

HVX, HVX+

Drive for Xylem high-efficiency motor control

Firmware Version: 01.00.00

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1 Introduction and Safety

1.1 Introduction

Purpose of this manual

This manual provides information on how to do the following in the correct manner:

- Installation
- Operation
- Programming.

Supplementary instructions

The instructions and warnings of this manual apply to the standard unit as described in the sale documentation. Special version pumps may be supplied with supplementary instruction manuals. For situations not considered in the manual or in the commercial documentation, contact Xylem or the Authorised Distributor.

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.
 ATTENTION:	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
	Hot surface hazard

1.3 User safety

Strictly comply with current health and safety regulations.

Qualified personnel

This unit must be used only by qualified users. Qualified users are people able to recognise the risks and avoid hazards during installation, use and maintenance of the unit.

1.4 Protection of the environment

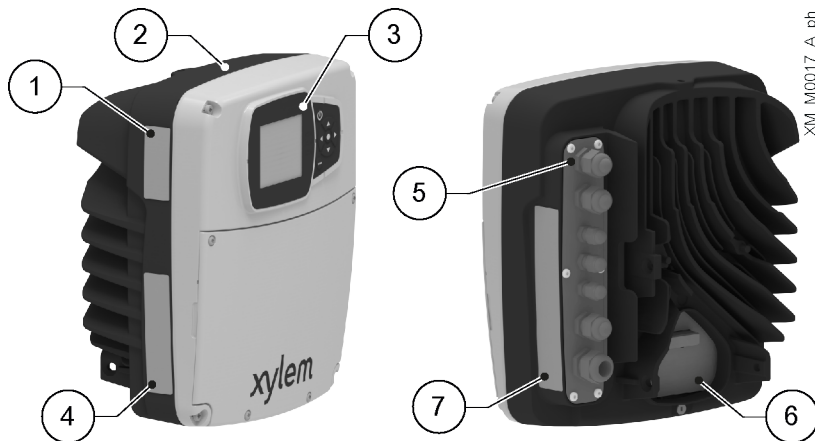
Disposal of packaging and product

Comply with the current regulations on sorted waste disposal.

2 Product Description

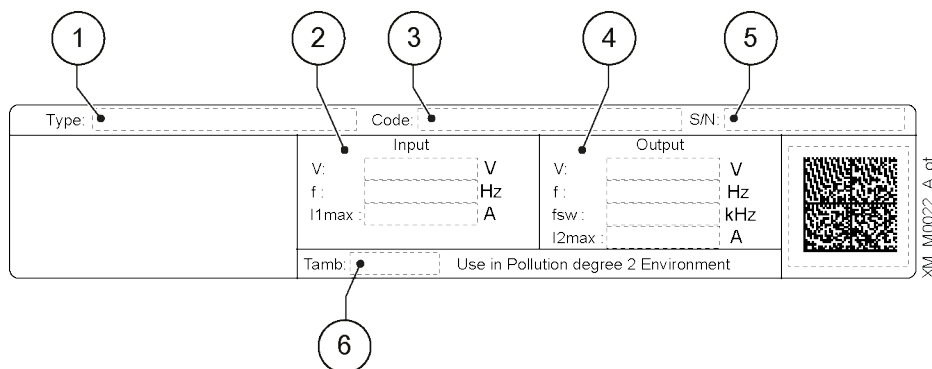
The product is a drive for controlling high-efficiency motors installed on Xylem pump units.

2.1 Part names



1. Radio equipment approval sticker
2. Drive
3. Drive display
4. Data plate
5. Power supply and signal cable inlets
6. Connection to the motor
7. Drive warning sticker

2.2 Data plate

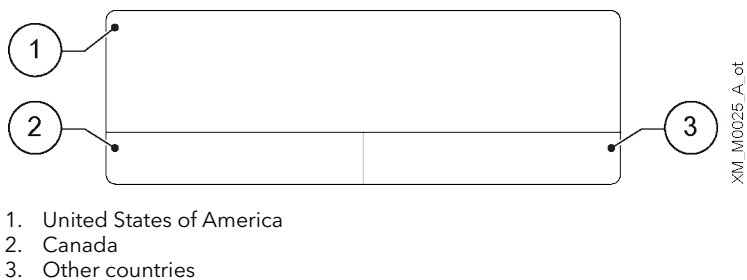


1. Model
2. Input operating limits
3. Identification code
4. Output operating limits
5. Serial number
6. Room temperature range

2.3 Drive warning sticker



2.4 Radio equipment approval sticker



3 Installation

3.1 Precautions

General precautions

Before starting, make sure that the safety instructions shown in **Introduction and Safety** on page 5 have been fully read and understood.



DANGER:

Installation and all the electrical connections must be completed by a technician possessing the technical-professional requirements outlined in the current regulations.



WARNING:

Always wear personal protective equipment.



WARNING:

Always use suitable working tools.



WARNING:

When selecting the place of installation and connecting the unit to the electric power supplies, strictly comply with current regulations.

Electrical measures



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.

NOTE:

The mains voltage and frequency must match the values indicated on the drive data plate.

Ground



DANGER: Electrical hazard

Always connect the external protection conductor (ground) to the ground terminal before attempting to make any other electrical connections.



DANGER: Electrical hazard

Connect all the electrical accessories of the unit to the ground.



DANGER: Electrical hazard

Check that the external protection conductor (ground) is longer than the phase conductors. In case of accidental disconnection of the unit from the phase conductors, the protection conductor must be the last one to detach itself from the terminal.

**DANGER: Electrical hazard**

Install suitable systems for protection against indirect contact, in order to prevent lethal electric shocks.

3.2 Guidelines for electrical connection

1. Check that the electrical leads are protected against:
 - High temperature
 - Vibrations
 - Collisions
 - Liquids.
2. Check that the power supply line is provided with:
 - A short circuit protection device of appropriate size
 - A mains disconnection device with contact opening distance ensuring complete disconnection for overvoltage III category conditions.

3.3 Guidelines for the control panel

NOTE:

The control panel must match the ratings on the unit data plate.

3.3.1 Fuses and/or automatic switches

- An electronically activated drive function ensures motor overload protection. The overload protection function calculates the increment level in order to activate the timing of the trigger function (motor stop).
The higher the input current, the faster the response. The function provides Class 20 protection for the motor.
- The drive must be equipped with overcurrent and short-circuit protection to prevent the overheating of the power supply cables. Line fuses or automatic switches must be installed to ensure this protection. Fuses and automatic switches must be provided by the installer as part of the installation.
- Use the recommended fuses and/or automatic switches on the power supply side as protection in the event of drive component failure (first failure). The use of the recommended fuses and automatic switches ensures that possible damage to the drive is limited to the inside of the same. For other types of protection, ensure that the passing energy is equal to or less than that of the recommended models.
- The fuses shown in the table are suitable for use on a circuit capable of releasing 5000 Arms (symmetrical), maximum 480 V. With the indicated fuses, the short-circuit current rating (SCCR) for the drive is 5000 Arms.

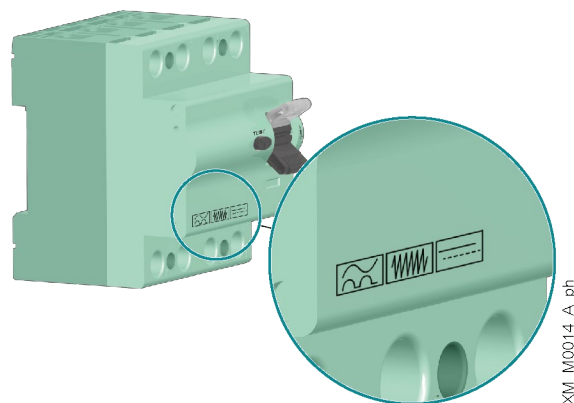
The figure shows the recommended fuses and switches.

HVX, HVX+ model	Xylem motor model	Three-phase power supply voltage, Vac	Non-UL fuses, type gG, A	UL fuses, type T, manufacturer and model				MCB S203 model ABB Switches
				Bussmann	Edison	Littelfuse	Ferraz- Shawmut	
B	EXM.../3...B..	200 - 240	16	JJN-15	TJN (15)	JLLN 15	A3T15	C16
C	EXM.../3...C..		30	JJN-30	TJN (30)	JLLN 30	A3T30	C32
D	EXM.../3...D..		63	JJN-60	TJN (60)	JLLN 60	A3T60	C63
B	EXM.../4...B..	380 - 480	16	JJS-15	TJS (15)	JLLS 15	A6T15	C16
C	EXM.../4...C..		30	JJS-30	TJS (30)	JLLS 30	A6T30	C32
D	EXM.../4...D..		63	JJS-60	TJS (60)	JLLS 60	A6T60	C63

3.3.2 Residual current devices, RCD (GFCI)

When using ground fault circuit breakers, GFCI, or residual current devices, RCD, also known as automatic earth leakage circuit breakers, ELCD, check that:

- They are suitable sized for the system configuration and environment of use
- They have a starting delay to prevent faults caused by transient ground currents
- They can detect alternate or direct current, they are marked with the symbols shown in the figure.

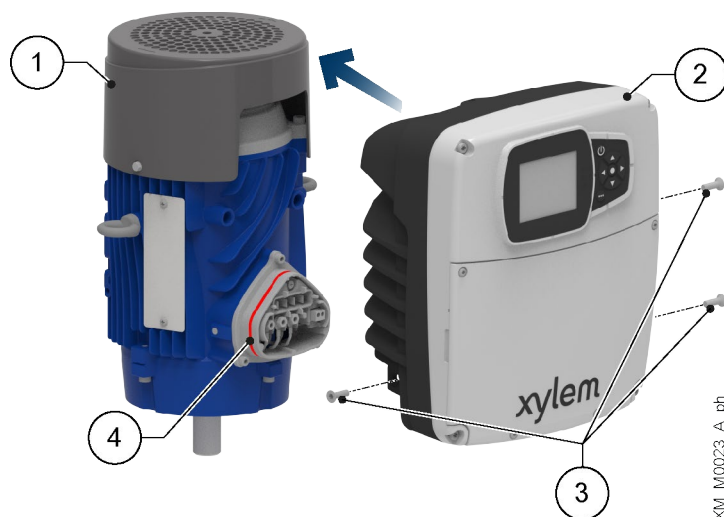


NOTE:

When using an automatic earth leakage switch or a ground fault switch, make sure to consider the total earth leakage current of all the electric devices of the system.

3.4 Guidelines for the drive

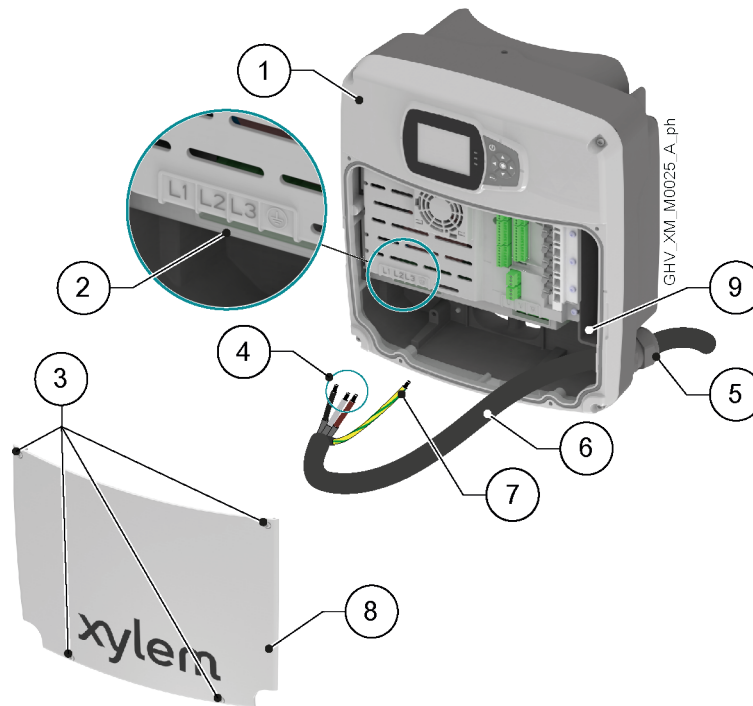
3.4.1 Assembly



1. Motor
2. Drive
3. Fastening screw
4. Seal

1. Lubricate the seal with alcohol.
2. Move the drive close to the motor.
3. Tighten the screws with a Torx spanner.
Tightening torque:
 - Size B and C: 6 Nm (55 lbf·in) $\pm$ 15%
 - Size D: 8 Nm (70 lbf·in) $\pm$ 15%.

3.4.2 Power supply connection

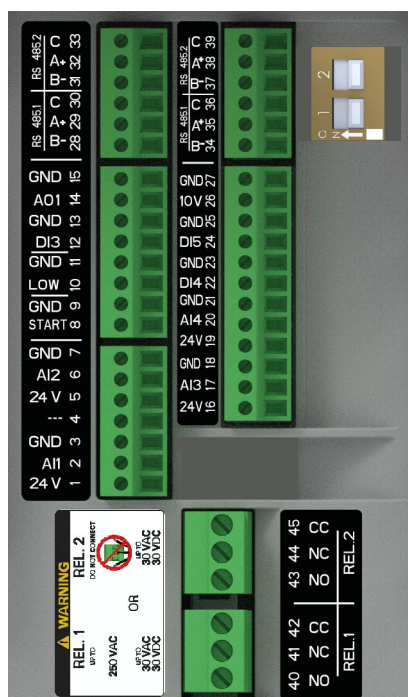


1. Drive
2. Terminals
3. Screws of the cover
4. Phase conductors
5. Cable Gland
6. Power supply cord
7. Protection conductor (ground)
8. Cover
9. Additional ground connection

1. Remove the cover and observe the wiring diagrams inside.
2. Insert the power cable in the cable gland.
3. Tightly connect the conductors, making sure that the protection one is longer than the phase ones.
For size D only, tighten the terminal screws with a Pozidriv screwdriver.
Tightening torque: 4 Nm (35 lbf·in).
4. Tighten the cable gland.
5. Fit the cover and tighten the screws.
Tightening torque: 3 Nm (27 lbf·in) $\pm$ 15%.

3.4.3 Auxiliary connections

HVX+

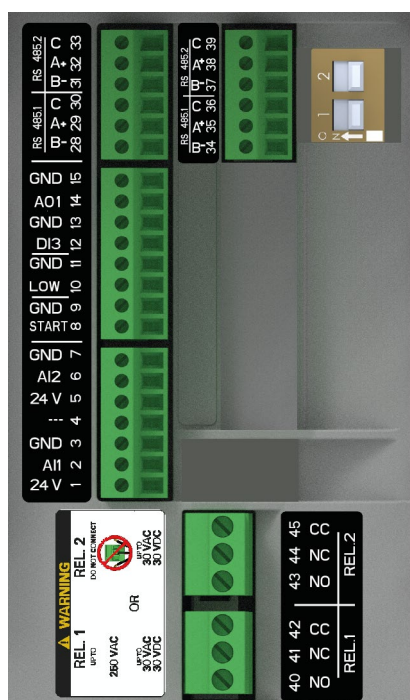


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Position number	Name	Description	Default setting
1	Analogue input 1	Power supply +24 VDC, max. 60 mA (total, terminals 1 + 5)	Pressure sensor 1
2		Configurable analogue input 1	
3		Electronic GND	
4	Reserved	For internal use, do not connect	-
5	Analogue input 2	Power supply +24 VDC, 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 VDC, contact current 6 mA	-
9		Electronic GND	
10	External Lack of Water	Low water level digital input, internal pull-up +24 VDC, contact current 6 mA	-
11		Electronic GND	
12	Digital Input 3	Configurable digital input 3, internal pull-up +24 VDC, contact current 6 mA	Emergency start at maximum speed
13		Electronic GND	
14	Analogue output	Configurable analogue output	Motor Speed
15		Electronic GND	
16	Analogue input 3	Power supply +24 VDC, max. 60 mA (total, terminals 16 and 19)	Not selected
17		Configurable analogue input 3	
18		Electronic GND	

Position number	Name	Description	Default setting
19	Analogue input 4	Power supply +24 VDC, 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 VDC, contact current 6 mA	Not selected
23		Electronic GND	
24	Digital Input 5	Configurable digital input 5, internal pull-up +24 VDC, contact current 6 mA	Not selected
25		Electronic GND	
26	10 VDC power supply	Power supply +10 VDC, 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	
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 start
44		Configurable relay 2: normally closed	
45		Configurable relay 2: common contact	

HVX



XM_M0021_A.ph

Position number	Name	Description	Default setting
1	Analogue input 1	Power supply +24 VDC, 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 VDC, 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 VDC, contact current 6 mA	-
9		Electronic GND	
10	External Lack of Water	Low water level digital input, internal pull-up +24 VDC, contact current 6 mA	-
11		Electronic GND	
12	Digital Input 3	Configurable digital input 3, internal pull-up +24 VDC, contact current 6 mA	Emergency start at maximum speed
13		Electronic GND	
14	Analogue output	Configurable analogue output	Motor Speed
15		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	

Position number	Name	Description	Default setting
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	
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 start
44		Configurable relay 2: normally closed	
45		Configurable relay 2: common contact	

4 Control

Introduction



DANGER: Electrical hazard

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

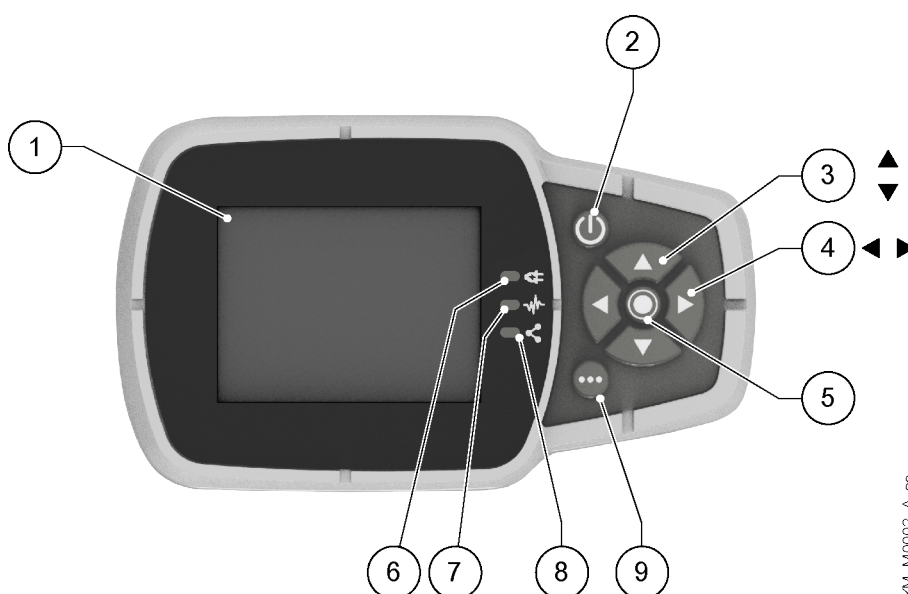


WARNING: Hot surface hazard

Only touch the drive display buttons. Pay attention to the high temperature released by the unit.

Depending on model, please observe the instructions in the paragraphs HVX+ drive display on page 17 or HVX drive display on page 20.

4.1 HVX+ drive display

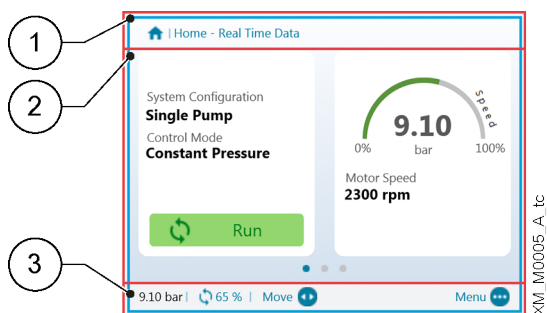


XM_M0002_A_sc

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).

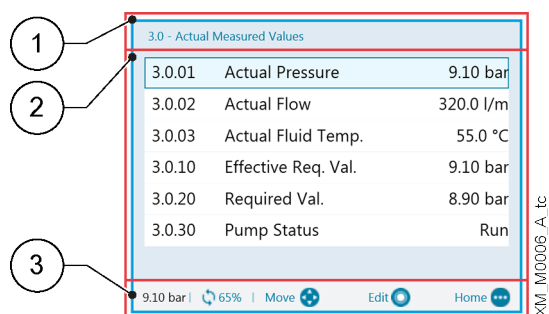
Position number	Name	Function
5	SEND button	- Advancing through the menu levels - Confirm the selection of a parameter - Confirm the value of a parameter.
6	Unit LED on	Indicate that the unit is powered.
7	Unit status LED	Indicate: - Motor not powered (off) - Alarm active and motor stopped (yellow) - Unit error and motor stopped (red) - Motor started (green) - Alarm active and motor started (yellow alternating green).
8	Connection status LED	Indicate: - BMS communication disabled (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 the unit to a mobile device (extended pressure)

4.1.1 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.

4.1.2 Parameter menu, HVX+



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.

4.1.3 Unit start using the HVX+ drive display

1. Check the connection between the START/STOP and GND inputs on the terminal board.
2. Press ON/OFF to start the unit.
Note: if parameter 1.0.45 Autostart is configured to "Yes", it will not be necessary to press ON/OFF again at the next start.
3. With the unit in operation, the working setpoint can be changed by switching to the second screen.

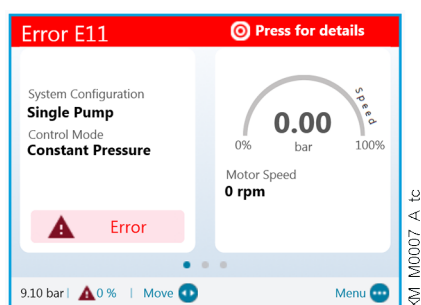
4.1.4 Operating mode change, HVX+

The unit parameters are set at the factory and the unit is ready for use.

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.

4.1.5 Error reset, HVX+

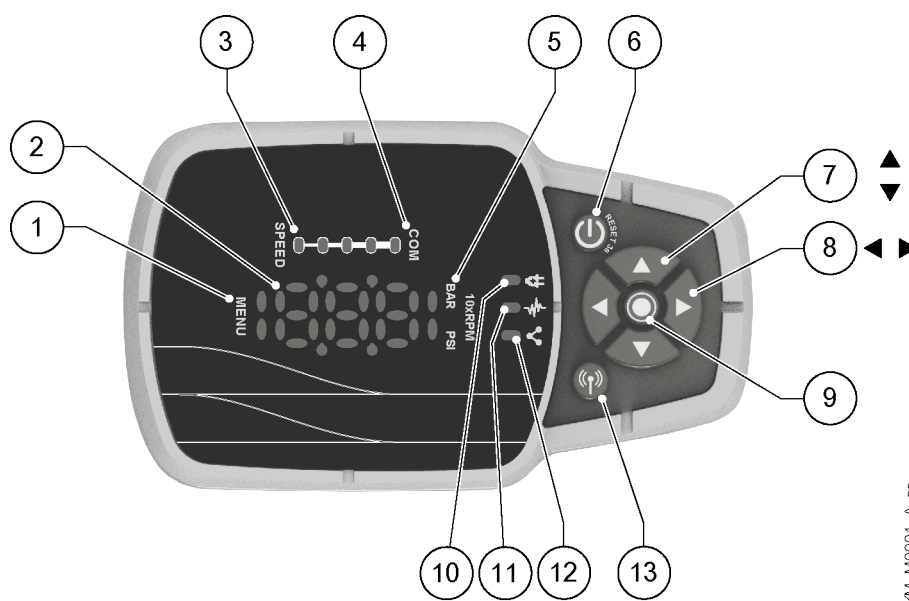


In the event of an error, the unit automatically makes several attempts to reset itself, where permitted: if the attempts are unsuccessful, the unit stops and the display shows the error code.

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 troubleshooting instructions
4. Reset the error by pressing and holding down ON/OFF for 3 seconds: the unit returns to the status before the error.

4.2 HVX drive display



Position number	Name	Function
1	Menu indicator	Indicate: • Navigation through the menu items (steady light) • The display of a parameter value (flashing light).
2	Seven-segment display	
3	Speed bar	
4	Multi-pump communication indicator	

Position number	Name	Function
5	Unit of measure indicator	
6	ON/OFF button	- Start and stop the unit - Reset the errors by pressing for 5 seconds.
7	UP and DOWN arrow keys	- Quickly change the setpoint in the main display - Navigate through the submenus and change the parameter displayed in the parameter menu - 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).
8	RIGHT and LEFT arrow keys	- Show speed and pressure in alternation in the main display - Navigate the parameter menu levels - LEFT arrow only, confirm the changed value - Lock and unlock the display by simultaneously pressing the RIGHT and LEFT arrows (extended pressure). - RIGHT arrow only, navigate through the active error codes, if more than one are present
9	SEND button	- Advancing through the menu levels - Confirm the value of a parameter - Enter the parameter configuration menu (extended pressure).
10	Unit LED on	Indicate that the unit is powered.
11	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).
12	Connection status LED	Indicate: - BMS communication disabled (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).
13	Wireless technology communication button	Connect the unit to a mobile device.

4.2.1 Main visualization

Glyph	Name	Description
	OFF	Unit stopped with ON/OFF button or BMS. Note: lower priority in relation to STOP.
	STOP	START/STOP and GND digital inputs open.
	Start request	Request to start the unit with the ON/OFF button. It remains active for a few seconds, then the following appears: - Unit in operation, or - Alarm, or - Error.
	Alarm	Alarm code of the unit in alarm status, in alternation with the main display. The unit status LED can be: - Yellow= motor stopped - Yellow in alternation with green = motor started.
	Error	Error code of the unit in error status.
	Unit in operation	Unit in operation and selected unit of measure display: - Speed, 10xRPM - Pressure in bar or psi.
	Display blocked	Display locked by the operator and button operation inhibited.

4.2.2 Parameter menu, HVX

The menu is split into 3 levels:

- Main
- Submenu
- Parameters.

To display or change a parameter:

1. Press the SEND button (extended pressure).
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 UP and DOWN arrow keys to navigate through the menus.
5. Press SEND or the RIGHT arrow to go to the menu sub-levels until the parameter value is found.
6. Press the UP and DOWN arrow keys to increase or decrease the parameter value.
7. Press SEND or the LEFT arrow key to confirm.
Note: after 5 seconds of inactivity, the parameter returns to the previously set value.

Glyph	Name	Notes
	Main menu	- Menus numbered from 1 to 9. - Menu indicator: fixed light.
	Submenu	- Submenus numbered from 1 to 9. - Menu indicator: fixed light.
	Parameter	Navigation in the parameter level. - Parameters numbered from 0 to 99. - Submenus numbered from 1 to 9. - Menu indicator: fixed light.
	Parameter value	Parameter value modification. - Menu indicator: light flashing. - Parameter value while editing: flashing.

4.2.3 Unit start using the HVX drive display

1. Check the connection between the START/STOP and GND inputs on the terminal board.
2. Press ON/OFF to start the unit.
Note: if parameter 1.0.45 Autostart is configured to "Yes", it will not be necessary to press ON/OFF again at the next start.
3. With the unit in operation, the control setpoint can be changed with immediate effect using the UP and DOWN arrow keys.

4.2.4 Operating mode change, HVX

The unit parameters are set at the factory and the unit is ready for use.
To change parameters and advanced features, access the configuration parameters.

1. Press the SEND button (extended pressure).
2. Enter the password using the arrow keys.
3. Press SEND.
4. Select the parameter to be changed in the M01 menu.

4.2.5 Error reset, HVX

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. Identify the cause and follow the troubleshooting instructions
2. Reset the error by pressing and holding down ON/OFF for 3 seconds: the unit returns to the status before the error.

4.3 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

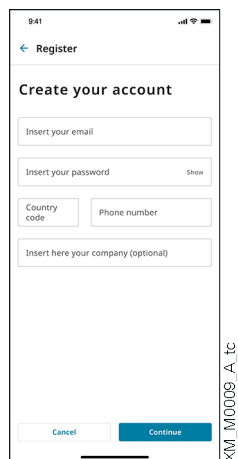
1. Download the Xylem X App to the mobile device from App Store¹ or Google Play² by scanning the QR code:



¹ Compatible with iOS® operating systems with version 15.0 and above

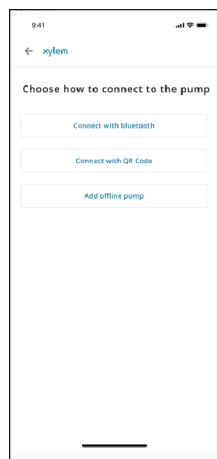
² Compatible with Android operating systems with version 10.0 and above

2. Complete the registration.



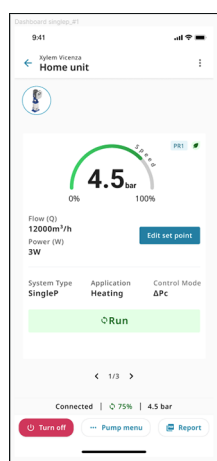
XM_M0009_A_tc

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



XM_M0008_A_tc

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.



XM_M0010_A_tc

5 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. If the symbol is not present, the parameter is only applied to the unit in which it is displayed.
(X+)	Only available on HVX+.
(X)	Only available on HVX.
(A)	Only available on HVX when using the Xylem X app.
(R)	Read only. The parameter cannot be changed. If the symbol is not present, the parameter can be changed.

5.1 M01, home menu

Frequently used parameters or their aliases.

5.1.1 S01.0 application

Parameter	Type	Name	Description	Value
P01.0.01	(X+)	Language	See parameter P09.0.01.	Default = English
P01.0.05	(G)	System Type	See parameter P04.0.01.	Default = depending on the pump unit model
P01.0.06	(G)	Control Mode	See parameter P04.0.02.	Default = constant pressure
P01.0.10	(G)	System Configuration	See parameter P06.0.01.	Default = single pump unit
P01.0.11		Multipump Address	See parameter P06.0.03.	Min = 1
P01.0.15	(G)	Start Value	See parameter P04.0.05.	Min = 0% Max = 100% Default = 100%
P01.0.20	(G)	Lack Of Water Delay	See parameter P04.3.11.	Min = 1 s Max = 100 s Default = 1 s
P01.0.31	(G)	Pressure - Minimum Threshold	See parameter P04.3.01.	Min = P01.1.11 Max = P01.1.12 Default = P01.1.11 (disabled)
P01.0.32	(G) (X+)	Flow - Minimum Threshold	See parameter P04.3.02.	Min = P01.1.21 Max = P01.1.22 Default = P01.1.21 (disabled)
P01.0.33	(G) (X+)	Temperature - Minimum Threshold	See parameter P04.3.03.	Min = P01.1.31 Max = P01.1.32 Default = P01.1.31 (disabled)
P01.0.34	(G) (X+)	Level - Minimum Threshold	See parameter P04.3.04.	Min = P01.1.41 Max = P01.1.42 Default = P01.1.41 (disabled)
P01.0.40	(G)	Minimum Threshold Delay	See parameter P04.3.10.	Min = 1 s Max = 100 s Default = 1 s
P01.0.45	(G)	Auto Start	See parameter P04.0.06.	Default = yes
P01.0.46		On/Off Set	Select the ON (ON) or OFF (OFF) status of the pump unit. Corresponds to the action on the ON/OFF button.	Default = Off
P01.0.50	(X+)	Date	See parameter P09.0.11.	-
P01.0.51	(X+)	Hour	See parameter P09.0.12.	-

5.1.2 S01.1 sensors

Parameter	Type	Name	Description	Value
P01.1.00		Measuring Unit Selection	See parameter P04.0.09.	Default = International System units
P01.1.01		Actuator - Zero Value	See parameter P05.0.01.	Min = 0 rpm Max = 9999 rpm Default = 0 rpm
P01.1.02		Actuator - Full Scale	See parameter P05.0.02.	Min = 0 rpm Max = 9999 rpm Default = 3600 rpm
P01.1.11	(G)	Pressure - Zero Value	See parameter P05.0.11.	Min = -5 bar Max = 10 bar Default = 0 bar
P01.1.12	(G)	Pressure - Full Scale	See parameter P05.0.12.	Min = 0 bar Max = 100 bar Default = depending on the pump unit model
P01.1.21	(G) (X+)	Flow - Zero Value	See parameter P05.0.21.	Min = 0 m ³ /h Max = 9999 m ³ /h Default = 0 m ³ /h
P01.1.22	(G) (X+)	Flow - Full Scale	See parameter P05.0.22.	Min = 0 m ³ /h Max = 9999 m ³ /h Default = 100 m ³ /h
P01.1.31	(G) (X+)	Temperature - Zero Value	See parameter P05.0.31.	Min = -100 °C Max = 9999 °C Default = 0 °C
P01.1.32	(G) (X+)	Temperature - Full Scale	See parameter P05.0.32.	Min = -100 °C Max = 9999 °C Default = 100 °C
P01.1.41	(G) (X+)	Level - Zero Value	See parameter P05.0.41.	Min = -999 m Max = 9999 m Default = 0 m
P01.1.42	(G) (X+)	Level - Full Scale	See parameter P05.0.42.	Min = -999 m Max = 9999 m Default = 10 m

5.1.3 S01.2 setpoint

Parameter	Type	Name	Description	Value
P01.2.01	(G)	Speed Setpoint 1	See parameter P04.1.01.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P01.2.02	(G)	Speed Setpoint 2	See parameter P04.1.02.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P01.2.03	(G) (X+)	Speed Setpoint 3	See parameter P04.1.03.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P01.2.04	(G) (X+)	Speed Setpoint 4	See parameter P04.1.04.	Min = P04.2.31 Max = P04.2.31 Default = 2000 rpm
P01.2.11	(G)	Pressure Setpoint 1	See parameter P04.1.11.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P01.2.12	(G)	Pressure Setpoint 2	See parameter P04.1.12.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P01.2.13	(G) (X+)	Pressure Setpoint 3	See parameter P04.1.13.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P01.2.14	(G) (X+)	Pressure Setpoint 4	See parameter P04.1.14.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P01.2.21	(G) (X+)	Flow Setpoint 1	See parameter P04.1.21.	Min = P01.1.21 Max = P01.1.22 Default = 0 m³/h
P01.2.22	(G) (X+)	Flow Setpoint 2	See parameter P04.1.22.	Min = P01.1.21 Max = P01.1.22 Default = 0 m³/h
P01.2.23	(G) (X+)	Flow Setpoint 3	See parameter P04.1.23.	Min = P01.1.21 Max = P01.1.22 Default = 0 m³/h
P01.2.24	(G) (X+)	Flow Setpoint 4	See parameter P04.1.24.	Min = P01.1.21 Max = P01.1.22 Default = 0 m³/h
P01.2.31	(G) (X+)	Temperature Setpoint 1	See parameter P04.1.31.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P01.2.32	(G) (X+)	Temperature Setpoint 2	See parameter P04.1.32.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P01.2.33	(G) (X+)	Temperature Setpoint 3	See parameter P04.1.33.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P01.2.34	(G) (X+)	Temperature Setpoint 4	See parameter P04.1.34.	Min = P01.1.31 Max = P01.1.32 Default = 25°C

Parameter	Type	Name	Description	Value
P01.2.41	(G) (X+)	Level Setpoint 1	See parameter P04.1.41.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P01.2.42	(G) (X+)	Level Setpoint 2	See parameter P04.1.42.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P01.2.43	(G) (X+)	Level Setpoint 3	See parameter P04.1.43.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P01.2.44	(G) (X+)	Level Setpoint 4	See parameter P04.1.44.	Min = P01.1.41 Max = P01.1.42 Default = 0 m

5.1.4 S01.4 Jog mode

Parameter	Type	Name	Description	Value
P01.4.01		Jog Speed	Select the speed for Jog mode. It is used to run the pump unit at a specific speed, to prime the pump unit and to determine the minimum speed.	Min = 0 Max = P04.2.32 Default = 0
P01.4.02	(G)	Min. speed	See parameter P04.2.31	Min = 0 Max = P04.2.32 Default = depending on the pump unit model

5.1.5 S01.5 safety

Parameter	Type	Name	Description	Value
P01.5.10		Password Entry	See parameter P09.4.01	Min = 0 Max = 999
P01.5.11		Logout	See parameter P09.4.02	
P01.5.12		Set Password	See parameter P09.4.03	Min = 0 Max = 999 Default = 66

5.2 M02, Error Log

Shows the errors stored in the log, in chronological order: *Error 1* is the last recorded. Each log entry includes a counter indicating how many times the same error code has been logged. If a new error generated has the same code as the last error recorded, the counter is increased by 1; if, however, the error code is different, a new record is created.

5.2.1 S02.0 errors

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

5.3 M03, pump unit information

It groups the parameters useful for application, pump unit and drive diagnostics.

5.3.1 S03.0 measured values

Parameter	Type	Name	Description	Value
P03.0.01	(R)	Current pressure	Current measured pressure value.	-
P03.0.02	(R)	Actual Flow	Current measured flow value.	-
P03.0.03	(R)	Current liquid temperature	Current measured liquid temperature value	-
P03.0.04	(R)	Actual Level	Current value of the liquid level.	-
P03.0.10	(R)	Effective Required Value	Current requested effective value. It's the result of proportional or quadratic pressure control, head losses compensation and offset function.	-
P03.0.20	(R) (G)	Required Value	Current requested value It's the current setpoint, before the calculation of proportional or quadratic pressure control, head losses compensation or offset function.	-
P03.0.30	(R) (G)	Pump status	Displays the current status of the unit. 0-Off (OFF): the unit is set to stand still (OFF). 1-Run (RUN): the unit is running (the motor is rotating). 2-Alarm, unit stopped (RLS): the unit is not running because the START/STOP contact is open and an alarm is active. 3-Alarm, unit running (RLR): the unit is running (the motor is rotating) and an alarm is active. 4-Alarm, unit in on (RLN): the unit is not running but is ready to start (ON) and an alarm is active. 5-Alarm, unit in off (RLD): the unit is set to stand still (OFF) and an alarm is active. 6-Error (ERR): the unit is not running because an error is active. 7-Stop (SEP): the unit is not running because the START/STOP contact is open. 8-On (ON): the unit is not running but is ready to start (ON).	-

5.3.2 S03.1 counters

Parameter	Type	Name	Description	Value
P03.1.01	(R) (G) (A)	Unit Powered Time	Displays the total time elapsed from the electrically powered pump unit.	-
P03.1.02	(R) (G) (A)	Operating time	Displays the total time the motor has spent running.	-
P03.1.05	(R) (G) (A)	Energy Counter	Displays the total energy used by the pump unit.	-

5.3.3 S03.2 motor

Parameter	Type	Name	Description	Value
P03.2.01	(R) (G)	Motor Speed	Displays the actual motor speed in rpm.	-
P03.2.02	(R) (G)	Motor Speed %	Displays the actual motor speed in percentage.	-
P03.2.05	(R) (G)	Motor current	Displays the actual motor input current.	-
P03.2.06	(R) (G)	Motor load	Displays the actual motor electric power input.	-
P03.2.07	(R) (G)	Motor Voltage	Displays the actual voltage provided to the motor.	-
P03.2.08	(R) (G)	Grid Voltage	Displays the actual voltage provided by the power grid.	-
P03.2.09	(R) (G)	DC Bus Voltage	Displays the actual DC bus voltage.	-
P03.2.20	(R) (G)	Power Module Temperature	Displays the actual temperature of the power module responsible for the current supplied to the motor.	-
P03.2.21	(R) (G)	Inverter Temperature	Displays the actual temperature of the air inside the drive, measured on the electronic board.	-
P03.2.22	(R) (G)	Motor PTC	Displays the actual motor PTC reading, if present.	-

5.3.4 S03.3 status of inputs/outputs

Parameter	Type	Name	Description	Value														
P03.3.01	(R) (A)	Digital I/O Status	Displays the status of the digital inputs and outputs, in the following order: <table><tr><td>DI5</td><td>DI4</td><td>DI3</td><td>LOW</td><td>START /STOP</td><td>REL2</td><td>REL1</td></tr><tr><td>0/1</td><td>0/1</td><td>0/1</td><td>0/1</td><td>0/1</td><td>0/1</td><td>0/1</td></tr></table> The status of each digital I/O is represented by: 0 if contact is open (relay de-energised) 1 if the contact is closed (relay energised).	DI5	DI4	DI3	LOW	START /STOP	REL2	REL1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	-
DI5	DI4	DI3	LOW	START /STOP	REL2	REL1												
0/1	0/1	0/1	0/1	0/1	0/1	0/1												
P03.3.11	(R)	Analogue Input 1 Value	Displays the raw value of the analogue input 1.	-														
P03.3.12	(R)	Analogue Input 2 Value	Displays the raw value of the analogue input 2.	-														
P03.3.13	(R) (X+)	Analogue Input 3 Value	Displays the raw value of the analogue input 3.	-														
P03.3.14	(R) (X+)	Analogue Input 4 Value	Displays the raw value of the analogue input 4.	-														
P03.3.20	(R)	Analogue Output Value	Displays the value of the analogue output.	-														
P03.3.30	(R)	Flow Sensor Value	Displays the value measured by the pump unit flow sensor, if present.	-														
P03.3.31	(R)	Temperature Sensor Value	Displays the value measured by the pump unit temperature sensor, if present.	-														

5.3.5 S03.4 Product information

Parameter	Type	Name	Description	Value
P03.4.01	(R) (A)	Unit Part Number	Product code (PN) of the complete pump unit.	-
P03.4.02	(R) (A)	Unit Production Date	Production date (PD) of the complete pump unit.	-
P03.4.03	(R) (A)	Unit Serial Number	Serial number (SN) of the complete pump unit.	-
P03.4.05	(R) (A)	Drive Production Date	Drive production date (PD).	-
P03.4.06	(R) (A)	Drive Serial Number	Drive serial number (SN).	-
P03.4.10	(R) (G) (A)	Hmi Firmware Version	Firmware version of the user interface board.	-
P03.4.11	(R) (G) (A)	Hmi-Bt Firmware Version	Version of the wireless communication board firmware.	-
P03.4.12	(R) (G) (A)	Power Card Firmware Version	Firmware version of the power board.	-
P03.4.13	(R) (G) (A)	Control Card Firmware Version	Firmware version of the control board.	-
P03.4.14	(R) (A)	Map File Version	Version of the map file.	-
P03.4.15	(R) (A)	Default File Version	Version of the default file.	-
P03.4.16	(R) (A)	Parameter File Version	Version of the parameter file.	-
P03.4.17	(R) (X+)	Language File Version	Version of the language file.	-
P03.4.19	(R)	Firmware Version	Device firmware cumulative version.	-

5.4 M04, pump unit configuration

It groups the parameters to configure the pump unit for the desired application.

5.4.1 S04.0 configuration

Parameter	Type	Name	Description	Value
P04.0.01	(G)	System Type	Select the type of system. 0-Pressurisation (P-5): for open-circuit systems, e.g. systems for supplying water to the upper floors of a building, filling or emptying a reservoir, irrigation, etc.	Default = depending on the pump unit model
P04.0.02	(G)	Control Mode	Select the control mode for the pump unit. 0-Actuator (PCE): the unit works as a constant-speed actuator, varying the motor speed according to an external speed signal or to one or more programmed speeds. It can only be used for one unit in single operation. 1-Constant pressure (CP): the unit maintains constant pressure regardless of flow variation. The pressure feedback is read through a sensor connected to an analogue input or through fieldbus. 2-Proportional Pressure (PP): the unit increases the pressure setpoint (actual required value) in a linear manner in proportion to the flow. The flow can be approximated using the motor speed or measured using a flow sensor connected to an analogue input or through fieldbus. The pressure feedback is read through a sensor connected to an analogue input or through fieldbus. (X+) 3-Proportional Quadratic Pressure: the unit increases the pressure setpoint (actual required value) in a quadratic manner in proportion to the flow. The flow can be approximated using the motor speed or measured using a flow sensor connected to an analogue input or through fieldbus. The pressure feedback is read through a sensor connected to an analogue input or through fieldbus. (X+) 4-Constant flow: the unit varies the motor speed to keep a constant flow. The flow feedback is read through a sensor connected to an analogue input or through fieldbus. (X+) 5-Constant temperature: the unit varies the motor speed to keep a constant temperature. The temperature feedback is read through a sensor connected to an analogue input or through fieldbus. (X+) 6-Constant Level: the unit varies the motor speed to maintain a constant level, for example of a tank or well. The level feedback is read through a sensor connected to an analogue input or through fieldbus.	Default = constant pressure
P04.0.03	(G)	Regulation Mode	Select the adjustment mode. 0-Normal (N-): the motor speed increases when the measured value is below the setpoint. 1-Inverse (I-): the motor speed increases when the measured value is above the setpoint.	Default = Normal
P04.0.05	(G)	Start Value	Select the start value after the stop of the system due to the setpoint having been reached, as a percentage of the setpoint. In a pressure boosting system, if the setpoint is reached and there is no more liquid demand, it stops. The pump unit restarts when the pressure drops below the <i>Start Value</i> . For example, if the setpoint is set to 10 bar, the start value set to 90% will start the pump unit at 9 bar. Caution: if the value is set too low, for example below the suction pressure, the pump unit will not start. If set to 100%, the function is disabled.	Min = 0% Max = 100% Default = 100%

Parameter	Type	Name	Description	Value
P04.0.06	(G)	Auto Start	Select the status of the pump unit when restarting after an electric power supply failure. 0-ON: when the electric power supply returns, the system returns to the status it was in before the disconnection. 1-OFF: when the electric power supply returns, the system is set to OFF.	Default = yes
P04.0.07	(G)	Configuration of minimum speed	Select the behaviour of the pump unit when the setpoint and minimum speed are reached. In <i>actuator</i> control mode, this parameter selects the behaviour of the pump unit when the speed setpoint is lower than the minimum speed. 0-Minimum speed (P _{min}): the pump unit continues at minimum speed. 1-Null velocity (0): the pump unit reaches speed 0 and stops.	Default = Zero speed
P04.0.09		Measuring Unit Selection	Select the measuring unit set used by the unit.	Default = International System units
P04.0.11	(G) (X+)	Pressure Measuring Unit	Select the measuring unit for the pressure.	Default = bar
P04.0.12	(G) (X+)	Flow Measuring Unit	Select the measuring unit for the flow.	Default = m ³ /h
P04.0.13	(G) (X+)	Temperature Measuring Unit	Select the measuring unit for the temperature.	Default = °C
P04.0.14	(G) (X+)	Level Measuring Unit	Select the measuring unit for the level.	Default = m
P04.0.21		Setpoint 1 Selection	Select the reference origin for setpoint 1. 0-Analogue (P _{an}): the setpoint reference is provided through one of the analogue inputs. 1-Parameter (P _{pr}): the setpoint reference is provided through one of the dedicated parameters.	Default = Parameter
P04.0.22		Setpoint 2 Selection	Select the reference origin for setpoint 2. 0-Off (0): the setpoint is not used. 1-Analogue (P _{an}): the setpoint reference is provided through one of the analogue inputs. 2-Parameter (P _{pr}): the setpoint reference is provided through one of the dedicated parameters.	Default = Parameter
P04.0.23	(X+)	Setpoint 3 Selection	Select the reference origin for setpoint 3. 0-Off: The setpoint is not used. 1-Analogue: the setpoint reference is provided through one of the analogue inputs. 2-Parameter: the setpoint reference is provided through one of the dedicated parameters.	Default = Parameter
P04.0.24	(X+)	Setpoint 4 Selection	Select the reference origin for setpoint 4. 0-Off: the setpoint is not used. 1-Analogue: the setpoint reference is provided through one of the analogue inputs. 2-Parameter: the setpoint reference is provided through one of the dedicated parameters.	Default = Parameter

5.4.2 S04.1 setpoint

Parameter	Type	Name	Description	Value
P04.1.01	(G)	Speed - Set. 1	Select the value for Setpoint 1 in <i>Actuator</i> control mode.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P04.1.02	(G)	Speed - Set. 2	Select the value for Setpoint 2 in <i>Actuator</i> control mode.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P04.1.03	(G) (X+)	Speed - Set. 3	Select the value for Setpoint 3 in <i>Actuator</i> control mode.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm
P04.1.04	(G) (X+)	Speed - Set. 4	Select the value for Setpoint 4 in <i>Actuator</i> control mode.	Min = P04.2.31 Max = P04.2.31 Default = 2000 rpm
P04.1.11	(G)	Pressure - Set. 1	Select the value for Setpoint 1 in one of the <i>Pressure</i> control modes.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P04.1.12	(G)	Pressure - Set. 2	Select the value for Setpoint 2 in one of the <i>Pressure</i> control modes.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P04.1.13	(G) (X+)	Pressure - Set. 3	Select the value for Setpoint 3 in one of the <i>Pressure</i> control modes.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P04.1.14	(G) (X+)	Pressure - Set. 4	Select the value for Setpoint 4 in one of the <i>Pressure</i> control modes.	Min = P01.1.11 Max = P01.1.12 Default = 3,5 bar
P04.1.21	(G) (X+)	Flow - Set. 1	Select the value for Setpoint 1 in <i>Constant Flow</i> control mode.	Min = P01.1.21 Max = P01.1.22 Default = 0 m ³ /h
P04.1.22	(G) (X+)	Flow - Set. 2	Select the value for Setpoint 2 in <i>Constant Flow</i> control mode.	Min = P01.1.21 Max = P01.1.22 Default = 0 m ³ /h
P04.1.23	(G) (X+)	Flow - Set. 3	Select the value for Setpoint 3 in <i>Constant Flow</i> control mode.	Min = P01.1.21 Max = P01.1.22 Default = 0 m ³ /h
P04.1.24	(G) (X+)	Flow - Set. 4	Select the value for Setpoint 4 in <i>Constant Flow</i> control mode.	Min = P01.1.21 Max = P01.1.22 Default = 0 m ³ /h
P04.1.31	(G) (X+)	Temperature - Set. 1	Select the value for Setpoint 1 in <i>Constant Temperature</i> control mode.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P04.1.32	(G) (X+)	Temperature - Set. 2	Select the value for Setpoint 2 in <i>Constant Temperature</i> control mode.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P04.1.33	(G) (X+)	Temperature - Set. 3	Select the value for Setpoint 3 in <i>Constant Temperature</i> control mode.	Min = P01.1.31 Max = P01.1.32 Default = 25°C
P04.1.34	(G) (X+)	Temperature - Set. 4	Select the value for Setpoint 4 in <i>Constant Temperature</i> control mode.	Min = P01.1.31 Max = P01.1.32 Default = 25°C

Parameter	Type	Name	Description	Value
P04.1.41	(G) (X+)	Level - Set. 1	Select the value for Setpoint 1 in <i>Constant Level</i> /control mode.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P04.1.42	(G) (X+)	Level - Set. 2	Select the value for Setpoint 2 in <i>Constant Level</i> /control mode.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P04.1.43	(G) (X+)	Level - Set. 3	Select the value for Setpoint 3 in <i>Constant Level</i> /control mode.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P04.1.44	(G) (X+)	Level - Set. 4	Select the value for Setpoint 4 in <i>Constant Level</i> /control mode.	Min = P01.1.41 Max = P01.1.42 Default = 0 m
P04.1.60	(G)	Limit setpoint saving	Select Yes to limit how often the Setpoint is saved in memory, in order to prolong its life. Useful in applications where a BMS control device continuously varies the value. 0-No: the unit limits the saving of the setpoint in the memory. 1-Yes: the setpoint is saved in the memory each time it is changed.	Default = No

5.4.3 S04.2 adjustment

Parameter	Type	Name	Description	Value
P04.2.01	(G)	Window	Select the adjustment window. This parameter defines a band around the setpoint as a percentage of the setpoint itself. When the measured value is outside the window, the system uses ramps 1 and 2. When inside, it uses ramps 3 and 4.	Min = 0% Max = 100% Default = 10%
P04.2.02	(G)	Hysteresis	Select the adjustment hysteresis band. This parameter defines a band, around the setpoint, as a percentage of the adjustment window. The limits of the hysteresis band define where the system changes between acceleration and deceleration ramps.	Min = 0% Max = 100% Default = 80%
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 = 0 rpm Max = P04.2.32 Default = P04.2.31
P04.2.07	(G)	Linear Lift Amount	Select the linear setpoint increment value at maximum speed, as a percentage of the setpoint itself, to compensate for friction losses. The increment is linear, starting from 0% when the motor is at <i>Increment Speed</i> , up to the <i>Linear Increment Value</i> when the motor is at maximum speed.	Min = 0% Max = 200% Default = 0%
P04.2.08	(G) (X+)	Quadratic Lift Amount	Select the quadratic setpoint increment value at maximum speed as a percentage of the setpoint itself to compensate for friction losses. The increment is quadratic, starting from 0% when the motor is at <i>Increment Speed</i> , up to <i>Linear Increment Value</i> when the motor is at maximum speed	Min = 0% Max = 9999% Default = 50%
P04.2.11	(G)	Ramp 1	Select the fast acceleration ramp time. This ramp is used when the motor speed is above the <i>Minimum speed</i> and the measured value is outside the range defined by the adjustment <i>window</i> .	Min = 1 s Max = 999 s Default = 5 s ($P \leq 5.5$ kW) 10 s ($5.5 \leq P \leq 11$ kW) 15 s ($P > 11$ kW)
P04.2.12	(G)	Ramp 2	Select the fast deceleration ramp time. This ramp is used when the motor speed is above the <i>Minimum speed</i> and the measured value is outside the range defined by the adjustment <i>window</i> .	Min = 1 s Max = 999 s Default = 5 s ($P \leq 5.5$ kW) 10 s ($5.5 \leq P \leq 11$ kW) 15 s ($P > 11$ kW)
P04.2.13	(G)	Ramp 3	Select the slow acceleration ramp time. This ramp is used when the measured value is within the adjustment <i>window</i> .	Min = 1 s Max = 999 s Default = 85 s
P04.2.14	(G)	Ramp 4	Select the slow deceleration ramp time. This ramp is used when the measured value is within the adjustment <i>window</i> .	Min = 1 s Max = 999 s Default = 85 s

Parameter	Type	Name	Description	Value
P04.2.15	(G)	Acceleration ramp minimum speed	Select the acceleration ramp time below minimum speed. This ramp is used when the motor speed is below the <i>Minimum Speed</i> .	Min = 1 s Max = 25 s Default = 2 s ($P \leq 5.5$ kW) 4 s ($P > 5.5$ kW)
P04.2.16	(G)	Deceleration ramp minimum speed	Select the deceleration ramp time below the minimum speed. This ramp is used when the motor speed is below the <i>Minimum Speed</i> .	Min = 1 s Max = 25 s Default = 2 s ($P \leq 5.5$ kW) 4 s ($P > 5.5$ kW)
P04.2.31	(G)	Min. speed	Select the minimum speed.	Min = 0 Max = depending on the pump unit model Default = depending on the pump unit model
P04.2.32	(G)	Max RPM set	Select the maximum speed.	Min = min Speed Max = depending on the pump unit model Default = depending on the pump unit model
P04.2.35	(G)	Min Speed Time	Select the time the motor spends at minimum speed before coming to a complete stop. This parameter is only active if the parameter <i>Minimum Speed Configuration</i> is set to <i>Zero Speed</i> .	Min = 0 s Max = 100 s Default = 0 s

5.4.4 S04.3 thresholds

Parameter	Type	Name	Description	Value
P04.3.00	(G)	Automatic Error Reset	Select the type of error reset. 0-Yes: the unit will automatically reset the error, if possible, up to a maximum of 5 times in 1 hour. 1-No: in the event of an error, the unit will remain stationary, waiting for a user-controlled error reset.	Default = yes
P04.3.01	(G)	Pressure - Minimum Threshold	Select the minimum threshold limit for pressure control: if the value is not reached within the <i>Minimum threshold delay</i> , then the unit stops giving the error "E22 Minimum threshold".	Min = P01.1.11 Max = P01.1.12 Default = P01.1.11 (disabled)
P04.3.02	(G) (X+)	Flow - Minimum Threshold	Select the minimum threshold limit for flow control: if the value is not reached within the <i>Minimum threshold delay</i> , then the unit stops giving the error "E22 Minimum threshold".	Min = P01.1.21 Max = P01.1.22 Default = P01.1.21 (disabled)
P04.3.03	(G) (X+)	Temperature - Minimum Threshold	Select the minimum threshold limit for temperature control: if the value is not reached within the <i>Minimum threshold delay</i> , then the unit stops giving the error "E22 Minimum threshold".	Min = P01.1.31 Max = P01.1.32 Default = P01.1.31 (disabled)
P04.3.04	(G) (X+)	Level - Minimum Threshold	Select the minimum threshold limit for level control: if the value is not reached within the <i>Minimum threshold delay</i> , then the unit stops giving the error "E22 Minimum threshold".	Min = P01.1.41 Max = P01.1.42 Default = P01.1.41 (disabled)
P04.3.10	(G)	Minimum Threshold Delay	Select the minimum threshold protection time delay. This delay is the time given to the pump unit to reach the minimum threshold value: if not reached, the unit stops giving the "E22 Minimum threshold" error.	Min = 1 s Max = 100 s Default = 1 s
P04.3.11	(G)	Lack Of Water Delay	Select the water shortage protection time delay (LOW). This delay is the time that passes between the opening of the LOW contact and the actual activation of error "E21 Lack of water (LOW)".	Min = 1 s Max = 100 s Default = 1 s

5.4.5 S04.4 self-test

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 = P04.2.31
P04.4.02	(G)	Test Run Timeout	Select the time that must elapse for the self-test to start. The pump unit must have been stationary for the time set in this parameter for the self-test to start. To enable the self-test, the START/STOP terminals 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.	

5.4.6 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	Disable the function or select the unit status if the pipe-filling threshold is not reached within the <i>pipe-filling time</i> . 0-Disabled (A15): the function is disabled. 1-Alarm (ALARM): the failure of the function generates alarm "A29 Pipe Filling" and the unit continues the procedure. As long as the function is active, the minimum pressure threshold is disabled.	Default = Disabled
P04.6.03	(G)	Pipe Filling Threshold	Select the pressure the system has to reach to exit the <i>pipe filling function</i> .	Min = 0 bar Max = P04.1.11 Default = P04.1.11 - 1.5 bar
P04.6.05	(G)	Pipe Filling Time	Select the maximum time given to the pipe filling function to reach the <i>Pipe filling threshold</i> .	Min = 0 s Max = 999 s Default = 180 s
P04.6.06	(G)	No. of pipe filling pumps	Select the number of pump units that will run simultaneously during the <i>Pipe filling function</i> .	Min = 1 Max = P06.0.02 Default = 1
P04.6.10	(G)	Pipe filling stabilisation time	Select the time given to the unit to check whether the measured pressure is constant. The pressure is considered constant if its value is within the window calculated on the setpoint, centred on the pressure measured at the beginning of the current stabilisation time.	Min = 1 s Max = P04.6.05 Default = 5 s
P04.6.15	(G)	Pipe filling speed increase	Select the amount of speed, in percentage of the <i>maximum speed</i> , 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%

5.5 M05, I/O settings

It groups the parameters for configuring digital and analogue inputs and outputs.

5.5.1 S05.0 measuring intervals

Parameter	Type	Name	Description	Value
P05.0.00		Actual Value Source	Select the input type for the controlled value. 0-AI Auto (PUE): the current value is automatically taken from the analogue input set to the same size as the control mode. 1-AI Differential (d IF): the actual value is the absolute value resulting from the difference of 2 analogue inputs set to the same size as the control mode. 2-AI Auto - Minor (LQU): the current value is taken from the lowest of the analogue inputs set to the same size as the control mode. 3-AI Auto - Major (H IE): the current value is taken from the highest of the analogue inputs set to the same size as the control mode. 4-Selection DI (d IF): the analogue value is selected through the digital input status set to "sensor selection 1/2".	Default = Auto AI
P05.0.01		Actuator - Zero Value	Select the zero value of the regulation feedback sensor when the system is set to <i>Actuator</i> control mode.	Min = 0 rpm Max = 9999 rpm Default = 0 rpm
P05.0.02		Actuator - Full Scale	Select the full range of the regulation feedback sensor when the system is set to <i>Actuator</i> control mode.	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 when the system is set to one of the <i>Pressure</i> control modes.	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 when the system is set to one of the <i>Pressure</i> control modes.	Min = 0 bar Max = 100 bar Default = depending on the pump unit model
P05.0.21	(G) (X+)	Flow - Zero Value	Select the zero value of the regulation feedback sensor when the system is set to <i>Constant Flow</i> control mode.	Min = 0 m ³ /h Max = 9999 m ³ /h Default = 0 m ³ /h
P05.0.22	(G) (X+)	Flow - Full Scale	Select the full range of the regulation feedback sensor when the system is set to <i>Constant Flow</i> control mode.	Min = 0 m ³ /h Max = 9999 m ³ /h Default = 100 m ³ /h
P05.0.31	(G) (X+)	Temperature - Zero Value	Select the zero value of the regulation feedback sensor when the system is set to <i>Constant Temperature</i> control mode.	Min = -100°C Max = 9999°C Default = 0°C
P05.0.32	(G) (X+)	Temperature - Full Scale	Select the full range of the regulation feedback sensor when the system is set to <i>Constant Temperature</i> control mode.	Min = -100°C Max = 9999°C Default = 100°C

Parameter	Type	Name	Description	Value
P05.0.41	(G) (X+)	Level - Zero Value	Select the zero value of the regulation feedback sensor when the system is set to <i>Constant Level</i> /control mode.	Min = -999 m Max = 9999 m Default = 0 m
P05.0.42	(G) (X+)	Level - Full Scale	Select the full range of the regulation feedback sensor when the system is set to <i>Constant Level</i> /control mode.	Min = -999 m Max = 9999 m Default = 10 m

5.5.2 S05.1 analogue inputs

Parameter	Type	Name	Description	Value
P05.1.01		Analogue Input 1 Function	Select the function of analogue input 1. 0-Off (OFF): the analogue input is disabled 1-Pressure (P-E): a pressure sensor is connected to the analogue input. (X+) 2-Flow: a flow sensor is connected to the analogue input. (X+) 3-Temperature: a temperature sensor is connected to the analogue input. (X+) 4-Level: a level sensor is connected to the analogue input. 5-Setpoint (SEt): a setpoint reference is connected to the analogue input.	Default = Pressure
P05.1.02		Analog Input 1 Type	Select the type of analogue input connected to analogue input 1. 0-0 to 20 mA (020). 1-4 to 20 mA (420). 2-0 to 10 V (0 10). 3-2 to 10 V (2 10).	Default = 4 to 20 mA
P05.1.11		Analogue Input 2 Function	Select the function of analogue input 2. 0-Off (OFF): the analogue input is disabled. 1-Pressure (P-E): a pressure sensor is connected to the analogue input. (X+) 2-Flow: a flow sensor is connected to the analogue input. (X+) 3-Temperature: a temperature sensor is connected to the analogue input. (X+) 4-Level: a level sensor is connected to the analogue input. 5-Setpoint (SEt): a setpoint reference is connected to the analogue input.	Default = Off
P05.1.12		Analog Input 2 Type	Select the type of analogue input connected to analogue input 2. 0-0 to 20 mA (020). 1-4 to 20 mA (420). 2-0 to 10 V (0 10). 3-2 to 10 V (2 10).	Default = 4 to 20 mA

Parameter	Type	Name	Description	Value
P05.1.21	(X+)	Analogue Input 3 Function	Select the function of analogue input 3. 0-Off: the analogue input is disabled. 1-Pressure: a pressure sensor is connected to the analogue input. 2-Flow: a flow sensor is connected to the analogue input. 3-Temperature: a temperature sensor is connected to the analogue input. 4-Level: a level sensor is connected to the analogue input. 5-Setpoint: a setpoint reference is connected to the analogue input.	Default = Off
P05.1.22	(X+)	Analog Input 3 Type	Select the type of analogue input connected to analogue input 3. 0-0 to 20 mA. 1-4 to 20 mA. 2-0 to 10 V. 3-2 to 10 V.	Default = 4 to 20 mA
P05.1.31	(X+)	Analogue Input 4 Function	Select the function of analogue input 4. 0-Off: the analogue input is disabled 1-Pressure: a pressure sensor is connected to the analogue input 2-Flow: a flow sensor is connected to the analogue input 3-Temperature: a temperature sensor is connected to the analogue input 4-Level: a level sensor is connected to the analogue input 5-Setpoint: a setpoint reference is connected to the analogue input	Default = Off
P05.1.32	(X+)	Analog Input 4 Type	Select the type of analogue input connected to analogue input 4. 0-0 to 20 mA 1-4 to 20 mA 2-0 to 10 V 3-2 to 10 V	Default = 4 to 20 mA
P05.1.40	(X+)	Sensor Curve	Select the mathematical function (curve) that determines the current value based on the sensor signal, when set as flow sensor. 0-Linear: suitable for flow sensors with signal linearly proportional to the measured flow. With this selection, all analogue inputs set by flow will be considered linear. 1-Quadratic: suitable for flow measurement through calibrated bore and differential pressure sensor or 2 pressure sensors, where the sensor signal is quadratically proportional to the flow. With this selection, all analogue inputs set by flow will be considered quadratic.	Default = Linear
P05.1.50		Analogue Actuator Type	Select profile type for actuator mode, when referenced through analogue input. 0-Hydrovar HVL (HVL): the profile is the same as that used in the Hydrovar HVL; see the dedicated diagram. 1-Manual (MAN): the profile can be adjusted through the configuration parameters.	Default = Hydrovar HVL

5.5.3 S05.2 digital inputs

Parameter	Type	Name	Description	Value
P05.2.03		Digital Input 3 Function	Select digital input function 3. 0-Disabled (015): function not used. 1-Setpoint selection (SE5): the digital input is used to select the current Setpoint. 2-Sensor selection 1/2 (S12): the digital input is used to switch between Analogue Input 1 and Analogue Input 2. 3-Minimum speed (M1): closing the DI forces the motor to run at minimum speed. 4-Maximum speed (M4): closing the DI forces the motor to run at maximum speed. 5-Solo Run (Srn): closing the DI forces the motor to run at maximum speed, bypassing most errors. Caution: the motor will run even if the pump unit is set to Off or if the Start/Stop or LOW contacts are open. 6-Error Reset (rE5): closing the DI resets the error condition. 7-External error (EE5): opening the DI activates error "E16 External DI error". 8-External Alarm (EPC): opening the DI activates alarm "A16 External DI alarm".	Default = Run Only
P05.2.04	(X+)	Digital Input 4 Function	Select digital input function 4. 0-Disabled: function not used. 1-Setpoint selection: the digital input is used to select the current setpoint. 2-Sensor selection 1/2: the digital input is used to switch between Analogue Input 1 and Analogue Input 2. 3-Minimum speed: closing the DI forces the motor to run at minimum speed. 4-Maximum speed: closing the DI forces the motor to run at maximum speed. 5-Run only: closing the DI forces the motor to run at maximum speed bypassing most errors. Caution: the motor will run even if the pump unit is set to Off or if the Start/Stop or LOW contacts are open. 6-Error Reset: closing the DI resets the error condition. 7-External error: opening the DI activates error "E16 External DI error" 8-External alarm: opening the DI activates alarm "A16 External DI alarm".	Default = Disabled
P05.2.05	(X+)	Digital Input 5 Function	Select digital input function 5. 0-Disabled: function not used. 1-Setpoint selection: the digital input is used to select the current setpoint. 2-Sensor selection 1/2: the digital input is used to switch between Analogue Input 1 and Analogue Input 2. 3-Minimum speed: closing the DI forces the motor to run at minimum speed. 4-Maximum speed: closing the DI forces the motor to run at maximum speed. 5-Run only: closing the DI forces the motor to run at maximum speed bypassing most errors. CAUTION: the motor will run even if the pump unit is set to Off or if the Start/Stop or LOW contacts are open. 6-Error Reset: closing the DI resets the error condition. 7-External error: opening the DI activates error "E16 External DI error". 8-External alarm: opening the DI activates alarm "A16 External DI alarm".	Default = Disabled

5.5.4 S05.3 analogue output

Parameter	Type	Name	Description	Value
P05.3.01		Analogue Output Function	Select the analogue output function. 0-Current value (I _{RL}): the analogue output replicates the current measured value. 1-Actual value required (EFF): the analogue output replicates the actual requested value. 2-Motor speed (SPd): the analogue output replicates the current motor speed. 3-Motor power (P _{wr}): the analogue output replicates the current motor power input. 4-Motor current (I _{wr}): the analogue output replicates the actual motor input current. 5-Value AN1 (Rn1): the analogue output replicates the value read at analogue input 1. 6-Value AN2 (Rn2): the analogue output replicates the value read at analogue input 2. (X+) 7-Value AN3: the analogue output replicates the value read at analogue input 3. (X+) 8-Value AN4: the analogue output replicates the value read at analogue input 4. (X+) 9-Temperature: the analogue output replicates the current measured liquid temperature. (X+) 10-Estimated flow: the analogue output replicates the current estimated flow value. (X+) 11-Flow: the analogue output replicates the current measured flow.	Default = Motor speed
P05.3.02		Analogue Output Type	Select the signal type for the analogue output. 0-0 to 20 mA (Q20). 1-4 to 20 mA (420). 2-0 to 10 V (Q10). 3-2 to 10 V (210).	Default = 4 to 20 mA

5.5.5 S05.4 digital outputs

Parameter	Type	Name	Description	Value
P05.4.01		Relay 1 Function	Select the Relay 1 function. 0-Off (OFF): the relay is disabled. 1-Power supply (PU): the relay is active when the unit is powered from the mains. 2-Run (RUN): the relay is active when the motor is running. 3-Motor heating (HE): the relay is active when the motor heating function is active. 4-Error (ERR): the relay is active when no error is active. 5-Alarm or error (ALR): the relay is active when no alarm or error is active. 6-On (ON): the relay is active when the unit is in the On status (stopped but ready to run). 7-Reset error (RES): the relay is active when the Automatic error reset parameter is set to "Yes" and the maximum number of automatic resets has been reached.	Default = Error
P05.4.02		Relay 2 Function	Select the Relay 2 function. 0-Off (OFF): the relay is disabled. 1-Power supply (PU): the relay is active when the unit is powered from the mains. 2-Run (RUN): the relay is active when the motor is running. 3-Motor heating (HE): the relay is active when the motor heating function is active. 4-Error (ERR): the relay is active when no error is active. 5-Alarm or error (ALR): the relay is active when no alarm or error is active. 6-On (ON): the relay is active when the unit is in the On status (stopped but ready to run). 7-Reset error (RES): the relay is active when the Automatic error reset parameter is set to "Yes" and the maximum number of automatic resets has been reached.	Default = Run

5.5.6 S05.8 calibrations

Parameter	Type	Name	Description	Value
P05.8.01		Offset AI 1	Select the offset value at zero value of analogue input 1.	-
P05.8.02		Gain AI 1	Select the gain of analogue input 1.	-
P05.8.11		Offset AI 2	Select the offset value at zero value of analogue input 2.	-
P05.8.12		Gain AI 2	Select the gain of analogue input 2.	-
P05.8.21	(X+)	Offset AI 3	Select the offset value at zero value of analogue input 3.	-
P05.8.22	(X+)	Gain AI 3	Select the gain of analogue input 3.	-
P05.8.31	(X+)	Offset AI 4	Select the offset value at zero value of analogue input 4.	-
P05.8.32	(X+)	Gain AI 4	Select the gain of analogue input 4.	-

5.6 M06, multi-pump

It groups the parameters to configure a multi-pump system.

5.6.1 S06.0 measuring intervals

Parameter	Type	Name	Description	Value
P06.0.01	(G)	System Configuration	Select the system configuration. 0-Single Pump unit (SNG): the unit is set to run alone, without interaction with other units. 1- Serial Cascade (NSE): in this configuration, several units operate together, connected through the RS485 interface. Only the last unit started varies its speed, while the units already running run at full speed. 2-Synchronous Cascade (NSY): in this configuration, several units operate together, connected through the RS485 interface. All running units operate at the same variable speed.	Default = single pump unit
P06.0.02	(G)	Max Units	Select the maximum number of units that operate simultaneously in a multi-pump system.	Min = 0 Max = 8 (X+), 4 (X) Default = 6 (X+), 3 (X)
P06.0.03		Multipump Address	Select the address of the pump unit in a multi-pump system. Each unit has a unique address, with a value from 1 to 8.	Min = 1 Max = 8 (X+), 4 (X) Default = 1
P06.0.04	(A)	Multipump Map	Displays the map of the connected units in the multi-pump system.	-
P06.0.05		Multipump Priority	Displays the unit priority in the multi-pump system.	-

5.6.2 S06.1 adjustment

Parameter	Type	Name	Description	Value
P06.1.11	(G)	Pressure - Inc. value	Select the increment value in the multi-pump system. This value, in conjunction with the actual decrease value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 bar Max = P05.0.12 Default = 0,35 bar
P06.1.12	(G)	Pressure - Dec. value	Select the decrease value in the multi-pump system. This value, in conjunction with the actual increase value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 bar Max = P05.0.12 Default = 0,15 bar
P06.1.21	(G) (X+)	Flow - Inc. value	Select the increment value in the multi-pump system. This value, in conjunction with the actual decrease value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 m3/h Max = P05.0.22 Default = 1,5 m3/h
P06.1.22	(G) (X+)	Flow - Dec. value	Select the decrease value in the multi-pump system. This value, in conjunction with the actual increase value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 m3/h Max = P05.0.22 Default = 1,5 m3/h
P06.1.31	(G) (X+)	Temperature - Inc. value	Select the increment value in the multi-pump system. This value, in conjunction with the actual decrease value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 °C Max = P05.0.32 Default = 1,5 °C
P06.1.32	(G) (X+)	Temperature - Dec. value	Select the decrease value in the multi-pump system. This value, in conjunction with the actual increase value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 °C Max = P05.0.32 Default = 1,5 °C
P06.1.41	(G) (X+)	Level - Inc. value	Select the increment value in the multi-pump system. This value, in conjunction with the actual decrease value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 m Max = P05.0.42 Default = 0,15 m
P06.1.42	(G) (X+)	Level - Dec. value	Select the decrease value in the multi-pump system. This value, in conjunction with the actual increase value, will be used to calculate the effective required value in a multi-pump system.	Min = 0 m Max = P05.0.42 Default = 0,15 m
P06.1.61	(G)	Multipump Enable Speed	Select the enabling speed for subsequent pump units. The next pump unit starts when the following conditions are true: - the motor speed is equal to or higher than the multi-pump enable speed - the current value falls below Setpoint - Decrement value	Min = P04.2.31 Max = P04.2.32 Default = depending on the pump unit model
P06.1.71	(G)	Synchronous Limit	Select the speed limit for synchronous cascade mode. The pump unit with priority P2 switches off when its speed falls below this value.	Min = P04.2.31 Max = P04.2.32 Default = depending on the pump unit model

Parameter	Type	Name	Description	Value
P06.1.72	(G)	Synchronous Window	Select the speed window for synchronous cascade mode. The pump unit with priority P3 will shut off when its speed goes below synchronous limit + synchronous window, the pump unit with priority 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 time interval for automatic switching: enables an automatic priority switching between the master pump unit and the other pump units. At the end of this time interval, the next pump unit becomes the master and the timer starts again; this allows the working hours to be distributed evenly among the pump units. The automatic switching interval is only active if the master pump unit never comes to a stop.	Min = 0 h Max = 250 h Default = 24 h

5.7 M07, inverter

5.7.1 S07.0 switching frequency settings

Parameter	Type	Name	Description	Value
P07.0.01		Maximum Switching Freq.	Select the maximum switching frequency of the inverter modulation. Range: 2 to 16 KHz	Min = 2 kHz Max = 16 kHz Default = 16 kHz ($P \leq 5.5$ kW) 10 kHz ($5.5 \leq P \leq 11$ kW) 8 kHz ($P > 11$ kW)
P07.0.02		Min Switching Frequency	Select the minimum switching frequency. In case of overheating, the unit will automatically decrease the switching frequency down to this value.	Min = 2 kHz Max = 16 kHz Default = 2 kHz

5.7.2 S07.1 speed skip 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 = 0 rpm Max = P04.2.32 Default = 0 rpm (disabled)
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

5.7.3 S07.2 motor overheating

Parameter	Type	Name	Description	Value
P07.2.01	(G)	Motor heating function	Select the activation of the motor heating function. A stream of warm air is injected into the motor to prevent condensation or ice formation. The injected stream does not cause the motor to turn. 0-Off (OFF): the function is disabled 1-On (ON): the function is enabled and activates when the motor is stopped and the inverter temperature falls below the motor heating temperature (P07.2.03). 2-Always active (ALWAYS): the function is always active when the motor is stopped, regardless of the inverter temperature	Default = Off
P07.2.02		Motor heating current	Select the amount of current, in percentage of the maximum current, that will flow through the motor when the motor heating function is running.	Min = 0 % Max = 100 % Default = 50 %
P07.2.03	(G)	Motor heating temperature	Select the temperature below which the motor-heating function is active. This parameter is only active if the Motor heating function (P07.2.01) parameter is set to On.	Min = -5°C Max = 30°C Default = 0°C

5.8 M08, communication

5.8.1 S08.0 ports

Parameter	Type	Name	Description	Value
P08.0.01		Com 1 Function	Select the function of the communication port 1 (RS 485.1). 0-Disabled (disabled): the communication port is not active 1-Modbus RTU (RTU): the selected protocol is Modbus RTU slave 2-BACnet MS/TP (BACnet): the selected protocol is BACnet MS/TP 3-Multi-pump (Multi-pump): the selected protocol is hydrovar X multi-pump	Default = Multi-pump
P08.0.02		Com 2 Function	Select the function of the communication port 2 (RS 485.2). 0-Disabled (disabled): the communication port is not active 1-Modbus RTU (RTU): the selected protocol is Modbus RTU slave 2-BACnet MS/TP (BACnet): the selected protocol is BACnet MS/TP	Default = Modbus RTU

5.8.2 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.	Min = 1200 bps Max = 115200 bps Default = 115200 bps
P08.1.08		Modbus RTU Format	Select the unit network format in order to match the format of the Modbus RTU master.	Default = 8N1

5.8.3 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.	Min = 1200 bps Max = 115000 bps Default = 38400 bps
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.	Default = 84003
P08.2.05		Bacnet MS/TP Max Master	Select the BACnet MS/TP maximum number of masters.	Min = 0 Max = 127 Default = 127

5.8.4 S08.3 Enable Wireless Communication

Parameter	Type	Name	Description	Value
P08.3.01		Enable Wireless Communication	Select activation of the unit's wireless communication. 0-Off (OFF): Wireless communication is disabled and the unit cannot connect to a mobile device 1-On (ON): Wireless communication is enabled and a mobile device with the X app running can connect to the unit	Default = On

5.9 M09, general

5.9.1 S09.0 localisation

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

5.9.2 S09.1 display

Parameter	Type	Name	Description	Value
P09.1.01		Display Energy Saving	Select the activation of the display power-saving function. 0-Off (OFF): the unit keeps the display always on 1-On (ON): the unit switches the display off when the power saving interval expires	Default = On (X+) Off (X)
P09.1.02		Energy Saving Time	Select the time in minutes that must pass from the last keyboard action before the display dims.	Min = 1 min Max = 999 min Default = 10 min
P09.1.10		Display Orientation	Select the orientation of the display. 0-Hours 6 (6): the orientation of the display is suitable for a horizontal pump unit 1-Hours 12 (12): the orientation of the display is suitable for a vertical pump unit	Default = depending on the pump unit model

6 Modbus RTU

6.1 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.

6.2 Transmission

Function not supported.

6.3 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
- The frame check (LRC or CRC), applied to the entire message.

Both the parity check and the frame check 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.

6.4 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.

6.5 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.

6.5.1 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 => Modbus address of current pressure (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

6.5.2 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

6.6 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.

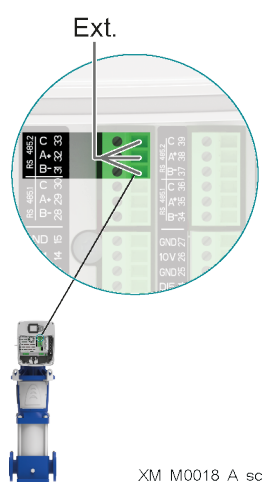
- When Modbus RTU communication between the drive and an external device is active, the drive display connection status light comes on.
- Set parameter *P04.1.60 Limit Setpoint Saving* to *Yes* to write to the volatile memory area and extend the life of the non-volatile EEPROM memory.

NOTE:

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

Connect a single pump unit to an external device

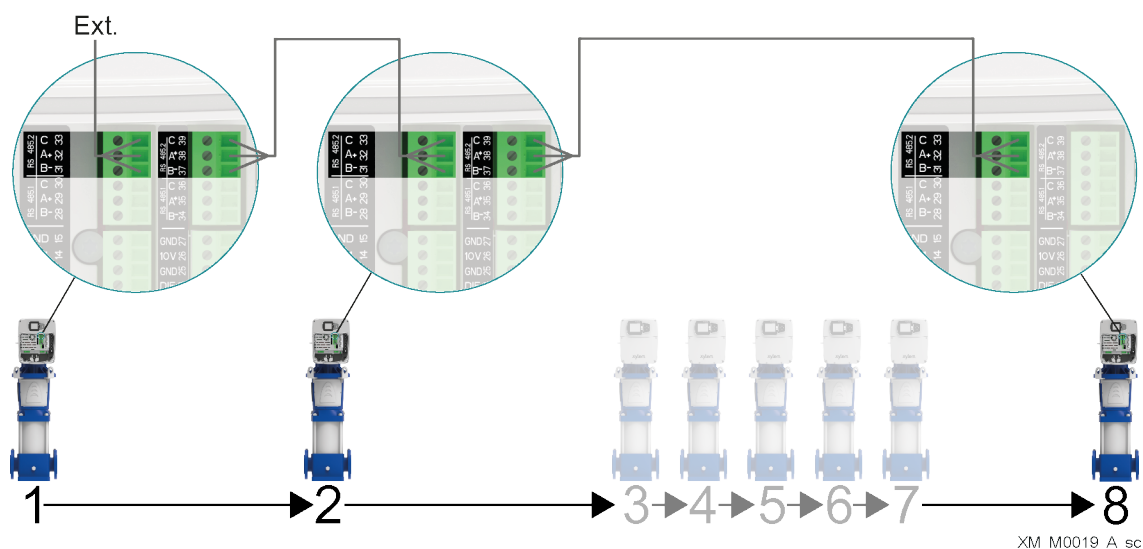
1. Remove the cover of the drive and observe the wiring diagrams inside.
2. Connect terminals 31 (B), 32 (A) and 33 (C) to the external device, for example PLC, BMS, etc.



Connecting a multi-pump system to an external device

Multi-pump mode allows the connection of two or three motor drives 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 drive 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 drives 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).

6.7 List of registers

Address [Dec]	Menu ID	Name	Properties	Type	Unit	Min	Max
0	-	Start/Stop: 0-Stop 1-Start	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	-	Log: System Status	R	UINT32	-	-	-
2019	-	Log: Error code	R	UINT32	-	-	-
2021	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2023	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2025	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2027	-	Log: Motor Current	R	FLOAT32	A	-	-
2029	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2031	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2033	-	Log: Motor load	R	FLOAT32	-	-	-
2035	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2037	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2057	-	Log: Error code	R	UINT32	-	-	-
2059	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2061	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2063	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2065	-	Log: Motor Current	R	FLOAT32	A	-	-
2067	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2069	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2071	-	Log: Motor load	R	FLOAT32	-	-	-
2073	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2075	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2095	-	Log: Error code	R	UINT32	-	-	-
2097	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2099	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2101	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2103	-	Log: Motor Current	R	FLOAT32	A	-	-
2105	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2107	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2109	-	Log: Motor load	R	FLOAT32	-	-	-
2111	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2113	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2133	-	Log: Error code	R	UINT32	-	-	-
2135	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2137	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2139	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2141	-	Log: Motor Current	R	FLOAT32	A	-	-
2143	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2145	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2147	-	Log: Motor load	R	FLOAT32	-	-	-
2149	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2151	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2171	-	Log: Error code	R	UINT32	-	-	-
2173	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2175	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2177	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2179	-	Log: Motor Current	R	FLOAT32	A	-	-
2181	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2183	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2185	-	Log: Motor load	R	FLOAT32	-	-	-
2187	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2189	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2209	-	Log: Error code	R	UINT32	-	-	-
2211	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2213	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2215	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2217	-	Log: Motor Current	R	FLOAT32	A	-	-
2219	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2221	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2223	-	Log: Motor Power	R	FLOAT32	-	-	-
2225	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2227	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2247	-	Log: Error code	R	UINT32	-	-	-
2249	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2251	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2253	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2255	-	Log: Motor Current	R	FLOAT32	A	-	-
2257	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2259	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2261	-	Log: Motor Power	R	FLOAT32	-	-	-
2263	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2265	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2285	-	Log: Error code	R	UINT32	-	-	-
2287	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2289	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2291	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2293	-	Log: Motor Current	R	FLOAT32	A	-	-
2295	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2297	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2299	-	Log: Motor Power	R	FLOAT32	-	-	-
2301	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2303	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2323	-	Log: Error code	R	UINT32	-	-	-
2325	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2327	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2329	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2331	-	Log: Motor Current	R	FLOAT32	A	-	-
2333	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2335	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2337	-	Log: Motor Power	R	FLOAT32	-	-	-
2339	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2341	-	Log: Grid Voltage	R	FLOAT32	V	-	-
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	-	Log: System Status	R	UINT32	-	-	-
2361	-	Log: Error code	R	UINT32	-	-	-
2363	-	Log: Flow Rate	R	FLOAT32	P04.0.12 - Flow Unit	-	-
2365	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
2367	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2369	-	Log: Motor Current	R	FLOAT32	A	-	-
2371	-	Log: Motor Voltage	R	FLOAT32	V	-	-
2373	-	Log: Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
2375	-	Log: Motor Power	R	FLOAT32	-	-	-
2377	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2379	-	Log: Grid Voltage	R	FLOAT32	V	-	-
2381	-	Total Error Counter	R	UINT16	-	-	-
2382	-	Total Alarms Counter	R	UINT16	-	-	-
2383	-	Error 1 Bitfield:	R	UINT32	-	-	-
		0-IGBT Overtemperature					
		1-IGBT Internal Overtemperature					
		2-IGBT Overcurrent					
		3-Motor Overcurrent					
		4-Overvoltage DC-Bus					
		5-Undervoltage DC-Bus					
		6-Motor Startup Error					
		7-Generic Firmware Error					
		8-Ext-Flash Error					
		9-Ext-Eeprom Error					
		10-Motor Overtemperature					
		11-I2T Error					
		12-PowerClassRestrict					
		13-Inverter Overtemperature					
		14-*Reserved					

		15-Motor Connection					
		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-*Reserved					
		27-Multipump Bus Timeout					
		28-Internal Communication MOC					
		29-AOC Hardware Error					
		30-*Reserved					
		31-*Reserved					
2385	-	Error2 BitField:	R	UINT32	-	-	-
		0-*Reserved					
		1-Ground Leakage					
		2-*Reserved					
		3-Grid Overvoltage					
		4-Power Failure					
		5-Minimum Threshold					
		6-Lack of Water					
		7-*Reserved					
		8-Missing Configuration files					
		9-Grid Undervoltage					
		10-Wrong Feedback Configuration					
		11 ÷ 31-*Reserved					
2387	-	Alarm1 Bitfield:	R	UINT32	-	-	-
		0-Generic Firmware Alarm					
		1-Extenal Alarm					
		2-*Reserved					
		3-MultiPump Comm. Lost					
		4-MultiPump Address Conflict					
		5-MultiPump Incompatibility					
		6-Internal Communication MOC					
		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					
3001	P03.0.01	Current pressure	R	FLOAT32	P04.0.11 - Pressure Unit	-	-
3003	P03.0.02	Actual Flow	R	FLOAT32	P04.0.12 - Flow Unit	-	-
3005	P03.0.03	Current Fluid Temp.	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
	[X+]						
3007	P03.0.04	Actual Level	R	FLOAT32	P04.0.14 - Level Unit	-	-
	[X+]						
3009	P03.0.10	Effective Value Required	R	FLOAT32	-	-	-
3011	P03.0.20	Required Value	R	FLOAT32	-	-	-

3013	P03.0.30	Pump status	R	ENUM	-	-	-
3101	P03.1.01	Unit Powered Time	R	UINT32	h	-	-
3103	P03.1.02	Operating time	R	UINT32	h	-	-
3105	P03.1.05	Energy Counter	R	FLOAT32	P04.0.16 - Energy Unit	-	-
3201	P03.2.01	Motor Speed	R	UINT16	rpm	-	-
3202	P03.2.02	Motor Speed %	R	FLOAT32	%	-	-
3204	P03.2.05	Motor Current	R	FLOAT32	A	-	-
3206	P03.2.06	Motor Power	R	FLOAT32	P04.0.15 - Power Unit	-	-
3208	P03.2.07	Motor Voltage	R	FLOAT32	V	-	-
3210	P03.2.08	Grid Voltage	R	UINT16	V	-	-
3211	P03.2.09	DC Bus Voltage	R	UINT16	V	-	-
3220	P03.2.20	Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
3222	P03.2.21	Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Unit	-	-
3224	P03.2.22	Motor Ptc	R	FLOAT32	-	-	-
3301	P03.3.01	Digital I/O Status	R	UINT16	-	-	-
3302	P03.3.11	Analogue Input 1 Value	R	FLOAT32	P05.1.02 - Type AI 1	-	-
3304	P03.3.12	Analogue Input 2 Value	R	FLOAT32	P05.1.12 - Type AI 2	-	-
3306	P03.3.13	Analogue Input 3 Value [X+]	R	FLOAT32	P05.1.22 - Type AI 3	-	-
3308	P03.3.14	Analogue Input 4 Value [X+]	R	FLOAT32	P05.1.32 - Type AI 1	-	-
3310	P03.3.20	Analogue Output Value	R	FLOAT32	P05.3.02 - Analogue 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	-	-	-
3419	P03.4.05	Drive Production Date	R	UINT32	-	-	-
3421	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3422	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3423	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3424	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3425	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3426	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3427	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3428	P03.4.06	Drive Serial Number	R	UINT16	-	-	-
3429	P03.4.10	Hmi Firmware Version	R	UINT32	-	-	-
3431	P03.4.11	Hmi-Bt Firmware Version	R	UINT32	-	-	-
3433	P03.4.12	Power Card 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	-	-	-
3441	P03.4.16	Parameter File Version	R	UINT32	-	-	-

3443	P03.4.17 [X+]	Language File Version	R	UINT32	-	-	-
3445	P03.4.19	Firmware Version	R	UINT32	-	-	-
3447	-	Type of Drive	R	ENUM	-	-	-
4001	P04.0.01	System Type	R/W	ENUM	-	0	0
4002	P04.0.02	Control Mode	R/W	ENUM	-	0	7
4003	P04.0.03 [X+]	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	Configuration of minimum speed	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 [X+]	Flow Measuring Unit	R/W	ENUM	-	0	4
4010	P04.0.13 [X+]	Temperature Measuring Unit	R/W	ENUM	-	0	2
4011	P04.0.14 [X+]	Level Measuring Unit	R/W	ENUM	-	0	3
4012	P04.0.15 [X+]	Power Measuring Unit	R/W	ENUM	-	0	3
4013	P04.0.16 [X+]	Energy Measuring Unit	R/W	ENUM	-	0	5
4014	P04.0.17 [X+]	Specific Energy Meas. Unit	R/W	ENUM	-	0	4
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 [X+]	Setpoint 3 Selection	R/W	ENUM	-	0	2
4024	P04.0.24 [X+]	Setpoint 4 Selection	R/W	ENUM	-	0	2
4101	P04.1.01	Speed Setpoint 1	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
4102	P04.1.02	Speed Setpoint 2	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
4103	P04.1.03 [X+]	Speed Setpoint 3	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
4104	P04.1.04 [X+]	Speed Setpoint 4	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
4111	P04.1.11	Pressure-Setpoint 1	R/W	FLOAT32	P04.0.11 - Pressure 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 Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4115	P04.1.13 [X+]	Pressure-Setpoint 3	R/W	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4117	P04.1.14 [X+]	Pressure-Setpoint 4	R/W	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4121	P04.1.21 [X+]	Flow Setpoint 1	R/W	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale

4123	P04.1.22 [X+]	Flow Setpoint 2	R/W	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4125	P04.1.23 [X+]	Flow Setpoint 3	R/W	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4127	P04.1.24 [X+]	Flow Setpoint 4	R/W	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4131	P04.1.31 [X+]	Temperature-Setp. 1	R/W	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4133	P04.1.32 [X+]	Temperature-Setp. 2	R/W	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4135	P04.1.33 [X+]	Temperature-Setp. 3	R/W	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4137	P04.1.34 [X+]	Temperature-Setp. 4	R/W	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4141	P04.1.41 [X+]	Level Setpoint 1	R/W	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4143	P04.1.42 [X+]	Level Setpoint 2	R/W	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4145	P04.1.43 [X+]	Level Setpoint 3	R/W	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4147	P04.1.44 [X+]	Level Setpoint 4	R/W	FLOAT32	P04.0.14 - Level 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
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 - Minimum Speed	P04.2.32 - Maximum Speed
4204	P04.2.07	Linear Lift Amount	R/W	UINT16	%	0	200
4205	P04.2.08 [X+]	Quadrat. Incr. Val.	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
4231	P04.2.31	Min. speed	R/W	UINT16	rpm	0	2000
4232	P04.2.32	Max RPM set	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 Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4303	P04.3.02 [X+]	Flow - Minimum Threshold	R/W	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale

4305	P04.3.03 [X+]	Temperature - Minimum Threshold	R/W	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4307	P04.3.04 [X+]	Level - Minimum Threshold	R/W	FLOAT32	P04.0.14 - Level 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
4401	P04.4.01	Test Run Speed	R/W	UINT16	rpm	0	P04.2.32 - Maximum 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
4601	P04.6.01	Pipe Filling Function	R/W	ENUM	-	0	1
4602	P04.6.03	Pipe Filling Threshold	R/W	FLOAT32	P04.0.11 - Pressure 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. unit
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
5000	P05.0.00	Actual Value Source	R/W	ENUM	-	0	5
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 Unit	-5	10
5005	P05.0.12	Pressure - Full Scale	R/W	FLOAT32	P04.0.11 - Pressure Unit	0	100
5007	P05.0.21 [X+]	Flow - Zero Value	R/W	FLOAT32	P04.0.12 - Flow Unit	0	9999
5009	P05.0.22 [X+]	Flow - Full Scale	R/W	FLOAT32	P04.0.12 - Flow Unit	0	9999
5011	P05.0.31 [X+]	Temperature - Zero Value	R/W	FLOAT32	P04.0.13 - Temperature Unit	-100	9999
5013	P05.0.32 [X+]	Temperature - Full Scale	R/W	FLOAT32	P04.0.13 - Temperature Unit	-100	9999
5015	P05.0.41 [X+]	Level - Zero Value	R/W	FLOAT32	P04.0.14 - Level Unit	-999	9999
5017	P05.0.42 [X+]	Level - Full Scale	R/W	FLOAT32	P04.0.14 - Level Unit	-999	9999
5101	P05.1.01	Analogue Input 1 Function	R/W	ENUM	-	0	5
5102	P05.1.02	Analog Input 1 Type	R/W	ENUM	-	0	3
5103	P05.1.11	Analogue Input 2 Function	R/W	ENUM	-	0	5
5104	P05.1.12	Analog Input 2 Type	R/W	ENUM	-	0	3
5105	P05.1.21 [X+]	Analogue Input 3 Function	R/W	ENUM	-	0	5
5106	P05.1.22 [X+]	Analog Input 3 Type	R/W	ENUM	-	0	3
5107	P05.1.31 [X+]	Analogue Input 4 Function	R/W	ENUM	-	0	5
5108	P05.1.32 [X+]	Analog Input 1 Type	R/W	ENUM	-	0	3
5109	P05.1.40 [X+]	Sensor Curve	R/W	ENUM	-	0	1
5110	P05.1.50	Analogue Actuator Type	R/W	ENUM	-	0	1

5203	P05.2.03	Digital Input 3 Function	R/W	ENUM	-	0	8
5204	P05.2.04	Digital Input 4 Function [X+]	R/W	ENUM	-	0	8
5205	P05.2.05	Digital Input 5 Function [X+]	R/W	ENUM	-	0	8
5301	P05.3.01	Analogue Output Function	R/W	ENUM	-	0	12
5302	P05.3.02	Analogue 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	Analogue Input 1 Offset	R/W	FLOAT32	-	-10	10
5803	P05.8.02	Analogue Input 1 Gain	R/W	FLOAT32	-	0	1.5
5805	P05.8.11	Analogue Input 2 Offset	R/W	FLOAT32	-	-10	10
5807	P05.8.12	Analogue Input 2 Gain	R/W	FLOAT32	-	0	1.5
5809	P05.8.21	Analogue Input 3 Offset [X+]	R/W	FLOAT32	-	-10	10
5811	P05.8.22	Analogue Input 3 Gain [X+]	R/W	FLOAT32	-	0	1.5
5813	P05.8.31	Analogue Input 4 Offset [X+]	R/W	FLOAT32	-	-10	10
5815	P05.8.32	Analogue Input 4 Gain [X+]	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	8
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 Unit	0	P05.0.12 - Pressure - Full Scale
6113	P06.1.12	Pressure - Dec. value	R/W	FLOAT32	P04.0.11 - Pressure Unit	0	P05.0.12 - Pressure - Full Scale
6115	P06.1.21 [X+]	Flow - Inc. value	R/W	FLOAT32	P04.0.12 - Flow Unit	0	P05.0.22 - Flow - Full Scale
6117	P06.1.22 [X+]	Flow - Dec. value	R/W	FLOAT32	P04.0.12 - Flow Unit	0	P05.0.22 - Flow - Full Scale
6119	P06.1.31 [X+]	Temperature - Inc. value	R/W	FLOAT32	P04.0.13 - Temperature Unit	0	P05.0.32 - Temperature - Full Scale
6121	P06.1.32 [X+]	Temperature - Dec. value	R/W	FLOAT32	P04.0.13 - Temperature Unit	0	P05.0.32 - Temperature - Full Scale
6123	P06.1.41 [X+]	Level - Inc. value	R/W	FLOAT32	P04.0.14 - Level Unit	0	P05.0.42 - Level - Full Scale
6125	P06.1.42 [X+]	Level - Dec. value	R/W	FLOAT32	P04.0.14 - Level Unit	0	P05.0.42 - Level - Full Scale
6129	P06.1.61	Multipump Enable Speed	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum 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 - Maximum Speed

6132	P06.1.81	Automatic Switchover Interval	R/W	UINT16	h	0	250
6133	-	MultipumpDeviceEnable	R/W	UINT16	-	0	1
7001	P07.0.01	Switching Frequency	R/W	ENUM	-	0	5
7002	P07.0.02	Min Switching Frequency	R/W	ENUM	-	0	5
7101	P07.1.01	Skip Speed Center	R/W	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
7102	P07.1.02	Skip Speed Range	R/W	UINT16	rpm	0	300
7201	P07.2.01	Motor heating function	R/W	ENUM	-	0	2
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 - Max master BACnet MS/TP
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 - MAC address BACnet MS/TP	127
8210	-	Frame info BACnet	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	7
	[X+]						
9011	P09.0.12	Hour	R/W	UINT32	-	-	-
	[X+]						
9013	P09.0.11	Date	R/W	UINT32	-	-	-
	[X+]						
9201	P09.1.01	Display Energy Saving	R/W	ENUM	-	0	1
9202	P09.1.02	Energy Saving Time	R/W	UINT16	s	60	999
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 Couter Reset	R/W	ENUM	-	0	1
9303	P09.3.03	Motor Running Counter Reset	R/W	ENUM	-	0	1
9304	P09.3.04	Energy 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
9307- 65535	Reserved - Do not use						

7 BACnet MS/TP

7.1 Protocol implementation compliance statement (PICS)

Declaration of conformity

Date	29/03/2023
Vendor name	XYLEM INC
Product name	HYDROVAR X
Product model number	HVX, HVX+, HYDROVAR X, HYDROVAR X+
Application software version	01.00.00 (FW_PackVersion)
Firmware revision	01
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.

7.2 BACnet Device and BACnet Device Object Identifier

HVX and HVX+ are BACnet devices as they support 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.

Units connected to the local MS/TP network are localised through:

- a Device Object Identifier, or
- a MAC address.

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.

7.3 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.

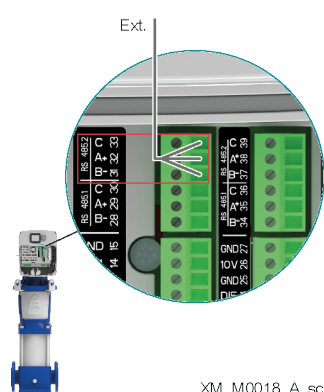
- When BACnet MS/TP communication between the drive and an external device is active, the connection status light on the drive display is on.
- Set parameter *P04.1.60 Limit Setpoint Saving* to *Yes* to write to the volatile memory area and extend the life of the non-volatile EEPROM memory.

NOTE:

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

Connect a single pump unit to an external device

1. Remove the cover of the drive and observe the wiring diagrams inside.
2. Connect terminals 31 (B), 32 (A) and 33 (C) to the external device, for example PLC, BMS, etc.



7.4 BACnet Strings

Object Identifier	Menu Index	Description	Object Name	Type
0	P03.4.01	Unit Part Number	PARTNUMBER	UINT16
1	P03.4.03	Unit Serial Number	SERIALFINISHED	UINT16
2	P03.4.06	Drive Serial Number	SERIAL_DRIVE	UINT16

7.5 BACnet Analogue Inputs

Object Identifier	Menu Index	Description	Object Name	Type	Unit of measurement	Min	Max
0	P02.0.01	Error 1 (Most Recent)	ERROR1CODE	UINT16	-	-	-
1	-	Error 1 - Date	ERROR1DATE	UINT32	-	-	-
2	-	Error 1 - Time	ERROR1TIME	UINT32	-	-	-
3	-	Error 1 - End Date	ERROR1ENDDATE	UINT32	-	-	-
4	-	Error 1 - End time	ERROR1ENDTIME	UINT32	-	-	-
5	-	Log: Error Counter	LOGERRORCOUN 1	UINT16	-	-	-
6	-	Log: Error 1 Bitfield	LOGERROR1BF 1	UINT32	-	-	-
7	-	Log: Error 2 Bitfield	LOGERROR2BF 1	UINT32	-	-	-
8	-	Log: Alarm 1 Bitfield	LOGALARM1BF 1	UINT32	-	-	-
9	-	Log: System Status	LOGSYSSTATUS 1	UINT32	-	-	-
10	-	Log: Error code	LOGINTERNALC 1	UINT32	-	-	-
11	-	Log: Flow Rate	LOGFLOW 1	FLOAT32	P04.0.12 - Flow Unit	-	-
12	-	Log: Head	LOGHEAD 1	FLOAT32	P04.0.11 - Pressure Unit	-	-
13	-	Log: Power Module Temperature	LOGIGBTTEMP 1	FLOAT32	P04.0.13 - Temperature Unit	-	-
14	-	Log: Motor Current	LOG_I_MOT 1	FLOAT32	A	-	-
15	-	Log: Motor Voltage	LOG_V_MOT 1	FLOAT32	V	-	-
16	-	Log: Inverter Temperature	LOGINNERTEMP 1	FLOAT32	P04.0.13 - Temperature Unit	-	-
17	-	Log: Motor Power	LOGTORQUE 1	FLOAT32	-	-	-
18	-	Log: DC Bus Voltage	LOG_DC_BUSVO 1	FLOAT32	V	-	-
19	-	Log: Grid Voltage	LOGGRIDVOLTA 1	FLOAT32	V	-	-
20	P02.0.02	Error 2	ERROR2CODE	UINT16	-	-	-
21	-	Error 2 - Date	ERROR2DATE	UINT32	-	-	-
22	-	Error 2 - Time	ERROR2TIME	UINT32	-	-	-
23	-	Error 2 - End Date	ERROR2ENDDATE	UINT32	-	-	-
24	-	Error 2 - End time	ERROR2ENDTIME	UINT32	-	-	-
25	-	Log: Error Counter	LOGERRORCOUN 2	UINT16	-	-	-
26	-	Log: Error 1 Bitfield	LOGERROR1BF 2	UINT32	-	-	-
27	-	Log: Error 2 Bitfield	LOGERROR2BF 2	UINT32	-	-	-
28	-	Log: Alarm 1 Bitfield	LOGALARM1BF 2	UINT32	-	-	-
29	-	Log: System Status	LOGSYSSTATUS 2	UINT32	-	-	-
30	-	Log: Error code	LOGINTERNALC 2	UINT32	-	-	-
31	-	Log: Flow Rate	LOGFLOW 2	FLOAT32	P04.0.12 - Flow Unit	-	-
32	-	Log: Head	LOGHEAD 2	FLOAT32	P04.0.11 - Pressure Unit	-	-
33	-	Log: Power Module Temperature	LOGIGBTTEMP 2	FLOAT32	P04.0.13 - Temperature Unit	-	-
34	-	Log: Motor Current	LOG_I_MOT 2	FLOAT32	A	-	-
35	-	Log: Motor Voltage	LOG_V_MOT 2	FLOAT32	V	-	-
36	-	Log: Inverter Temperature	LOGINNERTEMP 2	FLOAT32	P04.0.13 - Temperature Unit	-	-
37	-	Log: Motor Power	LOGTORQUE 2	FLOAT32	-	-	-
38	-	Log: DC Bus Voltage	LOG_DC_BUSVO 2	FLOAT32	V	-	-
39	-	Log: Grid Voltage	LOGGRIDVOLTA 2	FLOAT32	V	-	-
40	P02.0.03	Error 3	ERROR3CODE	UINT16	-	-	-
41	-	Error 3 - Date	ERROR3DATE	UINT32	-	-	-
42	-	Error 3 - Time	ERROR3TIME	UINT32	-	-	-
43	-	Error 3 - End Date	ERROR3ENDDATE	UINT32	-	-	-
44	-	Error 3 - End time	ERROR3ENDTIME	UINT32	-	-	-

45	-	Log: Error Counter	LOGERRORCOUN 3	UINT16	-	-	-
46	-	Log: Error 1 Bitfield	LOGERROR1BF 3	UINT32	-	-	-
47	-	Log: Error 2 Bitfield	LOGERROR2BF 3	UINT32	-	-	-
48	-	Log: Alarm 1 Bitfield	LOGALARM1BF 3	UINT32	-	-	-
49	-	Log: System Status	LOGSYSSTATUS 3	UINT32	-	-	-
50	-	Log: Error code	LOGINTERNALC 3	UINT32	-	-	-
51	-	Log: Flow Rate	LOGFLOW 3	FLOAT32	P04.0.12 - Flow Unit	-	-
52	-	Log: Head	LOGHEAD 3	FLOAT32	P04.0.11 - Pressure Unit	-	-
53	-	Log: Power Module Temperature	LOGIGBTTEMP 3	FLOAT32	P04.0.13 - Temperature Unit	-	-
54	-	Log: Motor Current	LOG_I_MOT 3	FLOAT32	A	-	-
55	-	Log: Motor Voltage	LOG_V_MOT 3	FLOAT32	V	-	-
56	-	Log: Inverter Temperature	LOGINNERTEMP 3	FLOAT32	P04.0.13 - Temperature Unit	-	-
57	-	Log: Motor Power	LOGTORQUE 3	FLOAT32	-	-	-
58	-	Log: DC Bus Voltage	LOG_DC_BUSVO 3	FLOAT32	V	-	-
59	-	Log: Grid Voltage	LOGGRIDVOLTA 3	FLOAT32	V	-	-
60	P02.0.04	Error 4	ERROR4CODE	UINT16	-	-	-
61	-	Error 4 - Date	ERROR4DATE	UINT32	-	-	-
62	-	Error 4 - Time	ERROR4TIME	UINT32	-	-	-
63	-	Error 4 - End Date	ERROR4ENDDATE	UINT32	-	-	-
64	-	Error 4 - End time	ERROR4ENDTIME	UINT32	-	-	-
65	-	Log: Error Counter	LOGERRORCOUN 4	UINT16	-	-	-
66	-	Log: Error 1 Bitfield	LOGERROR1BF 4	UINT32	-	-	-
67	-	Log: Error 2 Bitfield	LOGERROR2BF 4	UINT32	-	-	-
68	-	Log: Alarm 1 Bitfield	LOGALARM1BF 4	UINT32	-	-	-
69	-	Log: System Status	LOGSYSSTATUS 4	UINT32	-	-	-
70	-	Log: Error code	LOGINTERNALC 4	UINT32	-	-	-
71	-	Log: Flow Rate	LOGFLOW 4	FLOAT32	P04.0.12 - Flow Unit	-	-
72	-	Log: Head	LOGHEAD 4	FLOAT32	P04.0.11 - Pressure Unit	-	-
73	-	Log: Power Module Temperature	LOGIGBTTEMP 4	FLOAT32	P04.0.13 - Temperature Unit	-	-
74	-	Log: Motor Current	LOG_I_MOT 4	FLOAT32	A	-	-
75	-	Log: Motor Voltage	LOG_V_MOT 4	FLOAT32	V	-	-
76	-	Log: Inverter Temperature	LOGINNERTEMP 4	FLOAT32	P04.0.13 - Temperature Unit	-	-
77	-	Log: Motor Power	LOGTORQUE 4	FLOAT32	-	-	-
78	-	Log: DC Bus Voltage	LOG_DC_BUSVO 4	FLOAT32	V	-	-
79	-	Log: Grid Voltage	LOGGRIDVOLTA 4	FLOAT32	V	-	-
80	P02.0.05	Error 5	ERROR5CODE	UINT16	-	-	-
81	-	Error 5 - Date	ERROR5DATE	UINT32	-	-	-
82	-	Error 5 - Time	ERROR5TIME	UINT32	-	-	-
83	-	Error 5 - End Date	ERROR5ENDDATE	UINT32	-	-	-
84	-	Error 5 - End time	ERROR5ENDTIME	UINT32	-	-	-
85	-	Log: Error Counter	LOGERRORCOUN 5	UINT16	-	-	-
86	-	Log: Error 1 Bitfield	LOGERROR1BF 5	UINT32	-	-	-
87	-	Log: Error 2 Bitfield	LOGERROR2BF 5	UINT32	-	-	-
88	-	Log: Alarm 1 Bitfield	LOGALARM1BF 5	UINT32	-	-	-
89	-	Log: System Status	LOGSYSSTATUS 5	UINT32	-	-	-
90	-	Log: Error code	LOGINTERNALC 5	UINT32	-	-	-
73	-	Log: Power Module Temperature	LOGIGBTTEMP 4	FLOAT32	P04.0.13 - Temperature Unit	-	-
74	-	Log: Motor Current	LOG_I_MOT 4	FLOAT32	A	-	-
75	-	Log: Motor Voltage	LOG_V_MOT 4	FLOAT32	V	-	-
76	-	Log: Inverter Temperature	LOGINNERTEMP 4	FLOAT32	P04.0.13 - Temperature Unit	-	-
77	-	Log: Motor load	LOGTORQUE 4	FLOAT32	-	-	-
78	-	Log: DC Bus Voltage	LOG_DC_BUSVO 4	FLOAT32	V	-	-
79	-	Log: Grid Voltage	LOGGRIDVOLTA 4	FLOAT32	V	-	-
80	P02.0.05	Error 5	ERROR5CODE	UINT16	-	-	-
81	-	Error 5 - Date	ERROR5DATE	UINT32	-	-	-
82	-	Error 5 - Time	ERROR5TIME	UINT32	-	-	-

83	-	Error 5 - End Date	ERROR5ENDDATE	UINT32	-	-	-
84	-	Error 5 - End time	ERROR5ENDTIME	UINT32	-	-	-
85	-	Log: Error Counter	LOGERRORCOUN 5	UINT16	-	-	-
86	-	Log: Error 1 Bitfield	LOGERROR1BF 5	UINT32	-	-	-
87	-	Log: Error 2 Bitfield	LOGERROR2BF 5	UINT32	-	-	-
88	-	Log: Alarm 1 Bitfield	LOGALARM1BF 5	UINT32	-	-	-
89	-	Log: System Status	LOGSYSSTATUS 5	UINT32	-	-	-
90	-	Log: Error code	LOGINTERNALC 5	UINT32	-	-	-
91	-	Log: Flow Rate	LOGFLOW 5	FLOAT32	P04.0.12 - Flow Unit	-	-
92	-	Log: Head	LOGHEAD 5	FLOAT32	P04.0.11 - Pressure Unit	-	-
93	-	Log: Power Module Temperature	LOGIGBTTEMP 5	FLOAT32	P04.0.13 - Temperature Unit	-	-
94	-	Log: Motor Current	LOG_I_MOT 5	FLOAT32	A	-	-
95	-	Log: Motor Voltage	LOG_V_MOT 5	FLOAT32	V	-	-
96	-	Log: Inverter Temperature	LOGINNERTEMP 5	FLOAT32	P04.0.13 - Temperature Unit	-	-
97	-	Log: Motor Power	LOGTORQUE 5	FLOAT32	-	-	-
98	-	Log: DC Bus Voltage	LOG_DC_BUSVO 5	FLOAT32	V	-	-
99	-	Log: Grid Voltage	LOGGRIDVOLTA 5	FLOAT32	V	-	-
100	P02.0.06	Error 6	ERROR6CODE	UINT16	-	-	-
101	-	Error 6 - Date	ERROR6DATE	UINT32	-	-	-
102	-	Error 6 - Time	ERROR6TIME	UINT32	-	-	-
103	-	Error 6 - End Date	ERROR6ENDDATE	UINT32	-	-	-
104	-	Error 6 - End time	ERROR6ENDTIME	UINT32	-	-	-
105	-	Log: Error Counter	LOGERRORCOUN 6	UINT16	-	-	-
106	-	Log: Error 1 Bitfield	LOGERROR1BF 6	UINT32	-	-	-
107	-	Log: Error 2 Bitfield	LOGERROR2BF 6	UINT32	-	-	-
108	-	Log: Alarm 1 Bitfield	LOGALARM1BF 6	UINT32	-	-	-
109	-	Log: System Status	LOGSYSSTATUS 6	UINT32	-	-	-
110	-	Log: Error code	LOGINTERNALC 6	UINT32	-	-	-
111	-	Log: Flow Rate	LOGFLOW 6	FLOAT32	P04.0.12 - Flow Unit	-	-
112	-	Log: Head	LOGHEAD 6	FLOAT32	P04.0.11 - Pressure Unit	-	-
113	-	Log: Power Module Temperature	LOGIGBTTEMP 6	FLOAT32	P04.0.13 - Temperature Unit	-	-
114	-	Log: Motor Current	LOG_I_MOT 6	FLOAT32	A	-	-
115	-	Log: Motor Voltage	LOG_V_MOT 6	FLOAT32	V	-	-
116	-	Log: Inverter Temperature	LOGINNERTEMP 6	FLOAT32	P04.0.13 - Temperature Unit	-	-
117	-	Log: Motor Power	LOGTORQUE 6	FLOAT32	-	-	-
118	-	Log: DC Bus Voltage	LOG_DC_BUSVO 6	FLOAT32	V	-	-
119	-	Log: Grid Voltage	LOGGRIDVOLTA 6	FLOAT32	V	-	-
120	P02.0.07	Error 7	ERROR7CODE	UINT16	-	-	-
121	-	Error 7 - Date	ERROR7DATE	UINT32	-	-	-
122	-	Error 7 - Time	ERROR7TIME	UINT32	-	-	-
123	-	Error 7 - End Date	ERROR7ENDDATE	UINT32	-	-	-
124	-	Error 7 - End time	ERROR7ENDTIME	UINT32	-	-	-
125	-	Log: Error Counter	LOGERRORCOUN 7	UINT16	-	-	-
126	-	Log: Error 1 Bitfield	LOGERROR1BF 7	UINT32	-	-	-
127	-	Log: Error 2 Bitfield	LOGERROR2BF 7	UINT32	-	-	-
128	-	Log: Alarm 1 Bitfield	LOGALARM1BF 7	UINT32	-	-	-
129	-	Log: System Status	LOGSYSSTATUS 7	UINT32	-	-	-
130	-	Log: Error code	LOGINTERNALC 7	UINT32	-	-	-
131	-	Log: Flow Rate	LOGFLOW 7	FLOAT32	P04.0.12 - Flow Unit	-	-
132	-	Log: Head	LOGHEAD 7	FLOAT32	P04.0.11 - Pressure Unit	-	-
133	-	Log: Power Module Temperature	LOGIGBTTEMP 7	FLOAT32	P04.0.13 - Temperature Unit	-	-
134	-	Log: Motor Current	LOG_I_MOT 7	FLOAT32	A	-	-
135	-	Log: Motor Voltage	LOG_V_MOT 7	FLOAT32	V	-	-
136	-	Log: Inverter Temperature	LOGINNERTEMP 7	FLOAT32	P04.0.13 - Temperature Unit	-	-
137	-	Log: Motor Power	LOGTORQUE 7	FLOAT32	-	-	-
138	-	Log: DC Bus Voltage	LOG_DC_BUSVO 7	FLOAT32	V	-	-

139	-	Log: Grid Voltage	LOGGRIDVOLTA 7	FLOAT32	V	-	-
140	P02.0.08	Error 8	ERROR8CODE	UINT16	-	-	-
141	-	Error 8 - Date	ERROR8DATE	UINT32	-	-	-
142	-	Error 8 - Time	ERROR8TIME	UINT32	-	-	-
143	-	Error 8 - End Date	ERROR8ENDDATE	UINT32	-	-	-
144	-	Error 8 - End time	ERROR8ENDTIME	UINT32	-	-	-
145	-	Log: Error Counter	LOGERRORCOUN 8	UINT16	-	-	-
146	-	Log: Error 1 Bitfield	LOGERROR1BF 8	UINT32	-	-	-
147	-	Log: Error 2 Bitfield	LOGERROR2BF 8	UINT32	-	-	-
148	-	Log: Alarm 1 Bitfield	LOGALARM1BF 8	UINT32	-	-	-
149	-	Log: System Status	LOGSYSSTATUS 8	UINT32	-	-	-
150	-	Log: Error code	LOGINTERNALC 8	UINT32	-	-	-
151	-	Log: Flow Rate	LOGFLOW 8	FLOAT32	P04.0.12 - Flow Unit	-	-
152	-	Log: Head	LOGHEAD 8	FLOAT32	P04.0.11 - Pressure Unit	-	-
153	-	Log: Power Module Temperature	LOGIGBTTEMP 8	FLOAT32	P04.0.13 - Temperature Unit	-	-
154	-	Log: Motor Current	LOG_I_MOT 8	FLOAT32	A	-	-
155	-	Log: Motor Voltage	LOG_V_MOT 8	FLOAT32	V	-	-
156	-	Log: Inverter Temperature	LOGINNERTEMP 8	FLOAT32	P04.0.13 - Temperature Unit	-	-
157	-	Log: Motor Power	LOGTORQUE 8	FLOAT32	-	-	-
158	-	Log: DC Bus Voltage	LOG_DC_BUSVO 8	FLOAT32	V	-	-
159	-	Log: Grid Voltage	LOGGRIDVOLTA 8	FLOAT32	V	-	-
160	P02.0.09	Error 9	ERROR9CODE	UINT16	-	-	-
161	-	Error 9 - Date	ERROR9DATE	UINT32	-	-	-
162	-	Error 9 - Time	ERROR9TIME	UINT32	-	-	-
163	-	Error 9 - End Date	ERROR9ENDDATE	UINT32	-	-	-
164	-	Error 9 - End time	ERROR9ENDTIME	UINT32	-	-	-
165	-	Log: Error Counter	LOGERRORCOUN 9	UINT16	-	-	-
166	-	Log: Error 1 Bitfield	LOGERROR1BF 9	UINT32	-	-	-
167	-	Log: Error 2 Bitfield	LOGERROR2BF 9	UINT32	-	-	-
168	-	Log: Alarm 1 Bitfield	LOGALARM1BF 9	UINT32	-	-	-
169	-	Log: System Status	LOGSYSSTATUS 9	UINT32	-	-	-
170	-	Log: Error code	LOGINTERNALC 9	UINT32	-	-	-
171	-	Log: Flow Rate	LOGFLOW 9	FLOAT32	P04.0.12 - Flow Unit	-	-
172	-	Log: Head	LOGHEAD 9	FLOAT32	P04.0.11 - Pressure Unit	-	-
173	-	Log: Power Module Temperature	LOGIGBTTEMP 9	FLOAT32	P04.0.13 - Temperature Unit	-	-
174	-	Log: Motor Current	LOG_I_MOT 9	FLOAT32	A	-	-
175	-	Log: Motor Voltage	LOG_V_MOT 9	FLOAT32	V	-	-
176	-	Log: Inverter Temperature	LOGINNERTEMP 9	FLOAT32	P04.0.13 - Temperature Unit	-	-
177	-	Log: Motor Power	LOGTORQUE 9	FLOAT32	-	-	-
178	-	Log: DC Bus Voltage	LOG_DC_BUSVO 9	FLOAT32	V	-	-
179	-	Log: Grid Voltage	LOGGRIDVOLTA 9	FLOAT32	V	-	-
180	P02.0.10	Error 10	ERROR10CODE	UINT16	-	-	-
181	-	Error 10 - Date	ERROR10DATE	UINT32	-	-	-
182	-	Error 10 - Time	ERROR10TIME	UINT32	-	-	-
183	-	Error 10 - End Date	ERROR10ENDDATE	UINT32	-	-	-
184	-	Error 10 - End time	ERROR10ENDTIME	UINT32	-	-	-
185	-	Log: Error Counter	LOGERRORCOU 10	UINT16	-	-	-
186	-	Log: Error 1 Bitfield	LOGERROR1BF 10	UINT32	-	-	-
187	-	Log: Error 2 Bitfield	LOGERROR2BF 10	UINT32	-	-	-
188	-	Log: Alarm 1 Bitfield	LOGALARM1BF 10	UINT32	-	-	-
189	-	Log: System Status	LOGSYSSTATU 10	UINT32	-	-	-
190	-	Log: Error code	LOGINTERNAL 10	UINT32	-	-	-
191	-	Log: Flow Rate	LOGFLOW 10	FLOAT32	P04.0.12 - Flow Unit	-	-
192	-	Log: Head	LOGHEAD 10	FLOAT32	P04.0.11 - Pressure Unit	-	-
193	-	Log: Power Module Temperature	LOGIGBTTEMP 10	FLOAT32	P04.0.13 - Temperature Unit	-	-
194	-	Log: Motor Current	LOG_I_MOT 10	FLOAT32	A	-	-

195	-	Log: Motor Voltage	LOG_V_MOT 10	FLOAT32	V	-	-
196	-	Log: Inverter Temperature	LOGINNERTEM 10	FLOAT32	P04.0.13 - Temperature Unit	-	-
197	-	Log: Motor Power	LOGTORQUE 10	FLOAT32	-	-	-
198	-	Log: DC Bus Voltage	LOG_DC_BUSV 10	FLOAT32	V	-	-
199	-	Log: Grid Voltage	LOGGRIDVOLT 10	FLOAT32	V	-	-
200	-	Total Error Counter	TOTAL_ERRORS_C	UINT16	-	-	-
201	-	Total Alarms Counter	TOTAL_ALARMS_C	UINT16	-	-	-
202	-	Error 1 Bitfield:	ERROR1_BF	UINT32	-	-	-
		0-IGBT Overtemperature					
		1-IGBT Internal Overtemperature					
		2-IGBT Overcurrent					
		3-Motor Overcurrent					
		4-Overvoltage DC-Bus					
		5-Undervoltage DC-Bus					
		6-Motor Startup Error					
		7-Generic Firmware Error					
		8-Ext-Flash Error					
		9-Ext-Eeprom Error					
		10-Motor Overtemperature					
		11-I2T Error					
		12-PowerClassRestrict					
		13-Inverter Overtemperature					
		14-*Reserved					
		15-Motor Connection					
		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-*Reserved					
		27-Multipump Bus Timeout					
		28-Internal Communication MOC					
		29-AOC Hardware Error					
		30-*Reserved					
		31-*Reserved					
203	-	Error2 BitField:	ERROR2_BF	UINT32	-	-	-
		0-*Reserved					
		1-Ground Leakage					
		2-*Reserved					
		3-Grid Overvoltage					
		4-Power Failure					
		5-Minimum Threshold					
		6-Lack of Water					
		7-*Reserved					
		8-Missing Configuration files					
		9-Grid Undervoltage					
		10-Wrong Feedback Configuration					
		11÷31-*Reserved					
204	-	Alarm1 Bitfield:	ALARM1_BF	UINT32	-	-	-
		0-Generic Firmware Alarm					
		1-External Alarm					
		2-*Reserved					
		3-MultiPump Comm. Lost					

		4-MultiPump Address Conflict					
		5-MultiPump Incompatibility					
		6-Internal Communication MOC					
		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					
205	P03.0.01	Current pressure	HEAD	FLOAT32	P04.0.11 - Pressure Unit	-	-
206	P03.0.02	Actual Flow	FLOW	FLOAT32	P04.0.12 - Flow Unit	-	-
	[X+]						
207	P03.0.03	Current Fluid Temp.	FLUIDTEMP	FLOAT32	P04.0.13 - Temperature Unit	-	-
	[X+]						
208	P03.0.04	Actual Level	ACTUALLEVEL	FLOAT32	P04.0.14 - Level Unit	-	-
	[X+]						
209	P03.0.10	Effective Value Required	EFFREQVAL	FLOAT32	-	-	-
210	P03.0.20	Required Value	INITIALREQVAL	FLOAT32	-	-	-
211	P03.0.30	Pump status	PUMPDEVICESTAT	ENUM	-	-	-
212	P03.1.01	Unit Powered Time	POWERUPTIME	UINT32	h	-	-
213	P03.1.02	Operating time	MOTORRUNNINGTI	UINT32	h	-	-
214	P03.1.05	Energy Counter	ENERGYCOUNTER	FLOAT32	P04.0.16 - Energy Unit	-	-
215	P03.2.01	Motor Speed	MOTOR_SPEED	UINT16	rpm	-	-
216	P03.2.02	Motor Speed %	MOTOR_SPEED_PE	FLOAT32	%	-	-
217	P03.2.05	Motor Current	OUTPUTCURRENT	FLOAT32	A	-	-
218	P03.2.06	Motor Power	OUTPUTPOWER	FLOAT32	P04.0.15 - Power Unit	-	-
219	P03.2.07	Motor Voltage	OUTPUTVOLTAGE	FLOAT32	V	-	-
220	P03.2.08	Grid Voltage	GRIDVOLTAGE	UINT16	V	-	-
221	P03.2.09	DC Bus Voltage	DCLINKVOLTAGE	UINT16	V	-	-
222	P03.2.20	Power Module Temperature	INVERTERPOWERM	FLOAT32	P04.0.13 - Temperature Unit	-	-
223	P03.2.21	Inverter Temperature	INVERTERCARDTE	FLOAT32	P04.0.13 - Temperature Unit	-	-
224	P03.2.22	Motor Ptc	MOTORPTCVALUE	FLOAT32	-	-	-
225	P03.3.01	Digital I/O Status	DIGITAL_IO_STA	UINT16	-	-	-
226	P03.3.11	Analogue Input 1 Value	ANALOGVALUE1	FLOAT32	P05.1.02 - Type AI 1	-	-
227	P03.3.12	Analogue Input 2 Value	ANALOGVALUE2	FLOAT32	P05.1.12 - Type AI 2	-	-
228	P03.3.13	Analogue Input 3 Value	ANALOGVALUE3	FLOAT32	P05.1.22 - Type AI 3	-	-
	[X+]						
229	P03.3.14	Analogue Input 4 Value	ANALOGVALUE4	FLOAT32	P05.1.32 - Type AI 1	-	-
	[X+]						
230	P03.3.20	Analogue Output Value	ANALOGOUTVALUE	FLOAT32	P05.3.02 - Analogue Output Type	-	-
231	P03.4.02	Unit Production Date	DATE_SERIALFIN	UINT32	-	-	-
232	P03.4.05	Drive Production Date	PRODUCTIONDATE	UINT32	-	-	-
233	-	Type of Drive	DRIVETYPE	ENUM	-	-	-
234	P06.0.04	Multipump Map	MULTIPUMPSMAP	UINT16	-	-	-
235	P06.0.05	Multipump Priority	MPO_MYPUMPPRIO	UINT16	-	-	-
236	P03.4.13	Control Card Firmware Version	AOC_VERSION	UINT32	-	-	-
237	P03.4.12	Power Card Firmware Version	MOC_VERSION	UINT32	-	-	-
238	P03.4.10	Hmi Firmware Version	UI_VERSION	UINT32	-	-	-
239	P03.4.11	Hmi-Bt Firmware Version	BTLE_VERSION	UINT32	-	-	-
240	P03.4.14	Map File Version	MAPS_VERSION	UINT32	-	-	-
241	P03.4.15	Default File Version	DEFAULT_VERSION	UINT32	-	-	-

242	P03.4.16	Parameter File Version	LUT_PAR_VERSION	UINT32	-	-	-
243	P03.4.17 [X+]	Language File Version	UI_LANGUAGES_V	UINT32	-	-	-

7.6 BACnet Analogue Values

Object Identifier	Menu Index	Description	Object Name	Type	Unit of measurement	Min	Max
0	-	Start/Stop: 0-Stop 1-Start	SET_STARTSTOP	ENUM	-	0	1
1	-	Error Reset Command	ERRORRESTARTCMD	ENUM	-	0	1
2	P04.0.01	System Type	SYSTEMTYPE	ENUM	-	0	0
3	P04.0.02	Control Mode	SET_CONTROLMOD	ENUM	-	0	7
4	P04.0.03	Regulation Mode	DIRECTION_OF_R	ENUM	-	0	1
5	P04.0.05	Start Value	SET_RESTARTVAL	UINT16	%	0	100
6	P04.0.06	Auto Start	AUTOSTART	ENUM	-	0	1
7	P04.0.07	Configuration of minimum speed	SET_MINSPEEDCO	ENUM	-	0	1
8	P04.0.09	Measuring Unit Selection	UNITSELECTION	ENUM	-	0	1
9	P04.0.11	Pressure Measuring Unit	PRESSUREUNITSE	ENUM	-	0	8
10	P04.0.12 [X+]	Flow Measuring Unit	FLOWUNITSEL	ENUM	-	0	4
11	P04.0.13 [X+]	Temperature Measuring Unit	TEMPUNITSEL	ENUM	-	0	2
12	P04.0.14 [X+]	Level Measuring Unit	LEVELUNITSEL	ENUM	-	0	3
13	P04.0.15 [X+]	Power Measuring Unit	POWERUNITSEL	ENUM	-	0	3
14	P04.0.16 [X+]	Energy Measuring Unit	ENERGYUNITSEL	ENUM	-	0	5
15	P04.0.17 [X+]	Specific Energy Meas. Unit	SPENUNITSEL	ENUM	-	0	4
16	P09.1.11	Max Decimals	MAXDECIMALS	UINT16	-	0	3
17	P04.0.21	Setpoint 1 Selection	CONFSETP 1	ENUM	-	0	1
18	P04.0.22	Setpoint 2 Selection	CONFSETP 2	ENUM	-	0	2
19	P04.0.23 [X+]	Setpoint 3 Selection	CONFSETP 3	ENUM	-	0	2
20	P04.0.24 [X+]	Setpoint 4 Selection	CONFSETP 4	ENUM	-	0	2
21	P04.1.01	Speed Setpoint 1	SETPOINTSPEED1	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
22	P04.1.02	Speed Setpoint 2	SETPOINTSPEED2	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
23	P04.1.03 [X+]	Speed Setpoint 3	SETPOINTSPEED3	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
24	P04.1.04 [X+]	Speed Setpoint 4	SETPOINTSPEED4	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
25	P04.1.11	Pressure-Setpoint 1	SETPOINTPRESS1	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
26	P04.1.12	Pressure-Setpoint 2	SETPOINTPRESS2	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale

27	P04.1.13 [X+]	Pressure-Setpoint 3	SETPOINTPRESS3	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
28	P04.1.14 [X+]	Pressure-Setpoint 4	SETPOINTPRESS4	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
29	P04.1.21 [X+]	Flow Setpoint 1	SETPOINTFLOW1	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
30	P04.1.22 [X+]	Flow Setpoint 2	SETPOINTFLOW2	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
31	P04.1.23 [X+]	Flow Setpoint 3	SETPOINTFLOW3	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
32	P04.1.24 [X+]	Flow Setpoint 4	SETPOINTFLOW4	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
33	P04.1.31 [X+]	Temperature-Setp. 1	SETPOINTTEMP1	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
34	P04.1.32 [X+]	Temperature-Setp. 2	SETPOINTTEMP2	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
35	P04.1.33 [X+]	Temperature-Setp. 3	SETPOINTTEMP3	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
36	P04.1.34 [X+]	Temperature-Setp. 4	SETPOINTTEMP4	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
37	P04.1.41 [X+]	Level Setpoint 1	SETPOINTLEVEL1	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
38	P04.1.42 [X+]	Level Setpoint 2	SETPOINTLEVEL2	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
39	P04.1.43 [X+]	Level Setpoint 3	SETPOINTLEVEL3	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
40	P04.1.44 [X+]	Level Setpoint 4	SETPOINTLEVEL4	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
45	P04.2.01	Window	SET_RPMWINDOW_	UINT16	%	1	100
46	P04.2.02	Hysteresis	SET_RPMHYST_PE	UINT16	%	1	100
47	P04.2.06	Lift Speed	SPEEDLIFTKNEE	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
48	P04.2.07	Linear Lift Amount	SPEEDLIFTAMOUN	UINT16	%	0	200
49	P04.2.08 [X+]	Quadrat. Incr. Val.	QUADRATICLIFTA	UINT16	%	0	999
50	P04.2.11	Ramp 1	RAMP1_SEC	UINT16	s	1	250
51	P04.2.12	Ramp 2	RAMP2_SEC	UINT16	s	1	250
52	P04.2.13	Ramp 3	RAMP3_SEC	UINT16	s	1	999
53	P04.2.14	Ramp 4	RAMP4_SEC	UINT16	s	1	999
54	P04.2.15	Ramp Speed Min Acceleration	RAMPSPPEEDMIN_A	FLOAT32	s	0.1	25
55	P04.2.16	Ramp Speed Min Deceleration	RAMPSPPEEDMIN_D	FLOAT32	s	0.1	25
56	P04.2.31	Min. speed	SET_MINRPM_RPM	UINT16	rpm	0	2000
57	P04.2.32	Max RPM set	SET_MAXRPM_RPM	UINT16	rpm	2000	4100

58	P04.2.35	Min Speed Time	MINSPEEDTIME	UINT16	s	0	100
59	P04.3.00	Automatic Error Reset	AUTOMATICERROR	ENUM	-	0	1
60	P04.3.01	Pressure - Minimum Threshold	MINTHRESHPRESS	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
61	P04.3.02 [X+]	Flow - Minimum Threshold	MINTHRESHTEMP	FLOAT32	P04.0.12 - Flow Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
62	P04.3.03 [X+]	Temperature - Minimum Threshold	MINTHRESHFLVL	FLOAT32	P04.0.13 - Temperature Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
63	P04.3.04 [X+]	Level - Minimum Threshold	MINTHRESHFLOW	FLOAT32	P04.0.14 - Level Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
65	P04.3.10	Minimum Threshold Delay	MINTHRESHDELAY	UINT16	s	1	100
66	P04.3.11	Lack Of Water Delay	LOW_DELAY	UINT16	s	1	100
67	P04.4.01	Test Run Speed	TESTRUNSPEED	UINT16	rpm	0	P04.2.32 - Maximum Speed
68	P04.4.02	Test Run Timeout	TESTRUNTIMEOUT	UINT16	h	0	255
69	P04.4.03	Test Run Time	TESTRUNTIME	UINT16	s	0	180
70	P04.4.05	Test Run Command	TESTRUNCOMMAND	ENUM	-	0	1
71	P04.6.01	Pipe Filling Function	SET_PIPEFILLIN	ENUM	-	0	1
72	P04.6.03	Pipe Filling Threshold	PIPE_FILL_THRE	FLOAT32	P04.0.11 - Pressure Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
73	P04.6.05	Pipe Filling Time	SET_RAMP_PF_SE	UINT16	s	0	999
74	P04.6.06	Max Pipe Filling Pumps	MAXPIPEFILLING	UINT16	-	1	P06.0.02 - Max. unit
75	P04.6.10	Pipe Filling Steady Time	SET_STEADYTIME	UINT16	s	1	P04.6.05 - Pipe Filling Time
76	P04.6.15	Pipe Filling Speed Step	SET_RPMSTEPF	UINT16	%	5	100
77	P05.0.00	Actual Value Source	ACT_VAL_SOURCE	ENUM	-	0	5
78	P05.0.01	Actuator - Zero Value	ACTUATOR_ZERO	UINT16	rpm	0	9999
79	P05.0.02	Actuator - Full Scale	ACTUATOR_FULL	UINT16	rpm	0	9999
80	P05.0.11	Pressure - Zero Value	PRESS_ZERO_VAL	FLOAT32	P04.0.11 - Pressure Unit	-5	10
81	P05.0.12	Pressure - Full Scale	PRESS_FULL	FLOAT32	P04.0.11 - Pressure Unit	0	100
82	P05.0.21 [X+]	Flow - Zero Value	FLOW_ZERO_VAL	FLOAT32	P04.0.12 - Flow Unit	0	9999
83	P05.0.22 [X+]	Flow - Full Scale	FLOW_FULL	FLOAT32	P04.0.12 - Flow Unit	0	9999
84	P05.0.31 [X+]	Temperature - Zero Value	TEMPE_ZERO_VAL	FLOAT32	P04.0.13 - Temperature Unit	-100	9999
85	P05.0.32 [X+]	Temperature - Full Scale	TEMP_FULL	FLOAT32	P04.0.13 - Temperature Unit	-100	9999
86	P05.0.41 [X+]	Level - Zero Value	LEVEL_ZERO_VAL	FLOAT32	P04.0.14 - Level Unit	-999	9999
87	P05.0.42 [X+]	Level - Full Scale	LEVEL_FULL	FLOAT32	P04.0.14 - Level Unit	-999	9999
90	P05.1.01	Analogue Input 1 Function	ANALOG_IN1_FUN	ENUM	-	0	5
91	P05.1.02	Analog Input 1 Type	ANALOG_IN1_CFG	ENUM	-	0	3
92	P05.1.11	Analogue Input 2 Function	ANALOG_IN2_FUN	ENUM	-	0	5
93	P05.1.12	Analog Input 2 Type	ANALOG_IN2_CFG	ENUM	-	0	3
94	P05.1.21 [X+]	Analogue Input 3 Function	ANALOG_IN3_FUN	ENUM	-	0	5

95	P05.1.22 [X+]	Analog Input 3 Type	ANALOG_IN3_CFG	ENUM	-	0	3
96	P05.1.31 [X+]	Analogue Input 4 Function	ANALOG_IN4_FUN	ENUM	-	0	5
97	P05.1.32 [X+]	Analog Input 1 Type	ANALOG_IN4_CFG	ENUM	-	0	3
98	P05.1.40 [X+]	Sensor Curve	LINEARQUADRATI	ENUM	-	0	1
99	P05.1.50 [X+]	Analogue Actuator Type	ANALOGACTUATOR	ENUM	-	0	1
100	P05.2.03	Digital Input 3 Function	DIG_IN_3_FUN	ENUM	-	0	8
101	P05.2.04 [X+]	Digital Input 4 Function	DIG_IN_4_FUN	ENUM	-	0	8
102	P05.2.05 [X+]	Digital Input 5 Function	DIG_IN_5_FUN	ENUM	-	0	8
103	P05.3.01	Analogue Output Function	ANALOG_OUT1FUN	ENUM	-	0	12
104	P05.3.02	Analogue Output Type	ANALOG_OUT1CFG	ENUM	-	0	3
105	P05.4.01	Relay 1 Function	DIG_OUT_1_FUN	ENUM	-	0	7
106	P05.4.02	Relay 2 Function	DIG_OUT_2_FUN	ENUM	-	0	7
107	P05.8.01	Analogue Input 1 Offset	AN_IN1_OFFSET	FLOAT32	-	-10	10
108	P05.8.02	Analogue Input 1 Gain	AN_IN1_GAIN	FLOAT32	-	0	1.5
109	P05.8.11	Analogue Input 2 Offset	AN_IN2_OFFSET	FLOAT32	-	-10	10
110	P05.8.12	Analogue Input 2 Gain	AN_IN2_GAIN	FLOAT32	-	0	1.5
111	P05.8.21 [X+]	Analogue Input 3 Offset	AN_IN3_OFFSET	FLOAT32	-	-10	10
112	P05.8.22 [X+]	Analogue Input 3 Gain	AN_IN3_GAIN	FLOAT32	-	0	1.5
113	P05.8.31 [X+]	Analogue Input 4 Offset	AN_IN4_OFFSET	FLOAT32	-	-10	10
114	P05.8.32 [X+]	Analogue Input 4 Gain	AN_IN4_GAIN	FLOAT32	-	0	1.5
115	P06.0.01	System Configuration	MPCONTROLMODE	ENUM	-	0	2
116	P06.0.02	Max Units	MAXPUMPNUMBER	UINT16	-	1	-
117	P06.0.03	Multipump Address	BACNET_MAC_MP	UINT16	-	1	8
118	P06.1.11	Pressure - Inc. value	ACTVALINCPRESS	FLOAT32	P04.0.11 - Pressure Unit	0	P05.0.12 - Pressure - Full Scale
119	P06.1.12	Pressure - Dec. value	ACTVALDECPRESS	FLOAT32	P04.0.11 - Pressure Unit	0	P05.0.12 - Pressure - Full Scale
120	P06.1.21 [X+]	Flow - Inc. value	ACTVALINCFLOW	FLOAT32	P04.0.12 - Flow Unit	0	P05.0.22 - Flow - Full Scale
121	P06.1.22 [X+]	Flow - Dec. value	ACTVALDECFLOW	FLOAT32	P04.0.12 - Flow Unit	0	P05.0.22 - Flow - Full Scale
122	P06.1.31 [X+]	Temperature - Inc. value	ACTVALINCTEMP	FLOAT32	P04.0.13 - Temperature Unit	0	P05.0.32 - Temperature - Full Scale
123	P06.1.32 [X+]	Temperature - Dec. value	ACTVALDECTEMP	FLOAT32	P04.0.13 - Temperature Unit	0	P05.0.32 - Temperature - Full Scale
124	P06.1.41 [X+]	Level - Inc. value	ACTVALINCLVL	FLOAT32	P04.0.14 - Level Unit	0	P05.0.42 - Level - Full Scale
125	P06.1.42 [X+]	Level - Dec. value	ACTVALDECLVL	FLOAT32	P04.0.14 - Level Unit	0	P05.0.42 - Level - Full Scale

128	P06.1.61	Multipump Enable Speed	MULTIPUMPENABL	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
129	P06.1.71	Synchronous Limit	SYNCHLIMSPEED	UINT16	rpm	0	3600
130	P06.1.72	Synchronous Window	SYNCHSPEEDWIND	UINT16	rpm	0	P04.2.32 - Maximum Speed
131	P06.1.81	Automatic Switchover Interval	SWITCHOVERINT	UINT16	h	0	250
132	P07.0.01	Switching Frequency	MAXSWITCHFREQ	ENUM	-	0	5
133	P07.0.02	Min Switching Frequency	MINSWITCHFREQ	ENUM	-	0	5
134	P07.1.01	Skip Speed Center	SKIPSPEEDCENTR	UINT16	rpm	P04.2.31 - Minimum Speed	P04.2.32 - Maximum Speed
135	P07.1.02	Skip Speed Range	SKIPSPEEDBAND	UINT16	rpm	0	300
136	P07.2.01	Motor heating function	MOTORPREHEATHI	ENUM	-	0	2
137	P08.0.01	Com 1 Function	COM_1_FUNC	ENUM	-	0	3
138	P08.0.02	Com 2 Function	COM_2_FUNC	ENUM	-	0	2
139	P08.1.01	Modbus RTU Address	MODBUSRTU_ADDR	UINT16	-	0	127
140	P08.1.02	Modbus RTU Baudrate	MODBUSRTU_BAUD	ENUM	-	0	8
141	P08.1.08	Modbus RTU Format	MODBUSRTU_FORM	ENUM	-	0	3
142	P08.2.01	Bacnet MS/TP Mac Address	BACNET_MAC	UINT16	-	0	P08.2.05 - Max master BACnet MS/TP
143	P08.2.02	Bacnet MS/TP Baudrate	BACNET_BAUD	ENUM	-	0	8
144	P08.2.03	Bacnet MS/TP Format	BACNET_FORMAT	ENUM	-	0	3
145	P08.2.04	Bacnet MS/TP Device Id	BACNET_DEVID	UINT32	-	-	4194304
146	P08.2.05	Bacnet MS/TP Max Master	BACNET_MAXMAS	UINT16	-	P08.2.01 - MAC address BACnet MS/TP	127
147	-	Frame info BACnet	BACNET_INFOFRM	UINT16	-	1	255
148	-	BACnet Reinit	BACNET_REINIT	ENUM	-	0	1
149	P08.3.01	Enable Wireless Communication	BLUETOOTHEN	ENUM	-	0	1
150	P09.0.01 [X+]	Language	LANGUAGE	ENUM	-	0	7
151	P09.0.12 [X+]	Hour	CALENDARTIME	UINT32	-	-	-
152	P09.0.11 [X+]	Date	CALENDARDATE	UINT32	-	-	-
153	P09.1.01	Display Energy Saving	EN_SAVING_EN	ENUM	-	0	1
154	P09.1.02	Energy Saving Time	EN_SAVING_TIME	UINT16	s	60	999
155	P09.1.10	Display Orientation	DISPLAYORIENTA	ENUM	-	0	1
156	P09.3.01	Error Log Reset	ERRORLOGRESET	ENUM	-	0	1
157	P09.3.02	Operating Time Couter Reset	OPERATINGTIMEC	ENUM	-	0	1
158	P09.3.03	Motor Running Counter Reset	MOTORRUNCOUNTE	ENUM	-	0	1
159	P09.3.04	Energy Counter Reset	KWHCOUNTERRESE	ENUM	-	0	1
160	P09.3.05	Factory Restore	FACTORYRESTORE	ENUM	-	0	1
161	P09.3.06	Commissioning Completed	FIRSTCOMMISSIO	ENUM	-	0	1
162	P09.3.07	Bonded Device List Reset	UNBONDDEVICE	ENUM	-	0	1
163	P04.1.60	Limit setpoint saving	SKIPSPSAVING	ENUM	-	0	1

8 Troubleshooting


WARNING:

Maintenance must be done by a technician possessing the technical-professional requirements outlined in the current regulations.


WARNING:

If a fault cannot be corrected or is not mentioned, contact Xylem or the Authorised Distributor.

8.1 List of alarms

Code	Name	Cause	Solution
A05	Data memory corrupted	The configuration files do not match or have not loaded correctly	1. Power off the unit 2. Wait 1 minute 3. Power the unit
A08	Downgrading active	The switching frequency was reduced due to the high ambient temperature	• Clean the unit • Check the status of the motor fan • Check the environmental conditions of installation
A11	Analogue input 1 alarm	The analogue input value is too high or too low	Check: • The operation of the device connected to the analogue input • The correct configuration of the analogue input
A12	Analogue input 2 alarm		
A13	Analogue input 3 alarm		
A14	Analogue input 4 alarm		
A15	Flow/Temperature sensor alarm	The embedded flow/temperature sensor is malfunctioning.	Check the sensor connection
A16	External digital input alarm	The digital input alarm is active	Check the operation of the device connected to the digital input
A17	Internal communication error	Communication problem between drive boards	1. Power off the unit 2. Wait 1 minute 3. Power the unit
A18	Multi-pump communication error	The unit is configured as a multi-pump but there is no communication with other units	Check: • The multi-pump system connections • The correct configuration of the communication ports
A19	Multi-pump address conflict	There are other units in the system with the same multi-pump address	Check that each unit has a unique multi-pump address
A20	Multi-pump incompatibility	A unit connected to the multi-pump system has non-compatible features or a different multi-pump protocol	• Do not select the non-compatible feature, or • Bring all the units to the same firmware version

Code	Name	Cause	Solution
A24	Incorrect setpoint configuration	No selected setpoint corresponds to the measured size of the control mode	Verify the correct configuration of the parameters of menus M04 and M05
A28	Fieldbus communication error	Interruption of fieldbus communication with the remote device	Check: - The status of the connected device - The correct configuration of the communication protocol parameters
A29	Pipe filling alarm	The pressure value indicated by the <i>pipe filling threshold</i> parameter was not reached within the time set in the <i>pipe filling time</i> parameter	Check: - The system status - The parameters of the pipe filling function
A35	HMI communication error	Communication error between the user interface board and the control board	- Power off the unit - Wait 1 minute - Power the unit
A36	BTLE Communication Lost	Communication error between the user interface board and the wireless communication board	- Power off the unit - Wait 1 minute - Power the unit

8.2 List of errors

Code	Name	Cause	Solution
E01	Speed limit exceeded	Motor speed above the intended limit	- Power off the unit - Wait 1 minute - Power the unit
E02	Overcurrent	The current motor input current is above the limit	Check: - The condition of the motor - The connection between drive and motor
E03	Undervoltage	Voltage below the minimum limit	Check that the power supply voltage is within the limits when the pump unit is operating at maximum power
E04	Rotor blocked	The rotor is locked and cannot rotate	Check that the pump unit is free of dirt or foreign bodies that could cause the rotor to seize
E05	Data memory corrupted	Part of the memory not correctly initialised or not functioning correctly	- Power off the unit - Wait 1 minute - Power the unit
E06	Power supply phase failure	One or more phases of the power supply network are disconnected	Check: - The presence of all phases - That the power supply voltage is within the prescribed limits when the pump unit is operating at maximum power

Code	Name	Cause	Solution
E07	Motor overheated	Motor temperature higher than the operating limits	• Clean the unit • Check the status of the motor fan • Check the environmental conditions of installation
E08	Drive overheated	Internal drive temperature higher than the operating limits	• Clean the unit • Check the status of the motor fan • Check the environmental conditions of installation
E09	Motor disconnected	The connection of one or more motor phases (between drive and motor) is interrupted.	Check: • That the impedance of the motor phases is equal for the three phases • The connection between drive and motor
E11	Sensor 1 error	The analogue input value is too high or too low	Check: • The operation of the device connected to the analogue input • The correct configuration of the analogue input
E12	Sensor 2 error		
E13	Sensor 3 error		
E14	Sensor 4 error		
E15	Flow/Temperature sensor error	The flow/temperature sensor is malfunctioning.	Check the sensor connection
E16	External digital input error	The digital input error is active	Check the operation of the device connected to the digital input
E17	Internal communication error	Communication problem between drive boards	1. Power off the unit 2. Wait 1 minute 3. Power the unit
E21	No water (LOW)	Contact on LOW digital input open	Check the status of the low-liquid prevention device (float or probes): if not used, connect a jumper to the LOW terminals
E22	Minimum threshold	The minimum threshold set was not reached in the time set in the <i>minimum threshold delay</i> parameter	Check: • That the pump unit is correctly primed • The correct configuration of the minimum threshold parameters
E23	Incorrect analogue input configuration	No analogue input is configured for the measured size of the control mode	Check that the parameters of menu M05 are configured correctly
E25	Control board power supply error	Power supply issue between the power board and the control board	1. Power off the unit 2. Disconnect all wiring from the control board 3. Power the unit
E26	Incorrect hardware configuration	Incorrect motor-drive configuration files	1. Power off the unit 2. Disconnect all wiring from the control board 3. Power the unit If the problem continues, contact Xylem or the Authorised Distributor

Code	Name	Cause	Solution
E27	Current leakage to the ground	The motor insulation to ground is compromised.	Check: • That the motor is dry • The insulation of each motor phase to the ground
E29	Pipe filling error	The pressure value indicated by the <i>pipe filling threshold</i> parameter was not reached within the time set in the <i>pipe filling time</i> parameter	Check: • The integrity of the system • The parameters of the pipe filling function
E30	Overload	The motor is overloaded	Check that the characteristics of the pumped liquid are suitable for the pump unit
E31	External reference 1 error	The analogue input value is too high or too low	Check: • The operation of the device connected to the analogue input • The correct configuration of the analogue input
E32	External reference 2 error		
E33	External reference 3 error		
E34	External reference 4 error		
E36	Power supply undervoltage	The power supply voltage is below the minimum accepted limit	Check that the power supply voltage is within the permissible limits
E43	Overvoltage	The DC-Bus voltage exceeds the maximum limit	Check that there are no other pump units in the system which with their flow could cause energy regeneration
E46	Power supply overvoltage	Power supply voltage above the maximum limit	Check that the power supply voltage is within the permissible limits

9 Specifications

9.1 Operating environment

Non-aggressive and non-explosive atmosphere.

Temperature

-20 to 50°C (-4 to 122°F).

Relative air humidity

< 50% at 40°C (104°F).

NOTE:

If the humidity exceeds the stated limits, contact Xylem or the Authorised Distributor.

Elevation

< 1000 m (3280 ft) above sea level.

NOTE: Tripping of the inverter's thermal protection

If the inverter is exposed to temperatures or installed at altitudes higher than those indicated, the unit's built-in automatic thermal protection function may intervene.

If the unit is installed at an altitude exceeding 2000 m (6600 ft), contact Xylem or the Authorised Distributor.

9.2 Electrical specifications

See the data plate.

Permitted tolerances for the supply voltage

- 200 - 240 V $\pm$ 10% 50/60 Hz
- 380 - 480 V $\pm$ 10% 50/60 Hz.

Leakage Current

$\leq$ 3.5 mA (AC).

Protection class

IP 55.

9.3 Compliance of radio frequency characteristics

EU/EEA

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

U.S.A.

HVX FCC ID: 2AYCGXSI02

HVX+ FCC ID: 2AYCGXSI03

The variable speed drive is compliant to Part 15 of the FCC Rules (FCC 15.247).

Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The variable speed drive is considered like a mobile device, and it complies with the safety requirements for RF exposure in accordance with FCC rule part 2.1093 and KDB 447498 D01 as demonstrated in the RF exposure analysis.

Installers must ensure that (i) this device must not be co-located or operated in conjunction with any other antenna or transmitter except in accordance with FCC multitransmitter product procedures, (ii) during normal use, there is always a minimum distance of at least 20 cm.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Unauthorized repairs, changes or modifications could result in permanent damage to the equipment and void your warranty and your authority to operate this device under Part 15 of the FCC Rules.

Canada

HVX ISED IC: 26881-XSI02

HVX+ ISED IC: 26881-XSI03

The variable speed drive is compliant to RSS-247.

Operation is subject to the following two conditions:

1. This device may not cause harmful interferences.
2. This device must accept any interference received, including interference that may cause undesired operation.

The variable speed drive is considered like a mobile device, and it complies with the safety requirements for RF exposure in accordance with RSS-102 Issue 5.

Installers must ensure that during normal use, there is always a minimum distance of at least 20 cm.

This device complies with ISED's license-exempt RSSs.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

9.4 Characteristics of inputs and outputs

Features	Description
Communication ports	2, RS-485
Digital inputs	3 for HVX, 5 for HVX+: - Floating/NPN contact, open manifold/drain open, to GND - Internal polarisation +24 VDC, current limited to 6 mA max. - Protection from -0.5 VDC to +30 VDC, ± 15 mA max.
Analogue inputs	2 for HVX, 4 for HVX+: - Configurable or 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	2, with NC and NO changeover contact: - Relay 1 up to 240 VAC 0.25 A or 30 VDC 2 A - Relay 2 up to 30 VAC 0.25 A or 30 VDC 2 A



WARNING:

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

10 Disposal

10.1 Precautions



WARNING:

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



WARNING:

It is prohibited to dispose of lubricating fluids and other hazardous substances in the environment.

11 Warranty

For information on the warranty refer to the commercial documentation.

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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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