.4.02	(G)	Min Speed	Select the pump minimum speed.	Min = 0 rpm ^{*)} Max = 2000 rpm ^{*)} Default = 800 rpm ^{*)}

^{*)} Depending on motor power

8.1.6 S01.5 Security

Parameter	Type	Name	Description	Value
P01.5.10		Password Entry	Enter the password. The default user password is 66.	Min = 0 Max = 999 Default = 0
P01.5.11	(R)	Logout	Logout	-
P01.5.12		Set Password	Set a new password. The password is required to access the menu.	Min = 0 Max = 999 Default = 66

8.2 M02 Error Log

8.2.1 S02.0 Errors

Parameter	Type	Name	Description	Value
P02.0.01	(G) (R)	Error 1 (Most Recent)		-
P02.0.02	(G) (R)	Error 2		-
P02.0.03	(G) (R)	Error 3		-
P02.0.04	(G) (R)	Error 4		-
P02.0.05	(G) (R)	Error 5		-
P02.0.06	(G) (R)	Error 6		-
P02.0.07	(G) (R)	Error 7		-
P02.0.08	(G) (R)	Error 8		-
P02.0.09	(G) (R)	Error 9		-
P02.0.10	(G) (R)	Error 10		-

8.2.2 S02.9 Bitfield

Parameter	Type	Name	Description	Value
P02.9.01	(R)	Error Bitfield 1	Error 1 Bitfield: 0÷6-*Reserved 7-Generic Firmware Error 8-Ext-Flash Error 9-Ext-Eeprom Error 10÷16-*Reserved 17-External Error 18-Sensor1 Error 19-Sensor2 Error 20-Sensor3 Error 21-Sensor4 Error 22-Setpoint 1 Error 23-Setpoint 2 Error 24-Setpoint 3 Error 25-Setpoint 4 Error 26÷28-*Reserved 29-AOC Hardware Error 30-*Reserved 31-*Reserved	-
P02.9.02	(R)	Error Bitfield 2	Error2 BitField: 0÷4-*Reserved 5-Minimum Threshold 6-Lack of Water 7-*Reserved 8-Missing Configuration files 9-*Reserved 10-Wrong Feedback Configuration 11-Configuration files mismatch 12-Drive is a spare part 13-Control Card is a spare part 14-HVSC connected to Hydrovar X+ 15-Missing Hydraulic Curves 16÷28-*Reserved 29-External VFD (variable frequency drive) error 30÷31-*Reserved	-

Parameter	Type	Name	Description	Value
P02.9.05	(R)	Alarm Bitfield 1	Alarm1 Bitfield: 0-Generic Firmware Alarm 1-Extenal Alarm 2-*Reserved 3-MultiPump Comm. Lost 4-MultiPump Address Conflict 5-MultiPump Incompatibility 6-*Reserved 7-Wrong Feedback Cfg 8-Wrong Setpoint Cfg 9-FieldBus Comm Lost 10-Pipe Filling Alarm 11-IGBT temperature derating 12-Internal Communication UI-AOC 13-AI1 Alarm 14-AI2 Alarm 15-AI3 Alarm 16-AI4 Alarm 17-Internal Communication UI-BLE 18-Factory Files not in Ext-Flash 19-Language file wrong 20-Control card update is possible 21-Cloning Failure in UI 22-Cloning failure in MP bus 23÷30-*Reserved 31-External VFD (variable frequency drive) alarm	-

8.3 M03 Pump information

8.3.1 S03.0 Actual Measured Values

Parameter	Type	Name	Description	Value
P03.0.00	(R)	Estimated Actual Value	The actual value is estimated using the hydraulic curves stored in the unit and by checking the speed and power consumption without using external sensors	-
P03.0.01	(R)	Actual Pressure	Current measured PRESSURE value	-
P03.0.02	(R)	Actual Flow	Current measured FLOW value	-
P03.0.03	(R)	Actual Fluid Temperature	Current measured FLUID TEMPERATURE value	-
P03.0.04	(R)	Actual Level	Current measured LEVEL value	-
P03.0.05	(R)	Actual Generic	Current measured GENERIC value	-
P03.0.06	(R)	Actual Shift	Current measured Setpoint Shift input value	-
P03.0.10	(G) (R)	Effective Required Value	Current calculated setpoint. This value is the result of proportional or quadratic pressure control, head losses compensation and Setpoint Shift function.	-
P03.0.20	(G) (R)	Required Value	Current setpoint. This value is the current setpoint, before the calculation of proportional or quadratic pressure control, head losses compensation or Setpoint Shift function.	-

Parameter	Type	Name	Description	Value
P03.0.30	(G) (R)	Pump Status	Display the current status of the unit. 0-Off (---): the unit is set to stay still. 1-Run (---): the unit is currently running. 2-Alarm, unit stopped (---): the unit is currently not running because the START/STOP digital input is open and an alarm is active 3-Alarm, unit running (---): the unit is currently running and an alarm is active 4-Alarm, unit on (---): the unit is not running but is ready to run, and an alarm is active 5-Alarm, unit off (---): the unit is set to stay still and an alarm is active 6-Error (---): the unit is not running because an error is active 7-Stop (---): the unit is not running because the START/STOP digital input is open 8-On (---): the unit is not running but is ready to run	-

8.3.2 S03.1 Counters

Parameter	Type	Name	Description	Value
P03.1.01	(G) (R)	Unit Powered Time	Display the total time the unit has spent connected to power.	-
P03.1.02	(G) (R)	Motor Running Time	Display the total time the motor has spent running.	-

8.3.3 S03.2 Motor

Parameter	Type	Name	Description	Value
P03.2.01	(G) (R)	Motor Speed	Display the actual motor speed in rpm	-
P03.2.02	(G) (R)	Motor Speed %	Display the actual motor speed in percentage	-

8.3.4 S03.3 Input/Output Status

Parameter	Type	Name	Description	Value
P03.3.01	(R)	Digital I/O Status	Display the status of the digital inputs and outputs	-
P03.3.11	(R)	Analog Input 1 Value	Display the raw value of the analog input.	-
P03.3.12	(R)	Analog Input 2 Value	Display the raw value of the analog input.	-
P03.3.13	(R)	Analog Input 3 Value	Display the raw value of the analog input.	-
P03.3.14	(R)	Analog Input 4 Value	Display the raw value of the analog input.	-
P03.3.20	(R)	Analog Output Value	Display the value of the analog output	-

8.3.5 S03.4 Product information

Parameter	Type	Name	Description	Value
P03.4.01	(R)	Unit Part Number	Show the part number (PN) of the Smart Controller	-
P03.4.02	(R)	Unit Production Date	Show the production date (PD) of the Smart Controller	-
P03.4.03	(R)	Unit Serial Number	Show the serial number (SN) of the Smart Controller	-
P03.4.10	(G) (R)	Hmi Firmware Version	Display the firmware version of the user interface board	-
P03.4.11	(G) (R)	Hmi-Bt Firmware Version	Display the firmware version of the wireless communication board	-
P03.4.13	(G) (R)	Control Card Firmware Version	Display the firmware version of the control board	-
P03.4.14	(R)	Map File Version	Display the version of the map file	-
P03.4.15	(R)	Default File Version	Display the version of the default file	-
P03.4.17	(R)	Language File Version	Display the version of the language file	-
P03.4.19	(R)	Firmware Version	Display the cumulative firmware version of the device	-
P03.4.25	(R)	Hydraulic Curves Stored	This parameter indicates if the hydraulic curves are stored in memory.	-

8.4 M04 Pump Control

8.4.1 S04.0 Configuration

Parameter	Type	Name	Description	Value
P04.0.01	(G)	System Type	Select the system type. 0-Pressurization: for open-loop systems, i.e. boosting water to a high building 1-Circulation (HV legacy): for Circulation HVAC systems using Hydrovar Ramps Control 2-Circulation: for Circulation HVAC systems using PI control	Default = Pressurization
P04.0.02	(G)	Control Mode	Select the control mode for the pump. 0-Actuator: The unit operates as a constant speed actuator. It can only be used for one unit in single operation. 1-Constant Pressure: The unit maintains constant pressure regardless of flow variation. 2-Prop. Press.: The unit increases the pressure setpoint linearly proportional to the flow. 3-Prop. Quad. Press.: The unit increases the pressure setpoint (actual demand value) quadratically proportional to the flow. 4-Constant Flow: The unit varies the motor speed to keep the flow constant. 5-Constant Temp: The unit varies the motor speed to keep the temperature constant. 6-Constant Level: The unit varies the motor speed to keep the level constant (for example in a tank or well). 7-Generic: The unit varies its speed to maintain a constant generic measured quantity.	Default = Constant Pressure

Parameter	Type	Name	Description	Value
P04.0.03	(G)	Regulation Mode	Select the regulation mode. 0-Normal: The motor speed increases when the measured value is below the setpoint, and decreases when the measured value is above the setpoint 1-Inverse: The motor speed increases when the measured value is above the setpoint, and decreases when the measured value is below the setpoint	Default = Normal
P04.0.05	(G)	Start Value	Define the start value after system stop for no demand, in percentage of the setpoint. In a pressurization system type, if the setpoint is met and there is no more consumption, the pump stops. The pump starts again when the pressure drops below the Restart Value (e.g. if the setpoint is set to 10 bar, a Restart Value set to 90% makes the pump start at 9 bar). Attention: If the value is set too low, (e.g. lower than the incoming pressure) the pump will not start. Value 100% makes this parameter not effective.	Min = 0 % Max = 100 % Default = 100 %
P04.0.06	(G)	Auto Start	Select the status of the pump following a power disconnection. 0-No: at the power return the unit is set to OFF. 1-Yes: at the power return, the unit is set to the status that was active prior of the power disconnection.	Default = Yes
P04.0.07	(G)	Min Speed Configuration	Select the behaviour of the pump when the minimum speed and the setpoint are reached. If ACTUATOR mode is selected, this parameter selects the behaviour of the pump when the speed setpoint is below the minimum speed. 0-Zero speed: The pump will reach speed 0 and stop 1-Min speed: The pump will continue to keep the minimum speed.	Default = Zero Speed
P04.0.09	(G)	Measuring Unit Selection	Select the measuring unit set used by the unit. 0-SI Units 1-Imperial Units	Default = SI Units
P04.0.11	(G)	Pressure Measuring Unit	Select the measuring unit. 0-bar 1-psi 2-ft 3-kPa 4-MPa 5-mbar 6-m 7-cm 8-in	Default = bar
P04.0.12	(G)	Flow Measuring Unit	Select the measuring unit. 0-l/min 1-m3/s 2-m3/h 3-g/min 4-l/s	Default = m3/h
P04.0.13	(G)	Temperature Measuring Unit	Select the measuring unit. 0-°C 1-°F 2-K	Default = °C
P04.0.14	(G)	Level Measuring Unit	Select the measuring unit. 1-m 2-ft 3-cm 4-in	Default = m
P04.0.15	(G)	Power Measuring Unit	Select the measuring unit. 1-W 2-kW 3-MW 4-Hp	Default = kW

Parameter	Type	Name	Description	Value
P04.0.16		Energy Measuring Unit	Select the measuring unit. 0-kWh 1-MWh 2-BTU 3-HPH 4-MJ 5-KJ	Default = kWh
P04.0.21		Setpoint 1 Selection	Select the source for the setpoint 1. 0-Analog: The setpoint reference is given via one of the analog inputs 1-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.22		Setpoint 2 Selection	Select the source for the setpoint. 0-Off: setpoint not used 1-Analog: The setpoint reference is given via one of the analog inputs 2-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.23		Setpoint 3 Selection	Select the source for the setpoint. 0-Off: setpoint not used 1-Analog: The setpoint reference is given via one of the analog inputs 2-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.24		Setpoint 4 Selection	Select the source for the setpoint. 0-Off: setpoint not used 1-Analog: The setpoint reference is given via one of the analog inputs 2-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter

8.4.2 S04.1 Setpoints

Parameter	Type	Name	Description	Value
P04.1.01	(G)	Speed Setpoint 1	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P04.1.02	(G)	Speed Setpoint 2	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P04.1.03	(G)	Speed Setpoint 3	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P04.1.04	(G)	Speed Setpoint 4	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P04.1.11	(G)	Pressure Setpoint 1	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P04.1.12	(G)	Pressure Setpoint 2	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}

Parameter	Type	Name	Description	Value
P04.1.13	(G)	Pressure Setpoint 3	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P04.1.14	(G)	Pressure Setpoint 4	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar ^{*)}
P04.1.15	(G)	Pressure Setpoint Type	This parameter specifies whether the setpoint should be at Zero Flow (see parameter 4.2.06) or at the maximum flow (Max Curve). The Max Curve option is available only if the unit has the hydraulic curves stored in memory	Default = Setpoint at Zero Flow
P04.1.16	(G)	H0 Pressure	If "Pressure Setpoint Type" (Parameter 04.1.15) is set at "Setpoint at Max Curve" and either linear or quadratic compensation is activated, this parameter is used to calculate the pressure setpoint at zero flow.	Min = P05.0.11 Max = P05.0.12 Default = 0.5 bar
P04.1.21	(G)	Flow Setpoint 1	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P04.1.22	(G)	Flow Setpoint 2	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P04.1.23	(G)	Flow Setpoint 3	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P04.1.24	(G)	Flow Setpoint 4	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min ^{*)}
P04.1.31	(G)	Temp. Setpoint 1	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P04.1.32	(G)	Temp. Setpoint 2	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P04.1.33	(G)	Temp. Setpoint 3	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P04.1.34	(G)	Temp. Setpoint 4	Select the value for Setpoint.	Min = - Max = - Default = 25 °C
P04.1.41	(G)	Level Setpoint 1	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P04.1.42	(G)	Level Setpoint 2	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P04.1.43	(G)	Level Setpoint 3	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}
P04.1.44	(G)	Level Setpoint 4	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m ^{*)}

Parameter	Type	Name	Description	Value
P04.1.51	(G)	Generic Setpoint 1	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.52	(G)	Generic Setpoint 2	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.53	(G)	Generic Setpoint 3	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.54	(G)	Generic Setpoint 4	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.60	(G)	Limit setpoint saving	The function limits the number of saves in internal memory. To be enabled in case of continuous writing of the setpoint by the fieldbus.	Default = No

^{*)} Depending on motor power

8.4.3 S04.2 Regulation

Parameter	Type	Name	Description	Value
P04.2.00	(G)	Regulation Type	This parameter specifies whether the regulation is based on Hydrovar Ramps control or PI control. See parameter in submenu 04.2.xx	Default = Hydrovar
P04.2.01	(G)	Window	Select the regulation window. This parameter defines a band around the setpoint, as a percentage of the setpoint. When the measured value is out of the window the system will use ramps 1 and 2; when the measured value is inside the window the system will use ramps 3 and 4.	Min = 1 % Max = 100 % Default = 20 %
P04.2.02	(G)	Hysteresis	Select the regulation hysteresis. This parameter defines a band, around the setpoint, that is a percentage of the window. The limits of the hysteresis band define the change between accelerating and decelerating ramps.	Min = 1 % Max = 100 % Default = 90 %
P04.2.06	(G)	Lift Speed	Select the speed value at which the setpoint value starts to increase, if a lift amount is set.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P04.2.07	(G)	Linear Lift Amount	Select the amount of linear increase of the setpoint at maximum speed, as a percentage of the setpoint, in order to compensate the friction losses. The increase will be linear, starting from 0% when the motor speed is equal to LIFT SPEED, up to LINEAR LIFT AMOUNT when the motor speed is maximum.	Min = 0 % Max = 200 % Default = 0 %
P04.2.08	(G)	Quad. Lift Amount	Select the amount of quadratic increase of the setpoint at maximum speed, as a percentage of the setpoint, in order to compensate the friction losses. The increase will be quadratic, starting from 0% when the motor speed is equal to LIFT SPEED, up to QUADRATIC LIFT AMOUNT when the motor speed is maximum.	Min = 0 % Max = 999 % Default = 0 %
P04.2.11	(G)	Ramp 1	Select the fast acceleration time. This ramp is used when the motor speed is above the MINIMUM SPEED and the measured value is outside the range defined by the WINDOW.	Min = 1 s ^{*)} Max = 250 s ^{*)} Default = 10 s ^{*)}

^{*)} Depending on motor power

Parameter	Type	Name	Description	Value
P04.2.12	(G)	Ramp 2	Select the fast deceleration time. This ramp is used when the motor speed is above the MINIMUM SPEED and the measured value is outside the range defined by the WINDOW.	Min = 1 s ^{*)} Max = 250 s ^{*)} Default = 10 s ^{*)}
P04.2.13	(G)	Ramp 3	Select the slow acceleration time. This ramp is used when the measured value is inside the range defined by the WINDOW.	Min = 1 s ^{*)} Max = 999 s ^{*)} Default = 70 s ^{*)}
P04.2.14	(G)	Ramp 4	Select the slow deceleration time. This ramp is used when the measured value is inside the range defined by the WINDOW.	Min = 1 s ^{*)} Max = 999 s ^{*)} Default = 70 s ^{*)}
P04.2.15	(G)	Ramp Speed Min Acceleration	Select the minimum speed accelerating ramp time. This ramp is used when the motor speed is below the MINIMUM SPEED	Min = 0.1 s ^{*)} Max = 25 s ^{*)} Default = 2 s ^{*)}
P04.2.16	(G)	Ramp Speed Min Deceleration	Select the minimum speed decelerating ramp time. This ramp is used when the motor speed is below the MINIMUM SPEED	Min = 0.1 s ^{*)} Max = 25 s ^{*)} Default = 2 s ^{*)}
P04.2.21	(G)	Pi Control - Kp	Select the proportional constant of the PI control	Min = 0 ^{*)} Max = 10000 ^{*)} Default = 0.5 ^{*)}
P04.2.25	(G)	Pi Control - Ti	Ti is the integral time variable used with the gain (Kp) to set the PI (Proportional-Integral) regulation. - If the control system is "hunting" (oscillating) or unstable, you can stabilize it by either reducing the gain (Kp) or increasing the integral time (Ti). - If the system is too slow to react, you can make it more responsive by increasing the gain (Kp).	Min = 0 s ^{*)} Max = 10000 s ^{*)} Default = 0.5 s ^{*)}
P04.2.31	(G)	Min Speed	Select the pump minimum speed.	Min = 0 rpm ^{*)} Max = 2000 rpm ^{*)} Default = 800 rpm ^{*)}
P04.2.32	(G)	Max Speed	Select the pump maximum speed.	Min = 2000 rpm ^{*)} Max = 4100 rpm ^{*)} Default = 3600 rpm ^{*)}
P04.2.35	(G)	Min Speed Time	Select the delay time the motor stays at minimum speed, before reaching a complete stop. This parameter is only active if parameter MIN SPEED CONFIGURATION is set to "Zero speed".	Min = 0 s Max = 100 s Default = 1 s

^{*)} Depending on motor power

8.4.4 S04.3 Thresholds

Parameter	Type	Name	Description	Value
P04.3.00	(G)	Automatic Error Reset	Select the type of error reset. 0-No: in case of error the unit will stay stopped, waiting for an error reset commanded by the user. 1-Yes: the unit will automatically reset the error, if possible, up to a maximum of 5 times in 1 hour.	Default = Yes
P04.3.01	(G)	Pressure - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.11 Max = P05.0.12 Default = 0 bar

Parameter	Type	Name	Description	Value
P04.3.02	(G)	Flow - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min
P04.3.03	(G)	Temperature - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = - Max = - Default = -50 °C
P04.3.04	(G)	Level - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.41 Max = P05.0.42 Default = 0 m
P04.3.05	(G)	Generic - Min. Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.3.10	(G)	Minimum Threshold Delay	Select the delay time of the minimum threshold protection. This delay is the time given to the system to reach the minimum threshold value: if not reached the unit stops giving the error "E22 Minimum threshold".	Min = 1 s Max = 100 s Default = 2 s
P04.3.11	(G)	Lack Of Water Delay	Select the delay time of the lack of water (LOW) protection. This delay is the time that passes between the opening of the LOW contact and the actual activation of the error "E21 Lack of water (LOW)".	Min = 1 s Max = 100 s Default = 2 s

8.4.5 S04.4 Test Run

Parameter	Type	Name	Description	Value
P04.4.01	(G)	Test Run Speed	Select the motor speed for the test run.	Min = 0 rpm ^{*)} Max = P04.2.32 Default = 1200 rpm ^{*)}
P04.4.02	(G)	Test Run Timeout	Select the time that have to pass before the test run starts. The pump must be not running for the time set in this parameter in order to start the test run. In order to let the TEST RUN work, the START/STOP digital input must be closed	Min = 0 h Max = 255 h Default = 100 h
P04.4.03	(G)	Test Run Time	Select the duration time of the test run.	Min = 0 s Max = 180 s Default = 5 s
P04.4.05		Test Run Command	Select ON to manually start the test run.	Default = Off

^{*)} Depending on motor power

8.4.6 S04.5 Setpoint Shift

Parameter	Type	Name	Description	Value
P04.5.01	(G)	SP Shift Function	Select the type of Setpoint Shift function. 0-Off: The Setpoint Shift function is disabled 1-SSV1: The Setpoint Shift function is enabled and only SSV1 (Setpoint Shift Value 1) is used 2-SSV2: The Setpoint Shift function is enabled and only SSV2 (Setpoint Shift Value 2) is used 3-Full: The Setpoint Shift function is enabled and both SSV1 and SSV2 are used	Default = Off

Parameter	Type	Name	Description	Value
P04.5.02	(G)	SP Shift Input	Select the magnitude used as reference for the Setpoint Shift function. 0-Setpoint Shift Pressure: The analog input set to Setpoint Shift Pressure 1-Pressure: The analog input set to Pressure 2-Flow: The analog input set to Flow 3-Temperature: Tanalog input set to Temperature 4-Level: The analog input set to Level 5-Generic: The analog input set to Generic	Default = Setpoint Shift Pressure
P04.5.05	(G)	SP Shift VALUE 1	Select the setpoint value desired for the first section of the Setpoint Shift function	Min = - Max = - Default = 0
P04.5.06	(G)	SP Shift VALUE 2	Select the setpoint value desired for the second section of the Setpoint Shift function	Min = - Max = - Default = 0
P04.5.10	(G)	SP Shift X 1	Select the Setpoint Shift input value at which the Setpoint Shift Value 1 starts to shift towards the Setpoint	Min = - Max = P04.5.11 Default = 0
P04.5.11	(G)	SP Shift X 2	Select the Setpoint Shift input value at which the Setpoint is used	Min = P04.5.10 Max = P04.5.12 Default = 0
P04.5.12	(G)	SP Shift X 3	Select the Setpoint Shift input value at which the Setpoint value starts to shift towards Setpoint Shift Value 2	Min = P04.5.11 Max = P04.5.13 Default = 0
P04.5.13	(G)	SP Shift X 4	Select the Setpoint Shift input value at which the Setpoint Shift Value 2 is used	Min = P04.5.12 Max = - Default = 0

8.4.7 S04.6 Pipe filling

Check the filling of the hydraulic system when not pressurised, to avoid water hammer.

When enabled, this function starts if the measured pressure is below the *Pipe Filling Threshold* and one of the following cases occurs:

- The unit is switched on
- The start/stop contact switches from open to closed
- The unit is set to ON
- An error is reset.

When the function is active, the unit runs at the minimum speed for the *pipe filling stabilisation time* and the pressure is monitored:

- If during the *stabilisation time* the pressure is constant, the speed is increased by the *pipe filling speed increase* value and the pressure is monitored again for another *stabilisation time*, etc.
- If the pressure is not constant, the speed is not increased
- If the *pipe filling threshold* is reached during the *pipe filling time*, the unit switches to the set standard control.

The *pipe-filling function* parameter allows to disable the function or select the status of the unit if the *pipe-filling threshold* is not reached within the *pipe-filling time*.

Parameter	Type	Name	Description	Value
P04.6.01	(G)	Pipe Filling Function	With this parameter you can disable the Pipe Filling function or select the status of the unit if the Pipe Filling Threshold is not reached. 0-Disabled: the Pipe Filling function is disabled 1-Alarm: the failure of the Pipe Filling function gives the alarm A29 Pipe Filling Alarm and the unit continues to run the function. 2-Error: the failure of the Pipe Filling function gives the error E29 Pipe Filling Error and the unit stops. While the Pipe Filling function is running the Minimum Threshold is disabled.	Default = Disabled
P04.6.03	(G)	Pipe Filling Threshold	Select the pressure the system has to reach to exit the pipe filling function.	Min = P05.0.11 Max = P05.0.12 Default = 2 bar
P04.6.05	(G)	Pipe Filling Time	Select the maximum time given to the pipe filling function to reach the PIPE FILLING THRESHOLD.	Min = 0 s Max = 999 s Default = 180 s
P04.6.06	(G)	Max Pipe Filling Pumps	Select the number of pumps that will run simultaneously during the pipe filling function.	Min = 1 Max = P06.0.02 Default = 1
P04.6.10	(G)	Pipe Filling Steady Time	Select the time given to the unit to verify if the measured pressure is stable. The pressure is considered stable if its value is within the WINDOW calculated on the setpoint, centered on the pressure measured at the beginning of the current steady time.	Min = 1 s Max = P04.6.05 Default = 5 s
P04.6.15	(G)	Pipe Filling Speed Step	Select the amount of speed, in percentage of the maximum speed, that the unit will add to the current speed if the measured pressure is stable for the PIPE FILLING STEADY TIME.	Min = 5 % Max = 100 % Default = 10 %

8.5 M05 Input/Output Settings

8.5.1 S05.0 Measuring ranges

Parameter	Type	Name	Description	Value
P05.0.00		Actual Value Source	Select the input for the controlled value. 0-Auto AI: The Actual Value is automatically linked to the Analog Input set to the controlled quantity of the Control Mode 1-Delta AI: The Actual Value is equal to the absolute difference of two Analog Inputs set to the controlled quantity of the Control Mode 2-Auto AI - Low: The Actual Value is equal to the lowest value of the Analog Inputs set to the controlled quantity of the Control Mode 3-Auto AI - High: The Actual Value is equal to the highest value of the Analog Inputs set to the controlled quantity of the Control Mode 4-DI Selection: The Analog Value is selected via the status of the Digital Input set to function "Sensor 1/2 Selection"	Default = Auto AI
P05.0.01		Actuator - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 0 rpm
P05.0.02		Actuator - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 3600 rpm
P05.0.11	(G)	Pressure - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -5 bar ^{*)} Max = 10 bar ^{*)} Default = 0 bar ^{*)}
P05.0.12	(G)	Pressure - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 bar ^{*)} Max = 100 bar ^{*)} Default = 10 bar ^{*)}
P05.0.21	(G)	Flow - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 l/min ^{*)} Max = 9999 l/min ^{*)} Default = 0 l/min ^{*)}
P05.0.22	(G)	Flow - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 l/min ^{*)} Max = 9999 l/min ^{*)} Default = 100 l/min ^{*)}
P05.0.31	(G)	Temperature - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 0 °C
P05.0.32	(G)	Temperature - Full Scale	Select the full range of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 100 °C

^{*)} Depending on motor power

Parameter	Type	Name	Description	Value
P05.0.41	(G)	Level - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -999 m ^{*)} Max = 9999 m ^{*)} Default = 0 m ^{*)}
P05.0.42	(G)	Level - Full Scale	Select the full range of the regulation feedback sensor.	Min = -999 m ^{*)} Max = 9999 m ^{*)} Default = 10 m ^{*)}
P05.0.51	(G)	Generic - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -1000 Max = 1000 Default = 0
P05.0.52	(G)	Generic - Full Scale	Select the full range of the regulation feedback sensor.	Min = -1000 Max = 1000 Default = 100
P05.0.61	(G)	SPS Pressure Zero Value	Select the zero value of the pressure sensor used for the Setpoint Shift function.	Min = -1 bar Max = 99 bar Default = 0 bar
P05.0.62	(G)	SPS Pressure Full Scale	Select the full scale of the pressure sensor used for the Setpoint Shift function.	Min = 0 bar Max = 999 bar Default = 10 bar

^{*)} Depending on motor power

8.5.2 S05.1 Analog inputs

Parameter	Type	Name	Description	Value
P05.1.01		Analog Input 1 Function	Select the function for the analog input. 0-Off: the analog input is disabled 1-Pressure: A pressure sensor is connected to the analog input 2-Setpoint: A setpoint reference is connected to the analog input 3-Flow: A flow sensor is connected to the analog input 4-Temperature: A temperature sensor is connected to the analog input 5-Level: A level sensor is connected to the analog input 6-Generic: a Generic input is connected to the analog input 7-Setpoint Shift: an input used for the Setpoint Shift function is connected to the analog input	Default = Pressure
P05.1.02		Analog Input 1 Type	Select the type of analog signal connected to the analog input. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA

Parameter	Type	Name	Description	Value
P05.1.11		Analog Input 2 Function	Select the function for the analog input. 0-Off: the analog input is disabled 1-Pressure: A pressure sensor is connected to the analog input 2-Setpoint: A setpoint reference is connected to the analog input 3-Flow: A flow sensor is connected to the analog input 4-Temperature: A temperature sensor is connected to the analog input 5-Level: A level sensor is connected to the analog input 6-Generic: a Generic input is connected to the analog input 7-Setpoint Shift: an input used for the Setpoint Shift function is connected to the analog input	Default = Off
P05.1.12		Analog Input 2 Type	Select the type of analog signal connected to the analog input. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA
P05.1.21		Analog Input 3 Function	Select the function for the analog input. 0-Off: the analog input is disabled 1-Pressure: A pressure sensor is connected to the analog input 2-Setpoint: A setpoint reference is connected to the analog input 3-Flow: A flow sensor is connected to the analog input 4-Temperature: A temperature sensor is connected to the analog input 5-Level: A level sensor is connected to the analog input 6-Generic: a Generic input is connected to the analog input 7-Setpoint Shift: an input used for the Setpoint Shift function is connected to the analog input	Default = Off
P05.1.22		Analog Input 3 Type	Select the type of analog signal connected to the analog input. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA

Parameter	Type	Name	Description	Value
P05.1.31		Analog Input 4 Function	Select the function for the analog input. 0-Off: the analog input is disabled 1-Pressure: A pressure sensor is connected to the analog input 2-Setpoint: A setpoint reference is connected to the analog input 3-Flow: A flow sensor is connected to the analog input 4-Temperature: A temperature sensor is connected to the analog input 5-Level: A level sensor is connected to the analog input 6-Generic: a Generic input is connected to the analog input 7-Setpoint Shift: an input used for the Setpoint Shift function is connected to the analog input	Default = Off
P05.1.32		Analog Input 4 Type	Select the type of analog signal connected to the analog input. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA
P05.1.50		Analog Actuator Type	Select the type of actuator profile to be used when the setpoint for the actuator mode is set to analog input. 0-Hydrovar HVL: The profile is the same used in the Hydrovar HVL, see dedicated chart 1-Manual: The profile can be tuned using the dedicated parameters.	Default = Hydrovar HVL

8.5.3 S05.2 Digital inputs

Parameter	Type	Name	Description	Value
P05.2.03	Digital Input 3 Function		Select the function for the Digital Input. 0-Disabled: function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection: Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed: Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run: Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset: Close the digital input to reset the error condition 7-External Error: Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm: Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set 10-External Drive Error: Open the digital input to activate the error condition "E80 External VFD (variable frequency drive) error" 11-External Drive Alarm: Open the digital input to activate the alarm condition "A80 External VFD (variable frequency drive) alarm"	Default = Solo Run
P05.2.04	Digital Input 4 Function		Select the function for the Digital Input. 0-Disabled: function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection: Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed: Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run: Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset: Close the digital input to reset the error condition 7-External Error: Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm: Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set 10-External Drive Error: Open the digital input to activate the error condition "E80 External VFD (variable frequency drive) error" 11-External Drive Alarm: Open the digital input to activate the alarm condition "A80 External VFD (variable frequency drive) alarm"	Default = External VFD Error

Parameter	Type	Name	Description	Value
P05.2.05		Digital Input 5 Function	Select the function for the Digital Input. 0-Disabled: function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection: Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed: Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run: Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset: Close the digital input to reset the error condition 7-External Error: Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm: Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set 10-External Drive Error: Open the digital input to activate the error condition "E80 External VFD (variable frequency drive) error" 11-External Drive Alarm: Open the digital input to activate the alarm condition "A80 External VFD (variable frequency drive) alarm"	Default = Disabled
P05.2.13		Digital Input 3 Logic	This parameter sets the digital input activation logic. 0-Normal: active if the digital input is closed. 1-Inverse: active if the digital input is open.	Default = Normal
P05.2.14		Digital Input 4 Logic	This parameter sets the digital input activation logic. 0-Normal: active if the digital input is closed. 1-Inverse: active if the digital input is open.	Default = Normal
P05.2.15		Digital Input 5 Logic	This parameter sets the digital input activation logic. 0-Normal: active if the digital input is closed. 1-Inverse: active if the digital input is open.	Default = Normal

8.5.4 S05.3 Analog output

Parameter	Type	Name	Description	Value
P05.3.01		Analog Output Function	Select the Analog Output function. 0-Actual value: The Analog Output replicates the current measured value 1-Effective required value: The Analog Output replicates the Effective Required Value 2-Motor speed: The Analog Output replicates the current motor speed 3-Motor load: The Analog Output replicates the current motor power 4-Motor current: The Analog Output replicates the actual current drained from the motor 5-AN1 value: The Analog Output replicates the value read on analog input 1 6-AN2 value: The Analog Output replicates the value read on analog input 2 7-AN3 value: The Analog Output replicates the value read on analog input 3 8-AN4 value: The Analog Output replicates the value read on analog input 4 9-Temperature: The Analog Output replicates the value of measured fluid temperature 10-Flow rate: The Analog Output replicates the current measured flow 11-SPS Input Value: The Analog Output replicates the current value of the analog input used for the Setpoint Shift function	Default = Motor speed
P05.3.02		Analog Output Type	Select the Analog Output type. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA

8.5.5 S05.4 Digital outputs

Parameter	Type	Name	Description	Value
P05.4.01		Relay 1 Function	Select the function of the Relay. 0-Off: the Relay is disabled 1-Power: the relay is active when the unit is connected to the power supply 2-Running: the relay is active when the motor is running 3-Motor Heating: the relay is active when the motor heating function is active 4-Error: the relay is active when no errors are active 5-Alarm or Error: the relay is active when no alarms or errors are active 6-On: the relay is active when the unit is in status ON (not running but ready to run) 7-Error Reset: the relay is active when the parameter "Automatic Error Reset" is set to YES and the maximum number of automatic reset has been reached	Default = Error
P05.4.02		Relay 2 Function	Select the function of the Relay. 0-Off: the Relay is disabled 1-Power: the relay is active when the unit is connected to the power supply 2-Running: the relay is active when the motor is running 3-Motor Heating: the relay is active when the motor heating function is active 4-Error: the relay is active when no errors are active 5-Alarm or Error: the relay is active when no alarms or errors are active 6-On: the relay is active when the unit is in status ON (not running but ready to run) 7-Error Reset: the relay is active when the parameter "Automatic Error Reset" is set to YES and the maximum number of automatic reset has been reached	Default = Running

8.5.6 S05.8 Calibrations

Parameter	Type	Name	Description	Value
P05.8.01		Analog Input 1 Offset	Select the offset at zero value for the Analog Input	Min = -100 Max = 100 Default = 0
P05.8.02		Analog Input 1 Gain	Select the gain for Analog Input	Min = 0 Max = 1.5 Default = 1
P05.8.11		Analog Input 2 Offset	Select the offset at zero value for the Analog Input	Min = -100 Max = 100 Default = 0
P05.8.12		Analog Input 2 Gain	Select the gain for Analog Input	Min = 0 Max = 1.5 Default = 1
P05.8.21		Analog Input 3 Offset	Select the offset at zero value for the Analog Input	Min = -100 Max = 100 Default = 0
P05.8.22		Analog Input 3 Gain	Select the gain for Analog Input	Min = 0 Max = 1.5 Default = 1
P05.8.31		Analog Input 4 Offset	Select the offset at zero value for the Analog Input	Min = -100 Max = 100 Default = 0
P05.8.32		Analog Input 4 Gain	Select the gain for Analog Input	Min = 0 Max = 1.5 Default = 1
P05.8.44		Analog Output 1 Offset	The OFFSET parameter is an additive constant applied to the analog output signal, shifting the entire output range. Adjusting offset corrects for zero-point errors in the output signal	Min = -100 mA Max = 100 mA Default = 0 mA
P05.8.45		Analog Output 1 Gain	The GAIN parameter is a multiplier applied to the analog output signal, controlling the slope of the output. Adjusting gain corrects for scaling errors in the output signal.	Min = 0 Max = 1.5 Default = 1

8.6 M06 Multipump

8.6.1 S06.0 Configuration

Parameter	Type	Name	Description	Value
P06.0.01	(G)	System Configuration	Select system configuration. 0-Single Pump: The unit is set up to operate on its own, with no interactions with other units. 1-Serial Cascade: In this configuration, several units work together, connected via the RS485 interface. Only the last started unit varies its speed, while the already running units operate at maximum speed. 2-Synchronous Cascade: In this configuration, several units work together, connected via the RS485 interface. All running units operate at the same variable speed.	Default = Single Pump
P06.0.02	(G)	Max Units	Select the maximum number of units that operate simultaneously in the multipump system.	Min = 1 Max = - Default = 6
P06.0.03		Multipump Address	Select the pump address in a multipump system. In a multipump system each unit has a unique address, with value from 1 to 8.	Min = 1 Max = - Default = 1
P06.0.04	(R)	Multipump Map	Display the map of the units that could be part of the multipump	-
P06.0.05	(R)	Multipump Priority	Display the multipump priority	-

8.6.2 S06.1 Regulation

Parameter	Type	Name	Description	Value
P06.1.11	(G)	Pressure - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 bar*) Max = P05.0.12 Default = 0.35 bar*)

*) Depending on motor power

Parameter	Type	Name	Description	Value
P06.1.12	(G)	Pressure - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 bar ^{*)} Max = P05.0.12 Default = 0.15 bar ^{*)}
P06.1.21	(G)	Flow - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 l/min ^{*)} Max = P05.0.22 Default = 0.35 l/min ^{*)}
P06.1.22	(G)	Flow - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 l/min ^{*)} Max = P05.0.22 Default = 0.15 l/min ^{*)}
P06.1.31	(G)	Temperature - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 °C Max = P05.0.32 Default = 1.5 °C
P06.1.32	(G)	Temperature - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 °C Max = P05.0.32 Default = 1.5 °C
P06.1.41	(G)	Level - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 m ^{*)} Max = P05.0.42 Default = 0.35 m ^{*)}
P06.1.42	(G)	Level - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 m ^{*)} Max = P05.0.42 Default = 0.15 m ^{*)}
P06.1.51	(G)	Generic - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 Max = P05.0.52 Default = 1.5
P06.1.52	(G)	Generic - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 Max = P05.0.52 Default = 1.5

^{*)} Depending on motor power

Parameter	Type	Name	Description	Value
P06.1.61	(G)	Multipump Enable Speed	Select the desired release speed for the following pumps. The next pump starts when the below conditions are matched: - the motor speed reaches the MULTIPUMP ENABLE SPEED - the actual value drops below SETPOINT-ACTUAL VALUE DECREASE.	Min = P04.2.31 Max = P04.2.32 Default = 3000 rpm ^{*)}
P06.1.71	(G)	Synchronous Limit	Select the speed limit for the multipump cascade synchronous. The pump with priority P2 will shut off if its speed goes below this value.	Min = 0 rpm ^{*)} Max = 3600 rpm ^{*)} Default = 840 rpm ^{*)}
P06.1.72	(G)	Synchronous Window	Select the speed window for the multipump cascade synchronous. The pump with priority P3 will shut off when its speed goes below SYNCHRONOUS LIMIT + SYNCHRONOUS WINDOW, P4 will shut off when its speed goes below SYNCHRONOUS LIMIT + 2 x SYNCHRONOUS WINDOW, and so on.	Min = 0 rpm Max = P04.2.32 Default = 150 rpm
P06.1.81	(G)	Automatic Switchover Interval	Select the timeout for the automatic switchover: it allows an automatic change-over of the MASTER pump and the assist pumps. As soon as the timeout is elapsed, the next pump becomes MASTER and the counter restarts; this gives even wear and similar operating hours to all pumps. The switchover interval is active as long as the MASTER does not stop.	Min = 0 h Max = 250 h Default = 24 h

^{*)} Depending on motor power

8.7 M07 Inverter

8.7.1 S07.1 Skip Speed Function

Parameter	Type	Name	Description	Value
P07.1.01	(G)	Skip Speed Center	Select the center of the speed band that will be avoided by the motor.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm ^{*)}
P07.1.02	(G)	Skip Speed Range	Select the range of the speed band that will be avoided by the motor.	Min = 0 rpm Max = 300 rpm Default = 0 rpm

^{*)} Depending on motor power

8.7.2 S07.9 Smart Controller

Parameter	Type	Name	Description	Value
P07.9.01	(G)	Motor Power Range	Select the Motor power "range" you are controlling. Based on this selection a default set of parameter will be applied. Motor <= 5kW 5kW < Motor <= 11kW 11kW < Motor <= 22kW 22kW < Motor <= 90kW Motor > 90kW	Default = Motor <= 5kW

8.8 M08 Communication

8.8.1 S08.0 Ports

Parameter	Type	Name	Description	Value
P08.0.01		Com 1 Function	Select the function for the communication port 1 (RS 485.1). 0-Disabled: The communication port is not active 1-Modbus RTU: The protocol selected is MODBUS RTU and the unit acts as Modbus slave 2-BACnet MS/TP: The protocol selected is BACnet MS/TP 3-Multipump: The protocol selected is the Hydrovar X Multipump protocol	Default = Multipump
P08.0.02		Com 2 Function	Select the function for the communication port 2 (RS 485.2). 0-Disabled: The communication port is not active 1-Modbus RTU: The protocol selected is MODBUS RTU and the unit acts as Modbus slave 2-BACnet MS/TP: The protocol selected is BACnet MS/TP	Default = Modbus RTU

8.8.2 S08.1 Modbus RTU

Parameter	Type	Name	Description	Value
P08.1.01		Modbus RTU Address	Select the unit address in the Modbus RTU network.	Min = 0 Max = 127 Default = 1
P08.1.02		Modbus RTU Baudrate	Select the unit network baudrate in order to match the baudrate of the Modbus RTU master.	Default = 115200
P08.1.08		Modbus RTU Format	Select the unit network format in order to match the format of the Modbus RTU master.	Default = 8N1

8.8.3 S08.2 Bacnet MS/TP

Parameter	Type	Name	Description	Value
P08.2.01		BACnet MS/TP Mac Address	Select the unit address in the RS-485 network.	Min = 0 Max = P08.2.05 Default = 1
P08.2.02		BACnet MS/TP Baudrate	Select the unit network baudrate in order to match the baudrate of the other BACnet MS/TP devices in the network.	Default = 38400
P08.2.03		BACnet MS/TP Format	Select the unit network format in order to match the format of the other BACnet MS/TP devices in the network.	Default = 8N1
P08.2.04		BACnet MS/TP Device Id	Select the BACnet MS/TP device ID	Min = - Max = 4194304 Default = 84003
P08.2.05		BACnet MS/TP Max Master	Select the BACnet MS/TP maximum number of masters	Min = P08.2.01 Max = 127 Default = 127

8.8.4 S08.3 Wireless Communication

Parameter	Type	Name	Description	Value
P08.3.01		Enable Wireless Communication	Select the activation of the wireless communication service. 0-Off: The wireless communication is disabled and the unit cannot be connected to a smartphone 1-On: The wireless communication is active and the unit can be connected to a smartphone running the dedicated app	Default = On

8.9 M09 General Settings

8.9.1 S09.0 Localization

Parameter	Type	Name	Description	Value
P09.0.01		Language	Select the display language.	Default = English
P09.0.11	(G)	Date	Select the unit calendar date.	
P09.0.12	(G)	Time	Set the unit clock.	

8.9.2 S09.1 Display

Parameter	Type	Name	Description	Value
P09.1.01		Display Energy Saving	Select the status of the display energy saving function. 0-Off: The unit will keep the display always active 1-On: The unit will dim the display after the ENERGY SAVING TIME is elapsed	Default = On
P09.1.02		Energy Saving Time	Select the time in minutes that must pass from the last keyboard action before the display dims.	Min = 60 s Max = 3600 s Default = 600 s
P09.1.10		Display Orientation	Select the display orientation. 0-6 O'CLOCK: The display has the correct orientation for an horizontal pump 1-12 O'CLOCK: The display has the correct orientation for a vertical pump	Default = 6 O'Clock ^{*)}
P09.1.11		Max Decimals	Set the maximum number of decimal points for values to be shown in the homepage	Min = 0 Max = 3 Default = 3

^{*)} Depending on motor power

8.9.3 S09.2 Parameters profiles

Parameter	Type	Name	Description	Value
P09.2.01	(G)	Select Active Parameter Set	Select the parameter set to activate.	Default = Param Set 1
P09.2.02		Save Active Parameter Set	Save current parameter set.	Default = Wait Save Action
P09.2.03		Load Parameter Set	Load default parameter set.	Default = Wait Load Action

8.9.4 S09.3 Factory Settings

Parameter	Type	Name	Description	Value
P09.3.01		Error Log Reset	Select YES to reset the error log.	Default = No
P09.3.02		Operating Time Counter Reset	Select YES to reset the operating time counter	Default = No
P09.3.03		Motor Running Counter Reset	Select YES to reset the motor running time counter	Default = No
P09.3.05		Factory Restore	Select YES to restore the unit to factory default parameters	Default = No
P09.3.06	(G)	Commissioning Completed	Select if the Genie procedure is completed.	Default = No
P09.3.07		Bonded Device List Reset	Select Yes to reset the bluetooth bonded device list	Default = No
P09.3.10		Upgrade Control Card	Download the configuration file from the HMI to the Control Card	Default = No

8.9.5 S09.4 Security

Parameter	Type	Name	Description	Value
P09.4.01		Password Entry	Enter the password. The default user password is 66.	Min = 0 Max = 999 Default = 0
P09.4.02	(R)	Logout	Logout	-
P09.4.03		Set Password	Set a new password. The password is required to access the menu.	Min = 0 Max = 999 Default = 66
P09.4.10		Key Lock	Select the activation of the key lock. Possible selections are: 0-No: The key buttons are always active. 1-Yes: After the Energy Saving Time is elapsed, the arrow and wireless communication buttons are locked. ON/OFF button is still active. 2-Yes - Password: After the Energy Saving Time is elapsed, all buttons are locked. Inserting the password is required to unlock the buttons. Attention: also On/Off button is locked, therefore an external Start/Stop contact is recommended.	Default = No

8.9.6 S09.5 Cloning

Parameter	Type	Name	Description	Value
P09.5.01		Start	Starting the CLONING will download the firmware of this specific unit on all the other units connected. The process will be performed independently of the firmware version of this unit being more or less recent of the other units.	Default = No
P09.5.02	(R)	Firmware Version	Display the cumulative firmware version of the device	-
P09.5.03	(R)	Progress	This value shows the percentage of progression of the CLONING once the process has been launched	-

9 Modbus RTU

9.1 Communication

The unit uses the RS485 serial interface, which defines:

- The connection pins
- The wiring
- The signal levels
- The transmission baud rates
- The parity check.

Controllers communicate with a master-client solution, where only the master can initiate a transfer, or polling. The other devices (client) respond by providing the master with the requested data, or by terminating the action requested in the query.

9.2 Transmission

Function not supported.

9.3 Data Protection

Standard Modbus serial networks use two types of error checks:

- The parity check (even or odd), which can be applied optionally to each character
- Longitudinal Redundancy Frame Control (hereinafter LRC) or Cyclic Redundancy Frame Control (hereinafter CRC), applied to the entire message.

Both checks are generated in the master device and applied to the message content before transmission.

The client device checks each character and the entire message frame during reception.

9.4 Protocol transmission modes

The data managed by the unit can be accessed considering the Modbus virtual memory, consisting of Holding Registers for all values.

When setting the parameters of the S08.0 Ports menu, the Modbus RTU protocol transmission mode is available.

The serial port communication parameters:

- P08.0.01 Address
- P08.0.02 Baud rate
- P08.0.08 Format

must be selected according to the network configuration.

NOTE:

The mode and serial parameters must be the same for all devices in the Modbus network.

When setting P08.0.08 Format parameter, the following modes are available:

- 8N1 1 start bit, 8 data bits, 1 stop bit, no parity
- 8N2 1 start bit, 8 data bits, 2 stop bits, no parity
- 8E1 1 start bit, 8 data bits, 1 stop bit, even parity
- 8O1 1 start bit, 8 data bits, 1 stop bit, odd parity.

The default configuration of the serial port is:

- P08.0.01 Address=1
- P08.0.02 Baud rate=115200
- P08.0.08 Format=8N1.

9.5 Supported function codes

The Modbus protocol function codes implemented in the unit are:

- Read Holding Registers (hex code 0x03), to read both Holding Registers representing Parameters and Information
- Write Multiple Registers (hex code 0x10), to write Holding Registers representing the Parameters.

9.5.1 Example 1

0x03 Read Holding Registers - READ COMMAND reads the binary content of holding registers in the client.

Note: Modbus registers are addressed from zero, for example, a Holding Register indexed as 0xBBA must be addressed as 0xBB9.

Example: Current Pressure Reading

Query

Client address	0x01
Function	0x03 Read Holding Register
Starting address High	0x0B
Starting address Low	0xB9 => 3001 DEC => Current pressure Modbus address (FLOAT32)
Number of points High	0x00
Number of points Low	0x02 Reading of two registers as FLOAT32
CRC Error Check-High	0x17
CRC Error Check-Low	0xCA CRC-Checksum generated

Response

Client address	0x01
Function	0x03
Byte count	0x04
Data High	0x40
Data Low	0xA0
Data High	0x00
Data Low	0x00
CRC Error Check-High	0xEF => 0x40A00000 HEX = 5.2f FLOAT32 => Actual value = 5.2 bar
CRC Error Check-Low	0xD1 CRC-Checksum generated

9.5.2 Example 2

0x10 Write Multiple Registers - WRITE COMMAND writes values in a block of contiguous registers.

Note: Modbus registers are addressed from zero, e.g. a Holding Register indexed as 0x1074 must be addressed as 0x1073.

Example: set Ramp 1 and Ramp 2 to 25 s, Ramp 3 and Ramp 4 to 100 s.

Query

Client address	0x01
Function	0x10 Write Multiple Registers
Starting address High	0x10
Starting address Low	0x74 => 4211 DEC => the first register is Ramp 1
Registers Quantity High	0x00
Registers Quantity Low	0x04 a total of 4 registers (Ramp 1 to Ramp 4) to be written
Byte Count	0x08 2 * Quantity of Registers
Reg Value High	0x00
Reg Value Low	0x19 => 19 HEX = 25 DEC => set ramp 1 to 25 sec
Reg Value High	0x00
Reg Value Low	0x19 => 19 HEX = 25 DEC => set ramp 2 to 25 sec
Reg Value High	0x00
Reg Value Low	0x64 => 64 HEX = 100 DEC => set ramp 3 to 100 sec
Reg Value High	0x00
Reg Value Low	0x64 => 64 HEX = 100 DEC => set ramp 4 to 100 sec
CRC Error Check-High	0xED
CRC Error Check-Low	0x6D CRC-Checksum generated

Response

Client address	0x01
Function	0x10
Starting address High	0x00
Starting address Low	0xCA
Registers Quantity High	0x00
Registers Quantity Low	0x04 a total of 4 registers (Ramp 1 to Ramp 4) written
CRC Error Check-High	0xF4
CRC Error Check-Low	0xE1 CRC-Checksum generated

9.6 Connections and data management, Modbus RTU

For detailed information on the installation, wiring and configuration of the unit, please refer to the Additional Installation, Operation and Maintenance Instructions manual.

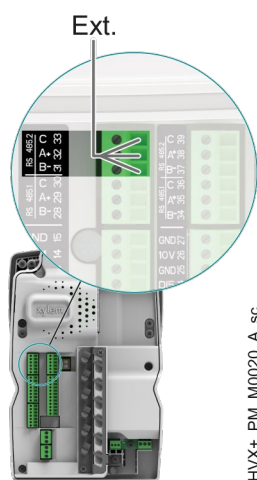
- When Modbus RTU communication between the unit and an external device is active, the control display connection status light comes on.
- Set parameter *P04.1.60 Limit Setpoint Saving* to *Yes* to write to the volatile memory area and extend the life of the non-volatile EEPROM memory.

NOTE:

Do not connect terminal (C) of the control board to different voltage potentials or PE.

Connecting a single unit to an external device

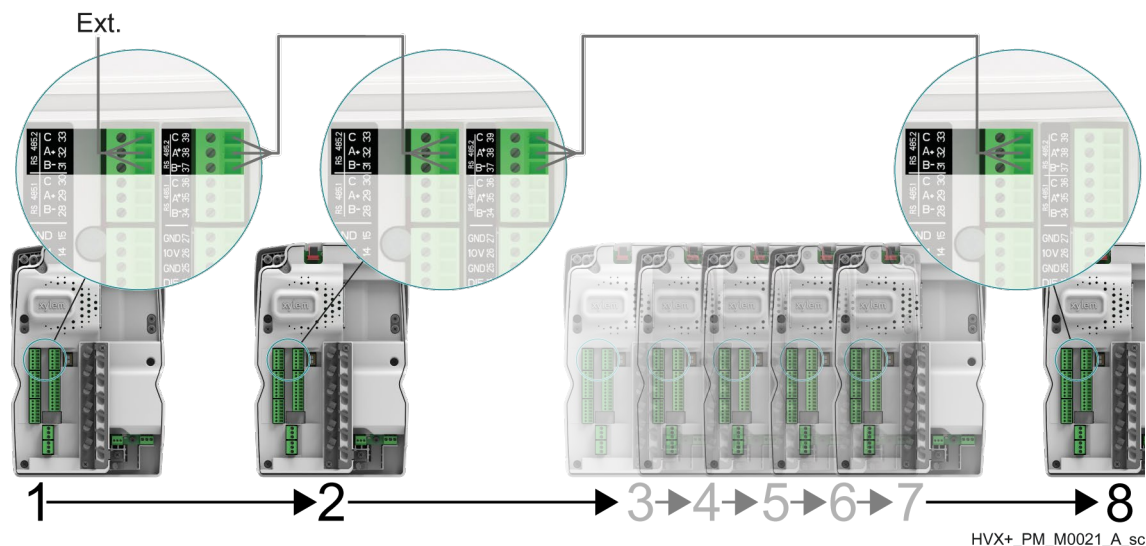
Connect terminals 31 (B), 32 (A) and 33 (C) to the external device, e.g. a programmable logic controller (hereinafter PLC), a BMS, etc....



Connecting a multi-pump system to an external device

Multi-pump mode allows the connection of two or three units in Multi-Master Multi-Pump configuration.

- Each unit of the booster set has its own unique Modbus address and provides a complete list of registers to the external device
- Parameter P08.1.01 Address must be set to a unique value on each unit of the booster set. Parameter P08.1.01 Address consists of the unit identification number in the Modbus network.
- Terminals 31 (B), 32 (A) and 33 (C) are used by default for communication with an external control device (e.g. PLC, BMS, etc.).
- To facilitate cascade connections of RS485 port signals, the terminals for each port are replicated on two connector rows.
- RS485.2 port signals are replicated on both terminal combination 31-31-33 and terminal combination 37-38-39.



As the unit is also connected in a multi-pump system, special care must be taken in case an external device (through Modbus protocol) requests to read and write drive parameters.

In particular:

- In a multi-pump system, in response to a “Read Registers” request on the Modbus, each unit only returns its own parameters to the external device, and not those of the other connected units in the booster set.
- In a multi-pump system, “Write Registers” requests on the Modbus must be sent from the external device to all the connected units, even if the parameters to be written are “Global” (for the booster set).

9.7 List of registers

Modbus Register	Menu ID	Name	R/W	Type	Dimension	Min	Max
0	-	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	R/W	ENUM	-	0	1
1	-	Error Reset Command	R/W	ENUM	-	0	1
2001	P02.0.01	Error 1 (Most Recent)	R	UINT16	-	-	-
2002	-	Error 1 - Date	R	UINT32	-	-	-
2004	-	Error 1 - Time	R	UINT32	-	-	-
2006	-	Error 1 - End Date	R	UINT32	-	-	-
2008	-	Error 1 - End Time	R	UINT32	-	-	-
2010	-	Log: Error Counter	R	UINT16	-	-	-
2011	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2013	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2015	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-

2017	-	LogSpeed	R	UINT32	-	-	-
2019	-	Log: Error Code	R	UINT32	-	-	-
2021	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2023	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2039	P02.0.02	Error 2	R	UINT16	-	-	-
2040	-	Error 2 - Date	R	UINT32	-	-	-
2042	-	Error 2 - Time	R	UINT32	-	-	-
2044	-	Error 2 - End Date	R	UINT32	-	-	-
2046	-	Error 2 - End Time	R	UINT32	-	-	-
2048	-	Log: Error Counter	R	UINT16	-	-	-
2049	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2051	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2053	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2055	-	LogSpeed	R	UINT32	-	-	-
2057	-	Log: Error Code	R	UINT32	-	-	-
2059	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2061	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2077	P02.0.03	Error 3	R	UINT16	-	-	-
2078	-	Error 3 - Date	R	UINT32	-	-	-
2080	-	Error 3 - Time	R	UINT32	-	-	-
2082	-	Error 3 - End Date	R	UINT32	-	-	-
2084	-	Error 3 - End Time	R	UINT32	-	-	-
2086	-	Log: Error Counter	R	UINT16	-	-	-
2087	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2089	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2091	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2093	-	LogSpeed	R	UINT32	-	-	-

2095	-	Log: Error Code	R	UINT32	-	-	-
2097	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2099	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2115	P02.0.04	Error 4	R	UINT16	-	-	-
2116	-	Error 4 - Date	R	UINT32	-	-	-
2118	-	Error 4 - Time	R	UINT32	-	-	-
2120	-	Error 4 - End Date	R	UINT32	-	-	-
2122	-	Error 4 - End Time	R	UINT32	-	-	-
2124	-	Log: Error Counter	R	UINT16	-	-	-
2125	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2127	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2129	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2131	-	LogSpeed	R	UINT32	-	-	-
2133	-	Log: Error Code	R	UINT32	-	-	-
2135	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2137	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2153	P02.0.05	Error 5	R	UINT16	-	-	-
2154	-	Error 5 - Date	R	UINT32	-	-	-
2156	-	Error 5 - Time	R	UINT32	-	-	-
2158	-	Error 5 - End Date	R	UINT32	-	-	-
2160	-	Error 5 - End Time	R	UINT32	-	-	-
2162	-	Log: Error Counter	R	UINT16	-	-	-
2163	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2165	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2167	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2169	-	LogSpeed	R	UINT32	-	-	-
2171	-	Log: Error Code	R	UINT32	-	-	-

2173	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2175	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2191	P02.0.06	Error 6	R	UINT16	-	-	-
2192	-	Error 6 - Date	R	UINT32	-	-	-
2194	-	Error 6 - Time	R	UINT32	-	-	-
2196	-	Error 6 - End Date	R	UINT32	-	-	-
2198	-	Error 6 - End Time	R	UINT32	-	-	-
2200	-	Log: Error Counter	R	UINT16	-	-	-
2201	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2203	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2205	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2207	-	LogSpeed	R	UINT32	-	-	-
2209	-	Log: Error Code	R	UINT32	-	-	-
2211	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2213	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2229	P02.0.07	Error 7	R	UINT16	-	-	-
2230	-	Error 7 - Date	R	UINT32	-	-	-
2232	-	Error 7 - Time	R	UINT32	-	-	-
2234	-	Error 7 - End Date	R	UINT32	-	-	-
2236	-	Error 7 - End Time	R	UINT32	-	-	-
2238	-	Log: Error Counter	R	UINT16	-	-	-
2239	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2241	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2243	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2245	-	LogSpeed	R	UINT32	-	-	-
2247	-	Log: Error Code	R	UINT32	-	-	-
2249	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

2251	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2267	P02.0.08	Error 8	R	UINT16	-	-	-
2268	-	Error 8 - Date	R	UINT32	-	-	-
2270	-	Error 8 - Time	R	UINT32	-	-	-
2272	-	Error 8 - End Date	R	UINT32	-	-	-
2274	-	Error 8 - End Time	R	UINT32	-	-	-
2276	-	Log: Error Counter	R	UINT16	-	-	-
2277	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2279	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2281	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2283	-	LogSpeed	R	UINT32	-	-	-
2285	-	Log: Error Code	R	UINT32	-	-	-
2287	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2289	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2305	P02.0.09	Error 9	R	UINT16	-	-	-
2306	-	Error 9 - Date	R	UINT32	-	-	-
2308	-	Error 9 - Time	R	UINT32	-	-	-
2310	-	Error 9 - End Date	R	UINT32	-	-	-
2312	-	Error 9 - End Time	R	UINT32	-	-	-
2314	-	Log: Error Counter	R	UINT16	-	-	-
2315	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2317	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2319	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2321	-	LogSpeed	R	UINT32	-	-	-
2323	-	Log: Error Code	R	UINT32	-	-	-
2325	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

2327	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2343	P02.0.10	Error 10	R	UINT16	-	-	-
2344	-	Error 10 - Date	R	UINT32	-	-	-
2346	-	Error 10 - Time	R	UINT32	-	-	-
2348	-	Error 10 - End Date	R	UINT32	-	-	-
2350	-	Error 10 - End Time	R	UINT32	-	-	-
2352	-	Log: Error Counter	R	UINT16	-	-	-
2353	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2355	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2357	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2359	-	LogSpeed	R	UINT32	-	-	-
2361	-	Log: Error Code	R	UINT32	-	-	-
2363	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2365	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2381	-	Totoal Error Counter	R	UINT16	-	-	-
2382	-	Total Alarm Counter	R	UINT16	-	-	-
2383	P02.9.01	Error Bitfield 1	R	UINT32	-	-	-
2385	P02.9.02	Error Bitfield 2	R	UINT32	-	-	-
2387	P02.9.05	Alarm Bitfield 1	R	UINT32	-	-	-
3000	P03.0.00	Estimated Actual Value	R	ENUM	-	-	-
3001	P03.0.01	Actual Pressure	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
3003	P03.0.02	Actual Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
3005	P03.0.03	Actual Fluid Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
3007	P03.0.04	Actual Level	R	FLOAT32	P04.0.14 - Level Measuring Unit	-	-
3009	P03.0.10	Effective Required Value	R	FLOAT32	-	-	-
3011	P03.0.20	Required Value	R	FLOAT32	-	-	-

3013	P03.0.30	Pump Status	R	ENUM	-	-	-
3014	P03.0.05	Actual Generic	R	FLOAT32	-	-	-
3016	P03.0.06	Actual Shift	R	FLOAT32	-	-	-
3101	P03.1.01	Unit Powered Time	R	UINT32	s	-	-
3103	P03.1.02	Motor Running Time	R	UINT32	s	-	-
3201	P03.2.01	Motor Speed	R	UINT16	rpm	-	-
3202	P03.2.02	Motor Speed %	R	FLOAT32	%	-	-
3301	P03.3.01	Digital I/O Status	R	UINT16	-	-	-
3302	P03.3.11	Analog Input 1 Value	R	FLOAT32	P05.1.02 - Analog Input 1 Type	-	-
3304	P03.3.12	Analog Input 2 Value	R	FLOAT32	P05.1.12 - Analog Input 2 Type	-	-
3306	P03.3.13	Analog Input 3 Value	R	FLOAT32	P05.1.22 - Analog Input 3 Type	-	-
3308	P03.3.14	Analog Input 4 Value	R	FLOAT32	P05.1.32 - Analog Input 4 Type	-	-
3310	P03.3.20	Analog Output Value	R	FLOAT32	P05.3.02 - Analog Output Type	-	-
3401	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3402	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3403	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3404	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3405	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3406	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3407	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3408	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3409	P03.4.02	Unit Production Date	R	UINT32	-	-	-
3411	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3412	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3413	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3414	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3415	P03.4.03	Unit Serial Number	R	UINT16	-	-	-

3416	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3417	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3418	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3429	P03.4.10	Hmi Firmware Version	R	UINT32	-	-	-
3431	P03.4.11	Hmi-Bt Firmware Version	R	UINT32	-	-	-
3435	P03.4.13	Control Card Firmware Version	R	UINT32	-	-	-
3437	P03.4.14	Map File Version	R	UINT32	-	-	-
3439	P03.4.15	Default File Version	R	UINT32	-	-	-
3443	P03.4.17	Language File Version	R	UINT32	-	-	-
3445	P03.4.19	Firmware Version	R	UINT32	-	-	-
3448	P03.4.25	Hydraulic Curves Stored	R	ENUM	-	-	-
4001	P04.0.01	System Type	R/W	ENUM	-	0	2
4002	P04.0.02	Control Mode	R/W	ENUM	-	0	7
4003	P04.0.03	Regulation Mode	R/W	ENUM	-	0	1
4004	P04.0.05	Start Value	R/W	UINT16	%	0	100
4005	P04.0.06	Auto Start	R/W	ENUM	-	0	1
4006	P04.0.07	Min Speed Configuration	R/W	ENUM	-	0	1
4007	P04.0.09	Measuring Unit Selection	R/W	ENUM	-	0	1
4008	P04.0.11	Pressure Measuring Unit	R/W	ENUM	-	0	8
4009	P04.0.12	Flow Measuring Unit	R/W	ENUM	-	0	4
4010	P04.0.13	Temperature Measuring Unit	R/W	ENUM	-	0	2
4011	P04.0.14	Level Measuring Unit	R/W	ENUM	-	0	3
4012	P04.0.15	Power Measuring Unit	R/W	ENUM	-	0	3
4013	P04.0.16	Energy Measuring Unit	R/W	ENUM	-	0	5
4014	P04.0.17	Specific Energy Meas. Unit	R/W	ENUM	-	0	4
4018	P04.1.15	Pressure Setpoint Type	R/W	ENUM	-	0	1
4019	P01.6.01	H0 Pressure	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale

4021	P04.0.21	Setpoint 1 Selection	R/W	ENUM	-	0	1
4022	P04.0.22	Setpoint 2 Selection	R/W	ENUM	-	0	2
4023	P04.0.23	Setpoint 3 Selection	R/W	ENUM	-	0	2
4024	P04.0.24	Setpoint 4 Selection	R/W	ENUM	-	0	2
4101	P04.1.01	Speed Setpoint 1	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4102	P04.1.02	Speed Setpoint 2	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4103	P04.1.03	Speed Setpoint 3	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4104	P04.1.04	Speed Setpoint 4	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4111	P04.1.11	Pressure Setpoint 1	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4113	P04.1.12	Pressure Setpoint 2	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4115	P04.1.13	Pressure Setpoint 3	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4117	P04.1.14	Pressure Setpoint 4	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4121	P04.1.21	Flow Setpoint 1	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4123	P04.1.22	Flow Setpoint 2	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4125	P04.1.23	Flow Setpoint 3	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4127	P04.1.24	Flow Setpoint 4	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4131	P04.1.31	Temp. Setpoint 1	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
4133	P04.1.32	Temp. Setpoint 2	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
4135	P04.1.33	Temp. Setpoint 3	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
4137	P04.1.34	Temp. Setpoint 4	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
4141	P04.1.41	Level Setpoint 1	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4143	P04.1.42	Level Setpoint 2	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4145	P04.1.43	Level Setpoint 3	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4147	P04.1.44	Level Setpoint 4	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale

4155	P04.1.60	Limit setpoint saving	R/W	ENUM	-	0	1
4156	P04.1.51	Generic Setpoint 1	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4158	P04.1.52	Generic Setpoint 2	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4160	P04.1.53	Generic Setpoint 3	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4162	P04.1.54	Generic Setpoint 4	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4200	P04.2.00	Regulation Type	R/W	ENUM	-	0	1
4201	P04.2.01	Window	R/W	UINT16	%	1	100
4202	P04.2.02	Hysteresis	R/W	UINT16	%	1	100
4203	P04.2.06	Lift Speed	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4204	P04.2.07	Linear Lift Amount	R/W	UINT16	%	0	200
4205	P04.2.08	Quad. Lift Amount	R/W	UINT16	%	0	999
4211	P04.2.11	Ramp 1	R/W	UINT16	s	1	250
4212	P04.2.12	Ramp 2	R/W	UINT16	s	1	250
4213	P04.2.13	Ramp 3	R/W	UINT16	s	1	999
4214	P04.2.14	Ramp 4	R/W	UINT16	s	1	999
4215	P04.2.15	Ramp Speed Min Acceleration	R/W	FLOAT32	s	0.1	25
4217	P04.2.16	Ramp Speed Min Deceleration	R/W	FLOAT32	s	0.1	25
4221	P04.2.21	Pi Control - Kp	R/W	FLOAT32	-	0	10000
4225	P04.2.25	Pi Control - Ti	R/W	FLOAT32	s	0	10000
4231	P04.2.31	Min Speed	R/W	UINT16	rpm	0	2000
4232	P04.2.32	Max Speed	R/W	UINT16	rpm	2000	4100
4233	P04.2.35	Min Speed Time	R/W	UINT16	s	0	100
4300	P04.3.00	Automatic Error Reset	R/W	ENUM	-	0	1
4301	P04.3.01	Pressure - Minimum Threshold	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4303	P04.3.02	Flow - Minimum Threshold	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale

4305	P04.3.03	Temperature - Minimum Threshold	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
4307	P04.3.04	Level - Minimum Threshold	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4310	P04.3.10	Minimum Threshold Delay	R/W	UINT16	s	1	100
4311	P04.3.11	Lack Of Water Delay	R/W	UINT16	s	1	100
4312	P04.3.05	Generic - Min. Threshold	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4401	P04.4.01	Test Run Speed	R/W	UINT16	rpm	0	P04.2.32 - Max Speed
4402	P04.4.02	Test Run Timeout	R/W	UINT16	h	0	255
4403	P04.4.03	Test Run Time	R/W	UINT16	s	0	180
4404	P04.4.05	Test Run Command	R/W	ENUM	-	0	1
4501	P04.5.01	SP Shift Function	R/W	ENUM	-	0	3
4502	P04.5.02	SP Shift Input	R/W	ENUM	-	0	5
4503	P04.5.05	SP Shift VALUE 1	R/W	FLOAT32	-	-	-
4505	P04.5.06	SP Shift VALUE 2	R/W	FLOAT32	-	-	-
4507	P04.5.10	SP Shift X 1	R/W	FLOAT32	-	-	P04.5.11 - SP Shift X 2
4509	P04.5.11	SP Shift X 2	R/W	FLOAT32	-	P04.5.10 - SP Shift X 1	P04.5.12 - SP Shift X 3
4511	P04.5.12	SP Shift X 3	R/W	FLOAT32	-	P04.5.11 - SP Shift X 2	P04.5.13 - SP Shift X 4
4513	P04.5.13	SP Shift X 4	R/W	FLOAT32	-	P04.5.12 - SP Shift X 3	-
4601	P04.6.01	Pipe Filling Function	R/W	ENUM	-	0	2
4602	P04.6.03	Pipe Filling Threshold	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4604	P04.6.05	Pipe Filling Time	R/W	UINT16	s	0	999
4605	P04.6.06	Max Pipe Filling Pumps	R/W	UINT16	-	1	P06.0.02 - Max Units
4606	P04.6.10	Pipe Filling Steady Time	R/W	UINT16	s	1	P04.6.05 - Pipe Filling Time
4607	P04.6.15	Pipe Filling Speed Step	R/W	UINT16	%	5	100
4901	P07.9.01	Motor Power Range	R	ENUM	-	-	-
4905	P07.9.05	VFD (variable frequency drive) Connection Type	R	ENUM	-	-	-
5000	P05.0.00	Actual Value Source	R/W	ENUM	-	0	7

5001	P05.0.01	Actuator - Zero Value	R/W	UINT16	rpm	0	9999
5002	P05.0.02	Actuator - Full Scale	R/W	UINT16	rpm	0	9999
5003	P05.0.11	Pressure - Zero Value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	-5	10
5005	P05.0.12	Pressure - Full Scale	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	100
5007	P05.0.21	Flow - Zero Value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
5009	P05.0.22	Flow - Full Scale	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
5011	P05.0.31	Temperature - Zero Value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
5013	P05.0.32	Temperature - Full Scale	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
5015	P05.0.41	Level - Zero Value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
5017	P05.0.42	Level - Full Scale	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
5021	P05.0.61	SPS Pressure Zero Value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	-1	99
5023	P05.0.62	SPS Pressure Full Scale	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	999
5025	P05.0.51	Generic - Zero Value	R/W	FLOAT32	-	-1000	1000
5027	P05.0.52	Generic - Full Scale	R/W	FLOAT32	-	-1000	1000
5101	P05.1.01	Analog Input 1 Function	R/W	ENUM	-	0	7
5102	P05.1.02	Analog Input 1 Type	R/W	ENUM	-	0	3
5103	P05.1.11	Analog Input 2 Function	R/W	ENUM	-	0	7
5104	P05.1.12	Analog Input 2 Type	R/W	ENUM	-	0	3
5105	P05.1.21	Analog Input 3 Function	R/W	ENUM	-	0	7
5106	P05.1.22	Analog Input 3 Type	R/W	ENUM	-	0	3
5107	P05.1.31	Analog Input 4 Function	R/W	ENUM	-	0	7
5108	P05.1.32	Analog Input 4 Type	R/W	ENUM	-	0	3
5109	P05.1.40	Sensor Curve	R/W	ENUM	-	0	1
5110	P05.1.50	Analog Actuator Type	R/W	ENUM	-	0	1
5203	P05.2.03	Digital Input 3 Function	R/W	ENUM	-	0	11

5204	P05.2.04	Digital Input 4 Function	R/W	ENUM	-	0	11
5205	P05.2.05	Digital Input 5 Function	R/W	ENUM	-	0	11
5213	P05.2.13	Digital Input 3 Logic	R/W	ENUM	-	0	1
5214	P05.2.14	Digital Input 4 Logic	R/W	ENUM	-	0	1
5215	P05.2.15	Digital Input 5 Logic	R/W	ENUM	-	0	1
5301	P05.3.01	Analog Output Function	R/W	ENUM	-	0	12
5302	P05.3.02	Analog Output Type	R/W	ENUM	-	0	3
5401	P05.4.01	Relay 1 Function	R/W	ENUM	-	0	7
5402	P05.4.02	Relay 2 Function	R/W	ENUM	-	0	7
5801	P05.8.01	Analog Input 1 Offset	R/W	FLOAT32	-	-100	100
5803	P05.8.02	Analog Input 1 Gain	R/W	FLOAT32	-	0	1.5
5805	P05.8.11	Analog Input 2 Offset	R/W	FLOAT32	-	-100	100
5807	P05.8.12	Analog Input 2 Gain	R/W	FLOAT32	-	0	1.5
5809	P05.8.21	Analog Input 3 Offset	R/W	FLOAT32	-	-100	100
5811	P05.8.22	Analog Input 3 Gain	R/W	FLOAT32	-	0	1.5
5813	P05.8.31	Analog Input 4 Offset	R/W	FLOAT32	-	-100	100
5815	P05.8.32	Analog Input 4 Gain	R/W	FLOAT32	-	0	1.5
5844	P05.8.44	Analog Output 1 Offset	R/W	FLOAT32	P05.3.02 - Analog Output Type	-100	100
5846	P05.8.45	Analog Output 1 Gain	R/W	FLOAT32	-	0	1.5
6001	P06.0.01	System Configuration	R/W	ENUM	-	0	2
6002	P06.0.02	Max Units	R/W	UINT16	-	1	-
6003	P06.0.03	Multipump Address	R/W	UINT16	-	1	-
6004	P06.0.04	Multipump Map	R	UINT16	-	-	-
6005	P06.0.05	Multipump Priority	R	UINT16	-	-	-
6111	P06.1.11	Pressure - Inc. value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
6113	P06.1.12	Pressure - Dec. value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
6115	P06.1.21	Flow - Inc. value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale

6117	P06.1.22	Flow - Dec. value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
6119	P06.1.31	Temperature - Inc. value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
6121	P06.1.32	Temperature - Dec. value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
6123	P06.1.41	Level - Inc. value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
6125	P06.1.42	Level - Dec. value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
6129	P06.1.61	Multipump Enable Speed	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
6130	P06.1.71	Synchronous Limit	R/W	UINT16	rpm	0	3600
6131	P06.1.72	Synchronous Window	R/W	UINT16	rpm	0	P04.2.32 - Max Speed
6132	P06.1.81	Automatic Switchover Interval	R/W	UINT16	h	0	250
6133	-	MultipumpDeviceEnable	R/W	UINT16	-	0	1
6134	P06.1.51	Generic - Inc. value	R/W	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
6136	P06.1.52	Generic - Dec. value	R/W	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
7101	P07.1.01	Skip Speed Center	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
7102	P07.1.02	Skip Speed Range	R/W	UINT16	rpm	0	300
8001	P08.0.01	Com 1 Function	R/W	ENUM	-	0	3
8002	P08.0.02	Com 2 Function	R/W	ENUM	-	0	2
8101	P08.1.01	Modbus RTU Address	R/W	UINT16	-	0	127
8102	P08.1.02	Modbus RTU Baudrate	R/W	ENUM	-	0	8
8108	P08.1.08	Modbus RTU Format	R/W	ENUM	-	0	3
8201	P08.2.01	BACnet MS/TP Mac Address	R/W	UINT16	-	0	P08.2.05 - BACnet MS/TP Max Master
8202	P08.2.02	BACnet MS/TP Baudrate	R/W	ENUM	-	0	8
8203	P08.2.03	BACnet MS/TP Format	R/W	ENUM	-	0	3
8204	P08.2.04	BACnet MS/TP Device Id	R/W	UINT32	-	-	4194304
8206	P08.2.05	BACnet MS/TP Max Master	R/W	UINT16	-	P08.2.01 - BACnet MS/TP Mac Address	127
8210	-	BACnet Info Frames	R/W	UINT16	-	1	255
8211	-	BACnet Reinit	R/W	ENUM	-	0	1

8301	P08.3.01	Enable Wireless Communication	R/W	ENUM	-	0	1
9001	P09.0.01	Language	R/W	ENUM	-	0	28
9011	P09.0.12	Time	R/W	UINT32	-	-	-
9013	P09.0.11	Date	R/W	UINT32	-	-	-
9101	P09.2.01	Select Active Parameter Set	R/W	ENUM	-	0	1
9201	P09.1.01	Display Energy Saving	R/W	ENUM	-	0	1
9202	P09.1.02	Energy Saving Time	R/W	UINT16	s	60	3600
9210	P09.1.10	Display Orientation	R/W	ENUM	-	0	1
9211	P09.1.11	Max Decimals	R/W	UINT16	-	0	3
9301	P09.3.01	Error Log Reset	R/W	ENUM	-	0	1
9302	P09.3.02	Operating Time Counter Reset	R/W	ENUM	-	0	1
9303	P09.3.03	Motor Running Counter Reset	R/W	ENUM	-	0	1
9305	P09.3.05	Factory Restore	R/W	ENUM	-	0	1
9306	P09.3.06	Commissioning Completed	R/W	ENUM	-	0	1
9307	P09.3.07	Bonded Device List Reset	R/W	ENUM	-	0	1
9501	P09.5.01	Start	R/W	ENUM	-	0	1
9503	P09.5.03	Progress	R	UINT16	%	-	-

10 BACnet MS/TP

10.1 Protocol implementation compliance statement (PICS)

Declaration of Conformity

Date	22/11/2024
Vendor name	Xylem Inc.
Product name	HYDROVAR X+ SMART CONTROLLER
Product model number	HVX+/WT, HVX+/PU
Application software version	01.00.00
Firmware revision	01.00.00
BACnet protocol version	19

BACnet standard device profile (Annex L)

☐	BACnet Advanced Workstation	(B-AWS)
☐	BACnet Operator Workstation	(B-OWS)
☐	BACnet Operator Display	(B-OD)
☐	BACnet Building Controller	(B-BC)
☐	BACnet Advanced Application Controller	(B-AAC)
☐	BACnet Application Specific Controller	(B-ASC)
☐	BACnet Smart Sensor	(B-SS)
☒	BACnet Smart Actuator	(B-SA)

BACnet interoperability blocks (Annex K)

☐	Data Sharing – Read Property-A	DS-RP-A
☒	Data Sharing – Read Property-B	DS-RP-B
☐	Data Sharing – Read Property Multiple-A	DS-RPM-A
☐	Data Sharing – Read Property Multiple-B	DS-RPM-B
☐	Data Sharing – Write Property-A	DS-WP-A
☒	Data Sharing – Write Property-B	DS-WP-B
☐	Data Sharing – Write Property Multiple-A	DS-WPM-A
☐	Data Sharing – Write Property Multiple-B	DS-WPM-B
☐	Data Sharing – Change of Value-A	DS-COV-A
☐	Data Sharing – Change of Value-B	DS-COV-B
☐	Data Sharing – Change of Value Property-A	DS-COVP-A
☐	Data Sharing – Change of Value Property-B	DS-COVP-B
☐	Data Sharing – Change of Value Unsolicited-A	DS-COVU-A
☐	Data Sharing – Change of Value Unsolicited-B	DS-COVU-B
☐	Data Sharing – View-A	DS-V-A
☐	Data Sharing – Advanced View-A	DS-AV-A
☐	Data Sharing – Modify-A	DS-M-A
☐	Data Sharing – Advanced Modify-A	DS-AM-A

Network device management

☐	Device Management – Dynamic Device Binding-A	DM-DDB-A
☒	Device Management – Dynamic Device Binding-B	DM-DDB-B
☐	Device Management – Dynamic Object Binding-A	DM-DOB-A
☒	Device Management – Dynamic Object Binding-B	DM-DOB-B
☐	Device Management – Device Communication Control-A	DM-DCC-A
☐	Device Management – Device Communication Control -B	DM-DCC-B
☐	Device Management – Private Transfer-A	DM-PT-A
☐	Device Management – Private Transfer-B	DM-PT-B
☐	Device Management – Text Message-A	DM-TM-A
☐	Device Management – Text Message-B	DM-TM-B
☐	Device Management – Time Synchronization-A	DM-TS-A
☐	Device Management – Time Synchronization-B	DM-TS-B
☐	Device Management – UTC Time Synchronization-A	DM-UTC-A
☐	Device Management – UTC Time Synchronization-B	DM-UTC-B
☐	Device Management – Reinitialize Device-A	DM-RD-A
☐	Device Management – Reinitialize Device-B	DM-RD-B
☐	Device Management – Backup and Restore-A	DM-BR-A
☐	Device Management – Backup and Restore-B	DM-BR-B
☐	Device Management – Restart-A	DM-R-A
☐	Device Management – Restart-B	DM-R-B
☐	Device Management – List Manipulation-A	DM-LM-A
☐	Device Management – List Manipulation-B	DM-LM-B
☐	Device Management – Object Creation and Deletion-A	DM-OCD-A
☐	Device Management – Object Creation and Deletion-B	DM-OCD-B
☐	Device Management – Virtual Terminal-A	DM-VT-A
☐	Device Management – Virtual Terminal-B	DM-VT-B
☐	Device Management – Automatic Network Mapping-A	DM-ANM-A
☐	Device Management – Automatic Device Mapping-A	DM-ADM-A
☐	Device Management – Automatic Time Synchronization-A	DM-ATS-A
☐	Device Management – Manual Time Synchronization-A	DM-MTS-A

Supported standard objects

Object	Supported	Created / deleted dynamically	Optional properties supported	Writing properties
Analog Input	☒	☐	-	-
Analog Value	☒	☐	-	Present_Value
Device	☒	☐	Max_Master, Max_Info_Frames	Object_Identifier
Network Port	☒	☐	MAC_Address, Max_Master, Max_Info_Frames	-
CharacterStringValue	☒	☐	-	-

Data link level

☐	BACnet IP, (Annex J)	
☐	BACnet IP, (Annex J), Foreign Device	
☐	ISO 8802-3, Ethernet (Clause 7)	
☐	ANSI/ATA 878.1, 2,5 Mb ARCNET (Clause 8)	
☐	ANSI/ATA 878.1, 2,5 Mb ARCNET (Clause 8), baud rate(s)	
☒	MS/TP master (Clause 9), baud rate(s)	• 1200 (limited functionality, possibility of timeout caused by low speed) • 2400 (limited functionality, possibility of timeout caused by low speed) • 4800 (limited functionality, possibility of timeout caused by low speed) • 9600 • 19200 • 38400 (recommended) • 57600 • 76800 • 115200
☐	MS/TP slave (Clause 9), baud rate(s)	
☐	Point-To-Point, EIA 232 (Clause 10), baud rate(s)	
☐	Point-To-Point, modem (Clause 10), baud rate(s)	
☐	LonTalk (Clause 11), medium	
☐	Other	

Device address constraint

Are devices with static constraints supported? Necessary for bidirectional communication with MS/TP slave and other devices.	☐ yes	☒ no
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Additional features

- Network options: Not present.
- Network safety options: Not present.
- Set of supported characters: Not present.
- Segmentation capabilities: Not present.
- Network management: Not present.
- Alarm and event management: Not present.
- Scheduling and programming: Not present.
- Capability of handling logs (trending): Not present.

10.2 BACnet Device and BACnet Device Object Identifier

HVX+ Smart Controller is a BACnet Device, as it supports digital communication using the BACnet protocol.

Each BACnet Device contains a Device Object. This is a standard object whose properties represent the characteristics that can be viewed from the outside.

If the unit is connected to the Master-Slave / Token-Passing (hereinafter MS/TP) local network, it is localised through:

- a Device Object Identifier, or
- A Media Access Control address (hereinafter MAC).

BACnet Device Object Identifier

The factory set value is 84003.

To change value, use the Write Property service in the Object_Identifier property of the Device Object, or the specific parameter P08.2.04 Device ID BACnet MS/TP available on the display.

MAC address

The factory set value is 1.

Check that each unit connected to the MS/TP network is identified by a different address in parameter P08.2.01 MAC address BACnet MS/TP.

10.3 Connections and data management, BACnet MS/TP

For detailed information on the installation, wiring and configuration of the unit, please refer to the Additional Installation, Operation and Maintenance Instructions manual.

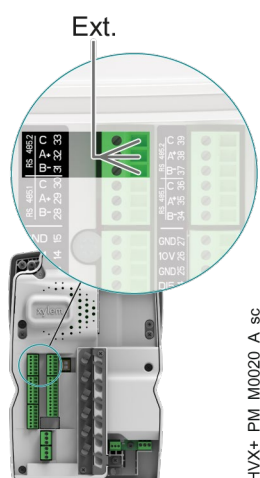
- When BACnet MS/TP communication between the unit and an external device is active, the connection status light on the control display is on.
- Set parameter *P04.1.60 Limit setpoint saving* to *Yes* to write to the volatile memory area and extend the life of the electrically erasable programmable read-only memory (hereinafter EEPROM).

NOTE:

Do not connect the terminal (C) of the control board to different voltage potentials or to the protection ground (hereinafter PE).

Connect a single unit to an external device

Connect terminals 31 (B), 32 (A) and 33 (C) to the external device, e.g. a programmable logic controller (hereinafter PLC), a BMS, etc.



10.4 BACnet Strings TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type			
0	P03.4.01	Unit Part Number	Unit Part Number	UINT16	-	-	-
1	P03.4.03	Unit Serial Number	Unit Serial Number	UINT16	-	-	-

10.5 BACnet Analog Inputs TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type	Dimension	Min	Max
0	P02.0.01	Error 1 (Most Recent)	Error 1 (Most Recent)	UINT16	-	-	-
1	-	Error 1 - Date	Error 1 - Date	UINT32	-	-	-
2	-	Error 1 - Time	Error 1 - Time	UINT32	-	-	-
3	-	Error 1 - End Date	Error 1 - End Date	UINT32	-	-	-
4	-	Error 1 - End Time	Error 1 - End Time	UINT32	-	-	-
5	-	Log: Error Counter	Log: Error Counter 1	UINT16	-	-	-
6	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 1	UINT32	-	-	-
7	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 1	UINT32	-	-	-
8	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 1	UINT32	-	-	-
9	-	LogSpeed	Log: Speed 1	UINT32	-	-	-
10	-	Log: Error Code	Log: Error Code 1	UINT32	-	-	-
11	-	Log: Flow	Log: Flow 1	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
12	-	Log: Head	Log: Head 1	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
13	P02.0.02	Error 2	Error 2	UINT16	-	-	-
14	-	Error 2 - Date	Error 2 - Date	UINT32	-	-	-
15	-	Error 2 - Time	Error 2 - Time	UINT32	-	-	-
16	-	Error 2 - End Date	Error 2 - End Date	UINT32	-	-	-
17	-	Error 2 - End Time	Error 2 - End Time 1	UINT32	-	-	-
18	-	Log: Error Counter	Log: Error Counter 2	UINT16	-	-	-
19	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 2	UINT32	-	-	-
20	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 2	UINT32	-	-	-
21	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 2	UINT32	-	-	-

22	-	LogSpeed	Log: Speed 2	UINT32	-	-	-
23	-	Log: Error Code	Log: Error Code 2	UINT32	-	-	-
24	-	Log: Flow	Log: Flow 2	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
25	-	Log: Head	Log: Head 2	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
26	P02.0.03	Error 3	Error 3	UINT16	-	-	-
27	-	Error 3 - Date	Error 3 - Date	UINT32	-	-	-
28	-	Error 3 - Time	Error 3 - Time	UINT32	-	-	-
29	-	Error 3 - End Date	Error 3 - End Date	UINT32	-	-	-
30	-	Error 3 - End Time	Error 3 - End Time 1	UINT32	-	-	-
31	-	Log: Error Counter	Log: Error Counter 3	UINT16	-	-	-
32	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 3	UINT32	-	-	-
33	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 3	UINT32	-	-	-
34	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 3	UINT32	-	-	-
35	-	LogSpeed	Log: Speed 3	UINT32	-	-	-
36	-	Log: Error Code	Log: Error Code 3	UINT32	-	-	-
37	-	Log: Flow	Log: Flow 3	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
38	-	Log: Head	Log: Head 3	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
39	P02.0.04	Error 4	Error 4	UINT16	-	-	-
40	-	Error 4 - Date	Error 4 - Date	UINT32	-	-	-
41	-	Error 4 - Time	Error 4 - Time	UINT32	-	-	-
42	-	Error 4 - End Date	Error 4 - End Date	UINT32	-	-	-
43	-	Error 4 - End Time	Error 4 - End Time 1	UINT32	-	-	-
44	-	Log: Error Counter	Log: Error Counter 4	UINT16	-	-	-
45	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 4	UINT32	-	-	-
46	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 4	UINT32	-	-	-
47	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 4	UINT32	-	-	-
48	-	LogSpeed	Log: Speed 4	UINT32	-	-	-

49	-	Log: Error Code	Log: Error Code 4	UINT32	-	-	-
50	-	Log: Flow	Log: Flow 4	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
51	-	Log: Head	Log: Head 4	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
52	P02.0.05	Error 5	Error 5	UINT16	-	-	-
53	-	Error 5 - Date	Error 5 - Date	UINT32	-	-	-
54	-	Error 5 - Time	Error 5 - Time	UINT32	-	-	-
55	-	Error 5 - End Date	Error 5 - End Date	UINT32	-	-	-
56	-	Error 5 - End Time	Error 5 - End Time 1	UINT32	-	-	-
57	-	Log: Error Counter	Log: Error Counter 5	UINT16	-	-	-
58	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 5	UINT32	-	-	-
59	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 5	UINT32	-	-	-
60	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 5	UINT32	-	-	-
61	-	LogSpeed	Log: Speed 5	UINT32	-	-	-
62	-	Log: Error Code	Log: Error Code 5	UINT32	-	-	-
63	-	Log: Flow	Log: Flow 5	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
64	P02.0.06	Error 6	Error 6	UINT16	-	-	-
65	-	Error 6 - Date	Error 6 - Date	UINT32	-	-	-
66	-	Error 6 - Time	Error 6 - Time	UINT32	-	-	-
67	-	Error 6 - End Date	Error 6 - End Date	UINT32	-	-	-
68	-	Error 6 - End Time	Error 6 - End Time 1	UINT32	-	-	-
69	-	Log: Error Counter	Log: Error Counter 6	UINT16	-	-	-
70	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 6	UINT32	-	-	-
71	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 6	UINT32	-	-	-
72	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 6	UINT32	-	-	-
73	-	LogSpeed	Log: Speed 6	UINT32	-	-	-
74	-	Log: Error Code	Log: Error Code 6	UINT32	-	-	-
75	-	Log: Flow	Log: Flow 6	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

76	-	Log: Head	Log: Head 6	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
77	P02.0.07	Error 7	Error 7	UINT16	-	-	-
78	-	Error 7 - Date	Error 7 - Date	UINT32	-	-	-
79	-	Error 7 - Time	Error 7 - Time	UINT32	-	-	-
80	-	Error 7 - End Date	Error 7 - End Date	UINT32	-	-	-
81	-	Error 7 - End Time	Error 7 - End Time 1	UINT32	-	-	-
82	-	Log: Error Counter	Log: Error Counter 7	UINT16	-	-	-
83	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 7	UINT32	-	-	-
84	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 7	UINT32	-	-	-
85	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 7	UINT32	-	-	-
86	-	LogSpeed	Log: Speed 7	UINT32	-	-	-
87	-	Log: Error Code	Log: Error Code 7	UINT32	-	-	-
88	-	Log: Flow	Log: Flow 7	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
89	-	Log: Head	Log: Head 7	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
90	P02.0.08	Error 8	Error 8	UINT16	-	-	-
91	-	Error 8 - Date	Error 8 - Date	UINT32	-	-	-
92	-	Error 8 - Time	Error 8 - Time	UINT32	-	-	-
93	-	Error 8 - End Date	Error 8 - End Date	UINT32	-	-	-
94	-	Error 8 - End Time	Error 8 - End Time 1	UINT32	-	-	-
95	-	Log: Error Counter	Log: Error Counter 8	UINT16	-	-	-
96	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 8	UINT32	-	-	-
97	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 8	UINT32	-	-	-
98	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 8	UINT32	-	-	-
99	-	LogSpeed	Log: Speed 8	UINT32	-	-	-
100	-	Log: Error Code	Log: Error Code 8	UINT32	-	-	-
101	-	Log: Flow	Log: Flow 8	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

102	-	Log: Head	Log: Head 8	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
103	P02.0.09	Error 9	Error 9	UINT16	-	-	-
104	-	Error 9 - Date	Error 9 - Date	UINT32	-	-	-
105	-	Error 9 - Time	Error 9 - Time	UINT32	-	-	-
106	-	Error 9 - End Date	Error 9 - End Date	UINT32	-	-	-
107	-	Error 9 - End Time	Error 9 - End Time 1	UINT32	-	-	-
108	-	Log: Error Counter	Log: Error Counter 9	UINT16	-	-	-
109	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 9	UINT32	-	-	-
110	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 9	UINT32	-	-	-
111	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 9	UINT32	-	-	-
112	-	LogSpeed	Log: Speed 9	UINT32	-	-	-
113	-	Log: Error Code	Log: Error Code 9	UINT32	-	-	-
114	-	Log: Flow	Log: Flow 9	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
115	-	Log: Head	Log: Head 9	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
116	P02.0.10	Error 10	Error 10	UINT16	-	-	-
117	-	Error 10 - Date	Error 10 - Date	UINT32	-	-	-
118	-	Error 10 - Time	Error 10 - Time	UINT32	-	-	-
119	-	Error 10 - End Date	Error 10 - End Date	UINT32	-	-	-
120	-	Error 10 - End Time	Error 10 - End Time 1	UINT32	-	-	-
121	-	Log: Error Counter	Log: Error Counter 10	UINT16	-	-	-
122	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 10	UINT32	-	-	-
123	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 10	UINT32	-	-	-
124	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 10	UINT32	-	-	-
125	-	LogSpeed	Log: Speed 10	UINT32	-	-	-
126	-	Log: Error Code	Log: Error Code 10	UINT32	-	-	-
127	-	Log: Flow	Log: Flow 10	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

128	-	Log: Head	Log: Head 10	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
129	-	Totoal Error Counter	Total Error Counter	UINT16	-	-	-
130	-	Total Alarm Counter	Total Alarm Counter	UINT16	-	-	-
131	P02.9.01	Error Bitfield 1	Error Bitfield 1	UINT32	-	-	-
132	P02.9.02	Error Bitfield 2	Error Bitfield 2	UINT32	-	-	-
133	P02.9.05	Alarm Bitfield 1	Alarm Bitfield 1	UINT32	-	-	-
134	P03.0.01	Actual Pressure	Actual Pressure	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
135	P03.0.02	Actual Flow	Actual Flow	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
136	P03.0.03	Actual Fluid Temperature	Actual Fluid Temperature	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
137	P03.0.04	Actual Level	Actual Level	FLOAT32	P04.0.14 - Level Measuring Unit	-	-
138	P03.0.10	Effective Required Value	Effective Required Value	FLOAT32	-	-	-
139	P03.0.20	Required Value	Required Value	FLOAT32	-	-	-
140	P03.0.30	Pump Status	Pump Status	ENUM	-	-	-
141	P03.1.01	Unit Powered Time	Unit Powered Time	UINT32	s	-	-
142	P03.1.02	Motor Running Time	Motor Running Time	UINT32	s	-	-
143	P03.2.01	Motor Speed	Motor Speed	UINT16	rpm	-	-
144	P03.2.02	Motor Speed %	Motor Speed %	FLOAT32	%	-	-
145	P03.3.01	Digital I/O Status	Digital I/O Status	UINT16	-	-	-
146	P03.3.11	Analog Input 1 Value	Analog Input 1 Value	FLOAT32	P05.1.02 - Analog Input 1 Type	-	-
147	P03.3.12	Analog Input 2 Value	Analog Input 2 Value	FLOAT32	P05.1.12 - Analog Input 2 Type	-	-
148	P03.3.13	Analog Input 3 Value	Analog Input 3 Value	FLOAT32	P05.1.22 - Analog Input 3 Type	-	-
149	P03.3.14	Analog Input 4 Value	Analog Input 4 Value	FLOAT32	P05.1.32 - Analog Input 4 Type	-	-
150	P03.3.20	Analog Output Value	Analog Output Value	FLOAT32	P05.3.02 - Analog Output Type	-	-
151	P03.4.02	Unit Production Date	Unit Production Date	UINT32	-	-	-

152	P06.0.04	Multipump Map	Multipump Map	UINT16	-	-	-
153	P06.0.05	Multipump Priority	Multipump Priority	UINT16	-	-	-
154	P03.4.13	Control Card Firmware Version	Control Card Firmware Version	UINT32	-	-	-
155	P03.4.10	Hmi Firmware Version	Hmi Firmware Version	UINT32	-	-	-
156	P03.4.11	Hmi-Bt Firmware Version	Hmi-Bt Firmware Version	UINT32	-	-	-
157	P03.4.14	Map File Version	Map File Version	UINT32	-	-	-
158	P03.4.15	Default File Version	Default File Version	UINT32	-	-	-
159	P03.4.17	Language File Version	Language File Version	UINT32	-	-	-
160	P03.0.00	Estimated Actual Value	Senorless or Sensored	ENUM	-	-	-
161	P03.4.25	Hydraulic Curves Stored	EstimationCapability	ENUM	-	-	-
162	P03.4.19	Firmware Version	Firmware Version	UINT32	-	-	-
163	P03.0.05	Actual Generic	Actual Generic	FLOAT32	-	-	-
164	P03.0.06	Actual Shift	Actual Shift	FLOAT32	-	-	-
165	P07.9.01	Motor Power Range	Motor Power Range	ENUM	-	-	-
166	P07.9.05	VFD (variable frequency drive) Connection Type	Inverter Connection Type	ENUM	-	-	-

10.6 BACnet Analog Values TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type	Dimension	Min	Max
0	-	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	On/Off Set	ENUM	-	0	1
1	-	Error Reset Command	ERRORRETCMD	ENUM	-	0	1
2	P04.0.01	System Type	System Type	ENUM	-	0	2
3	P04.0.02	Control Mode	Control Mode	ENUM	-	0	7
4	P04.0.03	Regulation Mode	Regulation Mode	ENUM	-	0	1
5	P04.0.05	Start Value	Start Value	UINT16	%	0	100
6	P04.0.06	Auto Start	Auto Start	ENUM	-	0	1
7	P04.0.07	Min Speed Configuration	Min Speed Configuration	ENUM	-	0	1

8	P04.0.09	Measuring Unit Selection	Measuring Unit Selection	ENUM	-	0	1
9	P04.0.11	Pressure Measuring Unit	Pressure Measuring Unit	ENUM	-	0	8
10	P04.0.12	Flow Measuring Unit	Flow Measuring Unit	ENUM	-	0	4
11	P04.0.13	Temperature Measuring Unit	Temperature Measuring Unit	ENUM	-	0	2
12	P04.0.14	Level Measuring Unit	Level Measuring Unit	ENUM	-	0	3
13	P04.0.15	Power Measuring Unit	Power Measuring Unit	ENUM	-	0	3
14	P04.0.16	Energy Measuring Unit	Energy Measuring Unit	ENUM	-	0	5
15	P04.0.17	Specific Energy Meas. Unit	Specific Energy Meas. Unit	ENUM	-	0	4
16	P09.1.11	Max Decimals	Max Decimals	UINT16	-	0	3
17	P04.0.21	Setpoint 1 Selection	Setpoint 1 Selection	ENUM	-	0	1
18	P04.0.22	Setpoint 2 Selection	Setpoint 2 Selection	ENUM	-	0	2
19	P04.0.23	Setpoint 3 Selection	Setpoint 3 Selection	ENUM	-	0	2
20	P04.0.24	Setpoint 4 Selection	Setpoint 4 Selection	ENUM	-	0	2
21	P04.1.01	Speed Setpoint 1	Speed Setpoint 1	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
22	P04.1.02	Speed Setpoint 2	Speed Setpoint 2	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
23	P04.1.03	Speed Setpoint 3	Speed Setpoint 3	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
24	P04.1.04	Speed Setpoint 4	Speed Setpoint 4	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
25	P04.1.11	Pressure Setpoint 1	Pressure Setpoint 1	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
26	P04.1.12	Pressure Setpoint 2	Pressure Setpoint 2	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
27	P04.1.13	Pressure Setpoint 3	Pressure Setpoint 3	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
28	P04.1.14	Pressure Setpoint 4	Pressure Setpoint 4	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
29	P04.1.21	Flow Setpoint 1	Flow Setpoint 1	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
30	P04.1.22	Flow Setpoint 2	Flow Setpoint 2	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
31	P04.1.23	Flow Setpoint 3	Flow Setpoint 3	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
32	P04.1.24	Flow Setpoint 4	Flow Setpoint 4	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
33	P04.1.31	Temp. Setpoint 1	Temp. Setpoint 1	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-

34	P04.1.32	Temp. Setpoint 2	Temp. Setpoint 2	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
35	P04.1.33	Temp. Setpoint 3	Temp. Setpoint 3	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
36	P04.1.34	Temp. Setpoint 4	Temp. Setpoint 4	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
37	P04.1.41	Level Setpoint 1	Level Setpoint 1	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
38	P04.1.42	Level Setpoint 2	Level Setpoint 2	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
39	P04.1.43	Level Setpoint 3	Level Setpoint 3	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
40	P04.1.44	Level Setpoint 4	Level Setpoint 4	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
41	P04.1.51	Generic Setpoint 1	Generic Setpoint 1	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
42	P04.1.52	Generic Setpoint 2	Generic Setpoint 2	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
43	P04.1.53	Generic Setpoint 3	Generic Setpoint 3	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
44	P04.1.54	Generic Setpoint 4	Generic Setpoint 4	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
45	P04.2.01	Window	Window	UINT16	%	1	100
46	P04.2.02	Hysteresis	Hysteresis	UINT16	%	1	100
47	P04.2.06	Lift Speed	Lift Speed	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
48	P04.2.07	Linear Lift Amount	Linear Lift Amount	UINT16	%	0	200
49	P04.2.08	Quad. Lift Amount	Quad. Lift Amount	UINT16	%	0	999
50	P04.2.11	Ramp 1	Ramp 1	UINT16	s	1	250
51	P04.2.12	Ramp 2	Ramp 2	UINT16	s	1	250
52	P04.2.13	Ramp 3	Ramp 3	UINT16	s	1	999
53	P04.2.14	Ramp 4	Ramp 4	UINT16	s	1	999
54	P04.2.15	Ramp Speed Min Acceleration	Ramp Speed Min Acceleration	FLOAT32	s	0.1	25
55	P04.2.16	Ramp Speed Min Deceleration	Ramp Speed Min Deceleration	FLOAT32	s	0.1	25
56	P04.2.31	Min Speed	Min Speed	UINT16	rpm	0	2000
57	P04.2.32	Max Speed	Max Speed	UINT16	rpm	2000	4100
58	P04.2.35	Min Speed Time	Min Speed Time	UINT16	s	0	100

59	P04.3.00	Automatic Error Reset	Automatic Error Reset	ENUM	-	0	1
60	P04.3.01	Pressure - Minimum Threshold	Pressure - Minimum Threshold	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
61	P04.3.02	Flow - Minimum Threshold	Flow - Minimum Threshold	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
62	P04.3.03	Temperature - Minimum Threshold	Temperature - Minimum Thresho	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
63	P04.3.04	Level - Minimum Threshold	Level - Minimum Threshold	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
64	P04.3.05	Generic - Min. Threshold	Generic - Min. Threshold	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
65	P04.3.10	Minimum Threshold Delay	Minimum Threshold Delay	UINT16	s	1	100
66	P04.3.11	Lack Of Water Delay	Lack Of Water Delay	UINT16	s	1	100
67	P04.4.01	Test Run Speed	Test Run Speed	UINT16	rpm	0	P04.2.32 - Max Speed
68	P04.4.02	Test Run Timeout	Test Run Timeout	UINT16	h	0	255
69	P04.4.03	Test Run Time	Test Run Time	UINT16	s	0	180
70	P04.4.05	Test Run Command	Test Run Command	ENUM	-	0	1
71	P04.6.01	Pipe Filling Function	Pipe Filling Function	ENUM	-	0	2
72	P04.6.03	Pipe Filling Threshold	Pipe Filling Threshold	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
73	P04.6.05	Pipe Filling Time	Pipe Filling Time	UINT16	s	0	999
74	P04.6.06	Max Pipe Filling Pumps	Max Pipe Filling Pumps	UINT16	-	1	P06.0.02 - Max Units
75	P04.6.10	Pipe Filling Steady Time	Pipe Filling Steady Time	UINT16	s	1	P04.6.05 - Pipe Filling Time
76	P04.6.15	Pipe Filling Speed Step	Pipe Filling Speed Step	UINT16	%	5	100
77	P05.0.00	Actual Value Source	Actual Value Source	ENUM	-	0	7
78	P05.0.01	Actuator - Zero Value	Actuator - Zero Value	UINT16	rpm	0	9999
79	P05.0.02	Actuator - Full Scale	Actuator - Full Scale	UINT16	rpm	0	9999
80	P05.0.11	Pressure - Zero Value	Pressure - Zero Value	FLOAT32	P04.0.11 - Pressure Measuring Unit	-5	10
81	P05.0.12	Pressure - Full Scale	Pressure - Full Scale	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	100
82	P05.0.21	Flow - Zero Value	Flow - Zero Value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
83	P05.0.22	Flow - Full Scale	Flow - Full Scale	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999

84	P05.0.31	Temperature - Zero Value	Temperature - Zero Value	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
85	P05.0.32	Temperature - Full Scale	Temperature - Full Scale	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
86	P05.0.41	Level - Zero Value	Level - Zero Value	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
87	P05.0.42	Level - Full Scale	Level - Full Scale	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
88	P05.0.51	Generic - Zero Value	Generic - Zero Value	FLOAT32	-	-1000	1000
89	P05.0.52	Generic - Full Scale	Generic - Full Scale	FLOAT32	-	-1000	1000
90	P05.1.01	Analog Input 1 Function	Analog Input 1 Function	ENUM	-	0	7
91	P05.1.02	Analog Input 1 Type	Analog Input 1 Type	ENUM	-	0	3
92	P05.1.11	Analog Input 2 Function	Analog Input 2 Function	ENUM	-	0	7
93	P05.1.12	Analog Input 2 Type	Analog Input 2 Type	ENUM	-	0	3
94	P05.1.21	Analog Input 3 Function	Analog Input 3 Function	ENUM	-	0	7
95	P05.1.22	Analog Input 3 Type	Analog Input 3 Type	ENUM	-	0	3
96	P05.1.31	Analog Input 4 Function	Analog Input 4 Function	ENUM	-	0	7
97	P05.1.32	Analog Input 4 Type	Analog Input 4 Type	ENUM	-	0	3
98	P05.1.40	Sensor Curve	Sensor Curve	ENUM	-	0	1
99	P05.1.50	Analog Actuator Type	Analog Actuator Type	ENUM	-	0	1
100	P05.2.03	Digital Input 3 Function	Digital Input 3 Function	ENUM	-	0	11
101	P05.2.04	Digital Input 4 Function	Digital Input 4 Function	ENUM	-	0	11
102	P05.2.05	Digital Input 5 Function	Digital Input 5 Function	ENUM	-	0	11
103	P05.3.01	Analog Output Function	Analog Output Function	ENUM	-	0	12
104	P05.3.02	Analog Output Type	Analog Output Type	ENUM	-	0	3
105	P05.4.01	Relay 1 Function	Relay 1 Function	ENUM	-	0	7
106	P05.4.02	Relay 2 Function	Relay 2 Function	ENUM	-	0	7
107	P05.8.01	Analog Input 1 Offset	Analog Input 1 Offset	FLOAT32	-	-100	100
108	P05.8.02	Analog Input 1 Gain	Analog Input 1 Gain	FLOAT32	-	0	1.5
109	P05.8.11	Analog Input 2 Offset	Analog Input 2 Offset	FLOAT32	-	-100	100
110	P05.8.12	Analog Input 2 Gain	Analog Input 2 Gain	FLOAT32	-	0	1.5

111	P05.8.21	Analog Input 3 Offset	Analog Input 3 Offset	FLOAT32	-	-100	100
112	P05.8.22	Analog Input 3 Gain	Analog Input 3 Gain	FLOAT32	-	0	1.5
113	P05.8.31	Analog Input 4 Offset	Analog Input 4 Offset	FLOAT32	-	-100	100
114	P05.8.32	Analog Input 4 Gain	Analog Input 4 Gain	FLOAT32	-	0	1.5
115	P06.0.01	System Configuration	System Configuration	ENUM	-	0	2
116	P06.0.02	Max Units	Max Units	UINT16	-	1	-
117	P06.0.03	Multipump Address	Multipump Address	UINT16	-	1	-
118	P06.1.11	Pressure - Inc. value	Pressure - Inc. value	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
119	P06.1.12	Pressure - Dec. value	Pressure - Dec. value	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
120	P06.1.21	Flow - Inc. value	Flow - Inc. value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
121	P06.1.22	Flow - Dec. value	Flow - Dec. value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
122	P06.1.31	Temperature - Inc. value	Temperature - Inc. value	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
123	P06.1.32	Temperature - Dec. value	Temperature - Dec. value	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
124	P06.1.41	Level - Inc. value	Level - Inc. value	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
125	P06.1.42	Level - Dec. value	Level - Dec. value	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
126	P06.1.51	Generic - Inc. value	Generic - Inc. value	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
127	P06.1.52	Generic - Dec. value	Generic - Dec. value	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
128	P06.1.61	Multipump Enable Speed	Multipump Enable Speed	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
129	P06.1.71	Synchronous Limit	Synchronous Limit	UINT16	rpm	0	3600
130	P06.1.72	Synchronous Window	Synchronous Window	UINT16	rpm	0	P04.2.32 - Max Speed
131	P06.1.81	Automatic Switchover Interval	Automatic Switchover Interval	UINT16	h	0	250
132	P07.1.01	Skip Speed Center	Skip Speed Center	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
133	P07.1.02	Skip Speed Range	Skip Speed Range	UINT16	rpm	0	300
134	P08.0.01	Com 1 Function	Com 1 Function	ENUM	-	0	3
135	P08.0.02	Com 2 Function	Com 2 Function	ENUM	-	0	2

136	P08.1.01	Modbus RTU Address	Modbus RTU Address	UINT16	-	0	127
137	P08.1.02	Modbus RTU Baudrate	Modbus RTU Baudrate	ENUM	-	0	8
138	P08.1.08	Modbus RTU Format	Modbus RTU Format	ENUM	-	0	3
139	P08.2.01	BACnet MS/TP Mac Address	BACnet MS/TP Mac Address	UINT16	-	0	P08.2.05 - BACnet MS/TP Max Master
140	P08.2.02	BACnet MS/TP Baudrate	BACnet MS/TP Baudrate	ENUM	-	0	8
141	P08.2.03	BACnet MS/TP Format	BACnet MS/TP Format	ENUM	-	0	3
142	P08.2.04	BACnet MS/TP Device Id	BACnet MS/TP Device Id	UINT32	-	-	4194304
143	P08.2.05	BACnet MS/TP Max Master	BACnet MS/TP Max Master	UINT16	-	P08.2.01 - BACnet MS/TP Mac Address	127
144	-	BACnet Info Frames	BACnet Info Frames	UINT16	-	1	255
145	-	BACnet Reinit	BACnet Reinit	ENUM	-	0	1
146	P08.3.01	Enable Wireless Communication	Enable Wireless Communication	ENUM	-	0	1
147	P09.0.01	Language	Language	ENUM	-	0	28
148	P09.0.12	Time	Time	UINT32	-	-	-
149	P09.0.11	Date	Date	UINT32	-	-	-
150	P09.1.01	Display Energy Saving	Display Energy Saving	ENUM	-	0	1
151	P09.1.02	Energy Saving Time	Energy Saving Time	UINT16	s	60	3600
152	P09.1.10	Display Orientation	Display Orientation	ENUM	-	0	1
153	P09.3.01	Error Log Reset	Error Log Reset	ENUM	-	0	1
154	P09.3.02	Operating Time Counter Reset	Operating Time Couter Reset	ENUM	-	0	1
155	P09.3.03	Motor Running Counter Reset	Motor Running Counter Reset	ENUM	-	0	1
156	P09.3.05	Factory Restore	Factory Restore	ENUM	-	0	1
157	P09.3.06	Commissioning Completed	Commissioning Completed	ENUM	-	0	1
158	P09.3.07	Bonded Device List Reset	Bonded Device List Reset	ENUM	-	0	1
159	P04.1.60	Limit setpoint saving	Limit setpoint saving	ENUM	-	0	1
160	P01.6.01	H0 Pressure	Setpoint Zero Flow	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
161	P04.2.00	Regulation Type	Regulation Type	ENUM	-	0	1

162	P05.8.44	Analog Output 1 Offset	Analog Output 1 Offset	FLOAT32	P05.3.02 - Analog Output Type	-100	100
163	P05.8.45	Analog Output 1 Gain	Analog Output 1 Gain	FLOAT32	-	0	1.5
164	P04.2.21	Pi Control - Kp	Pi Control - Kp	FLOAT32	-	0	10000
165	P04.2.25	Pi Control - Ti	Pi Control - Ti	FLOAT32	s	0	10000
166	P09.2.01	Select Active Parameter Set	Select Active Parameter Set	ENUM	-	0	1
167	-	MultipumpDeviceEnable	Multipump Device Enable	UINT16	-	0	1
168	P04.5.05	SP Shift VALUE 1	SP Shift VALUE 1	FLOAT32	-	-	-
169	P04.5.06	SP Shift VALUE 2	SP Shift VALUE 2	FLOAT32	-	-	-
170	P04.5.10	SP Shift X 1	SP Shift X 1	FLOAT32	-	-	P04.5.11 - SP Shift X 2
171	P04.5.11	SP Shift X 2	SP Shift X 2	FLOAT32	-	P04.5.10 - SP Shift X 1	P04.5.12 - SP Shift X 3
172	P04.5.12	SP Shift X 3	SP Shift X 3	FLOAT32	-	P04.5.11 - SP Shift X 2	P04.5.13 - SP Shift X 4
173	P04.5.13	SP Shift X 4	SP Shift X 4	FLOAT32	-	P04.5.12 - SP Shift X 3	-
174	P04.5.01	SP Shift Function	SP Shift Function	ENUM	-	0	3
175	P04.5.02	SP Shift Input	SP Shift Input	ENUM	-	0	5
176	P05.0.61	SPS Pressure Zero Value	SPS Pressure Zero Value	FLOAT32	P04.0.11 - Pressure Measuring Unit	-1	99
177	P05.0.62	SPS Pressure Full Scale	SPS Pressure Full Scale	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	999
178	P04.1.15	Pressure Setpoint Type	Pressure Setpoint Type	ENUM	-	0	1
179	P05.2.13	Digital Input 3 Logic	digital_in_3_polarity	ENUM	-	0	1
180	P05.2.14	Digital Input 4 Logic	digital_in_4_polarity	ENUM	-	0	1
181	P05.2.15	Digital Input 5 Logic	digital_in_5_polarity	ENUM	-	0	1

11 Maintenance

Before starting any work, make sure to read and understand all the safety instructions in **Introduction and safety**.



DANGER: Electrical hazard

Before starting work, check that the electric power supply is disconnected and locked out, to avoid unintentional restart of the unit, the control panel and the auxiliary control circuit.



WARNING: Physical hazard

Always wear personal protective equipment.

11.1 Maintenance every 4000 hours of operation, or every year

When the first of the two limits is reached, check the tightening:

- Of unit fixing screws
- Of the cable glands
- Of the terminals.

12 Troubleshooting

Before starting any work, make sure to read and understand all the safety instructions in **Introduction and safety**.

12.1 List of alarms

Code	Name	Cause and solution
A11	Analog Input 1 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A12	Analog Input 2 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A13	Analog Input 3 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A14	Analog Input 4 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A16	External DI Alarm	The external alarm has been activated. Verify the external device contact.
A18	Multipump Communication Lost	The unit is set to multipump but there are no other units communicating. Verify multipump connection and communication port configuration.
A19	Multipump Address conflict	There are other units in the multipump system with the same multipump address. Verify that each unit has a unique multipump address.
A20	Multipump Incompatibility	A unit connected in the multipump system has incompatible features or a different multipump protocol. Do not use the incompatible feature or update all units to the same firmware version.
A21	Cloning failure	Cloning failure
A23	Wrong analog input configuration	None of the analog input is set to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M05.
A24	Wrong Setpoint configuration	None of the setpoint selected correspond to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M04, M05.
A28	Fieldbus Communication lost	The communication with the remote fieldbus device is lost. Verify the status of the remote device and the correct configuration of fieldbus communication parameters.
A29	Pipe Filling Alarm	The pipe filling function filling pressure has not been reached within the pipe filling time. Verify the system integrity and the pipe filling parameters.
A35	HMI Communication lost	There is an internal communication issue between user interface board and control board. Power off, wait 1 minute, power on.
A36	BTLE Communication Lost	There is an internal communication issue between user interface board and wireless interface. Power off, wait 1 minute, power on.
A05	Bad files configuration	There is a mismatch in the configuration files or the files didn't load properly. Power off, wait 1 minute, power on.

Code	Name	Cause and solution
A50	Files revision mismatch	The HMI board and the Control Card contain different revisions of the same configuration files.
A80	VFD (variable frequency drive) alarm	This Alarm is active by opening the Digital Input configured as External VFD (variable frequency drive) Alarm. The external VFD will reset its internal alarm according to its configuration.

12.2 List of errors

Code	Name	Cause and solution
E11	Sensor 1 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E12	Sensor 2 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E13	Sensor 3 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E14	Sensor 4 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E16	External DI Error	The external error has been activated. Verify the external device contact.
E21	Lack of water (LOW)	The LOW digital input is open. Check the status of the lack of water device, if not used keep a loop between LOW terminals.
E22	Minimum Threshold	The minimum threshold set has not been reached within the minimum threshold delay. Verify that the pump has water. Verify the correct settings of the minimum threshold parameters.
E23	Wrong analog input configuration	None of the analog input is set to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M05.
E29	Pipe Filling Error	The pipe filling function filling pressure has not been reached within the pipe filling time. Verify the system integrity and the pipe filling parameters.
E31	External Reference 1 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E32	External Reference 2 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E33	External Reference 3 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E34	External Reference 4 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E05	Data Memory corrupted	There is a part of the memory that is incorrectly initialized or not working. Power off, wait 1 minute, power on.
E50	Configuration files mismatch	There is a mismatch between HMI board and Control Card configuration files.

Code	Name	Cause and solution
E51	Drive is a spare part	The HMI board and the Control Card don't contain the configuration files.
E52	Control Card is a spare part	The Control Card is a spare part without configuration files. Use parameter P09.3.10 to upgrade the control card with the files included in the HMI board.
E60	Multipump Protocol Incompatibility	There is an incompatibility between the multipump protocol between the units, align the units to the same firmware version.
E61	HVSC connected to Hydrovar X	Hydrovar Smart Controller and Hydrovar X+ cannot be linked together. the two models use different multipump protocols.
E80	VFD (variable frequency drive) Error	This Error is active by opening the Digital Input configured as External VFD (variable frequency drive) Error. The error trips when related digital input is opened and it automatically resets when digital input gets closed again. The VFD (variable frequency drive) will reset its internal errors according to its configuration.

12.3 Generic problems

Problem	Cause	Solution
When switched off and on again, the unit loses the calendar	Faulty or drained battery	Contact Xylem or the Authorised Distributor, or send the unit to an authorised workshop
Alarms and errors are recorded in order, but without date and time		

13 Specifications

13.1 Operating environment

Data	Description
Environmental conditions	Extended, indoor/outdoor use
Atmosphere	Non-aggressive and non-explosive
Temperature	-20 to 50°C (-4 to 122°F)
Relative air humidity	5% to 90% at 50°C (122°F) without the formation of condensation
For use in wet locations	No
Elevation	≤ 2000 m (6600 ft) above sea level
Pollution degree	2

13.2 Technical characteristics

See also Data plate.

Data	Unit version		
	PM	WM	
Type of equipment	Steady	Steady	
Connection to mains supply	Permanent	Permanent	
Operating conditions	Continuous	Continuous	
Power Supply Voltage	24 V direct current	24 V direct current	Alternating current 115 V, ..., 240 V 50/60 Hz
Permitted tolerance for the supply voltage	±10%	±10%	±10%
Max. input current	350 mA	350 mA	150 mA
Max. input power	8.5 W	8.5 W	10 W
Power supply line protection	-	-	Short-circuit protection device with overvoltage category III and threshold current set at 1 A, or 2A delayed fuse
Overvoltage category (EN 61010-1)	II	II	III
Equipment class (EN IEC 61010-2-201)	I, with protection ground	I, with protection ground	I, with protection ground
Leakage Current	-	-	≤ 0.5 mA
IP protection degree	- External part: 66 - Internal part: 20	66	66
Enclosure (EN IEC 61010-2-201)	Enclosed equipment (panel mounted equipment)	Enclosed equipment	
UL protection degree	Enclosure Type 12, 4X (external part)	Enclosure Type 12, 4X	Enclosure Type 12, 4X
Equipment mobility	Fixed	Fixed	

13.3 Conformity of the EU/EEA/GB radio frequency characteristics

Features	Description
Technology	Bluetooth® Low Energy 5.2 wireless technology
Band	2.4 GHz ISM
RF	≤ 4.5 mW (6.5 dBm)

13.4 Other EU/EEA/GB conformities and approvals

CE marking, see Declarations of Conformity.

13.5 Characteristics of inputs and outputs

Features	Description
Communication ports	2, RS-485
Digital inputs	- Floating / NPN contact, open manifold / drain open, to GND - Internal polarisation with +24 V direct current, current limited to 6 mA max. - Direct current protection from -0.5 V to +30 V, ±15 mA max.
Analogue inputs	- Configurable with 0-20 mA current or 0-10 V voltage 24V signal for sensor power supply with current limitation 60 mA
Analogue output	Configurable as either 0-20 mA current signal or 0-10 V voltage signal
Relay 1	- With NC and NO changeover contact - Up to 250 V (alternating current) 0.25 A. Load type, general use - Up to 30 V (direct current) 2 A. Load type, resistive
Relay 2	- With NC and NO changeover contact - Up to 30 V (alternating current) 0.25 A. Load type, general use - Up to 30 V (direct current) 2 A. Load type, resistive



DANGER: Electrical hazard

If relay 1 is connected to a voltage higher than 30 V, disconnect and do not use the terminals of relay 2.

13.6 Lithium battery

The unit contains a lithium battery that complies with international regulations for land, sea and air transport.

14 Disposal

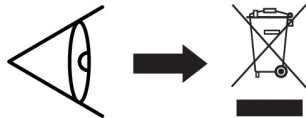
14.1 Precautions



WARNING: Environmental risk

The unit must be disposed of through approved companies specialised in the identification of different types of materials: steel, copper, plastic, lithium, ferrite etc...

14.2 WEEE (EU/EEA)

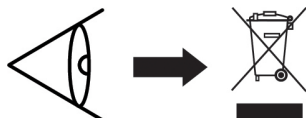


INFORMATION TO USERS pursuant to art. 14 of the Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE). The crossed bin symbol on the appliance or on its packaging indicates that the product at the end of its useful life must be collected separately and not disposed of together with other mixed urban waste. Appropriate separate collection for the subsequent start-up of the disused equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and on health and favours the re-use and / or recycling of the materials of which the equipment is composed.

WEEE from users other than private households³: the separate collection of this equipment at the end of its life is organized and managed by the producer⁴.

The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

14.3 WEEE (UK)



INFORMATION TO USERS pursuant to art. 44 of the The Waste Electrical and Electronic Equipment Regulations 2013 (S. I. 2013 No. 3113). The crossed bin symbol on the appliance or on its packaging indicates that the product at the end of its useful life must be collected separately and not disposed of together with other mixed urban waste. Appropriate separate collection for the subsequent start-up of the disused equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and on health and favours the re-use and / or recycling of the materials of which the equipment is composed.

WEEE from users other than private households⁵: the separate collection of this equipment at the end of its life is organized and managed by the producer⁶.

The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

³ Classification according to product type, use and current local laws

⁴ Producer of EEE as per Directive 2012/19/EU3 Classification according to product type, use and current local laws

⁵ Classification according to product type, use and current local laws

⁶ Producer of EEE as per WEEE Regulations 2013

15 Declarations of Conformity

Refer to the specific declaration relating to the marking on the product.



15.1 EU Declaration of Conformity (No. 86)

1. RED - Radio equipment: HVX+...WM..., HVX+...PM....
(see label on the last page of the "Safety and Other Information" manual)
RoHS - Unique identification of the EEE: HVX+...WM..., HVX+...PM....
2. Name and address of the manufacturer:
Xylem Service Italia S.r.l.
Via Vittorio Lombardi 14
36075 Montecchio Maggiore VI
Italy
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: control system (programmable logic controller) for frequency converters, with analogue and digital inputs and outputs, RS485 and wireless functions.
5. The object of the declaration described above is in conformity with the relevant Union harmonization legislation:
 - Directive 2014/53/EU of 16 April 2014 and subsequent amendments (radio equipment).
 - Directive 2011/65/EU of 8 June 2011 and subsequent amendments, including directive (EU) 2015/863 (restriction of the use of certain hazardous substances in electrical and electronic equipment).
6. References to the relevant harmonised standards used or references to the other technical specifications, in relation to which conformity is declared:
 - EN 61010-1:2010+A1:2019+A1:2019/AC:2019-04,
EN IEC 61010-2-201:2018,
EN 61326-1:2013, EN IEC 61326-1:2021,
EN 62311:2008, EN IEC 62311:2020,
ETSI EN 300 328 V2.2.2 (2019-07),
ETSI EN 301 489-1 V2.2.3 (2019-11),
ETSI EN 301 489-17 V3.3.1 (2024-09)
 - EN IEC 63000:2018.
7. Notified body: - - -
8. RED - Any accessories/components/software: - - -
9. Additional information: - - -

Signed for and on behalf of: Xylem Service Italia S.r.l.

Montecchio Maggiore, 18.09.2025

Alessio Vendraminelli
Managing Director

rev.01

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15.2 UK Declaration of Conformity (No 86)

1. RED - Radio equipment: HVX+...WM..., HVX+...PM....
(see label on the last page of the "Safety and Other Information" manual)
RoHS - Unique identification of the EEE: HVX+...WM..., HVX+...PM....
2. Name and address of the manufacturer:
Xylem Service Italia S.r.l.
Via Vittorio Lombardi 14
36075 Montecchio Maggiore VI
Italy
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: control system (programmable logic controller) for frequency converters, with analogue and digital inputs and outputs, RS485 and wireless functions.
5. The object of the declaration described above is in conformity with the relevant UK legislative acts:
 - S.I. 2017/1206 - The Radio Equipment Regulations 2017, as amended.
 - S.I. 2012/3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, as amended.
6. References to the relevant designated standards used or references to the other technical specifications, in relation to which conformity is declared:
 - EN 61010-1:2010+A1:2019+A1:2019/AC:2019-04,
EN IEC 61010-2-201:2018,
EN 61326-1:2013, EN IEC 61326-1:2021,
EN 62311:2008, EN IEC 62311:2020,
ETSI EN 300 328 V2.2.2 (2019-07),
ETSI EN 301 489-1 V2.2.3 (2019-11),
ETSI EN 301 489-17 V3.3.1 (2024-09)
 - EN IEC 63000:2018.
7. Approved body: - - -
8. RED - Any accessories/components/software: - - -
9. Additional information:

Signed for and on behalf of:
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Montecchio Maggiore, 18.09.2025

Alessio Vendraminelli
Managing Director

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16 Warranty

For information on the warranty refer to the commercial documentation.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) A leading global water technology company.

We're a global team unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to www.xylem.com



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