xylem
Let's Solve Water

Additional Installation, Operation
and Programming Instructions

hydrovar X Series

Motor with integrated variable speed drive EXM

Firmware Version: 1.3.0

Table of Contents

1 Introduction and Safety

1.1 Introduction

Purpose of this manual

This manual supplements, and does not replace, the manuals supplied with the product. It provides information on how to do the following in the correct manner:

- Installation
- Operation
- Programming.

Nomenclature used in the document

- hydrovar X: EXM motor with HVX drive
- hydrovar X+: EXM motor with HVX+ drive

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.
 CAUTION:	It identifies a dangerous situation which, if not avoided, may cause small or medium level injuries.
NOTE:	It identifies a situation which, if not avoided, may cause damage to property but not to people.

Complementary symbols

Symbol	Description
	Electrical hazard
	Hot surface hazard
	Explosive atmosphere hazard
	Ionizing radiation hazard
	Magnetic hazard

1.3 User safety

Strictly comply with current health and safety regulations.

Qualified personnel

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

Personal protective equipment

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

Sites exposed to ionizing radiations

WARNING: Ionizing radiation hazard

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

1.4 Protection of the environment

Disposal of packaging and product

Comply with the current regulations on sorted waste disposal.

2 Handling and storage

2.1 Precautions

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

CAUTION: Risks deriving from manual load handling

Handle the unit in compliance with the current regulations on "manual load handling", to avoid undesirable ergonomic conditions causing risks of back-spine injury.

WARNING: Cutting and crushing hazards

Always wear personal protective equipment.

2.2 Unit inspection upon delivery

Package inspection

1. Check that quantity, descriptions and product codes match the order.
2. Check the packaging for any damage or missing components.
3. In case of immediately detectable damage or missing parts:
   - Accept the goods with reserve, indicating any findings on the transport document, or
   - Reject the goods, indicating the reason on the transport document.

   In both cases, promptly contact Xylem or the Authorised Distributor from whom the product was purchased.

Unpacking and inspection of the unit

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

2.3 Lifting with a crane

WARNING: Crushing hazard

- Use ropes, hooks, shackles, sling bars or eyebolts that comply with current regulations and that are suitable for the specific use.
- Use the eyebolts screwed onto the motor only for lifting the motor itself.

1. Attach the ropes to the eyebolts on the motor.
2. Fix the ropes to the crane.
3. Lift the crane and tension the ropes without lifting the unit.
4. Lift and move the unit slowly, holding the motor shaft with one hand to balance the load
5. Set the unit down slowly.
6. Release the ropes from the eyebolts.

The figure shows how to lift the unit.

2.4 Storage

Storage of the packed unit

The unit must be stored:

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

NOTE:

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

Long-term storage of the unit

Follow the same instructions for the storage of the packed unit.
For more information on long-term storage contact the Xylem sales company or Authorised Distributor.

3 Product description

3.1 Features

The product is a permanent magnet assisted reluctance synchronous motor with HVX or HVX+ electronic variable speed drive.
The product can be supplied in the following configurations:

- Pre-assembled with integrated pump
- As compatible spare part for an EXM motor of the same type
- As a component intended for connection to a Xylem pump: in this case, the whole assembly constitutes a new product, for which the party completing the integration assumes full legal responsibility in every respect.

Intended use

Product intended for commercial, entrepreneurial, artisan or professional use for driving Xylem surface pump units, where it is necessary to vary performance based on requirements.

Always observe the operating limits in **Specifications**.

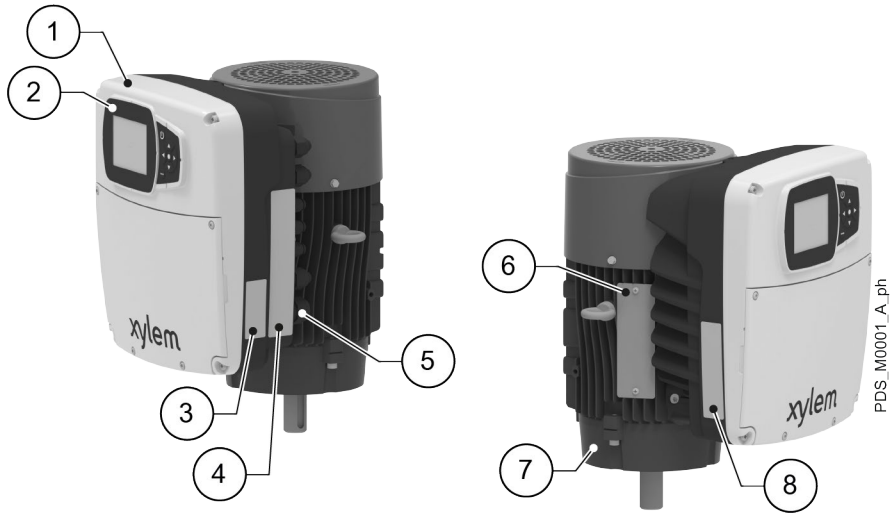
DANGER: Potentially explosive atmosphere hazard

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

Incorrect use

- Drive of pump units of different types and/or manufacturers as well as equipment or devices not included in the scope of the intended use
- Use of the EXM motor as a replacement of a traditional asynchronous motor of a pump unit.

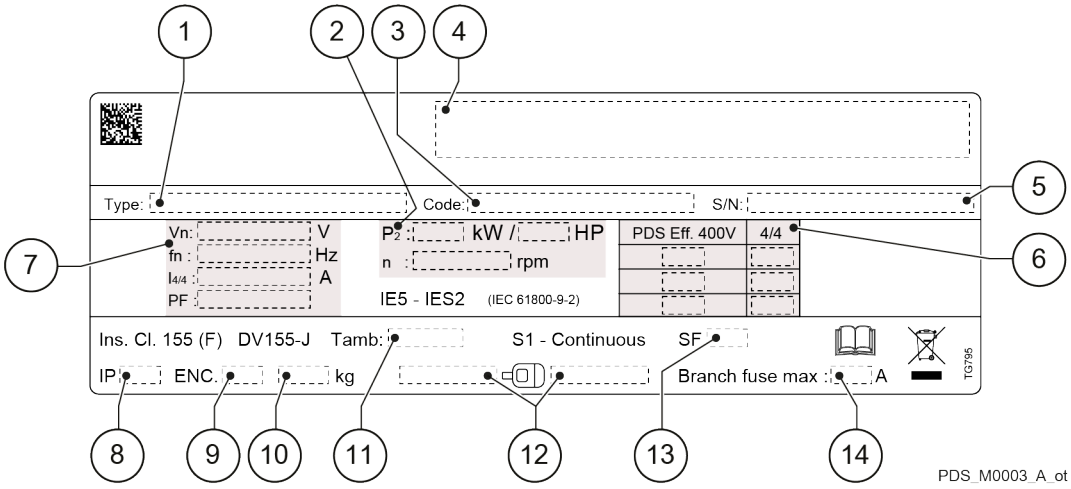
3.2 Part names



1. HVX or HVX+ drive
2. Operation panel
3. HVX or HVX+ drive radio equipment approval sticker
4. HVX or HVX+ drive warning sticker
5. Power supply and signal cable inlets
6. Data plate of the EXM motor assembly
7. EXM motor
8. Drive data plate

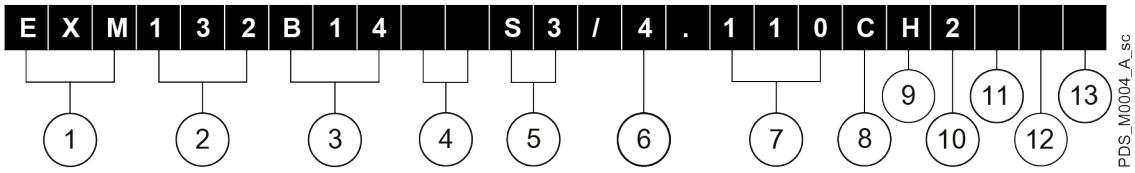
3.3 Data plates

Data plate of the EXM motor assembly



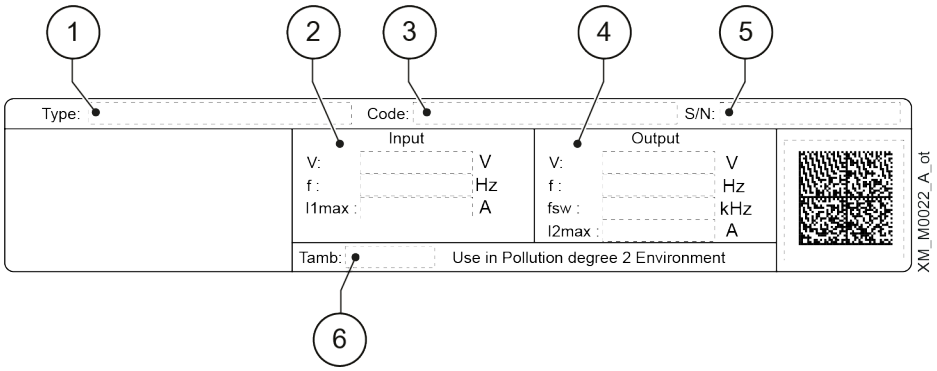
1. Model
2. Rated values at output
3. Identification code
4. Brands
5. Serial number
6. Unit full load efficiency
7. Rated values at input
8. IP protection degree
9. NEMA enclosure type
10. Mass of the unit
11. Room temperature range
12. Bearing model
13. Service factor
14. Max. capacity of protective fuses

Identification code



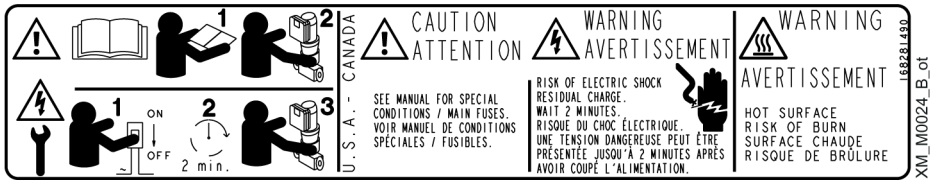
1. Series name
2. Axis height 90, 112, 132, 160 or 180 mm
3. Flange type B3, B5, B14, HM, CEA or CA
4. Key type SV, HA, HB or normalised [ ]
5. Special shaft extension type S1, S2, S3 or S4 or normalised [ ]
6. Power supply voltage 3x208 V, …, 240 V [03] or 3x380 V, …, 480 V [04]
7. Rated motor power in kWx10
8. Model size B, C or D
9. hydrovar X [S] or hydrovar X+ [H] drive
10. Speed range at rated power 3000 to 4000 min^{-1} or 3600 to 4000 min^{-1} [2] or 1500 to 2000 min^{-1} [4]
11. Standard drive [ ] or without filters [W]
12. Motor with foot [F] or without foot [ ]
13. Standard motor [ ] or oversized motor [R]

Data plate of the HVX or HVX+ drive

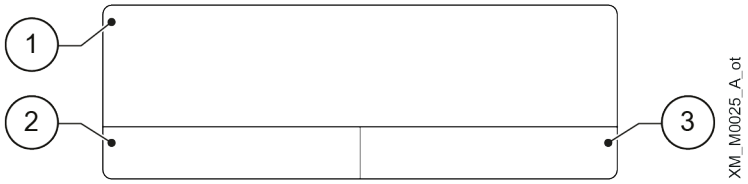


1. Model
2. Input operating limits
3. Identification code
4. Output operating limits
5. Serial number
6. Room temperature range

HVX or HVX+ drive warning sticker



HVX or HVX+ drive radio equipment approval sticker



1. United States of America
2. Canada
3. Other countries

4 Installation

4.1 Precautions

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

DANGER: Electrical hazard

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

WARNING: Physical and thermal hazards

- Always wear personal protective equipment.
- Always use suitable working tools.

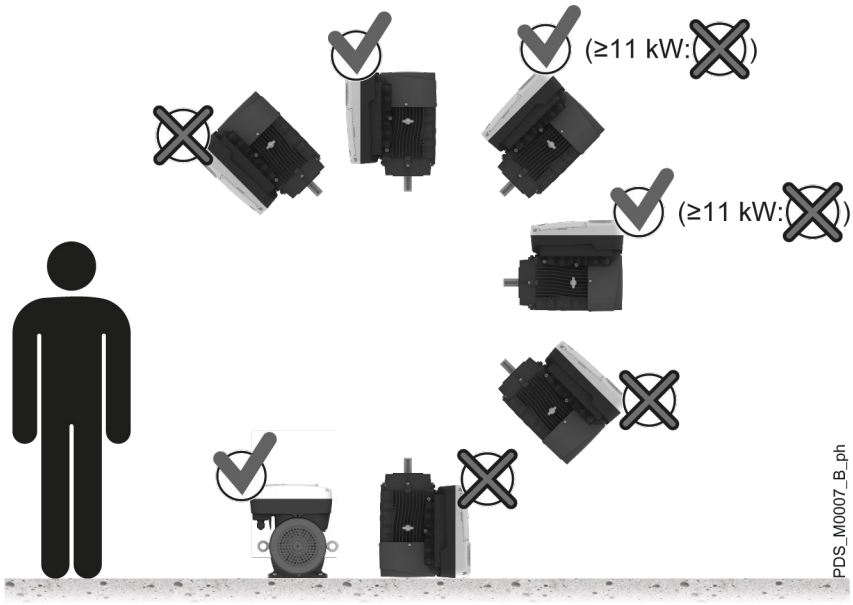
Note
The EXM motor is not supplied for the following pump models:

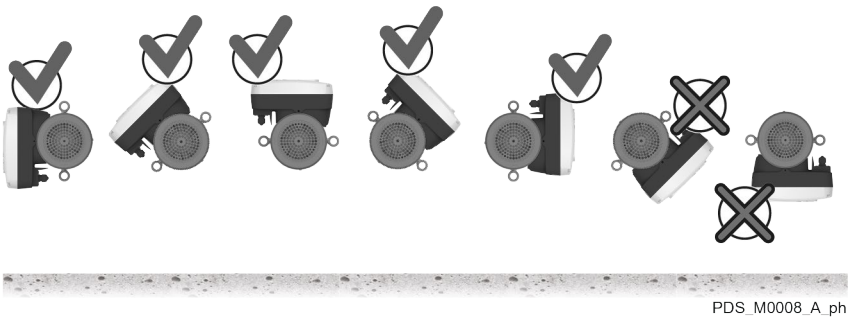
- HMK / HMX
- 1…22 SVI…E….

4.2 Mechanical installation

4.2.1 Permitted positions

The figures show the allowed positions for the drive only: see also the allowed positions in the pump unit manual.
Contact Xylem or the Authorised Distributor for other positions.





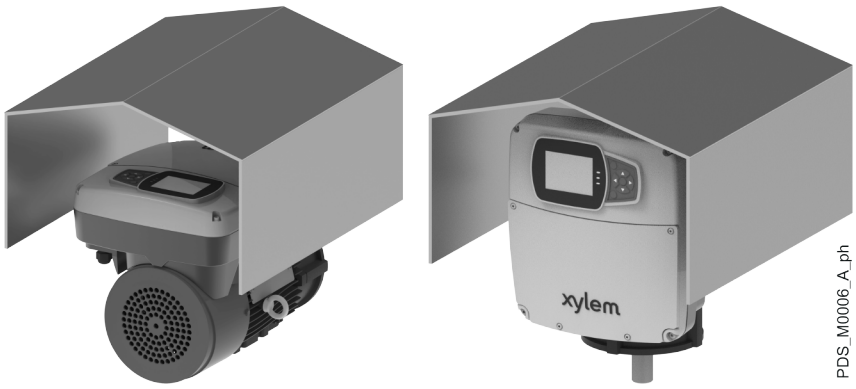
4.2.2 Installation area

1. Follow the provisions in **Operating environment** on page 124.

NOTE:

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

2. Place the unit in a raised position in relation to the floor.
3. Make sure that any leaks will not cause flooding to the installation area or submerge the unit.
4. In case of outdoor installation, ensure appropriate protection of the unit against direct sunlight, rain and snow using appropriate covers.



Air clearance between a wall and the external surfaces of the unit

- To ensure suitable ventilation: ≥ 100 mm (4 in)
- To permit inspection and removal of the motor: ≥ 300 mm (12 in)
- If the space available is any less, refer to the technical documentation of the pump unit.

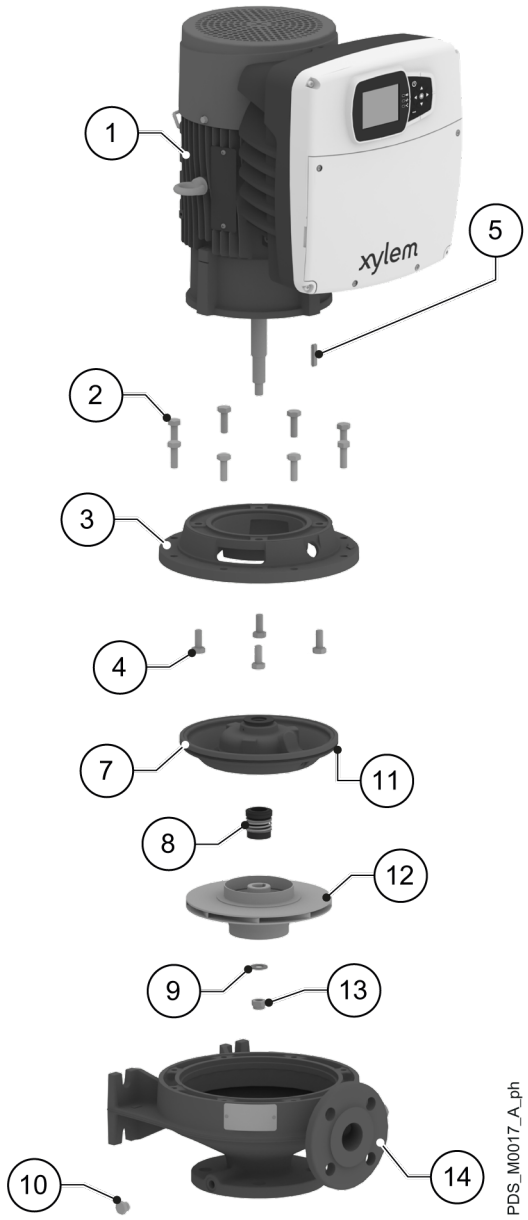
Environments prone to condensation

In environmental conditions prone to condensation, activate automatic motor heating mode. For further details, see **S07.2 Motor Heating**.

4.3 Mechanical connection with Xylem pumps

Mechanical connection of the hydrovar X or hydrovar X+ unit with pumps from the Xylem catalogue.

4.3.1 Connection with NSCEK and NSCEX pumps



1. hydrovar X or hydrovar X+ unit
2. Pump body fastening screws
3. Pump-motor adapter
4. Pump-motor adapter fastening screws
5. Impeller key
6. -
7. Seal housing
8. Mechanical seal
9. Washer
10. Drain plug
11. O-Ring
12. Impeller
13. Impeller locking nut
14. Pump body

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Disassemble the pump body by unscrewing the fastening screws.
2. Slip off the motor.
3. Unscrew the impeller nut and remove the washer.
4. Remove the impeller and key.
5. Remove the mechanical seal carefully with the help of the crow bars.
6. Remove the seal housing.
7. Remove the pump-motor adapter by loosening the screws.

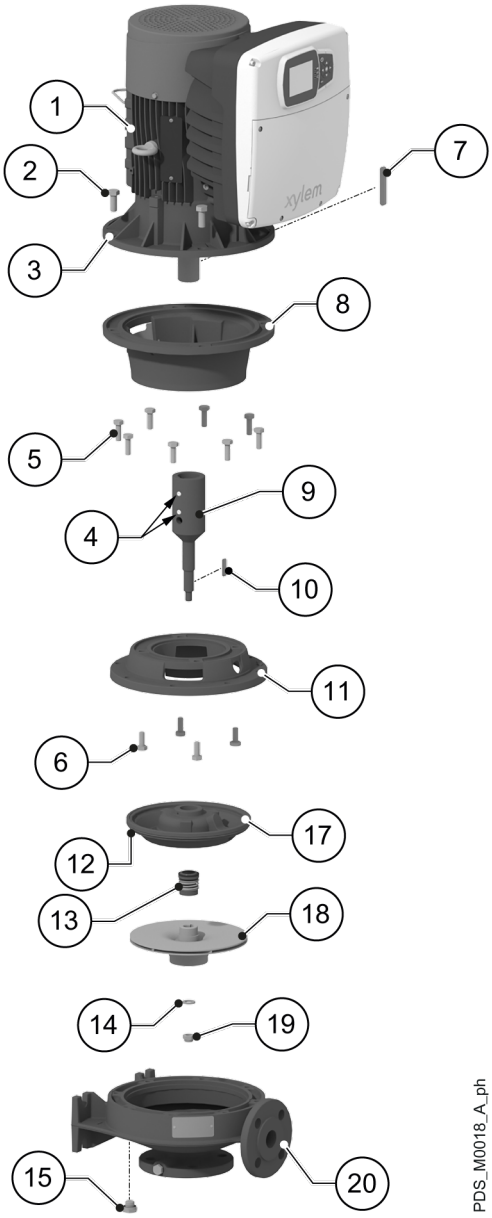
New unit assembly

1. Install the pump-motor adapter on the motor.
   Screw torques:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%.
2. Fit the seal housing on the flange, making sure that the O-ring is correctly positioned.
3. Lubricate the mechanical seal with alcohol.
4. Carefully place the mechanical seal on the shaft.
5. Position the key and place the impeller on the shaft.
6. Insert the washer and tighten the nut.
   Tightening torques:
   - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
7. Mount the motor assembly on the pump body.
   Screw torques:
   - M10X25 → 32 Nm (283 lbf·in) ± 15%
   - M10X30 and M10X35 → 40 Nm (354 lbf·in) ± 15%
   - M12 → 70 Nm (620 lbf·in) ± 15%.

Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.2 Connection with NSCSK and NSCSX pumps



1. hydrovar X or hydrovar X+ unit
2. Screws for fastening the motor flange to the adapter
3. Motor flange
4. Coupling locking grub screws
5. Pump body fastening screws
6. Pump-motor adapter fastening screws
7. Motor shaft key
8. Motor side adapter
9. Rigid coupling
10. Impeller key
11. Pump side adapter
12. O-Ring
13. Mechanical seal
14. Washer
15. Drain plug
16. -
17. Seal housing
18. Impeller
19. Impeller locking nut
20. Pump body

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Disassemble the pump body by unscrewing the fastening screws.
2. Slip off the motor.
3. Unscrew the impeller nut and remove the washer.
4. Remove the impeller and key.
5. Remove the mechanical seal carefully with the help of the crow bars.
6. Remove the seal housing.
7. Remove the flange by unscrewing the screws.
8. Partially unscrew one of the screws securing the flange to the adapter and fully unscrew all the others.
9. Remove the adapter by gently striking with a mallet the head of the partially unscrewed screw.
10. Completely unscrew the screw.
11. Loosen the grub screws of the coupling.
12. Pull out the coupling using the extractor.

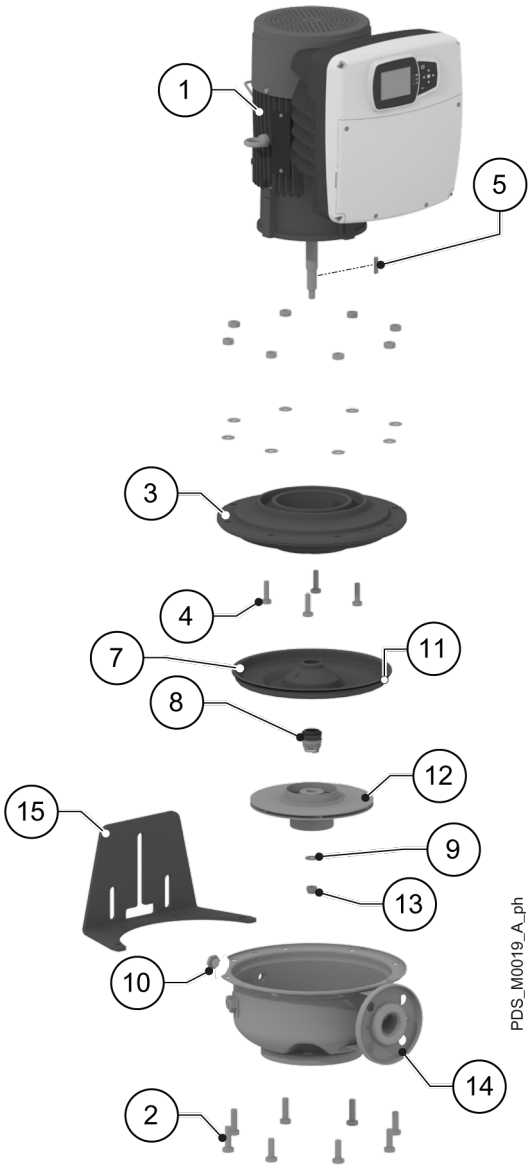
New unit assembly

1. Position the key and insert the coupling onto the shaft.
2. Secure the coupling by tightening the grub screws.
   Tightening torque: 13 Nm (115 lbf·in) ± 15%.
3. Mount the motor-side adapter on the motor flange.
   Screw torque:
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
4. Fit the pump-side adapter on the motor-side adapter.
   Screw torque:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%.
5. Fit the seal housing on the adapter, making sure that the O-ring is correctly positioned.
   Tightening torque: 20 Nm (177 lbf·in) ± 25%.
6. Lubricate the mechanical seal with alcohol.
7. Carefully place the mechanical seal on the shaft.
8. Position the key and place the impeller on the shaft.
9. Insert the washer and tighten the nut.
   Tightening torques:
   - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
10. Mount the motor assembly on the pump body.
    Screw torques:
    - M10 → 40 Nm (354 lbf·in) ± 15%
    - M12 → 70 Nm (620 lbf·in) ± 15%.
11. Fasten the drain plug.
    Tightening torque: 40 Nm (354 lbf·in) ± 25%.

Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.3 Connection with ESHEX pumps



1. hydrovar X or hydrovar X+ unit
2. Pump body fastening screws
3. Pump-motor adapter pump flange
4. Pump-motor flange adapter fastening screws
5. Impeller key
6. -
7. Seal housing
8. Mechanical seal
9. Washer
10. Drain plug
11. O-Ring
12. Impeller
13. Impeller locking nut
14. Pump body
15. Foot

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Disassemble the pump body by unscrewing the fastening screws.
2. Slip off the motor.
3. Unscrew the impeller nut and remove the washer.
4. Remove the impeller and key.
5. Remove the mechanical seal carefully with the help of the crow bars.
6. Remove the seal housing.
7. Unscrew the screws to remove the pump-motor adapter.

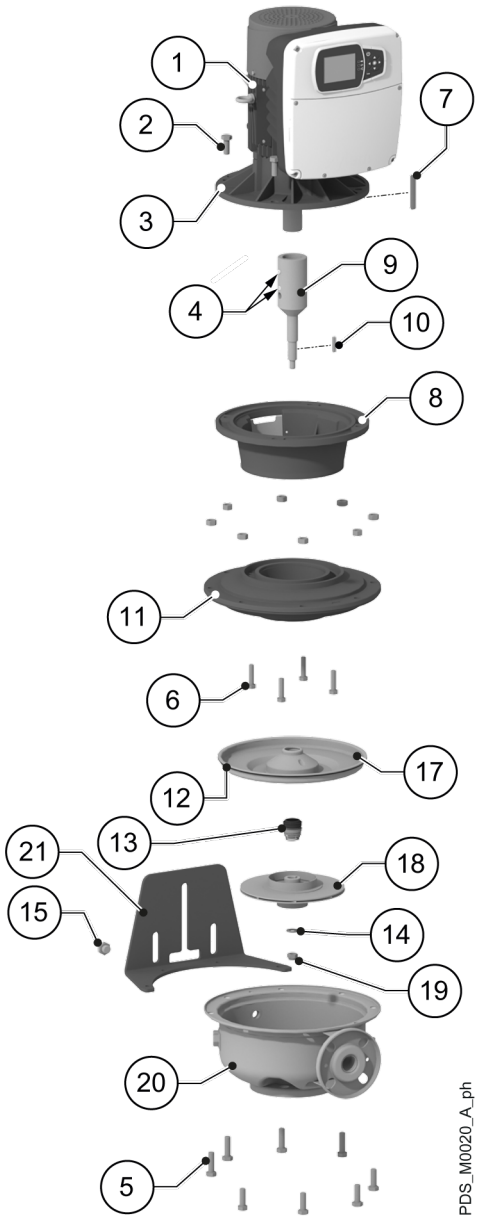
New unit assembly

1. Install the pump-motor adapter on the motor.
   Screw torques:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%.
2. Fit the seal housing on the pump-motor adapter, making sure that the O-ring is correctly positioned.
3. Lubricate the mechanical seal with alcohol.
4. Carefully place the mechanical seal on the shaft.
5. Position the key and place the impeller on the shaft.
6. Insert the washer and tighten the nut.
   Tightening torques:
   - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
7. Mount the motor assembly on the pump body.
   Screw torques:
   - M10X25 → 32 Nm (283 lbf·in) ± 15%
   - M10X30 and M10X35 → 40 Nm (354 lbf·in) ± 15%
   - M12 → 70 Nm (620 lbf·in) ± 15%.
8. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.

Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.4 Connection with ESHSX pumps



1. hydrovar X or hydrovar X+ unit
2. Screws for fastening the flange to the adapter
3. Motor flange
4. Coupling locking grub screws
5. Pump body fastening screws
6. Flange fastening screws
7. Motor shaft key
8. Motor adapter
9. Coupling
10. Impeller key
11. Pump flange
12. O-Ring
13. Mechanical seal
14. Washer
15. Drain plug
16. -
17. Seal housing
18. Impeller
19. Impeller locking nut
20. Pump body
21. Foot

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Disassemble the pump body by unscrewing the fastening screws.
2. Slip off the motor.
3. Unscrew the impeller nut and remove the washer.
4. Remove the impeller and key.
5. Remove the mechanical seal carefully with the help of the crow bars.
6. Remove the seal housing.
7. Remove the flange by unscrewing the screws.
8. Partially unscrew one of the screws securing the flange to the adapter and fully unscrew all the others.
9. Remove the adapter by gently striking with a mallet the head of the partially unscrewed screw.
10. Completely unscrew the screw.
11. Loosen the grub screws of the coupling.
12. Pull out the coupling using the extractor.

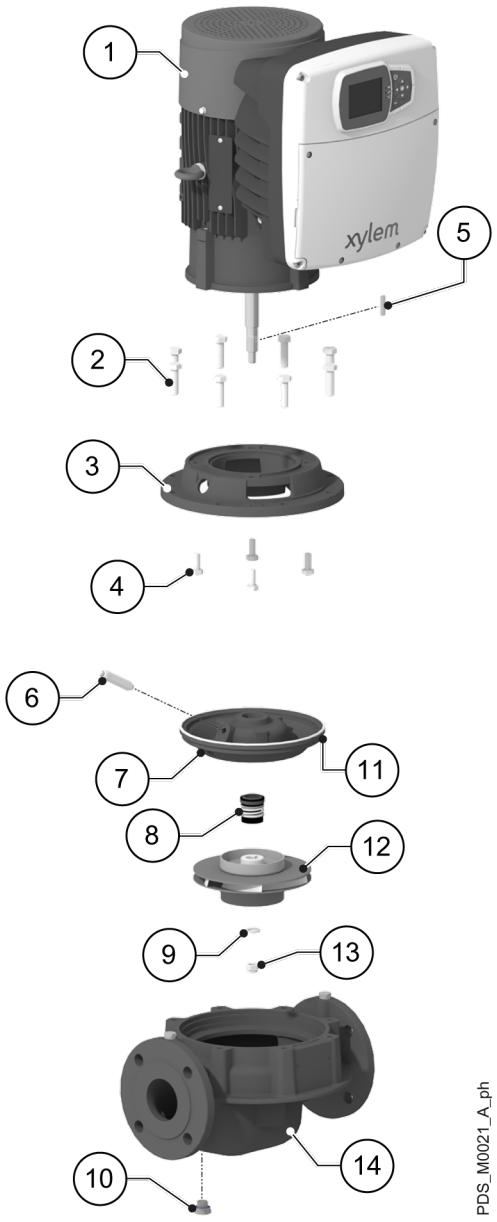
New unit assembly

1. Position the key and insert the coupling onto the shaft.
2. Secure the coupling by tightening the grub screws.
   Tightening torque: 13 Nm (115 lbf·in) ± 15%.
3. Fit the adapter on the motor.
   Screw torque:
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 50 Nm (443 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
4. Fit the flange on the adapter.
   Screw torque:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%.
5. Fit the seal housing on the flange, making sure that the O-ring is correctly positioned.
   Tightening torque: 20 Nm (177 lbf·in) ± 25%.
6. Lubricate the mechanical seal with alcohol.
7. Carefully place the mechanical seal on the shaft.
8. Position the key and place the impeller on the shaft.
9. Insert the washer and tighten the nut.
   Tightening torques:
   - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
10. Mount the motor assembly on the pump body.
    Screw torques:
    - M10 → 40 Nm (354 lbf·in) ± 15%
    - M12 → 70 Nm (620 lbf·in) ± 15%.
11. Fasten the drain plug.
    Tightening torque: 40 Nm (354 lbf·in) ± 25%.

Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.5 Connection with LNEEK, LNEEX, LNTEK and LNTEX pumps



1. hydrovar X or hydrovar X+ unit
2. Pump body fastening screws
3. Pump-motor adapter
4. Pump-motor adapter fastening screws
5. Impeller key
6. Bleed valve
7. Seal housing
8. Mechanical seal
9. Washer
10. Drain plug
11. O-Ring
12. Impeller
13. Impeller locking nut
14. Pump body

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Unscrews the relief valve.
2. Disassemble the pump body by unscrewing the fastening screws.
3. Slip off the motor.
4. Unscrew the impeller nut and remove the washer.
5. Remove the impeller and key.
6. Remove the mechanical seal carefully with the help of the crow bars.
7. Remove the seal housing.
8. Remove the pump-motor adapter by loosening the screws.

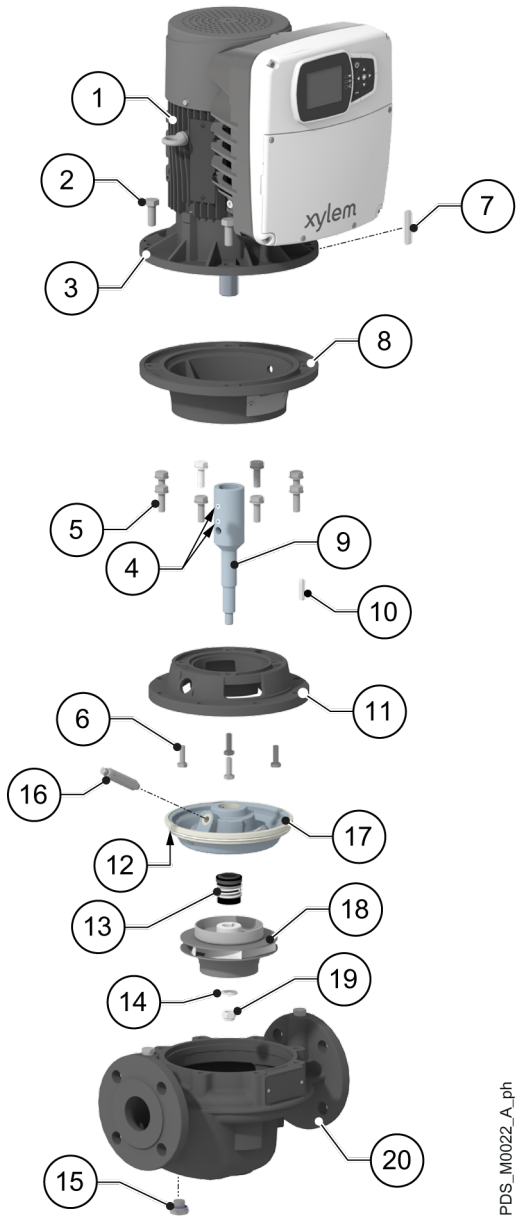
New unit assembly

1. Install the pump-motor adapter on the motor.
   Screw torques:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%.
2. Fit the seal housing on the pump-motor adapter, making sure that the O-ring is correctly positioned. The relief valve connection hole must coincide with the hole in the flange.
3. Apply some Teflon on the relief valve thread and screw the valve in position.
   Tightening torque: 20 Nm (177 lbf·in) ± 25%.
4. Lubricate the mechanical seal with alcohol.
5. Carefully place the mechanical seal on the shaft.
6. Position the key and place the impeller on the shaft.
7. Insert the washer and tighten the nut.
   Tightening torques:
   - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
8. Mount the motor assembly on the pump body.
   Screw torques:
   - M10X25 → 32 Nm (283 lbf·in) ± 15%
   - M10X30 and M10X35 → 40 Nm (354 lbf·in) ± 15%
   - M12 → 70 Nm (620 lbf·in) ± 15%.
9. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.

Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.6 Connection with LNESK, LNESX, LNTSK and LNTSX pumps



1. hydrovar X or hydrovar X+ unit
2. Screws for fastening the motor flange to the adapter
3. Motor flange
4. Coupling locking grub screws
5. Pump body fastening screws
6. Pump-motor adapter fastening screws
7. Motor shaft key
8. Motor side adapter
9. Rigid coupling
10. Impeller key
11. Pump side adapter
12. O-Ring
13. Mechanical seal
14. Washer
15. Drain plug
16. Bleed valve
17. Seal housing
18. Impeller
19. Impeller locking nut
20. Pump body

Preliminary operations

1. Shut the suction and discharge valves.
2. Empty the unit by removing the drain plug.

Unit disassembly

1. Unscrews the relief valve.
2. Disassemble the pump body by unscrewing the fastening screws.
3. Slip off the motor.
4. Unscrew the impeller nut and remove the washer.
5. Remove the impeller and key.
6. Remove the mechanical seal carefully with the help of the crow bars.
7. Remove the seal housing.
8. Remove the flange by unscrewing the screws.
9. Partially unscrew one of the screws securing the flange to the adapter and fully unscrew all the others.
10. Remove the adapter by gently striking with a mallet the head of the partially unscrewed screw.
11. Completely unscrew the screw.
12. Loosen the grub screws of the coupling.
13. Pull out the coupling using the extractor.

New unit assembly

1. Position the key and insert the coupling onto the shaft.
2. Secure the coupling by tightening the grub screws.
   Tightening torque: 13 Nm (115 lbf·in) ± 15%.
3. Fit the adapter on the motor.
   Screw torque:
   - M10 → 32 Nm (283 lbf·in) ± 15%
   - M12 → 45 Nm (398 lbf·in) ± 15%
   - M16 → 110 Nm (974 lbf·in) ± 15%.
4. Fit the flange on the adapter.
   Screw torque:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M10 → 32 Nm (283 lbf·in) ± 15%.
5. Fit the seal housing on the flange, making sure that the O-ring is correctly positioned. The relief valve connection hole must coincide with the hole in the flange.
   Tightening torque: 20 Nm (177 lbf·in) ± 25%.
6. Apply some Teflon on the relief valve thread and screw the valve in position.
   Tightening torque: 20 Nm (177 lbf·in) ± 25%.
7. Lubricate the mechanical seal with alcohol.
8. Carefully place the mechanical seal on the shaft.
9. Position the key and place the impeller on the shaft.
10. Insert the washer and tighten the nut.
    Tightening torques:
    - 7/16" - 20UNF → 25 Nm (221 lbf·in) ± 15%
    - M12 → 45 Nm (398 lbf·in) ± 15%
    - M16 → 110 Nm (974 lbf·in) ± 15%.
11. Mount the motor assembly on the pump body.
    Screw torques:
    - M10 → 40 Nm (354 lbf·in) ± 15%
    - M12 → 70 Nm (620 lbf·in) ± 15%.
12. Fasten the drain plug.
    Tightening torque: 40 Nm (354 lbf·in) ± 25%.

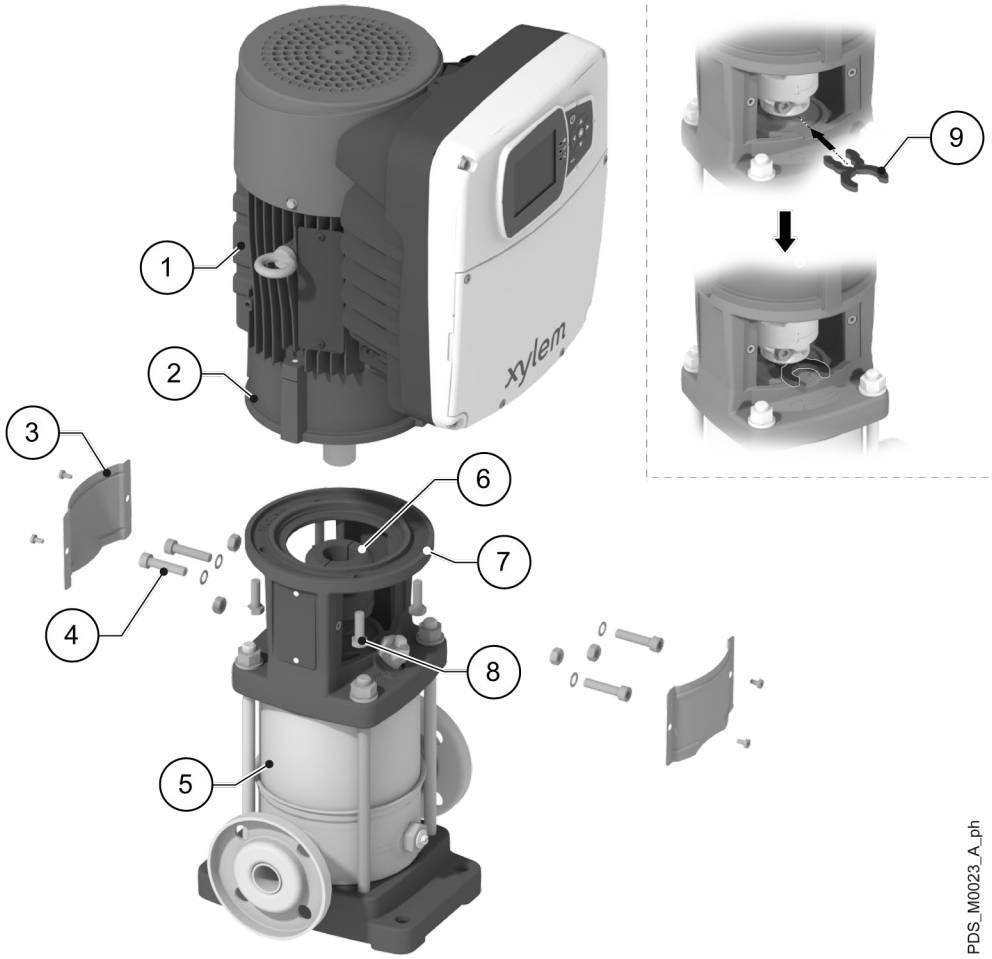
Final operations

1. Fasten the drain plug.
   Tightening torque: 40 Nm (354 lbf·in) ± 25%.
2. Prime the pump unit before starting it. See the pump unit manual.

4.3.7 Connection with SVK, SVX, SVIK and SVIX pumps

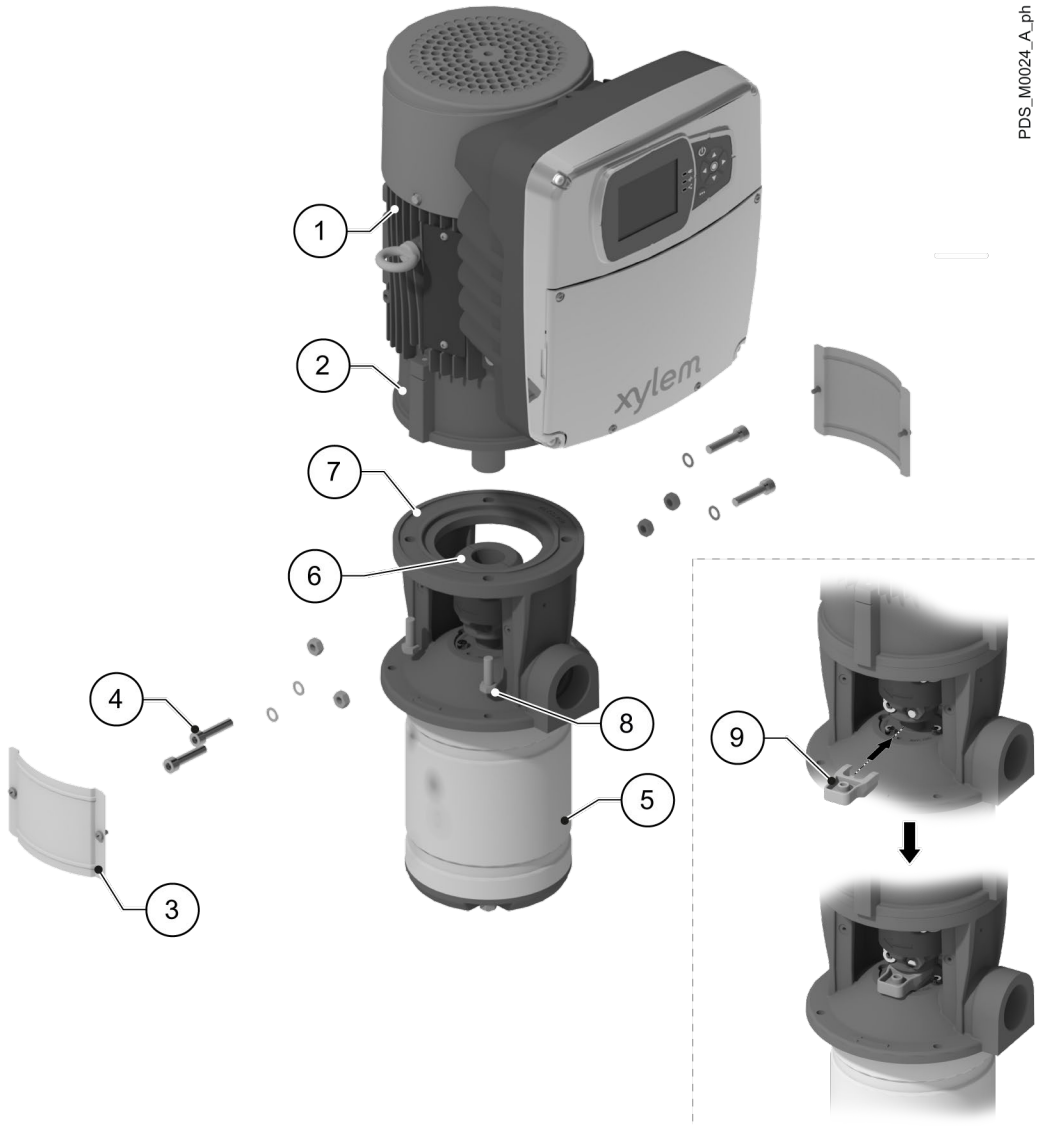
Excluding models 1...22 SVI...E...

SVK, SVX



1. hydrovar X or hydrovar X+ unit
2. Motor flange
3. Coupling protection
4. Couple screws
5. Pump
6. Coupling
7. Adapter
8. Motor fixing screws
9. Impeller stack shim

SVIK, SVIX



1. hydrovar X or hydrovar X+ unit
2. Motor flange
3. Coupling protection
4. Couple screws
5. Pump
6. Coupling
7. Adapter
8. Motor fixing screws
9. Impeller stack shim

Unit disassembly

1. Remove the protections.
2. Insert the fork spacer supplied with the pump unit.
3. Unscrew the coupling by unscrewing the screws.
4. Unscrew the screws fastening the flange to the adapter.
5. Slip off the motor.

New unit assembly

1. Mount the motor on the adapter.
   Screw torque:
   - M8 → 15 Nm (133 lbf·in) ± 15%
   - M12 → 50 Nm (442 lbf·in) ± 15%
   - M16 → 75 Nm (664 lbf·in) ± 15%.
2. Mount the joint.
   Screw torque:
   - M8 → 25 Nm (221 lbf·in) ± 15%
   - M10 → 50 Nm (442 lbf·in) ± 15%
   - M12 → 75 Nm (664 lbf·in) ± 15%.
3. Remove the fork shim.
4. Assemble the coupling guards.
   Screw torque:
   - M4 → 1.5 Nm (13 lbf·in) ± 25%
   - M5 → 3 Nm (27 lbf·in) ± 25%.

4.4 Electrical connections

4.4.1 Requirements

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.

Isolated type networks (IT)

Installation in distribution networks where the neutral is isolated from ground (IT systems):

- Must be evaluated according to the declared leakage current and the number of units to be connected;
- May require the use of hydrovar X and hydrovar X+ units in the 'W' variant (without EMI filters), dedicated for applications in category C4, as defined by the relevant product standards EN 61800-3:2004+A1:2012 and EN IEC 61800-3:2018.

Contact Xylem or the Authorised Distributor for further information.

4.4.2 Earthing/Grounding

DANGER: Electrical hazard

- Always connect the external protection conductor (ground) to the ground terminal before attempting to make any other electrical connections.
- Connect all the electrical accessories of the unit to ground.
- 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.
- Install suitable systems for protection against indirect contact, in order to prevent lethal electric shocks.

4.4.3 Guidelines for the control panel

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

Fuses and/or automatic switches

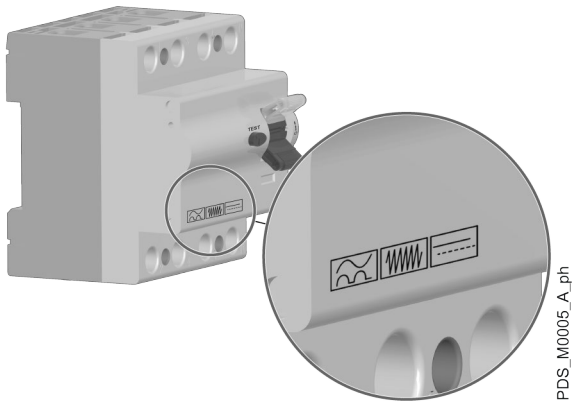
- An electronically activated drive function ensures motor overload protection. The overload protection function calculates the increment level in order to activate the timing of the trigger function (motor stop).
  The higher the input current, the faster the response. The function provides Class 20 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 internal 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.
- Compliance with UL requirements is only ensured by using approved fuses of category JDDZ.2/8 type T and with the characteristics indicated below and in the table.
- 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.
- Refer to the current shown on the data plate for the selection of the protective device and comply with local and national regulations for its sizing.

The figure shows the recommended fuses and switches.

Size of the HVX or HVX+ drive	Xylem motor	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

Residual current circuit breaker

- If a switch is installed to protect people against ground leakage, check that:
  - It is suitably sized for the system configuration and environment of use
  - It has a starting delay to prevent faults caused by transient ground currents
  - It can detect alternate or direct current, it is marked with the symbols shown in the figure.
- When using an automatic ground leakage switch or a ground fault switch, make sure to consider the total earth leakage current of all the electric devices of the system.



4.4.4 Guidelines for the drive

NOTE:

The cable cross section must be sized according to the rated current of the unit. Observe local and national regulations for cable sizing.

Cable input characteristics

See **Data plates** to ascertain the size of the drive.

Type of cable gland	Cable diameter, mm (in)	Tightening torque on the support plate, Nm (lbf·in)	Cable gland torque, Nm (lbf·in)	Number of inputs according to HVX or HVX+ drive size		
				B	C	D
M12	3-6.5 (0.1-0.26)	2.7 (24)	1.5 (13)	3	3	5
M16	5-10 (0.2-0.4)	5 (44)	3 (27)	3	3	3
M25	11-17 (0.4-0.7)	7.5 (66)	7 (62)	1	1	-
M40	19-28 (0.7-1.1)	14 (124)	12 (106)	-	-	1

NOTE:

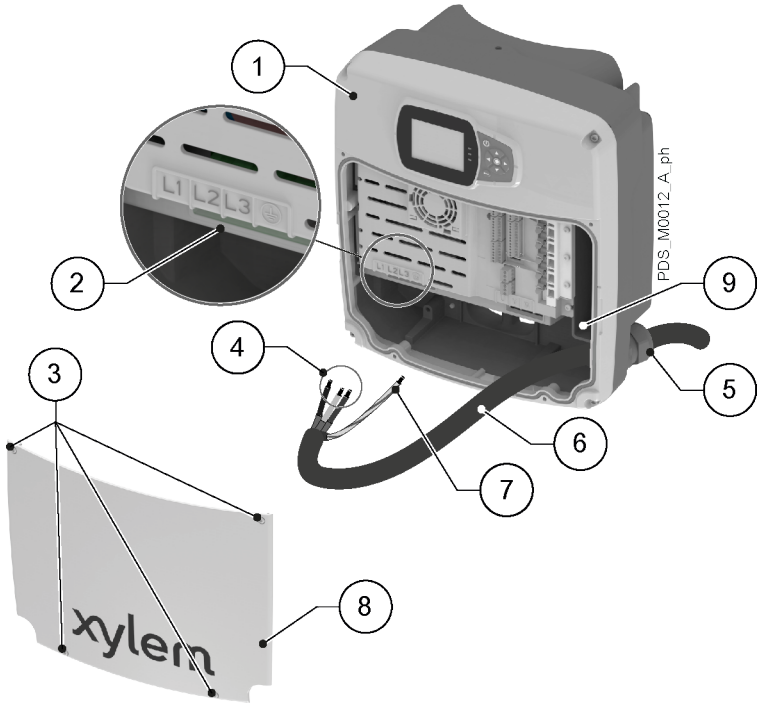
- During installation, check that the cable glands on the support plate are tightened correctly, according to the values in the table.
- When replacing cable glands and/or installing adapters, use suitable approved components to maintain degrees of protection IP55 and NEMA 4.

Characteristics of power terminals and conductors

See **Data plates** to ascertain the size of the drive.

Size of the HVX or HVX+ drive	Connection type	Type and cross-section of installable conductors	Stripping length, mm (in)
B and C	Spring	• Rigid: 1.5-10 mm^2 • Flexible: 1.5-6 mm^2 • Cable terminals without plastic sheath: 1.5-6 mm^2 • Cable terminals with plastic sheath: 1.5-4 mm^2 • UL/CSA compliant: AWG 16-8	15 (0.6)
D	With screw	• Rigid: 2.5-35 mm^2 • Flexible: 2.5-25 mm^2 • Cable terminals without plastic sheath: 2.5-25 mm^2 • Cable terminals with plastic sheath: 2.5-25 mm^2 • UL/CSA compliant: AWG 14-2	

Drive connection



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

1. Remove the cover and observe the wiring diagrams inside.
2. Ascertain the size of the drive; see **Data plates**.
3. Insert the power cable in the power supply cable gland:

Size of the HVX or HVX+ drive	Type of cable gland
B	M20
C	M25
D	M40

4. Tightly connect the conductors, making sure that the protection one is longer than the phase ones. In models size:
   - B and C, open the springs with a slotted screwdriver with a maximum width of 2.5 mm (0.98 in)
   - D, tighten the terminal screws with a Pozidriv screwdriver and tightening torque of 4 Nm (35 lbf-in).

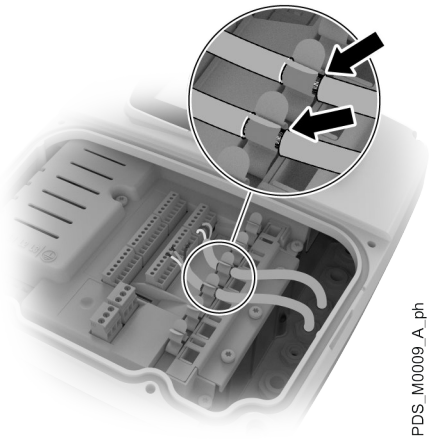
   Note: For size D models, it is advisable to use cable terminals with a plastic sheath.
5. Tighten the cable gland.
   Tightening torque:
   - M20 → 6 Nm (53 lbf·in)
   - M25 → 7 Nm (71 lbf·in)
   - M40 → 12 Nm (106 lbf·in).
6. Fit the cover and tighten the screws.
   Tightening torque: 2.5 Nm (22 lbf·in) ± 15%.

4.5 Auxiliary connections

DANGER: Electrical hazard:

Do not use relay 2 if relay 1 is connected to a voltage higher than 30 V.

It is recommended to connect the signal cable screens to ground via the spring metal terminals available near the signal terminals.



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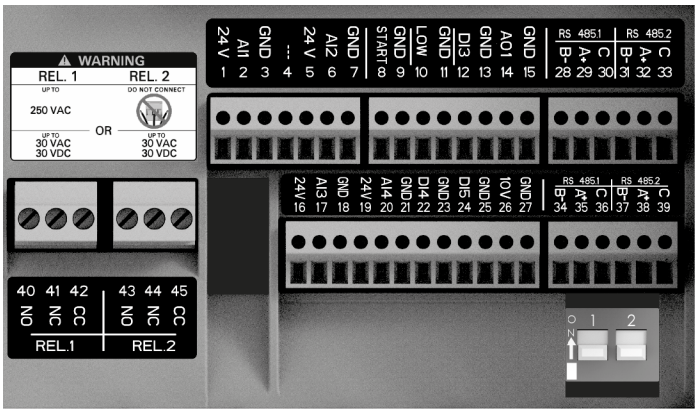
NOTE:

- Keep signal cables at least 200 mm (8 in) away from the power cable
- Do not intersect the power supply cables; if this cannot be avoided, a 90° intersection angle is permitted.

Characteristics of terminals

Position	Name	Type and cross-section of installable cables	Stripping length, mm (in)	Tightening torque, Nm (lbf·in) ± 15%
1-39	Analogue and digital inputs and outputs	• 0.2-1.5 mm^2 • AWG 28-16	6-7 (0.2-0.3)	0.2 (1.7)
40-45	Relay	• 0.34-2.5 mm^2 • AWG 24-12		0.5 (4)

4.5.1 Signal terminals, hydrovar X+



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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	
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	

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

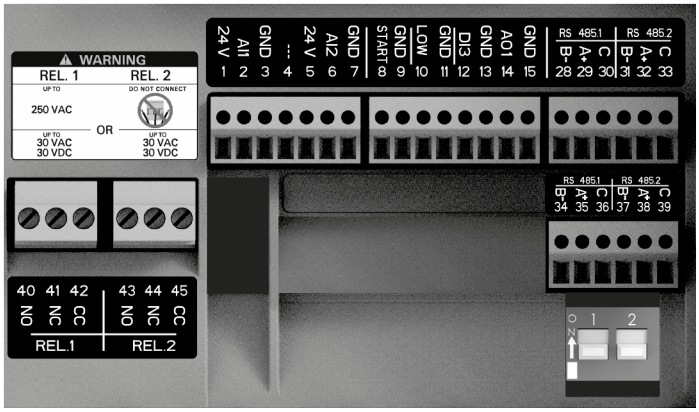
Communication Bus 1

Preconfigured for connection of up to 8 hydrovar X+ units in multi-pump configurations. The switch (1) activates the RS485 terminating resistor; set to ON if required.

Communication Bus 2

Configured for Modbus RTU protocol, it allows connection to external devices (PLC, BMS, PC) and firmware update using the Xylem Firmware Tool. The switch (2) enables the RS485 terminating resistor; set to ON if required.

4.5.2 Signal terminals, hydrovar X



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	

Position number	Name	Description	Default setting
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	
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	

Communication Bus 1

Preconfigured for connection of up to 8 hydrovar X units in multi-pump configurations. The switch (1) activates the RS485 terminating resistor; set to ON if required.

Communication Bus 2

Configured for Modbus RTU protocol, it allows connection to external devices (PLC, BMS, PC) and firmware update using the Xylem Firmware Tool. The switch (2) enables the RS485 terminating resistor; set to ON if required.

5 Use and operation

Before starting the unit, check that
- The safety instructions of chapter **Introduction and Safety** and
- The use and operating instructions of the pump unit manual

have been read and understood, and that the instructions in chapter **Installation** have been followed correctly.

Note: the unit has automatic reset thermal protection.

WARNING: Injuries hazard

The unit can restart inadvertently after it has cooled down: risk of physical injury.

6 Control

Introduction

DANGER: Electrical hazard

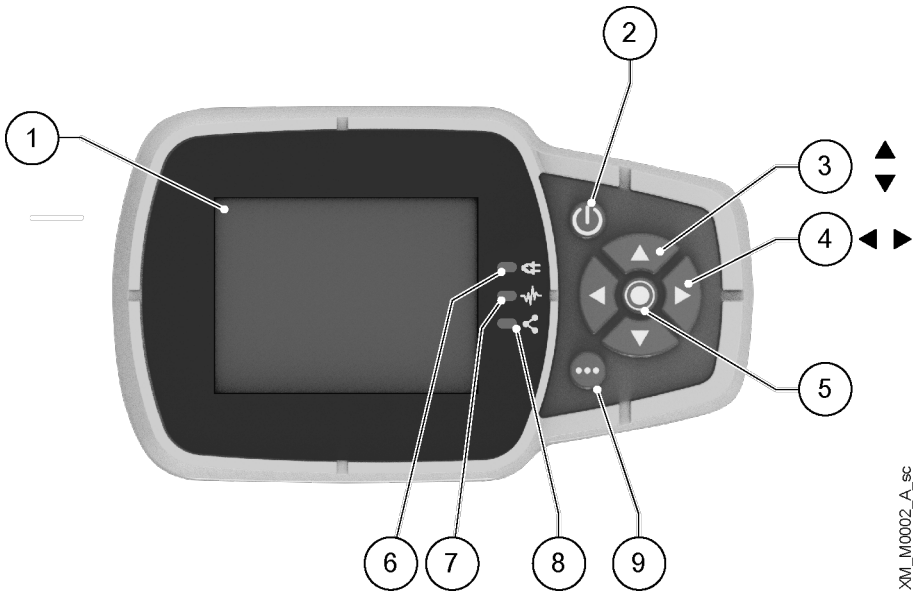
If the operation panel is damaged, contact Xylem or the Authorised Distributor.

WARNING: Hot surface hazard

Only touch the operation panel buttons. Pay attention to the high temperature released by the unit.

Depending on model, please observe the instructions in the paragraphs **hydrovar X+ operation panel** on page 38 or **hydrovar X operation panel** on page 41.

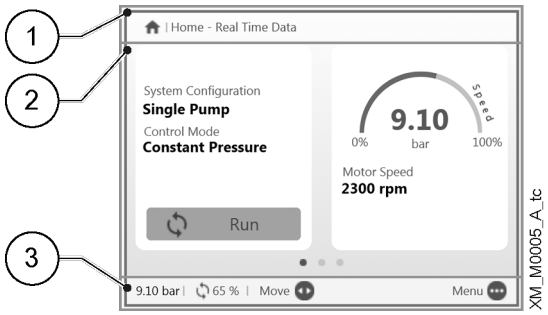
6.1 hydrovar X+ operation panel



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).

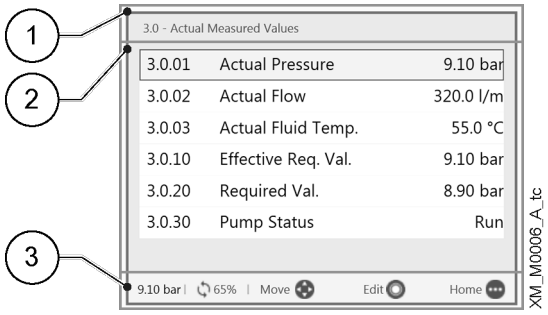
Position number	Name	Function
5	SEND button	• Advancing through the menu levels • Confirm the selection of a parameter • Confirm the value of a parameter.
6	Unit LED on	Indicate that the unit is powered.
7	Unit status LED	Indicate: • Motor not powered (off) • Alarm active and motor stopped (yellow) • 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)

6.1.1 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.

6.1.2 Parameter menu, hydrovar X+



Position number	Name	Description
1	Header bar	It shows the parameter path at menu and submenu level.
2	Parameter list	Shows: • 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	Shows: • 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.

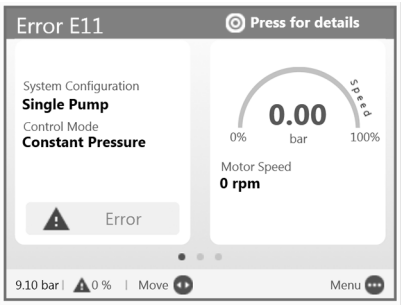
6.1.3 Unit start using the hydrovar X+ operation panel

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.

6.1.4 Operating mode change, hydrovar X+

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.

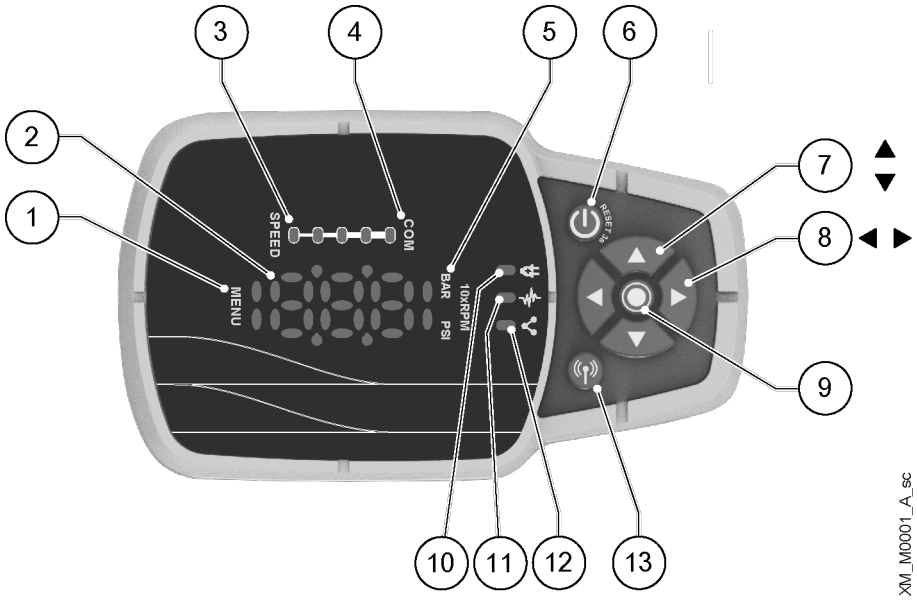
6.1.5 Error reset, hydrovar X+



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.

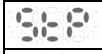
6.2 hydrovar X operation panel



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.

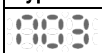
6.2.1 Main visualization

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.

6.2.2 Parameter menu, hydrovar X

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.

6.2.3 Unit start using the hydrovar X operation panel

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.

6.2.4 Operating mode change, hydrovar X

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.

6.2.5 Error reset, hydrovar X

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.

6.3 Xylem X App

Introduction

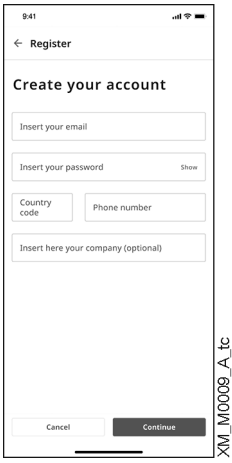
Available for mobile devices with wireless technology operating system.
Use the App to:
- Check the status of the unit
- Configure parameters
- Interact with the unit and obtain data during installation and maintenance
- Generate a work report
- Contact the assistance service.

Download the App and connect the mobile device with the unit

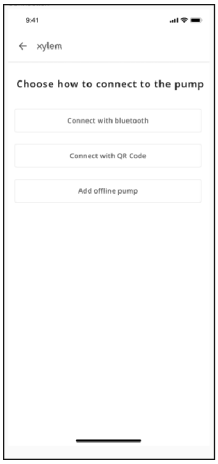
1. Download the Xylem X App to the mobile device from App Store [1] or Google Play [2] by scanning the QR code:

[1] Compatible with iOS® operating systems with version 15.0 and above
[2] Compatible with Android operating systems with version 10.0 and above

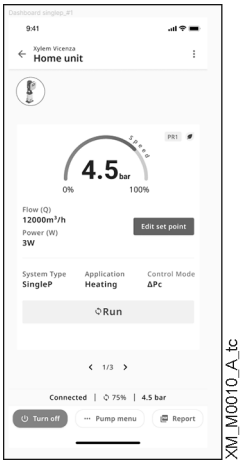
2. Complete the registration.



3. On the operation panel, press the wireless communication button.
4. Add the unit to the user profile.



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



7 Programming

Firmware version

The firmware version can be displayed through parameter P03.4.19.
The parametrization described here refers to the version on the cover.

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.

7.1 M01 Home menu

Frequently used parameters or their aliases.

7.1.1 S01.0 Application

Parameter	Type	Name	Description	Value
P01.0.01	(X+)	Language	Select the display language.	Default = English
P01.0.05	(G)	System Type	Select the system type. 0-Pressurization (PrS): for open-loop systems, i.e. boosting water to a high building 1-Circulation (HV legacy) (CrL): for Circulation HVAC systems using Hydrovar Ramps Control 2-Circulation (C ir): for Circulation HVAC systems using PI control	Default = Pressurization

Parameter	Type	Name	Description	Value
P01.0.06	(G)	Control Mode	Select the control mode for the pump. 0-Actuator (ACt): The unit operates as a constant speed actuator. It can only be used for one unit in single operation. 1-Constant Pressure (CP): The unit maintains constant pressure regardless of flow variation. 2-Prop. Press. (PP): The unit increases the pressure setpoint linearly proportional to the flow. 3-Prop. Quad. Press.: The unit increases the pressure setpoint (actual demand value) quadratically proportional to the flow. 4-Constant Flow: The unit varies the motor speed to keep the flow constant. 5-Constant Temp: The unit varies the motor speed to keep the temperature constant. 6-Constant Level: The unit varies the motor speed to keep the level constant (for example in a tank or well). 7-Generic: The unit varies its speed to maintain a constant generic measured quantity.	Default = Constant Pressure
P01.0.10	(G)	System Configuration	Select system configuration. 0-Single Pump (SnG): The unit is set up to operate on its own, with no interactions with other units. 1-Serial Cascade (nSE): In this configuration, several units work together, connected via the RS485 interface. Only the last started unit varies its speed, while the already running units operate at maximum speed. 2-Synchronous Cascade (nSY): In this configuration, several units work together, connected via the RS485 interface. All running units operate at the same variable speed.	Default = Single Pump
P01.0.11		Multipump Address	Select the pump address in a multipump system. In a multipump system each unit has an unique address, with value from 1 to 8.	Min = 1 Max = - Default = 1
P01.0.15	(G)	Start Value	Define the start value after system stop for no demand, in percentage of the setpoint. In a pressurization system type, if the setpoint is met and there is no more consumption, the pump stops. The pump starts again when the pressure drops below the Restart Value (e.g. if the setpoint is set to 10 bar, a Restart Value set to 90% makes the pump start at 9 bar). Attention: If the value is set too low, (e.g. lower than the incoming pressure) the pump will not start. Value 100% makes this parameter not effective.	Min = 0 % Max = 100 % Default = 100 %
P01.0.20	(G)	Lack Of Water Delay	Select the delay time of the lack of water (LOW) protection. This delay is the time that passes between the opening of the LOW contact and the actual activation of the error "E21 Lack of water (LOW)".	Min = 1 s Max = 100 s Default = 2 s

Parameter	Type	Name	Description	Value
P01.0.31	(G)	Pressure - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.11 Max = P05.0.12 Default = 0 bar
P01.0.32	(G) (X+)	Flow - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min
P01.0.33	(G) (X+)	Temperature - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.31 Max = P05.0.32 Default = -50 °C
P01.0.34	(G) (X+)	Level - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.41 Max = P05.0.42 Default = 0 m
P01.0.35	(G) (X+)	Generic - Min. Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.0.40	(G)	Minimum Threshold Delay	Select the delay time of the minimum threshold protection. This delay is the time given to the system to reach the minimum threshold value: if not reached the unit stops giving the error "E22 Minimum threshold".	Min = 1 s Max = 100 s Default = 2 s
P01.0.45	(G)	Auto Start	Select the status of the pump following a power disconnection. 0-No (nO): at the power return the unit is set to OFF. 1-Yes (YES): at the power return, the unit is set to the status that was active prior of the power disconnection.	Default = Yes
P01.0.46		On/Off Set	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	Default = Off
P01.0.50	(G) (X+)	Date	Select the unit calendar date.	
P01.0.51	(G) (X+)	Time	Set the unit clock.	

7.1.2 S01.1 Sensors

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

*) depending on the pump model

7.1.3 S01.2 Setpoints

Parameter	Type	Name	Description	Value
P01.2.01	(G)	Speed Setpoint 1	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P01.2.02	(G)	Speed Setpoint 2	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P01.2.03	(G) (X+)	Speed Setpoint 3	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P01.2.04	(G) (X+)	Speed Setpoint 4	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P01.2.11	(G)	Pressure Setpoint 1	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P01.2.12	(G)	Pressure Setpoint 2	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P01.2.13	(G) (X+)	Pressure Setpoint 3	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P01.2.14	(G) (X+)	Pressure Setpoint 4	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P01.2.21	(G) (X+)	Flow Setpoint 1	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P01.2.22	(G) (X+)	Flow Setpoint 2	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P01.2.23	(G) (X+)	Flow Setpoint 3	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P01.2.24	(G) (X+)	Flow Setpoint 4	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P01.2.31	(G) (X+)	Temp. Setpoint 1	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P01.2.32	(G) (X+)	Temp. Setpoint 2	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P01.2.33	(G) (X+)	Temp. Setpoint 3	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C

*) depending on the pump model

Parameter	Type	Name	Description	Value
P01.2.34	(G) (X+)	Temp. Setpoint 4	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P01.2.41	(G) (X+)	Level Setpoint 1	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P01.2.42	(G) (X+)	Level Setpoint 2	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P01.2.43	(G) (X+)	Level Setpoint 3	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P01.2.44	(G) (X+)	Level Setpoint 4	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P01.2.51	(G) (X+)	Generic Setpoint 1	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.52	(G) (X+)	Generic Setpoint 2	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.53	(G) (X+)	Generic Setpoint 3	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P01.2.54	(G) (X+)	Generic Setpoint 4	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51

*) depending on the pump model

7.1.4 S01.3 Actual Measured Values

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

7.1.5 S01.4 Jog mode

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

*) depending on the pump model

7.1.6 S01.5 Safety

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

7.2 M02 Error Log

7.2.1 S02.0 Errors

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

7.2.2 S02.9 Bitfield

Parameter	Type	Name	Description	Value
P02.9.01	(R) (A)	Error Bitfield 1	Error 1 Bitfield: 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-Multipump Protocol Incompatibility 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	-
P02.9.02	(R) (A)	Error Bitfield 2	Error2 BitField: 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-Configuration files mismatch 12-Drive is a spare part 13-Control Card is a spare part 14-Hydrovar X connected to X+ 15-Missing Hydraulic Curves 16÷31-*Reserved	-

Parameter	Type	Name	Description	Value
P02.9.05	(R) (A)	Alarm Bitfield 1	Alarm1 Bitfield: 0-Generic Firmware Alarm 1-Extenal Alarm 2-*Reserved 3-MultiPump Comm. Lost 4-MultiPump Address Conflict 5-MultiPump Incompatibility 6-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 19-Language file wrong 20-Control card update is possible 21-Cloning Failure in UI 22-Cloning failure in MP bus 23÷31-*Reserved	-

7.3 M03 Pump information

7.3.1 S03.0 Actual Measured Values

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

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

7.3.2 S03.1 Counters

Parameter	Type	Name	Description	Value
P03.1.01	(G) (R) (A)	Unit Powered Time	Display the total time the unit has spent connected to power.	-
P03.1.02	(G) (R) (A)	Motor Running Time	Display the total time the motor has spent running.	-
P03.1.05	(G) (R) (A)	Energy Counter	Display the total energy used by the unit	-

7.3.3 S03.2 Motor

Parameter	Type	Name	Description	Value
P03.2.01	(G) (R)	Motor Speed	Display the actual motor speed in rpm	-
P03.2.02	(G) (R)	Motor Speed %	Display the actual motor speed in percentage	-
P03.2.05	(G) (R)	Motor Current	Display the actual current drawn by the motor	-
P03.2.06	(G) (R)	Motor Power	Display the actual electric power drawn by the motor	-
P03.2.07	(G) (R)	Motor Voltage	Display the actual voltage provided to the motor	-
P03.2.08	(G) (R)	Grid Voltage	Display the actual voltage provided by the power grid	-
P03.2.09	(G) (R)	DC Bus Voltage	Display the actual DC bus voltage	-

Parameter	Type	Name	Description	Value
P03.2.20	(G) (R)	Power Module Temperature	Display the actual temperature of the power module. This is the temperature of the electronic component responsible of the current supply to the motor.	-
P03.2.21	(G) (R)	Inverter Temperature	Display the drive actual internal temperature. This is the temperature of the air inside the drive, measured on the electronic board.	-

7.3.4 S03.3 Input/Output Status

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

7.3.5 S03.4 Product information

Parameter	Type	Name	Description	Value
P03.4.01	(R) (A)	Unit Part Number	Display the part number (PN) of the complete pump	-
P03.4.02	(R) (A)	Unit Production Date	Display the production date (PD) of the complete pump	-
P03.4.03	(R) (A)	Unit Serial Number	Display the serial number (SN) of the complete pump	-
P03.4.05	(R) (A)	Drive Production Date	Display the production date (PD) of the drive	-
P03.4.06	(R) (A)	Drive Serial Number	Display the serial number (SN) of the drive	-
P03.4.10	(G) (R) (A)	Hmi Firmware Version	Display the firmware version of the user interface board	-
P03.4.11	(G) (R) (A)	Hmi-Bt Firmware Version	Display the firmware version of the wireless communication board	-
P03.4.12	(G) (R) (A)	Power Card Firmware Version	Display the firmware version of the power board	-
P03.4.13	(G) (R) (A)	Control Card Firmware Version	Display the firmware version of the control board	-
P03.4.14	(R) (A)	Map File Version	Display the version of the map file	-

Parameter	Type	Name	Description	Value
P03.4.15	(R) (A)	Default File Version	Display the version of the default file	-
P03.4.16	(R) (A)	Parameter File Version	Display the version of the parameter file	-
P03.4.17	(R) (X+)	Language File Version	Display the version of the language file	-
P03.4.19	(R)	Firmware Version	Display the cumulative firmware version of the device	-
P03.4.25	(R)	Hydraulic Curves Stored	This parameter indicates if the hydraulic curves are stored in memory.	-

7.4 M04 Pump Control

7.4.1 S04.0 Configuration

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

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

Parameter	Type	Name	Description	Value
P04.0.15	(G) (X+)	Power Measuring Unit	Select the measuring unit. 1-W 2-kW 3-MW 4-Hp	Default = kW
P04.0.16	(X+)	Energy Measuring Unit	Select the measuring unit. 0-kWh 1-MWh 2-BTU 3-HPh 4-MJ 5-KJ	Default = kWh
P04.0.21		Setpoint 1 Selection	Select the source for the setpoint 1. 0-Analog (AnA): The setpoint reference is given via one of the analog inputs 1-Parameter (PAr): The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.22		Setpoint 2 Selection	Select the source for the setpoint. 0-Off (OFF): setpoint not used 1-Analog (AnA): The setpoint reference is given via one of the analog inputs 2-Parameter (PAr): The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.23	(X+)	Setpoint 3 Selection	Select the source for the setpoint. 0-Off: setpoint not used 1-Analog: The setpoint reference is given via one of the analog inputs 2-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter
P04.0.24	(X+)	Setpoint 4 Selection	Select the source for the setpoint. 0-Off: setpoint not used 1-Analog: The setpoint reference is given via one of the analog inputs 2-Parameter: The setpoint reference is given via one of the dedicated parameter	Default = Parameter

7.4.2 S04.1 Setpoints

Parameter	Type	Name	Description	Value
P04.1.01	(G)	Speed Setpoint 1	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P04.1.02	(G)	Speed Setpoint 2	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P04.1.03	(G) (X+)	Speed Setpoint 3	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P04.1.04	(G) (X+)	Speed Setpoint 4	Select the value for Setpoint.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P04.1.11	(G)	Pressure Setpoint 1	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P04.1.12	(G)	Pressure Setpoint 2	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P04.1.13	(G) (X+)	Pressure Setpoint 3	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P04.1.14	(G) (X+)	Pressure Setpoint 4	Select the value for Setpoint.	Min = P05.0.11 Max = P05.0.12 Default = 3.5 bar*)
P04.1.15	(G)	Pressure Setpoint Type	This parameter specifies whether the setpoint should be at Zero Flow (see parameter 4.2.06) or at the maximum flow (Max Curve). The Max Curve option is available only if the unit has the hydraulic curves stored in memory	Default = Setpoint at Zero Flow
P04.1.16	(G)	H0 Pressure	If "Pressure Setpoint Type" (Parameter 04.1.15) is set at "Setpoint at Max Curve" and either linear or quadratic compensation is activated, this parameter is used to calculate the pressure setpoint at zero flow.	Min = P05.0.11 Max = P05.0.12 Default = 0.5 bar
P04.1.21	(G) (X+)	Flow Setpoint 1	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P04.1.22	(G) (X+)	Flow Setpoint 2	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P04.1.23	(G) (X+)	Flow Setpoint 3	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P04.1.24	(G) (X+)	Flow Setpoint 4	Select the value for Setpoint.	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min*)
P04.1.31	(G) (X+)	Temp. Setpoint 1	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P04.1.32	(G) (X+)	Temp. Setpoint 2	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C

*) depending on the pump model

Parameter	Type	Name	Description	Value
P04.1.33	(G) (X+)	Temp. Setpoint 3	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P04.1.34	(G) (X+)	Temp. Setpoint 4	Select the value for Setpoint.	Min = P05.0.31 Max = P05.0.32 Default = 25 °C
P04.1.41	(G) (X+)	Level Setpoint 1	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P04.1.42	(G) (X+)	Level Setpoint 2	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P04.1.43	(G) (X+)	Level Setpoint 3	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P04.1.44	(G) (X+)	Level Setpoint 4	Select the value for Setpoint.	Min = P05.0.41 Max = P05.0.42 Default = 0 m*)
P04.1.51	(G) (X+)	Generic Setpoint 1	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.52	(G) (X+)	Generic Setpoint 2	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.53	(G) (X+)	Generic Setpoint 3	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.54	(G) (X+)	Generic Setpoint 4	Select the value for Setpoint.	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.1.60	(G)	Limit setpoint saving	The function limits the number of saves in internal memory. To be enabled in case of continuous writing of the setpoint by the fieldbus.	Default = No

*) depending on the pump model

7.4.3 S04.2 Regulation

Parameter	Type	Name	Description	Value
P04.2.00	(G)	Regulation Type	This parameter specifies whether the regulation is based on Hydrovar Ramps control or PI control. See parameter in submenu 04.2.xx	Default = Hydrovar
P04.2.01	(G)	Window	Select the regulation window. This parameter defines a band around the setpoint, as a percentage of the setpoint. When the measured value is out if the window the system will use ramps 1 and 2; when the measured value is inside the window the system will use ramps 3 and 4.	Min = 1 % Max = 100 % Default = 20 %
P04.2.02	(G)	Hysteresis	Select the regulation hysteresis. This parameter defines a band, around the setpoint, that is a percentage of the window. The limits of the hysteresis band define the change between accelerating and decelerating ramps.	Min = 1 % Max = 100 % Default = 90 %

Parameter	Type	Name	Description	Value
P04.2.06	(G)	Lift Speed	Select the speed value at which the setpoint value starts to increase, if a lift amount is set.	Min = P04.2.31 Max = P04.2.32 Default = 2000 rpm*)
P04.2.07	(G)	Linear Lift Amount	Select the amount of linear increase of the setpoint at maximum speed, as a percentage of the setpoint, in order to compensate the friction losses. The increase will be linear, starting from 0% when the motor speed is equal to LIFT SPEED, up to LINEAR LIFT AMOUNT when the motor speed is maximum.	Min = 0 % Max = 200 % Default = 0 %
P04.2.08	(G) (X+)	Quad. Lift Amount	Select the amount of quadratic increase of the setpoint at maximum speed, as a percentage of the setpoint, in order to compensate the friction losses. The increase will be quadratic, starting from 0% when the motor speed is equal to LIFT SPEED, up to QUADRATIC LIFT AMOUNT when the motor speed is maximum.	Min = 0 % Max = 999 % Default = 0 %
P04.2.11	(G)	Ramp 1	Select the fast acceleration time. This ramp is used when the motor speed is above the MINIMUM SPEED and the measured value is outside the range defined by the WINDOW.	Min = 1 s*) Max = 250 s*) Default = 10 s*)
P04.2.12	(G)	Ramp 2	Select the fast deceleration time. This ramp is used when the motor speed is above the MINIMUM SPEED and the measured value is outside the range defined by the WINDOW.	Min = 1 s*) Max = 250 s*) Default = 10 s*)
P04.2.13	(G)	Ramp 3	Select the slow acceleration time. This ramp is used when the measured value is inside the range defined by the WINDOW.	Min = 1 s*) Max = 999 s*) Default = 70 s*)
P04.2.14	(G)	Ramp 4	Select the slow deceleration time. This ramp is used when the measured value is inside the range defined by the WINDOW.	Min = 1 s*) Max = 999 s*) Default = 70 s*)
P04.2.15	(G)	Ramp Speed Min Acceleration	Select the minimum speed accelerating ramp time. This ramp is used when the motor speed is below the MINIMUM SPEED	Min = 0.1 s*) Max = 25 s*) Default = 2 s*)
P04.2.16	(G)	Ramp Speed Min Deceleration	Select the minimum speed decelerating ramp time. This ramp is used when the motor speed is below the MINIMUM SPEED	Min = 0.1 s*) Max = 25 s*) Default = 2 s*)
P04.2.21	(G)	Pi Control - Kp	Select the proportional constant of the PI control	Min = 0*) Max = 10000*) Default = 0.5*)
P04.2.25	(G)	Pi Control - Ti	Ti is the integral time variable used with the gain (Kp) to set the PI (Proportional-Integral) regulation. - If the control system is "hunting" (oscillating) or unstable, you can stabilize it by either reducing the gain (Kp) or increasing the integral time (Ti). - If the system is too slow to react, you can make it more responsive by increasing the gain (Kp).	Min = 0 s*) Max = 10000 s*) Default = 0.5 s*)

*) depending on the pump model

Parameter	Type	Name	Description	Value
P04.2.31	(G)	Min Speed	Select the pump minimum speed.	Min = 0 rpm*) Max = 2000 rpm*) Default = 800 rpm*)
P04.2.32	(G)	Max Speed	Select the pump maximum speed.	Min = 2000 rpm*) Max = 4100 rpm*) Default = 3600 rpm*)
P04.2.35	(G)	Min Speed Time	Select the delay time the motor stays at minimum speed, before reaching a complete stop. This parameter is only active if parameter MIN SPEED CONFIGURATION is set to "Zero speed".	Min = 0 s Max = 100 s Default = 1 s

*) depending on the pump model

7.4.4 S04.3 Thresholds

Parameter	Type	Name	Description	Value
P04.3.00	(G)	Automatic Error Reset	Select the type of error reset. 0-No (nO): in case of error the unit will stay stopped, waiting for an error reset commanded by the user. 1-Yes (YES): the unit will automatically reset the error, if possible, up to a maximum of 5 times in 1 hour.	Default = Yes
P04.3.01	(G)	Pressure - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.11 Max = P05.0.12 Default = 0 bar
P04.3.02	(G) (X+)	Flow - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.21 Max = P05.0.22 Default = 0 l/min
P04.3.03	(G) (X+)	Temperature - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.31 Max = P05.0.32 Default = -50 °C
P04.3.04	(G) (X+)	Level - Minimum Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.41 Max = P05.0.42 Default = 0 m
P04.3.05	(G) (X+)	Generic - Min. Threshold	Select the minimum threshold limit: if the value is not reached within the parameter P01.0.40 "Minimum threshold delay", then the unit stops giving the error "E22 Minimum threshold".	Min = P05.0.51 Max = P05.0.52 Default = P05.0.51
P04.3.10	(G)	Minimum Threshold Delay	Select the delay time of the minimum threshold protection. This delay is the time given to the system to reach the minimum threshold value: if not reached the unit stops giving the error "E22 Minimum threshold".	Min = 1 s Max = 100 s Default = 2 s
P04.3.11	(G)	Lack Of Water Delay	Select the delay time of the lack of water (LOW) protection. This delay is the time that passes between the opening of the LOW contact and the actual activation of the error "E21 Lack of water (LOW)".	Min = 1 s Max = 100 s Default = 2 s

7.4.5 S04.4 Test Run

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

*) depending on the pump model

7.4.6 S04.5 Setpoint Shift

Parameter	Type	Name	Description	Value
P04.5.01	(G) (X+)	SP Shift Function	Select the type of Setpoint Shift function. 0-Off: The Setpoint Shift function is disabled 1-SSV1: The Setpoint Shift function is enabled and only SSV1 (Setpoint Shift Value 1) is used 2-SSV2: The Setpoint Shift function is enabled and only SSV2 (Setpoint Shift Value 2) is used 3-Full: The Setpoint Shift function is enabled and both SSV1 and SSV2 are used	Default = Off
P04.5.02	(G) (X+)	SP Shift Input	Select the magnitude used as reference for the Setpoint Shift function. 0-Setpoint Shift Pressure: The analog input set to Setpoint Shift Pressure 1-Pressure: The analog input set to Pressure 2-Flow: The analog input set to Flow 3-Temperature: Tanalog input set to Temperature 4-Level: The analog input set to Level 5-Generic: The analog input set to Generic	Default = Setpoint Shift Pressure
P04.5.05	(G) (X+)	SP Shift VALUE 1	Select the setpoint value desired for the first section of the Setpoint Shift function	Min = - Max = - Default = 0
P04.5.06	(G) (X+)	SP Shift VALUE 2	Select the setpoint value desired for the second section of the Setpoint Shift function	Min = - Max = - Default = 0
P04.5.10	(G) (X+)	SP Shift X 1	Select the Setpoint Shift input value at which the Setpoin Shift Value 1 starts to shift towards the Setpoint	Min = - Max = P04.5.11 Default = 0

Parameter	Type	Name	Description	Value
P04.5.11	(G) (X+)	SP Shift X 2	Select the Setpoint Shift input value at which the Setpoint is used	Min = P04.5.10 Max = P04.5.12 Default = 0
P04.5.12	(G) (X+)	SP Shift X 3	Select the Setpoint Shift input value at which the Setpoint value starts to shift towards Setpoint Shift Value 2	Min = P04.5.11 Max = P04.5.13 Default = 0
P04.5.13	(G) (X+)	SP Shift X 4	Select the Setpoint Shift input value at which the Setpoint Shift Value 2 is used	Min = P04.5.12 Max = - Default = 0

7.4.7 S04.6 Pipe filling

Check the filling of the hydraulic system when not pressurised, to avoid water hammer.
When enabled, this function starts if the measured pressure is below the *Pipe Filling Threshold* and one of the following cases occurs:

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

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

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

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

Parameter	Type	Name	Description	Value
P04.6.01	(G)	Pipe Filling Function	With this parameter you can disable the Pipe Filling function or select the status of the unit if the Pipe Filling Threshold is not reached. 0-Disabled (dIS): the Pipe Filling function is disabled 1-Alarm (ALA): the failure of the Pipe Filling function gives the alarm A29 Pipe Filling Alarm and the unit continues to run the function. 2-Error (Err): the failure of the Pipe Filling function gives the error E29 Pipe Filling Error and the unit stops. While the Pipe Filling function is running the Minimum Threshold is disabled.	Default = Disabled
P04.6.03	(G)	Pipe Filling Threshold	Select the pressure the system has to reach to exit the pipe filling function.	Min = P05.0.11 Max = P05.0.12 Default = 2 bar

Parameter	Type	Name	Description	Value
P04.6.05	(G)	Pipe Filling Time	Select the maximum time given to the pipe filling function to reach the PIPE FILLING THRESHOLD.	Min = 0 s Max = 999 s Default = 180 s
P04.6.06	(G)	Max Pipe Filling Pumps	Select the number of pumps that will run simultaneously during the pipe filling function.	Min = 1 Max = P06.0.02 Default = 1
P04.6.10	(G)	Pipe Filling Steady Time	Select the time given to the unit to verify if the measured pressure is stable. The pressure is considered stable if its value is within the WINDOW calculated on the setpoint, centred on the pressure measured at the beginning of the current steady time.	Min = 1 s Max = P04.6.05 Default = 5 s
P04.6.15	(G)	Pipe Filling Speed Step	Select the amount of speed, in percentage of the maximum speed, that the unit will add to the current speed if the measured pressure is stable for the PIPE FILLING STEADY TIME.	Min = 5 % Max = 100 % Default = 10 %

7.5 M05 Input/Output Settings

7.5.1 S05.0 Measuring ranges

Parameter	Type	Name	Description	Value
P05.0.00		Actual Value Source	Select the input for the controlled value. 0-Auto AI (AUt): The Actual Value is automatically linked to the Analog Input set to the controlled quantity of the Control Mode 1-Delta AI (d iF): The Actual Value is equal to the absolute difference of two Analog Inputs set to the controlled quantity of the Control Mode 2-Auto AI - Low (LOU): The Actual Value is equal to the lowest value of the Analog Inputs set to the controlled quantity of the Control Mode 3-Auto AI - High (h iG): The Actual Value is equal to the highest value of the Analog Inputs set to the controlled quantity of the Control Mode 4-DI Selection (d in): The Analog Value is selected via the status of the Digital Input set to function "Sensor 1/2 Selection" 5-Sensorless Delta Pressure or Flow (SnL): The actual value is estimated using the hydraulic curves stored in memory, if available. 6-Sensored or Sensorless Delta Pressure (SdF): The actual value is automatically linked to the analog input set as "Pressure". If the analog input is not available, the actual value will be estimated using the hydraulic curves stored in memory, if available.	Default = Auto AI
P05.0.01		Actuator - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 0 rpm
P05.0.02		Actuator - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 rpm Max = 9999 rpm Default = 3600 rpm
P05.0.11	(G)	Pressure - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -5 bar*) Max = 10 bar*) Default = 0 bar*)
P05.0.12	(G)	Pressure - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 bar*) Max = 100 bar*) Default = 10 bar*)
P05.0.21	(G) (X+)	Flow - Zero Value	Select the zero value of the regulation feedback sensor.	Min = 0 l/min*) Max = 9999 l/min*) Default = 0 l/min*)
P05.0.22	(G) (X+)	Flow - Full Scale	Select the full range of the regulation feedback sensor.	Min = 0 l/min*) Max = 9999 l/min*) Default = 100 l/min*)
P05.0.31	(G) (X+)	Temperature - Zero Value	Select the zero value of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 0 °C
P05.0.32	(G) (X+)	Temperature - Full Scale	Select the full range of the regulation feedback sensor.	Min = -100 °C Max = 9999 °C Default = 100 °C

*) depending on the pump model

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

*) depending on the pump model

7.5.2 S05.1 Analogue inputs

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

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

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

7.5.3 S05.2 Digital inputs

Parameter	Type	Name	Description	Value
P05.2.03		Digital Input 3 Function	Select the function for the Digital Input. 0-Disabled (dIS): function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection (S12): Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed (rmn): Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run (Srn): Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset (rES): Close the digital input to reset the error condition 7-External Error (EXE): Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm (EXA): Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set	Default = Solo Run
P05.2.04	(X+)	Digital Input 4 Function	Select the function for the Digital Input. 0-Disabled: function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection: Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed: Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run: Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset: Close the digital input to reset the error condition 7-External Error: Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm: Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set	Default = Disabled

Parameter	Type	Name	Description	Value
P05.2.05	(X+)	Digital Input 5 Function	Select the function for the Digital Input. 0-Disabled: function not used 1-Setpoint Switch: Use the digital input to switch between Setpoints. 2-Sensor 1/2 Selection: Use the digital input to switch between Analog Sensor 1 and Analog Sensor 2. 3-Min. Speed: Close the digital input to run the motor at minimum speed 4-Max Speed: Close the digital input to run the motor at maximum speed 5-Solo Run: Close the digital input to run the motor at maximum speed bypassing most of the errors. 6-Error Reset: Close the digital input to reset the error condition 7-External Error: Open the digital input to activate the error condition "E16 External D.I. error" 8-External Alarm: Open the digital input to activate the alarm condition "A16 External D.I. alarm" 9-Parameter Set Selection: Close the digital input to switch parameter set	Default = Disabled

7.5.4 S05.3 Analogue output

Parameter	Type	Name	Description	Value
P05.3.01		Analog Output Function	Select the Analog Output function. 0-Actual value (URL): The Analog Output replicates the current measured value 1-Effective required value (EFF): The Analog Output replicates the Effective Required Value 2-Motor speed (SPd): The Analog Output replicates the current motor speed 3-Motor load (PUr): The Analog Output replicates the current motor power 4-Motor curret: The Analog Output replicates the actual current drained from the motor 5-AN1 value (An 1): The Analog Output replicates the value read on analog input 1 6-AN2 value (An2): The Analog Output replicates the value read on analog input 2 7-AN3 value: The Analog Output replicates the value read on analog input 3 8-AN4 value: The Analog Output replicates the value read on analog input 4 9-Temperature: The Analog Output replicates the value of measured fluid temperature 10-Flow rate: The Analog Output replicates the current measured flow 11-SPS Input Value: The Analog Output replicates the current value of the analog input used for the Setpoint Shift function	Default = Motor speed

Parameter	Type	Name	Description	Value
P05.3.02		Analog Output Type	Select the Analog Output type. 0-0÷20 mA 1-4÷20 mA 2-0÷10 V 3-2÷10 V	Default = 4÷20 mA

7.5.5 S05.4 Digital outputs

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

7.5.6 S05.8 Calibrations

The parameters in this menu are used to calibrate the measurement of the sensors connected to the analogue inputs as well as the actuation of the analogue output.

Analogue inputs – hydrovar X, hydrovar X+

The analogue input calibration procedure involves comparing the value measured by the unit (hydrovar X or hydrovar X+) with the value measured by an external reference sensor.
The measurement should be carried out at two points, ideally corresponding to 10% and 90% of the full scale of the analogue signal.

Configuration example:

- P05.1.01 = 1 - Pressure
- P05.0.11 = 0 bar
- P05.0.12 = 10 bar

Definitions:

- "Actual Values 1 and 2": pressure values measured by the external sensor at 10% and 90% of the full scale
- "Read Values 1 and 2": values read by hydrovar X or hydrovar X+ via parameter "P03.0.1 - Current Pressure" at the same points.

Settings to be completed:

- P05.8.02 (AI 1 Gain) = (Actual Value 2 - Actual Value 1) ÷ (Read Value 2 - Read Value 1)
- P05.8.01 (AI 1 Offset) = Actual Value 1 - (Read Value 1 × P05.8.02).

Analogue output – hydrovar X+

The calibration procedure for the analogue output involves comparing the actual voltage or current value measured at terminals AO1 (14) and GND (15) with the value read via parameter P03.3.20.

Calibration example:

- P05.8.45 (Analog Output Gain) = (Actual Value 2 - Actual Value 1) ÷ (Read Value 2 - Read Value 1)
- P05.8.44 (Analog Output Offset) = Actual Value 1 - (Read Value 1 × P05.8.45).

Table of Parameters

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

7.6 M06 Multipump

7.6.1 S06.0 Configuration

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

7.6.2 S06.1 Regulation

Parameter	Type	Name	Description	Value
P06.1.11	(G)	Pressure - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 bar*) Max = P05.0.12 Default = 0.35 bar*)
P06.1.12	(G)	Pressure - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 bar*) Max = P05.0.12 Default = 0.15 bar*)
P06.1.21	(G) (X+)	Flow - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 l/min*) Max = P05.0.22 Default = 0.35 l/min*)
P06.1.22	(G) (X+)	Flow - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 l/min*) Max = P05.0.22 Default = 0.15 l/min*)

*) depending on the pump model

Parameter	Type	Name	Description	Value
P06.1.31	(G) (X+)	Temperature - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 °C Max = P05.0.32 Default = 1.5 °C
P06.1.32	(G) (X+)	Temperature - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 °C Max = P05.0.32 Default = 1.5 °C
P06.1.41	(G) (X+)	Level - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 m*) Max = P05.0.42 Default = 0.35 m*)
P06.1.42	(G) (X+)	Level - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 m*) Max = P05.0.42 Default = 0.15 m*)
P06.1.51	(G) (X+)	Generic - Inc. value	Select the multipump actual value increase. This value, in conjunction with the actual value decrease, will be used to calculate the effective required value in a multipump system.	Min = 0 Max = P05.0.52 Default = 1.5
P06.1.52	(G) (X+)	Generic - Dec. value	Select the multipump actual value decrease. This value, in conjunction with the actual value increase, will be used to calculate the effective required value in a multipump system.	Min = 0 Max = P05.0.52 Default = 1.5
P06.1.61	(G)	Multipump Enable Speed	Select the desired release speed for the following pumps. The next pump starts when the below conditions are matched: - the motor speed reaches the MULTIPUMP ENABLE SPEED - the actual value drops below SETPOINT-ACTUAL VALUE DECREASE.	Min = P04.2.31 Max = P04.2.32 Default = 3000 rpm*)
P06.1.71	(G)	Synchronous Limit	Select the speed limit for the multipump cascade synchronous. The pump with priority P2 will shut off if its speed goes below this value.	Min = 0 rpm*) Max = 3600 rpm*) Default = 840 rpm*)
P06.1.72	(G)	Synchronous Window	Select the speed window for the multipump cascade synchronous. The pump with priority P3 will shut off when its speed goes below SYNCHRONOUS LIMIT + SYNCHRONOUS WINDOW, P4 will shut off when its speed goes below SYNCHRONOUS LIMIT + 2 x SYNCHRONOUS WINDOW, and so on.	Min = 0 rpm Max = P04.2.32 Default = 150 rpm

*) depending on the pump model

Parameter	Type	Name	Description	Value
P06.1.81	(G)	Automatic Switchover Interval	Select the timeout for the automatic switchover: it allows an automatic change-over of the MASTER pump and the assist pumps. As soon as the timeout is elapsed, the next pump becomes MASTER and the counter restarts; this gives even wear and similar operating hours to all pumps. The switchover interval is active as long as the MASTER does not stop.	Min = 0 h Max = 250 h Default = 24 h

*) depending on the pump model

7.7 M07 Inverter

7.7.1 S07.0 Switching Frequency Settings

Parameter	Type	Name	Description	Value
P07.0.01		Max Switching Frequency	Select the maximum switching frequency of the inverter modulation. Range: 2 ÷ 16 KHz	Default = 16 KHz
P07.0.02		Min Switching Frequency	Select the minimum switching frequency the unit will use. In case of overheating, the unit will automatically decrease the switching frequency down to this value.	Default = 4 KHz

7.7.2 S07.1 Skip Speed Function

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

*) depending on the pump model

7.7.3 S07.2 Motor Heating

Parameter	Type	Name	Description	Value
P07.2.01	(G)	Motor heating function	Select to enable the motor heating function. When this function is enabled, if the motor is not running and the inverter temperature decreases below the motor heating temperature (7.2.03), a current flows to the motor to avoid icing. This current flow does not make the motor rotate. 0-Off (OFF): the motor heating function is disabled 1-On (On): the motor heating function is enabled and starts running when the motor is not running and the inverter temperature is below the Motor Heating Temperature (7.2.03) 2-Always On (AOn): the motor heating function is always running when the motor is not running, independently from the inverter temperature	Default = Off

*) depending on the pump model

Parameter	Type	Name	Description	Value
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 will run. This parameter is active only if Motor heating function (7.2.01) is set to ON	Min = -5 °C Max = 30 °C Default = 0 °C

*) depending on the pump model

7.7.4 S07.3 Special Functions

Parameter	Type	Name	Description	Value
P07.3.01		Feed Forward Function	Feed Forward Function	Default = Off

7.8 M08 Communication

7.8.1 S08.0 Ports

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

7.8.2 S08.1 Modbus RTU

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

7.8.3 S08.2 Bacnet MS/TP

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

7.8.4 S08.3 Wireless Communication

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

7.9 M09 General Settings

7.9.1 S09.0 Localization

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

7.9.2 S09.1 Display

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

*) depending on the pump model

7.9.3 S09.2 Parameters profiles

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

7.9.4 S09.3 Factory Settings

Parameter	Type	Name	Description	Value
P09.3.01		Error Log Reset	Select YES to reset the error log.	Default = No
P09.3.02		Operating Time Counter Reset	Select YES to reset the operating time counter	Default = No
P09.3.03		Motor Running Counter Reset	Select YES to reset the motor running time counter	Default = No
P09.3.04		Energy Counter Reset	Select YES to reset the energy counter	Default = No
P09.3.05		Factory Restore	Select YES to restore the unit to factory default parameters	Default = No
P09.3.06	(G) (X+)	Commissioning Completed	Select if the Genie procedure is completed.	Default = No
P09.3.07		Bonded Device List Reset	Select Yes to reset the bluetooth bonded device list	Default = No
P09.3.10		Upgrade Control Card	Download the configuration file from the HMI to the Control Card	Default = No

7.9.5 S09.4 Security

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

7.9.6 S09.5 Cloning

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

8 Modbus RTU

8.1 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.

8.2 Transmission

Function not supported.

8.3 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.

8.4 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.

8.5 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.

8.5.1 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 = 5.0f FLOAT32 => Actual value = 5.0 bar
CRC Error Check--Low	0xD1 CRC-Checksum generated

8.5.2 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	0x18
CRC Error Check-Low	0x6A CRC-Checksum generated

Response

Client address	0x01
Function	0x10
Starting address High	0x10
Starting address Low	0x73
Registers Quantity High	0x00
Registers Quantity Low	0x04 a total of 4 registers (Ramp 1 to Ramp 4) written
CRC Error Check-High	0x34
CRC Error Check--Low	0xD1 CRC-Checksum generated

8.6 Connections and data management, Modbus RTU

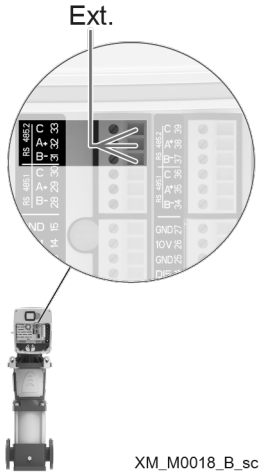
- When Modbus RTU communication between the drive and an external device is active, the operation panel connection status light comes on.
- Set parameter *P04.1.60 Limit Setpoint Saving* to *Yes* to write to the volatile memory area and extend the life of the non-volatile EEPROM memory.

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

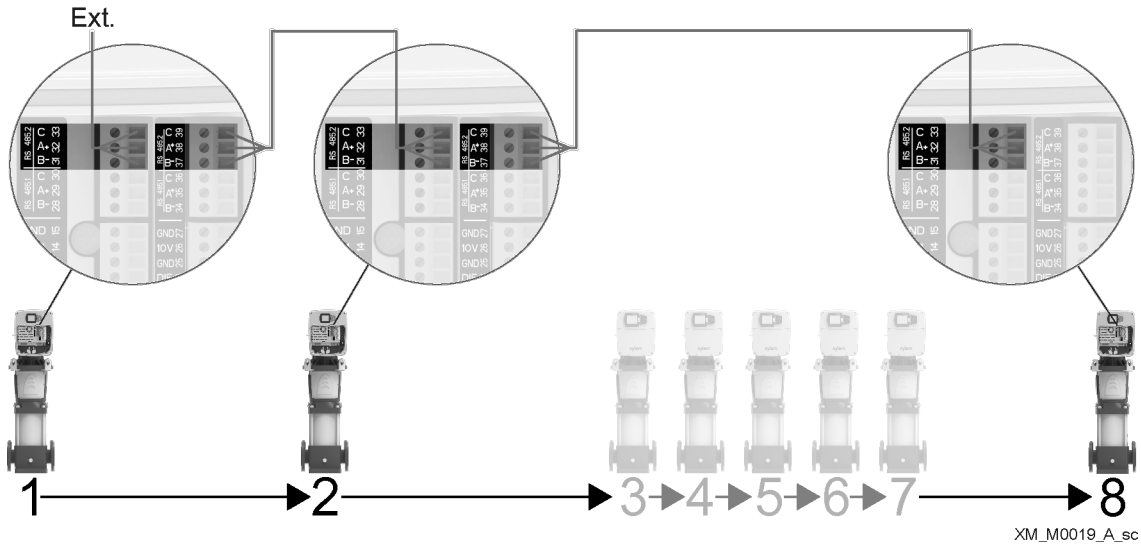
1. Remove the cover of the drive and observe the wiring diagrams inside.
2. Connect terminals 31 (B), 32 (A) and 33 (C) to the external device, for example PLC, BMS, etc.



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).

8.7 List of registers

Modbus Register	Menu ID	Name	R/W	Type	Dimension	Min	Max
0	-	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	R/W	ENUM	-	0	1
1	-	Error Reset Command	R/W	ENUM	-	0	1
2001	P02.0.01	Error 1 (Most Recent)	R	UINT16	-	-	-
2002	-	Error 1 - Date	R	UINT32	-	-	-
2004	-	Error 1 - Time	R	UINT32	-	-	-
2006	-	Error 1 - End Date	R	UINT32	-	-	-
2008	-	Error 1 - End Time	R	UINT32	-	-	-
2010	-	Log: Error Counter	R	UINT16	-	-	-
2011	-	Log: Error 1 Bitfield	R	UINT32	-	-	-
2013	-	Log: Error 2 Bitfield	R	UINT32	-	-	-
2015	-	Log: Alarm 1 Bitfield	R	UINT32	-	-	-
2017	-	LogSpeed	R	UINT32	-	-	-
2019	-	Log: Error Code	R	UINT32	-	-	-
2021	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2023	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2025	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2033	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2057	-	Log: Error Code	R	UINT32	-	-	-
2059	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2061	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2063	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2071	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2095	-	Log: Error Code	R	UINT32	-	-	-
2097	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2099	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2101	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2109	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2133	-	Log: Error Code	R	UINT32	-	-	-
2135	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2137	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2139	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2147	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2171	-	Log: Error Code	R	UINT32	-	-	-
2173	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2175	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2177	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2185	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2209	-	Log: Error Code	R	UINT32	-	-	-
2211	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

2213	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2215	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2223	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2247	-	Log: Error Code	R	UINT32	-	-	-
2249	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2251	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2253	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2261	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2285	-	Log: Error Code	R	UINT32	-	-	-
2287	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2289	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2291	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2299	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2323	-	Log: Error Code	R	UINT32	-	-	-
2325	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2327	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2329	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2337	-	LogPower	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	-	LogSpeed	R	UINT32	-	-	-
2361	-	Log: Error Code	R	UINT32	-	-	-
2363	-	Log: Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
2365	-	Log: Head	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
2367	-	Log: Power Module Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	-	-
2375	-	LogPower	R	FLOAT32	-	-	-
2377	-	Log: DC Bus Voltage	R	FLOAT32	V	-	-
2379	-	Log: Grid Voltage	R	FLOAT32	V	-	-
2381	-	Totoal Error Counter	R	UINT16	-	-	-
2382	-	Total Alarm Counter	R	UINT16	-	-	-
2383	P02.9.01	Error Bitfield 1	R	UINT32	-	-	-
2385	P02.9.02	Error Bitfield 2	R	UINT32	-	-	-
2387	P02.9.05	Alarm Bitfield 1	R	UINT32	-	-	-
3000	P03.0.00	Estimated Actual Value	R	ENUM	-	-	-

3001	P03.0.01	Actual Pressure	R	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
3003	P03.0.02	Actual Flow	R	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
3005	P03.0.03 [X+]	Actual Fluid Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
3007	P03.0.04 [X+]	Actual Level	R	FLOAT32	P04.0.14 - Level Measuring Unit	-	-
3009	P03.0.10	Effective Required Value	R	FLOAT32	-	-	-
3011	P03.0.20	Required Value	R	FLOAT32	-	-	-
3013	P03.0.30	Pump Status	R	ENUM	-	-	-
3014	P03.0.05 [X+]	Actual Generic	R	FLOAT32	-	-	-
3016	P03.0.06 [X+]	Actual Shift	R	FLOAT32	-	-	-
3101	P03.1.01	Unit Powered Time	R	UINT32	s	-	-
3103	P03.1.02	Motor Running Time	R	UINT32	s	-	-
3105	P03.1.05	Energy Counter	R	FLOAT32	P04.0.16 - Energy Measuring 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 Measuring 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 Measuring Unit	-	-
3222	P03.2.21	Inverter Temperature	R	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
3224	P03.2.22	Motor Ptc	R	FLOAT32	-	-	-
3301	P03.3.01	Digital I/O Status	R	UINT16	-	-	-
3302	P03.3.11	Analog Input 1 Value	R	FLOAT32	P05.1.02 - Analog Input 1 Type	-	-
3304	P03.3.12	Analog Input 2 Value	R	FLOAT32	P05.1.12 - Analog Input 2 Type	-	-
3306	P03.3.13 [X+]	Analog Input 3 Value	R	FLOAT32	P05.1.22 - Analog Input 3 Type	-	-
3308	P03.3.14 [X+]	Analog Input 4 Value	R	FLOAT32	P05.1.32 - Analog Input 4 Type	-	-
3310	P03.3.20	Analog Output Value	R	FLOAT32	P05.3.02 - Analog Output Type	-	-
3401	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3402	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3403	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3404	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3405	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3406	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3407	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3408	P03.4.01	Unit Part Number	R	UINT16	-	-	-
3409	P03.4.02	Unit Production Date	R	UINT32	-	-	-
3411	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3412	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3413	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3414	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3415	P03.4.03	Unit Serial Number	R	UINT16	-	-	-

3416	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3417	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
3418	P03.4.03	Unit Serial Number	R	UINT16	-	-	-
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	-	Drive Type	R	ENUM	-	-	-
3448	P03.4.25	Hydraulic Curves Stored	R	ENUM	-	-	-
4001	P04.0.01	System Type	R/W	ENUM	-	0	2
4002	P04.0.02	Control Mode	R/W	ENUM	-	0	7
4003	P04.0.03 [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	Min Speed Configuration	R/W	ENUM	-	0	1
4007	P04.0.09	Measuring Unit Selection	R/W	ENUM	-	0	1
4008	P04.0.11	Pressure Measuring Unit	R/W	ENUM	-	0	8
4009	P04.0.12 [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
4018	P04.1.15	Pressure Setpoint Type	R/W	ENUM	-	0	1
4019	P01.6.01	H0 Pressure	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4021	P04.0.21	Setpoint 1 Selection	R/W	ENUM	-	0	1
4022	P04.0.22	Setpoint 2 Selection	R/W	ENUM	-	0	2
4023	P04.0.23 [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 - Min Speed	P04.2.32 - Max Speed

4102	P04.1.02	Speed Setpoint 2	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4103	P04.1.03 [X+]	Speed Setpoint 3	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4104	P04.1.04 [X+]	Speed Setpoint 4	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4111	P04.1.11	Pressure Setpoint 1	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4113	P04.1.12	Pressure Setpoint 2	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4115	P04.1.13 [X+]	Pressure Setpoint 3	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4117	P04.1.14 [X+]	Pressure Setpoint 4	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4121	P04.1.21 [X+]	Flow Setpoint 1	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4123	P04.1.22 [X+]	Flow Setpoint 2	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4125	P04.1.23 [X+]	Flow Setpoint 3	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4127	P04.1.24 [X+]	Flow Setpoint 4	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4131	P04.1.31 [X+]	Temp. Setpoint 1	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4133	P04.1.32 [X+]	Temp. Setpoint 2	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4135	P04.1.33 [X+]	Temp. Setpoint 3	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
4137	P04.1.34 [X+]	Temp. Setpoint 4	R/W	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring 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 Measuring 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 Measuring 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 Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4155	P04.1.60	Limit setpoint saving	R/W	ENUM	-	0	1
4156	P04.1.51 [X+]	Generic Setpoint 1	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale

4158	P04.1.52 [X+]	Generic Setpoint 2	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4160	P04.1.53 [X+]	Generic Setpoint 3	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4162	P04.1.54 [X+]	Generic Setpoint 4	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4200	P04.2.00	Regulation Type	R/W	ENUM	-	0	1
4201	P04.2.01	Window	R/W	UINT16	%	1	100
4202	P04.2.02	Hysteresis	R/W	UINT16	%	1	100
4203	P04.2.06	Lift Speed	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
4204	P04.2.07	Linear Lift Amount	R/W	UINT16	%	0	200
4205	P04.2.08 [X+]	Quad. Lift Amount	R/W	UINT16	%	0	999
4211	P04.2.11	Ramp 1	R/W	UINT16	s	1	250
4212	P04.2.12	Ramp 2	R/W	UINT16	s	1	250
4213	P04.2.13	Ramp 3	R/W	UINT16	s	1	999
4214	P04.2.14	Ramp 4	R/W	UINT16	s	1	999
4215	P04.2.15	Ramp Speed Min Acceleration	R/W	FLOAT32	s	0.1	25
4217	P04.2.16	Ramp Speed Min Deceleration	R/W	FLOAT32	s	0.1	25
4221	P04.2.21	Pi Control - Kp	R/W	FLOAT32	-	0	10000
4225	P04.2.25	Pi Control - Ti	R/W	FLOAT32	s	0	10000
4231	P04.2.31	Min Speed	R/W	UINT16	rpm	0	2000
4232	P04.2.32	Max Speed	R/W	UINT16	rpm	2000	4100
4233	P04.2.35	Min Speed Time	R/W	UINT16	s	0	100
4300	P04.3.00	Automatic Error Reset	R/W	ENUM	-	0	1
4301	P04.3.01	Pressure - Minimum Threshold	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4303	P04.3.02 [X+]	Flow - Minimum Threshold	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
4305	P04.3.03 [X+]	Temperature - Minimum Threshold	R/W	FLOAT32	P04.0.13 - Temperature Measuring 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 Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
4310	P04.3.10	Minimum Threshold Delay	R/W	UINT16	s	1	100
4311	P04.3.11	Lack Of Water Delay	R/W	UINT16	s	1	100
4312	P04.3.05 [X+]	Generic - Min. Threshold	R/W	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
4401	P04.4.01	Test Run Speed	R/W	UINT16	rpm	0	P04.2.32 - Max Speed
4402	P04.4.02	Test Run Timeout	R/W	UINT16	h	0	255
4403	P04.4.03	Test Run Time	R/W	UINT16	s	0	180
4404	P04.4.05	Test Run Command	R/W	ENUM	-	0	1
4501	P04.5.01 [X+]	SP Shift Function	R/W	ENUM	-	0	3
4502	P04.5.02 [X+]	SP Shift Input	R/W	ENUM	-	0	5
4503	P04.5.05 [X+]	SP Shift VALUE 1	R/W	FLOAT32	-	-	-

4505	P04.5.06 [X+]	SP Shift VALUE 2	R/W	FLOAT32	-	-	-
4507	P04.5.10 [X+]	SP Shift X 1	R/W	FLOAT32	-	-	P04.5.11 - SP Shift X 2
4509	P04.5.11 [X+]	SP Shift X 2	R/W	FLOAT32	-	P04.5.10 - SP Shift X 1	P04.5.12 - SP Shift X 3
4511	P04.5.12 [X+]	SP Shift X 3	R/W	FLOAT32	-	P04.5.11 - SP Shift X 2	P04.5.13 - SP Shift X 4
4513	P04.5.13 [X+]	SP Shift X 4	R/W	FLOAT32	-	P04.5.12 - SP Shift X 3	-
4601	P04.6.01	Pipe Filling Function	R/W	ENUM	-	0	2
4602	P04.6.03	Pipe Filling Threshold	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
4604	P04.6.05	Pipe Filling Time	R/W	UINT16	s	0	999
4605	P04.6.06	Max Pipe Filling Pumps	R/W	UINT16	-	1	P06.0.02 - Max Units
4606	P04.6.10	Pipe Filling Steady Time	R/W	UINT16	s	1	P04.6.05 - Pipe Filling Time
4607	P04.6.15	Pipe Filling Speed Step	R/W	UINT16	%	5	100
5000	P05.0.00	Actual Value Source	R/W	ENUM	-	0	7
5001	P05.0.01	Actuator - Zero Value	R/W	UINT16	rpm	0	9999
5002	P05.0.02	Actuator - Full Scale	R/W	UINT16	rpm	0	9999
5003	P05.0.11	Pressure - Zero Value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	-5	10
5005	P05.0.12	Pressure - Full Scale	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	100
5007	P05.0.21 [X+]	Flow - Zero Value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
5009	P05.0.22 [X+]	Flow - Full Scale	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
5011	P05.0.31 [X+]	Temperature - Zero Value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
5013	P05.0.32 [X+]	Temperature - Full Scale	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
5015	P05.0.41 [X+]	Level - Zero Value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
5017	P05.0.42 [X+]	Level - Full Scale	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
5021	P05.0.61 [X+]	SPS Pressure Zero Value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	-1	99
5023	P05.0.62 [X+]	SPS Pressure Full Scale	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	999
5025	P05.0.51 [X+]	Generic - Zero Value	R/W	FLOAT32	-	-1000	1000
5027	P05.0.52 [X+]	Generic - Full Scale	R/W	FLOAT32	-	-1000	1000
5101	P05.1.01	Analog Input 1 Function	R/W	ENUM	-	0	7
5102	P05.1.02	Analog Input 1 Type	R/W	ENUM	-	0	3
5103	P05.1.11	Analog Input 2 Function	R/W	ENUM	-	0	7
5104	P05.1.12	Analog Input 2 Type	R/W	ENUM	-	0	3
5105	P05.1.21 [X+]	Analog Input 3 Function	R/W	ENUM	-	0	7
5106	P05.1.22 [X+]	Analog Input 3 Type	R/W	ENUM	-	0	3

5107	P05.1.31 [X+]	Analog Input 4 Function	R/W	ENUM	-	0	7
5108	P05.1.32 [X+]	Analog Input 4 Type	R/W	ENUM	-	0	3
5109	P05.1.40 [X+]	Sensor Curve	R/W	ENUM	-	0	1
5110	P05.1.50	Analog Actuator Type	R/W	ENUM	-	0	1
5203	P05.2.03	Digital Input 3 Function	R/W	ENUM	-	0	9
5204	P05.2.04 [X+]	Digital Input 4 Function	R/W	ENUM	-	0	9
5205	P05.2.05 [X+]	Digital Input 5 Function	R/W	ENUM	-	0	9
5301	P05.3.01	Analog Output Function	R/W	ENUM	-	0	12
5302	P05.3.02	Analog Output Type	R/W	ENUM	-	0	3
5401	P05.4.01	Relay 1 Function	R/W	ENUM	-	0	7
5402	P05.4.02	Relay 2 Function	R/W	ENUM	-	0	7
5801	P05.8.01	Analog Input 1 Offset	R/W	FLOAT32	-	-100	100
5803	P05.8.02	Analog Input 1 Gain	R/W	FLOAT32	-	0	1.5
5805	P05.8.11	Analog Input 2 Offset	R/W	FLOAT32	-	-100	100
5807	P05.8.12	Analog Input 2 Gain	R/W	FLOAT32	-	0	1.5
5809	P05.8.21 [X+]	Analog Input 3 Offset	R/W	FLOAT32	-	-100	100
5811	P05.8.22 [X+]	Analog Input 3 Gain	R/W	FLOAT32	-	0	1.5
5813	P05.8.31 [X+]	Analog Input 4 Offset	R/W	FLOAT32	-	-100	100
5815	P05.8.32 [X+]	Analog Input 4 Gain	R/W	FLOAT32	-	0	1.5
5844	P05.8.44	Analog Output 1 Offset	R/W	FLOAT32	P05.3.02 - Analog Output Type	-100	100
5846	P05.8.45	Analog Output 1 Gain	R/W	FLOAT32	-	0	1.5
6001	P06.0.01	System Configuration	R/W	ENUM	-	0	2
6002	P06.0.02	Max Units	R/W	UINT16	-	1	-
6003	P06.0.03	Multipump Address	R/W	UINT16	-	1	-
6004	P06.0.04	Multipump Map	R	UINT16	-	-	-
6005	P06.0.05	Multipump Priority	R	UINT16	-	-	-
6111	P06.1.11	Pressure - Inc. value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
6113	P06.1.12	Pressure - Dec. value	R/W	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
6115	P06.1.21 [X+]	Flow - Inc. value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
6117	P06.1.22 [X+]	Flow - Dec. value	R/W	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
6119	P06.1.31 [X+]	Temperature - Inc. value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
6121	P06.1.32 [X+]	Temperature - Dec. value	R/W	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
6123	P06.1.41 [X+]	Level - Inc. value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale

6125	P06.1.42 [X+]	Level - Dec. value	R/W	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
6129	P06.1.61	Multipump Enable Speed	R/W	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
6130	P06.1.71	Synchronous Limit	R/W	UINT16	rpm	0	3600
6131	P06.1.72	Synchronous Window	R/W	UINT16	rpm	0	P04.2.32 - Max Speed
6132	P06.1.81	Automatic Switchover Interval	R/W	UINT16	h	0	250
6133	-	MultipumpDeviceEnable	R/W	UINT16	-	0	1
6134	P06.1.51 [X+]	Generic - Inc. value	R/W	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
6136	P06.1.52 [X+]	Generic - Dec. value	R/W	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
7001	P07.0.01	Max 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 - Min Speed	P04.2.32 - Max 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
7301	P07.3.01	Feed Forward Function	R/W	ENUM	-	0	1
8001	P08.0.01	Com 1 Function	R/W	ENUM	-	0	3
8002	P08.0.02	Com 2 Function	R/W	ENUM	-	0	2
8101	P08.1.01	Modbus RTU Address	R/W	UINT16	-	0	127
8102	P08.1.02	Modbus RTU Baudrate	R/W	ENUM	-	0	8
8108	P08.1.08	Modbus RTU Format	R/W	ENUM	-	0	3
8201	P08.2.01	BACnet MS/TP Mac Address	R/W	UINT16	-	0	P08.2.05 - BACnet MS/TP Max Master
8202	P08.2.02	BACnet MS/TP Baudrate	R/W	ENUM	-	0	8
8203	P08.2.03	BACnet MS/TP Format	R/W	ENUM	-	0	3
8204	P08.2.04	BACnet MS/TP Device Id	R/W	UINT32	-	-	4194304
8206	P08.2.05	BACnet MS/TP Max Master	R/W	UINT16	-	P08.2.01 - BACnet MS/TP Mac Address	127
8210	-	BACnet Info Frames	R/W	UINT16	-	1	255
8211	-	BACnet Reinit	R/W	ENUM	-	0	1
8301	P08.3.01	Enable Wireless Communication	R/W	ENUM	-	0	1
9001	P09.0.01 [X+]	Language	R/W	ENUM	-	0	28
9011	P09.0.12 [X+]	Time	R/W	UINT32	-	-	-
9013	P09.0.11 [X+]	Date	R/W	UINT32	-	-	-
9101	P09.2.01 [X+]	Select Active Parameter Set	R/W	ENUM	-	0	1
9201	P09.1.01	Display Energy Saving	R/W	ENUM	-	0	1
9202	P09.1.02	Energy Saving Time	R/W	UINT16	s	60	3600
9210	P09.1.10	Display Orientation	R/W	ENUM	-	0	1
9211	P09.1.11	Max Decimals	R/W	UINT16	-	0	3
9301	P09.3.01	Error Log Reset	R/W	ENUM	-	0	1
9302	P09.3.02	Operating Time Counter Reset	R/W	ENUM	-	0	1
9303	P09.3.03	Motor Running Counter Reset	R/W	ENUM	-	0	1

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 [X+]	Commissioning Completed	R/W	ENUM	-	0	1
9307	P09.3.07	Bonded Device List Reset	R/W	ENUM	-	0	1

9 BACnet MS/TP

9.1 Protocol implementation compliance statement (PICS)

Declaration of Conformity

Data	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

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.

9.2 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.

9.3 Connections and data management, BACnet MS/TP

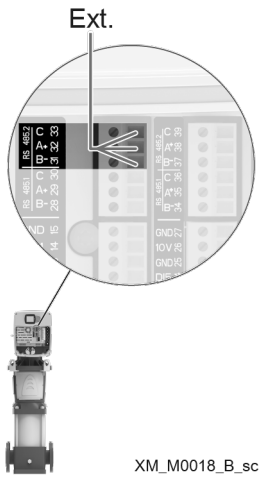
- When BACnet MS/TP communication between the drive and an external device is active, the connection status light on the operation panel is on.
- Set parameter *P04.1.60 Limit Setpoint Saving* to *Yes* to write to the volatile memory area and extend the life of the non-volatile EEPROM memory.

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.



9.4 BACnet Strings TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type			
0	P03.4.01	Unit Part Number	Unit Part Number	UINT16	-	-	-
1	P03.4.03	Unit Serial Number	Unit Serial Number	UINT16	-	-	-
2	P03.4.06	Drive Serial Number	Drive Serial Number	UINT16	-	-	-

9.5 BACnet Analog Inputs TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type	Dimension	Min	Max
0	P02.0.01	Error 1 (Most Recent)	Error 1 (Most Recent)	UINT16	-	-	-
1	-	Error 1 - Date	Error 1 - Date	UINT32	-	-	-
2	-	Error 1 - Time	Error 1 - Time	UINT32	-	-	-
3	-	Error 1 - End Date	Error 1 - End Date	UINT32	-	-	-
4	-	Error 1 - End Time	Error 1 - End Time	UINT32	-	-	-
5	-	Log: Error Counter	Log: Error Counter 1	UINT16	-	-	-
6	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 1	UINT32	-	-	-
7	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 1	UINT32	-	-	-
8	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 1	UINT32	-	-	-
9	-	LogSpeed	Log: Speed 1	UINT32	-	-	-
10	-	Log: Error Code	Log: Error Code 1	UINT32	-	-	-
11	-	Log: Flow	Log: Flow 1	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
12	-	Log: Head	Log: Head 1	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
13	-	Log: Power Module Temperature	Log: Power Module Temp 1	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
14	-	Log: Motor Current	Log: Motor Current 1	FLOAT32	A	-	-
15	-	Log: Motor Voltage	Log: Motor Voltage 1	FLOAT32	V	-	-
16	-	Log: Inverter Temperature	Log: Inverter Temperature 1	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
17	-	LogPower	Log: Motor Power 1	FLOAT32	-	-	-
18	-	Log: DC Bus Voltage	Log: DC Bus Voltage 1	FLOAT32	V	-	-
19	-	Log: Grid Voltage	Log: Grid Voltage 1	FLOAT32	V	-	-
20	P02.0.02	Error 2	Error 2	UINT16	-	-	-
21	-	Error 2 - Date	Error 2 - Date	UINT32	-	-	-
22	-	Error 2 - Time	Error 2 - Time	UINT32	-	-	-
23	-	Error 2 - End Date	Error 2 - End Date	UINT32	-	-	-
24	-	Error 2 - End Time	Error 2 - End Time 1	UINT32	-	-	-
25	-	Log: Error Counter	Log: Error Counter 2	UINT16	-	-	-
26	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 2	UINT32	-	-	-
27	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 2	UINT32	-	-	-
28	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 2	UINT32	-	-	-
29	-	LogSpeed	Log: Speed 2	UINT32	-	-	-
30	-	Log: Error Code	Log: Error Code 2	UINT32	-	-	-
31	-	Log: Flow	Log: Flow 2	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
32	-	Log: Head	Log: Head 2	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
33	-	Log: Power Module Temperature	Log: Power Module Temp 2	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
34	-	Log: Motor Current	Log: Motor Current 2	FLOAT32	A	-	-
35	-	Log: Motor Voltage	Log: Motor Voltage 2	FLOAT32	V	-	-

36	-	Log: Inverter Temperature	Log: Inverter Temperature 2	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
37	-	LogPower	Log: Motor Power 2	FLOAT32	-	-	-
38	-	Log: DC Bus Voltage	Log: DC Bus Voltage 2	FLOAT32	V	-	-
39	-	Log: Grid Voltage	Log: Grid Voltage 2	FLOAT32	V	-	-
40	P02.0.03	Error 3	Error 3	UINT16	-	-	-
41	-	Error 3 - Date	Error 3 - Date	UINT32	-	-	-
42	-	Error 3 - Time	Error 3 - Time	UINT32	-	-	-
43	-	Error 3 - End Date	Error 3 - End Date	UINT32	-	-	-
44	-	Error 3 - End Time	Error 3 - End Time 1	UINT32	-	-	-
45	-	Log: Error Counter	Log: Error Counter 3	UINT16	-	-	-
46	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 3	UINT32	-	-	-
47	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 3	UINT32	-	-	-
48	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 3	UINT32	-	-	-
49	-	LogSpeed	Log: Speed 3	UINT32	-	-	-
50	-	Log: Error Code	Log: Error Code 3	UINT32	-	-	-
51	-	Log: Flow	Log: Flow 3	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
52	-	Log: Head	Log: Head 3	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
53	-	Log: Power Module Temperature	Log: Power Module Temp 3	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
54	-	Log: Motor Current	Log: Motor Current 3	FLOAT32	A	-	-
55	-	Log: Motor Voltage	Log: Motor Voltage 3	FLOAT32	V	-	-
56	-	Log: Inverter Temperature	Log: Inverter Temperature 3	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
57	-	LogPower	Log: Motor Power 3	FLOAT32	-	-	-
58	-	Log: DC Bus Voltage	Log: DC Bus Voltage 3	FLOAT32	V	-	-
59	-	Log: Grid Voltage	Log: Grid Voltage 3	FLOAT32	V	-	-
60	P02.0.04	Error 4	Error 4	UINT16	-	-	-
61	-	Error 4 - Date	Error 4 - Date	UINT32	-	-	-
62	-	Error 4 - Time	Error 4 - Time	UINT32	-	-	-
63	-	Error 4 - End Date	Error 4 - End Date	UINT32	-	-	-
64	-	Error 4 - End Time	Error 4 - End Time 1	UINT32	-	-	-
65	-	Log: Error Counter	Log: Error Counter 4	UINT16	-	-	-
66	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 4	UINT32	-	-	-
67	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 4	UINT32	-	-	-
68	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 4	UINT32	-	-	-
69	-	LogSpeed	Log: Speed 4	UINT32	-	-	-
70	-	Log: Error Code	Log: Error Code 4	UINT32	-	-	-
71	-	Log: Flow	Log: Flow 4	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
72	-	Log: Head	Log: Head 4	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
73	-	Log: Power Module Temperature	Log: Power Module Temp 4	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
74	-	Log: Motor Current	Log: Motor Current 4	FLOAT32	A	-	-
75	-	Log: Motor Voltage	Log: Motor Voltage 4	FLOAT32	V	-	-
76	-	Log: Inverter Temperature	Log: Inverter Temperature 4	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
77	-	LogPower	Log: Motor Power 4	FLOAT32	-	-	-
78	-	Log: DC Bus Voltage	Log: DC Bus Voltage 4	FLOAT32	V	-	-
79	-	Log: Grid Voltage	Log: Grid Voltage 4	FLOAT32	V	-	-
80	P02.0.05	Error 5	Error 5	UINT16	-	-	-
81	-	Error 5 - Date	Error 5 - Date	UINT32	-	-	-
82	-	Error 5 - Time	Error 5 - Time	UINT32	-	-	-
83	-	Error 5 - End Date	Error 5 - End Date	UINT32	-	-	-

84	-	Error 5 - End Time	Error 5 - End Time 1	UINT32	-	-	-
85	-	Log: Error Counter	Log: Error Counter 5	UINT16	-	-	-
86	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 5	UINT32	-	-	-
87	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 5	UINT32	-	-	-
88	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 5	UINT32	-	-	-
89	-	LogSpeed	Log: Speed 5	UINT32	-	-	-
90	-	Log: Error Code	Log: Error Code 5	UINT32	-	-	-
91	-	Log: Flow	Log: Flow 5	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
92	-	Log: Head	Log: Head 5	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
93	-	Log: Power Module Temperature	Log: Power Module Temp 5	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
94	-	Log: Motor Current	Log: Motor Current 5	FLOAT32	A	-	-
95	-	Log: Motor Voltage	Log: Motor Voltage 5	FLOAT32	V	-	-
96	-	Log: Inverter Temperature	Log: Inverter Temperature 5	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
97	-	LogPower	Log: Motor Power 5	FLOAT32	-	-	-
98	-	Log: DC Bus Voltage	Log: DC Bus Voltage 5	FLOAT32	V	-	-
99	-	Log: Grid Voltage	Log: Grid Voltage 5	FLOAT32	V	-	-
100	P02.0.06	Error 6	Error 6	UINT16	-	-	-
101	-	Error 6 - Date	Error 6 - Date	UINT32	-	-	-
102	-	Error 6 - Time	Error 6 - Time	UINT32	-	-	-
103	-	Error 6 - End Date	Error 6 - End Date	UINT32	-	-	-
104	-	Error 6 - End Time	Error 6 - End Time 1	UINT32	-	-	-
105	-	Log: Error Counter	Log: Error Counter 6	UINT16	-	-	-
106	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 6	UINT32	-	-	-
107	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 6	UINT32	-	-	-
108	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 6	UINT32	-	-	-
109	-	LogSpeed	Log: Speed 6	UINT32	-	-	-
110	-	Log: Error Code	Log: Error Code 6	UINT32	-	-	-
111	-	Log: Flow	Log: Flow 6	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
112	-	Log: Head	Log: Head 6	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
113	-	Log: Power Module Temperature	Log: Power Module Temp 6	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
114	-	Log: Motor Current	Log: Motor Current 6	FLOAT32	A	-	-
115	-	Log: Motor Voltage	Log: Motor Voltage 6	FLOAT32	V	-	-
116	-	Log: Inverter Temperature	Log: Inverter Temperature 6	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
117	-	LogPower	Log: Motor Power 6	FLOAT32	-	-	-
118	-	Log: DC Bus Voltage	Log: DC Bus Voltage 6	FLOAT32	V	-	-
119	-	Log: Grid Voltage	Log: Grid Voltage 6	FLOAT32	V	-	-
120	P02.0.07	Error 7	Error 7	UINT16	-	-	-
121	-	Error 7 - Date	Error 7 - Date	UINT32	-	-	-
122	-	Error 7 - Time	Error 7 - Time	UINT32	-	-	-
123	-	Error 7 - End Date	Error 7 - End Date	UINT32	-	-	-
124	-	Error 7 - End Time	Error 7 - End Time 1	UINT32	-	-	-
125	-	Log: Error Counter	Log: Error Counter 7	UINT16	-	-	-
126	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 7	UINT32	-	-	-
127	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 7	UINT32	-	-	-
128	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 7	UINT32	-	-	-
129	-	LogSpeed	Log: Speed 7	UINT32	-	-	-
130	-	Log: Error Code	Log: Error Code 7	UINT32	-	-	-
131	-	Log: Flow	Log: Flow 7	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-

132	-	Log: Head	Log: Head 7	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
133	-	Log: Power Module Temperature	Log: Power Module Temp 7	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
134	-	Log: Motor Current	Log: Motor Current 7	FLOAT32	A	-	-
135	-	Log: Motor Voltage	Log: Motor Voltage 7	FLOAT32	V	-	-
136	-	Log: Inverter Temperature	Log: Inverter Temperature 7	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
137	-	LogPower	Log: Motor Power 7	FLOAT32	-	-	-
138	-	Log: DC Bus Voltage	Log: DC Bus Voltage 7	FLOAT32	V	-	-
139	-	Log: Grid Voltage	Log: Grid Voltage 7	FLOAT32	V	-	-
140	P02.0.08	Error 8	Error 8	UINT16	-	-	-
141	-	Error 8 - Date	Error 8 - Date	UINT32	-	-	-
142	-	Error 8 - Time	Error 8 - Time	UINT32	-	-	-
143	-	Error 8 - End Date	Error 8 - End Date	UINT32	-	-	-
144	-	Error 8 - End Time	Error 8 - End Time 1	UINT32	-	-	-
145	-	Log: Error Counter	Log: Error Counter 8	UINT16	-	-	-
146	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 8	UINT32	-	-	-
147	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 8	UINT32	-	-	-
148	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 8	UINT32	-	-	-
149	-	LogSpeed	Log: Speed 8	UINT32	-	-	-
150	-	Log: Error Code	Log: Error Code 8	UINT32	-	-	-
151	-	Log: Flow	Log: Flow 8	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
152	-	Log: Head	Log: Head 8	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
153	-	Log: Power Module Temperature	Log: Power Module Temp 8	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
154	-	Log: Motor Current	Log: Motor Current 8	FLOAT32	A	-	-
155	-	Log: Motor Voltage	Log: Motor Voltage 8	FLOAT32	V	-	-
156	-	Log: Inverter Temperature	Log: Inverter Temperature 8	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
157	-	LogPower	Log: Motor Power 8	FLOAT32	-	-	-
158	-	Log: DC Bus Voltage	Log: DC Bus Voltage 8	FLOAT32	V	-	-
159	-	Log: Grid Voltage	Log: Grid Voltage 8	FLOAT32	V	-	-
160	P02.0.09	Error 9	Error 9	UINT16	-	-	-
161	-	Error 9 - Date	Error 9 - Date	UINT32	-	-	-
162	-	Error 9 - Time	Error 9 - Time	UINT32	-	-	-
163	-	Error 9 - End Date	Error 9 - End Date	UINT32	-	-	-
164	-	Error 9 - End Time	Error 9 - End Time 1	UINT32	-	-	-
165	-	Log: Error Counter	Log: Error Counter 9	UINT16	-	-	-
166	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 9	UINT32	-	-	-
167	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 9	UINT32	-	-	-
168	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 9	UINT32	-	-	-
169	-	LogSpeed	Log: Speed 9	UINT32	-	-	-
170	-	Log: Error Code	Log: Error Code 9	UINT32	-	-	-
171	-	Log: Flow	Log: Flow 9	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
172	-	Log: Head	Log: Head 9	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
173	-	Log: Power Module Temperature	Log: Power Module Temp 9	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
174	-	Log: Motor Current	Log: Motor Current 9	FLOAT32	A	-	-
175	-	Log: Motor Voltage	Log: Motor Voltage 9	FLOAT32	V	-	-
176	-	Log: Inverter Temperature	Log: Inverter Temperature 9	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
177	-	LogPower	Log: Motor Power 9	FLOAT32	-	-	-

178	-	Log: DC Bus Voltage	Log: DC Bus Voltage 9	FLOAT32	V	-	-
179	-	Log: Grid Voltage	Log: Grid Voltage 9	FLOAT32	V	-	-
180	P02.0.10	Error 10	Error 10	UINT16	-	-	-
181	-	Error 10 - Date	Error 10 - Date	UINT32	-	-	-
182	-	Error 10 - Time	Error 10 - Time	UINT32	-	-	-
183	-	Error 10 - End Date	Error 10 - End Date	UINT32	-	-	-
184	-	Error 10 - End Time	Error 10 - End Time 1	UINT32	-	-	-
185	-	Log: Error Counter	Log: Error Counter 10	UINT16	-	-	-
186	-	Log: Error 1 Bitfield	Log: Error 1 Bitfield 10	UINT32	-	-	-
187	-	Log: Error 2 Bitfield	Log: Error 2 Bitfield 10	UINT32	-	-	-
188	-	Log: Alarm 1 Bitfield	Log: Alarm 1 Bitfield 10	UINT32	-	-	-
189	-	LogSpeed	Log: Speed 10	UINT32	-	-	-
190	-	Log: Error Code	Log: Error Code 10	UINT32	-	-	-
191	-	Log: Flow	Log: Flow 10	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
192	-	Log: Head	Log: Head 10	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
193	-	Log: Power Module Temperature	Log: Power Module Temp 10	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
194	-	Log: Motor Current	Log: Motor Current 10	FLOAT32	A	-	-
195	-	Log: Motor Voltage	Log: Motor Voltage 10	FLOAT32	V	-	-
196	-	Log: Inverter Temperature	Log: Inverter Temperature 10	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
197	-	LogPower	Log: Motor Power 10	FLOAT32	-	-	-
198	-	Log: DC Bus Voltage	Log: DC Bus Voltage 10	FLOAT32	V	-	-
199	-	Log: Grid Voltage	Log: Grid Voltage 10	FLOAT32	V	-	-
200	-	Totoal Error Counter	Total Error Counter	UINT16	-	-	-
201	-	Total Alarm Counter	Total Alarm Counter	UINT16	-	-	-
202	P02.9.01	Error Bitfield 1	Error Bitfield 1	UINT32	-	-	-
203	P02.9.02	Error Bitfield 2	Error Bitfield 2	UINT32	-	-	-
204	P02.9.05	Alarm Bitfield 1	Alarm Bitfield 1	UINT32	-	-	-
205	P03.0.01	Actual Pressure	Actual Pressure	FLOAT32	P04.0.11 - Pressure Measuring Unit	-	-
206	P03.0.02 [X+]	Actual Flow	Actual Flow	FLOAT32	P04.0.12 - Flow Measuring Unit	-	-
207	P03.0.03 [X+]	Actual Fluid Temperature	Actual Fluid Temperature	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
208	P03.0.04 [X+]	Actual Level	Actual Level	FLOAT32	P04.0.14 - Level Measuring Unit	-	-
209	P03.0.10	Effective Required Value	Effective Required Value	FLOAT32	-	-	-
210	P03.0.20	Required Value	Required Value	FLOAT32	-	-	-
211	P03.0.30	Pump Status	Pump Status	ENUM	-	-	-
212	P03.1.01	Unit Powered Time	Unit Powered Time	UINT32	s	-	-
213	P03.1.02	Motor Running Time	Motor Running Time	UINT32	s	-	-
214	P03.1.05	Energy Counter	Energy Counter	FLOAT32	P04.0.16 - Energy Measuring Unit	-	-
215	P03.2.01	Motor Speed	Motor Speed	UINT16	rpm	-	-
216	P03.2.02	Motor Speed %	Motor Speed %	FLOAT32	%	-	-
217	P03.2.05	Motor Current	Motor Current	FLOAT32	A	-	-
218	P03.2.06	Motor Power	Motor Power	FLOAT32	P04.0.15 - Power Measuring Unit	-	-
219	P03.2.07	Motor Voltage	Motor Voltage	FLOAT32	V	-	-
220	P03.2.08	Grid Voltage	Grid Voltage	UINT16	V	-	-
221	P03.2.09	DC Bus Voltage	DC Bus Voltage	UINT16	V	-	-
222	P03.2.20	Power Module Temperature	Power Module Temperature	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-

223	P03.2.21	Inverter Temperature	Inverter Temperature	FLOAT32	P04.0.13 - Temperature Measuring Unit	-	-
224	P03.2.22	Motor Ptc	Motor Ptc	FLOAT32	-	-	-
225	P03.3.01	Digital I/O Status	Digital I/O Status	UINT16	-	-	-
226	P03.3.11	Analog Input 1 Value	Analog Input 1 Value	FLOAT32	P05.1.02 - Analog Input 1 Type	-	-
227	P03.3.12	Analog Input 2 Value	Analog Input 2 Value	FLOAT32	P05.1.12 - Analog Input 2 Type	-	-
228	P03.3.13 [X+]	Analog Input 3 Value	Analog Input 3 Value	FLOAT32	P05.1.22 - Analog Input 3 Type	-	-
229	P03.3.14 [X+]	Analog Input 4 Value	Analog Input 4 Value	FLOAT32	P05.1.32 - Analog Input 4 Type	-	-
230	P03.3.20	Analog Output Value	Analog Output Value	FLOAT32	P05.3.02 - Analog Output Type	-	-
231	P03.4.02	Unit Production Date	Unit Production Date	UINT32	-	-	-
232	P03.4.05	Drive Production Date	Drive Production Date	UINT32	-	-	-
233	-	Drive Type	Drive type	ENUM	-	-	-
234	P06.0.04	Multipump Map	Multipump Map	UINT16	-	-	-
235	P06.0.05	Multipump Priority	Multipump Priority	UINT16	-	-	-
236	P03.4.13	Control Card Firmware Version	Control Card Firmware Version	UINT32	-	-	-
237	P03.4.12	Power Card Firmware Version	Power Card Firmware Version	UINT32	-	-	-
238	P03.4.10	Hmi Firmware Version	Hmi Firmware Version	UINT32	-	-	-
239	P03.4.11	Hmi-Bt Firmware Version	Hmi-Bt Firmware Version	UINT32	-	-	-
240	P03.4.14	Map File Version	Map File Version	UINT32	-	-	-
241	P03.4.15	Default File Version	Default File Version	UINT32	-	-	-
242	P03.4.16	Parameter File Version	Parameter File Version	UINT32	-	-	-
243	P03.4.17 [X+]	Language File Version	Language File Version	UINT32	-	-	-
244	P03.0.00 [X+]	Estimated Actual Value	Senorless or Sensored	ENUM	-	-	-
245	P03.4.25	Hydraulic Curves Stored	EstimationCapability	ENUM	-	-	-

9.6 BACnet Analog Values TABLE

Object Identifier	Menu ID	Param. Name	BACnet Obj. Name	Type	Dimension	Min	Max
0	-	Select the ON/OFF status of the pump. Corresponds to the action on the ON/OFF button. 0-On 1-Off	On/Off Set	ENUM	-	0	1
1	-	Error Reset Command	ERRORRESTCMD	ENUM	-	0	1
2	P04.0.01	System Type	System Type	ENUM	-	0	2
3	P04.0.02	Control Mode	Control Mode	ENUM	-	0	7
4	P04.0.03	Regulation Mode	Regulation Mode	ENUM	-	0	1
5	P04.0.05	Start Value	Start Value	UINT16	%	0	100
6	P04.0.06	Auto Start	Auto Start	ENUM	-	0	1
7	P04.0.07	Min Speed Configuration	Min Speed Configuration	ENUM	-	0	1
8	P04.0.09	Measuring Unit Selection	Measuring Unit Selection	ENUM	-	0	1
9	P04.0.11	Pressure Measuring Unit	Pressure Measuring Unit	ENUM	-	0	8

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

32	P04.1.24 [X+]	Flow Setpoint 4	Flow Setpoint 4	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
33	P04.1.31 [X+]	Temp. Setpoint 1	Temp. Setpoint 1	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
34	P04.1.32 [X+]	Temp. Setpoint 2	Temp. Setpoint 2	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
35	P04.1.33 [X+]	Temp. Setpoint 3	Temp. Setpoint 3	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
36	P04.1.34 [X+]	Temp. Setpoint 4	Temp. Setpoint 4	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
37	P04.1.41 [X+]	Level Setpoint 1	Level Setpoint 1	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
38	P04.1.42 [X+]	Level Setpoint 2	Level Setpoint 2	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
39	P04.1.43 [X+]	Level Setpoint 3	Level Setpoint 3	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
40	P04.1.44 [X+]	Level Setpoint 4	Level Setpoint 4	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
41	P04.1.51 [X+]	Generic Setpoint 1	Generic Setpoint 1	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
42	P04.1.52 [X+]	Generic Setpoint 2	Generic Setpoint 2	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
43	P04.1.53 [X+]	Generic Setpoint 3	Generic Setpoint 3	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
44	P04.1.54 [X+]	Generic Setpoint 4	Generic Setpoint 4	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
45	P04.2.01	Window	Window	UINT16	%	1	100
46	P04.2.02	Hysteresis	Hysteresis	UINT16	%	1	100
47	P04.2.06	Lift Speed	Lift Speed	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
48	P04.2.07	Linear Lift Amount	Linear Lift Amount	UINT16	%	0	200
49	P04.2.08 [X+]	Quad. Lift Amount	Quad. Lift Amount	UINT16	%	0	999
50	P04.2.11	Ramp 1	Ramp 1	UINT16	s	1	250
51	P04.2.12	Ramp 2	Ramp 2	UINT16	s	1	250
52	P04.2.13	Ramp 3	Ramp 3	UINT16	s	1	999

53	P04.2.14	Ramp 4	Ramp 4	UINT16	s	1	999
54	P04.2.15	Ramp Speed Min Acceleration	Ramp Speed Min Acceleration	FLOAT32	s	0.1	25
55	P04.2.16	Ramp Speed Min Deceleration	Ramp Speed Min Deceleration	FLOAT32	s	0.1	25
56	P04.2.31	Min Speed	Min Speed	UINT16	rpm	0	2000
57	P04.2.32	Max Speed	Max Speed	UINT16	rpm	2000	4100
58	P04.2.35	Min Speed Time	Min Speed Time	UINT16	s	0	100
59	P04.3.00	Automatic Error Reset	Automatic Error Reset	ENUM	-	0	1
60	P04.3.01	Pressure - Minimum Threshold	Pressure - Minimum Threshold	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
61	P04.3.02 [X+]	Flow - Minimum Threshold	Flow - Minimum Threshold	FLOAT32	P04.0.12 - Flow Measuring Unit	P05.0.21 - Flow - Zero Value	P05.0.22 - Flow - Full Scale
62	P04.3.03 [X+]	Temperature - Minimum Threshold	Temperature - Minimum Thresho	FLOAT32	P04.0.13 - Temperature Measuring Unit	P05.0.31 - Temperature - Zero Value	P05.0.32 - Temperature - Full Scale
63	P04.3.04 [X+]	Level - Minimum Threshold	Level - Minimum Threshold	FLOAT32	P04.0.14 - Level Measuring Unit	P05.0.41 - Level - Zero Value	P05.0.42 - Level - Full Scale
64	P04.3.05 [X+]	Generic - Min. Threshold	Generic - Min. Threshold	FLOAT32	-	P05.0.51 - Generic - Zero Value	P05.0.52 - Generic - Full Scale
65	P04.3.10	Minimum Threshold Delay	Minimum Threshold Delay	UINT16	s	1	100
66	P04.3.11	Lack Of Water Delay	Lack Of Water Delay	UINT16	s	1	100
67	P04.4.01	Test Run Speed	Test Run Speed	UINT16	rpm	0	P04.2.32 - Max Speed
68	P04.4.02	Test Run Timeout	Test Run Timeout	UINT16	h	0	255
69	P04.4.03	Test Run Time	Test Run Time	UINT16	s	0	180
70	P04.4.05	Test Run Command	Test Run Command	ENUM	-	0	1
71	P04.6.01	Pipe Filling Function	Pipe Filling Function	ENUM	-	0	2
72	P04.6.03	Pipe Filling Threshold	Pipe Filling Threshold	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
73	P04.6.05	Pipe Filling Time	Pipe Filling Time	UINT16	s	0	999
74	P04.6.06	Max Pipe Filling Pumps	Max Pipe Filling Pumps	UINT16	-	1	P06.0.02 - Max Units
75	P04.6.10	Pipe Filling Steady Time	Pipe Filling Steady Time	UINT16	s	1	P04.6.05 - Pipe Filling Time
76	P04.6.15	Pipe Filling Speed Step	Pipe Filling Speed Step	UINT16	%	5	100
77	P05.0.00	Actual Value Source	Actual Value Source	ENUM	-	0	7
78	P05.0.01	Actuator - Zero Value	Actuator - Zero Value	UINT16	rpm	0	9999

79	P05.0.02	Actuator - Full Scale	Actuator - Full Scale	UINT16	rpm	0	9999
80	P05.0.11	Pressure - Zero Value	Pressure - Zero Value	FLOAT32	P04.0.11 - Pressure Measuring Unit	-5	10
81	P05.0.12	Pressure - Full Scale	Pressure - Full Scale	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	100
82	P05.0.21 [X+]	Flow - Zero Value	Flow - Zero Value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
83	P05.0.22 [X+]	Flow - Full Scale	Flow - Full Scale	FLOAT32	P04.0.12 - Flow Measuring Unit	0	9999
84	P05.0.31 [X+]	Temperature - Zero Value	Temperature - Zero Value	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
85	P05.0.32 [X+]	Temperature - Full Scale	Temperature - Full Scale	FLOAT32	P04.0.13 - Temperature Measuring Unit	-100	9999
86	P05.0.41 [X+]	Level - Zero Value	Level - Zero Value	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
87	P05.0.42 [X+]	Level - Full Scale	Level - Full Scale	FLOAT32	P04.0.14 - Level Measuring Unit	-999	9999
88	P05.0.51 [X+]	Generic - Zero Value	Generic - Zero Value	FLOAT32	-	-1000	1000
89	P05.0.52 [X+]	Generic - Full Scale	Generic - Full Scale	FLOAT32	-	-1000	1000
90	P05.1.01	Analog Input 1 Function	Analog Input 1 Function	ENUM	-	0	7
91	P05.1.02	Analog Input 1 Type	Analog Input 1 Type	ENUM	-	0	3
92	P05.1.11	Analog Input 2 Function	Analog Input 2 Function	ENUM	-	0	7
93	P05.1.12	Analog Input 2 Type	Analog Input 2 Type	ENUM	-	0	3
94	P05.1.21 [X+]	Analog Input 3 Function	Analog Input 3 Function	ENUM	-	0	7
95	P05.1.22 [X+]	Analog Input 3 Type	Analog Input 3 Type	ENUM	-	0	3
96	P05.1.31 [X+]	Analog Input 4 Function	Analog Input 4 Function	ENUM	-	0	7
97	P05.1.32 [X+]	Analog Input 4 Type	Analog Input 4 Type	ENUM	-	0	3
98	P05.1.40 [X+]	Sensor Curve	Sensor Curve	ENUM	-	0	1
99	P05.1.50 [X+]	Analog Actuator Type	Analog Actuator Type	ENUM	-	0	1

100	P05.2.03	Digital Input 3 Function	Digital Input 3 Function	ENUM	-	0	9
101	P05.2.04 [X+]	Digital Input 4 Function	Digital Input 4 Function	ENUM	-	0	9
102	P05.2.05 [X+]	Digital Input 5 Function	Digital Input 5 Function	ENUM	-	0	9
103	P05.3.01	Analog Output Function	Analog Output Function	ENUM	-	0	12
104	P05.3.02	Analog Output Type	Analog Output Type	ENUM	-	0	3
105	P05.4.01	Relay 1 Function	Relay 1 Function	ENUM	-	0	7
106	P05.4.02	Relay 2 Function	Relay 2 Function	ENUM	-	0	7
107	P05.8.01	Analog Input 1 Offset	Analog Input 1 Offset	FLOAT32	-	-100	100
108	P05.8.02	Analog Input 1 Gain	Analog Input 1 Gain	FLOAT32	-	0	1.5
109	P05.8.11	Analog Input 2 Offset	Analog Input 2 Offset	FLOAT32	-	-100	100
110	P05.8.12	Analog Input 2 Gain	Analog Input 2 Gain	FLOAT32	-	0	1.5
111	P05.8.21 [X+]	Analog Input 3 Offset	Analog Input 3 Offset	FLOAT32	-	-100	100
112	P05.8.22 [X+]	Analog Input 3 Gain	Analog Input 3 Gain	FLOAT32	-	0	1.5
113	P05.8.31 [X+]	Analog Input 4 Offset	Analog Input 4 Offset	FLOAT32	-	-100	100
114	P05.8.32 [X+]	Analog Input 4 Gain	Analog Input 4 Gain	FLOAT32	-	0	1.5
115	P06.0.01	System Configuration	System Configuration	ENUM	-	0	2
116	P06.0.02	Max Units	Max Units	UINT16	-	1	-
117	P06.0.03	Multipump Address	Multipump Address	UINT16	-	1	-
118	P06.1.11	Pressure - Inc. value	Pressure - Inc. value	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
119	P06.1.12	Pressure - Dec. value	Pressure - Dec. value	FLOAT32	P04.0.11 - Pressure Measuring Unit	0	P05.0.12 - Pressure - Full Scale
120	P06.1.21 [X+]	Flow - Inc. value	Flow - Inc. value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
121	P06.1.22 [X+]	Flow - Dec. value	Flow - Dec. value	FLOAT32	P04.0.12 - Flow Measuring Unit	0	P05.0.22 - Flow - Full Scale
122	P06.1.31 [X+]	Temperature - Inc. value	Temperature - Inc. value	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale
123	P06.1.32 [X+]	Temperature - Dec. value	Temperature - Dec. value	FLOAT32	P04.0.13 - Temperature Measuring Unit	0	P05.0.32 - Temperature - Full Scale

124	P06.1.41 [X+]	Level - Inc. value	Level - Inc. value	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
125	P06.1.42 [X+]	Level - Dec. value	Level - Dec. value	FLOAT32	P04.0.14 - Level Measuring Unit	0	P05.0.42 - Level - Full Scale
126	P06.1.51 [X+]	Generic - Inc. value	Generic - Inc. value	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
127	P06.1.52 [X+]	Generic - Dec. value	Generic - Dec. value	FLOAT32	-	0	P05.0.52 - Generic - Full Scale
128	P06.1.61	Multipump Enable Speed	Multipump Enable Speed	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
129	P06.1.71	Synchronous Limit	Synchronous Limit	UINT16	rpm	0	3600
130	P06.1.72	Synchronous Window	Synchronous Window	UINT16	rpm	0	P04.2.32 - Max Speed
131	P06.1.81	Automatic Switchover Interval	Automatic Switchover Interval	UINT16	h	0	250
132	P07.0.01	Max Switching Frequency	Max Switching Frequency	ENUM	-	0	5
133	P07.0.02	Min Switching Frequency	Min Switching Frequency	ENUM	-	0	5
134	P07.1.01	Skip Speed Center	Skip Speed Center	UINT16	rpm	P04.2.31 - Min Speed	P04.2.32 - Max Speed
135	P07.1.02	Skip Speed Range	Skip Speed Range	UINT16	rpm	0	300
136	P07.2.01	Motor heating function	Motor heating function	ENUM	-	0	2
137	P08.0.01	Com 1 Function	Com 1 Function	ENUM	-	0	3
138	P08.0.02	Com 2 Function	Com 2 Function	ENUM	-	0	2
139	P08.1.01	Modbus RTU Address	Modbus RTU Address	UINT16	-	0	127
140	P08.1.02	Modbus RTU Baudrate	Modbus RTU Baudrate	ENUM	-	0	8
141	P08.1.08	Modbus RTU Format	Modbus RTU Format	ENUM	-	0	3
142	P08.2.01	BACnet MS/TP Mac Address	BACnet MS/TP Mac Address	UINT16	-	0	P08.2.05 - BACnet MS/TP Max Master
143	P08.2.02	BACnet MS/TP Baudrate	BACnet MS/TP Baudrate	ENUM	-	0	8
144	P08.2.03	BACnet MS/TP Format	BACnet MS/TP Format	ENUM	-	0	3
145	P08.2.04	BACnet MS/TP Device Id	BACnet MS/TP Device Id	UINT32	-	-	4194304
146	P08.2.05	BACnet MS/TP Max Master	BACnet MS/TP Max Master	UINT16	-	P08.2.01 - BACnet MS/TP Mac Address	127
147	-	BACnet Info Frames	BACnet Info Frames	UINT16	-	1	255
148	-	BACnet Reinit	BACnet Reinit	ENUM	-	0	1
149	P08.3.01	Enable Wireless Communication	Enable Wireless Communication	ENUM	-	0	1

150	P09.0.01 [X+]	Language	Language	ENUM	-	0	28
151	P09.0.12 [X+]	Time	Time	UINT32	-	-	-
152	P09.0.11 [X+]	Date	Date	UINT32	-	-	-
153	P09.1.01	Display Energy Saving	Display Energy Saving	ENUM	-	0	1
154	P09.1.02	Energy Saving Time	Energy Saving Time	UINT16	s	60	3600
155	P09.1.10	Display Orientation	Display Orientation	ENUM	-	0	1
156	P09.3.01	Error Log Reset	Error Log Reset	ENUM	-	0	1
157	P09.3.02	Operating Time Counter Reset	Operating Time Couter Reset	ENUM	-	0	1
158	P09.3.03	Motor Running Counter Reset	Motor Running Counter Reset	ENUM	-	0	1
159	P09.3.04	Energy Counter Reset	Energy Counter Reset	ENUM	-	0	1
160	P09.3.05	Factory Restore	Factory Restore	ENUM	-	0	1
161	P09.3.06	Commissioning Completed	Commissioning Completed	ENUM	-	0	1
162	P09.3.07	Bonded Device List Reset	Bonded Device List Reset	ENUM	-	0	1
163	P04.1.60	Limit setpoint saving	Limit setpoint saving	ENUM	-	0	1
164	P01.6.01 [X+]	H0 Pressure	Setpoint Zero Flow	FLOAT32	P04.0.11 - Pressure Measuring Unit	P05.0.11 - Pressure - Zero Value	P05.0.12 - Pressure - Full Scale
165	P04.2.00 [X+]	Regulation Type	Regulation Type	ENUM	-	0	1
166	P05.8.44	Analog Output 1 Offset	Analog Output 1 Offset	FLOAT32	P05.3.02 - Analog Output Type	-100	100
167	P05.8.45	Analog Output 1 Gain	Analog Output 1 Gain	FLOAT32	-	0	1.5

10 Maintenance

10.1 Precautions

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.
- After disconnecting the system from the power supply, wait 2 min for the discharge of the residual current.

WARNING: Physical and thermal hazards

- Always wear personal protective equipment.
- Always use suitable working tools.
- If the motor is installed in the pump unit, in case of very hot or cold liquids pay attention to the risk of injury to people.

Before starting work:

- Make sure to read and understand all the safety instructions in **Introduction and Safety**.
- Allow the pump unit and all system components to cool down before touching them.
- Ensure that the unit is isolated from the system and that the pressure is zero before disassembling the pump unit, removing the fill and drain plugs or disconnecting the piping system.

Motor magnetic field

The disassembly or installation of the rotor in the motor casing generates a strong magnetic field:

DANGER: Magnetic hazard

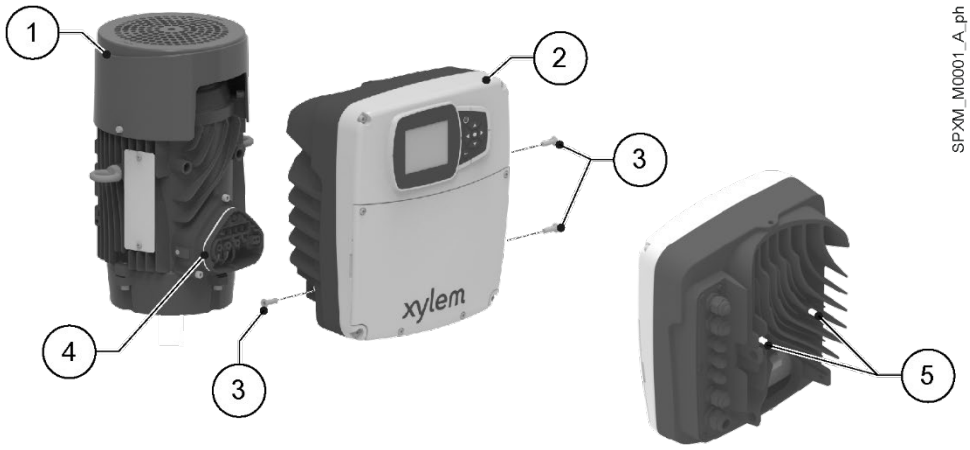
The magnetic field may be dangerous for anyone wearing pacemakers, or any other medical devices sensitive to magnetic fields.

NOTE:

The magnetic field may attract metal debris on the rotor surface, causing damage to the same.

10.2 HVX or HVX+ drive replacement

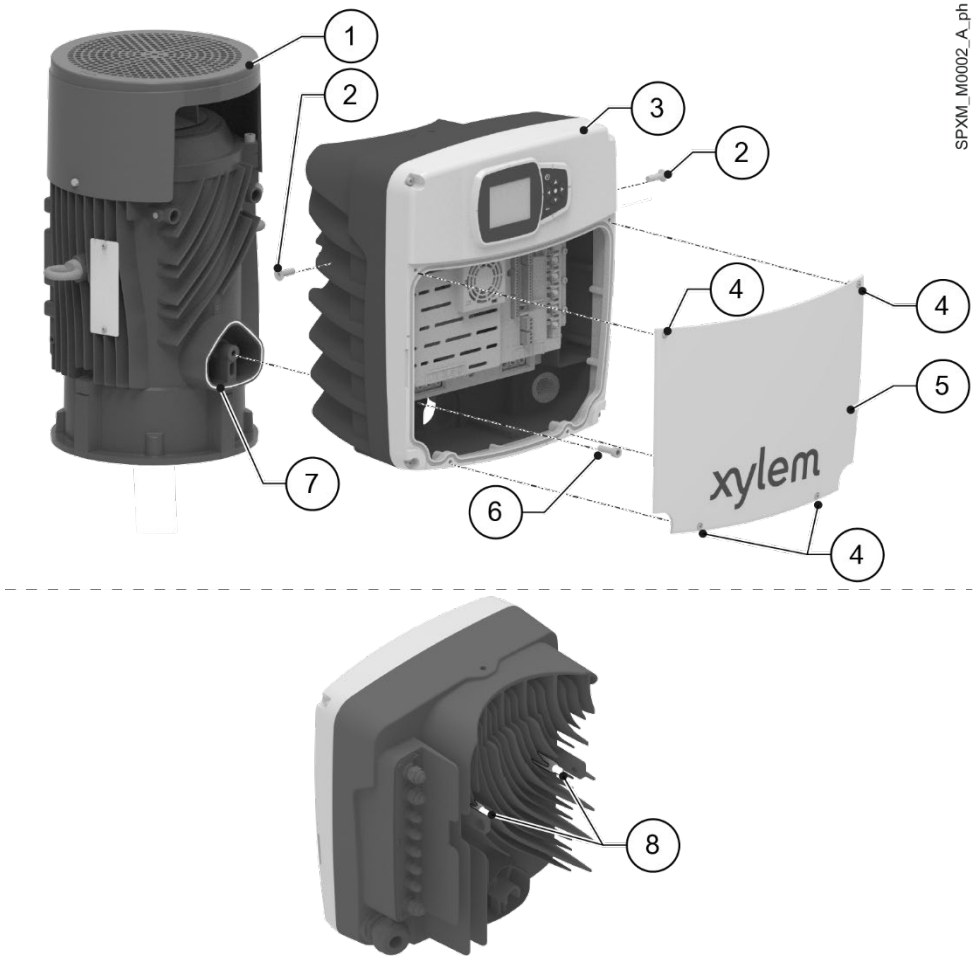
10.2.1 B and C size replacement



1. Motor
2. Drive
3. Fastening screws
4. Seal
5. Spacers

1. Disconnect any sensors connected to the drive.
2. Remove the drive, unscrewing the screws with the Torx spanner.
3. Lubricate the seal with alcohol.
4. Check the correct positioning and integrity of the spacers of the new drive.
5. Fit the new drive and tighten the screws.
6. Tightening torque: 6 Nm (55 lbf·in) ± 15%.
7. Reconnect any sensors to the drive.

10.2.2 D size replacement



1. Motor
2. Side fastening screws
3. Drive
4. Screws of the cover
5. Cover
6. Centre fastening screw
7. Seal
8. Spacer

Disassembling the old drive

1. Disconnect any sensors connected to the drive.
2. Remove the cover.
3. Disconnect the phase conductors of the motor.
4. Screw an M6 male eyebolt to the drive.
5. Attach the crane rope to the eyebolt.
6. Tensioning the rope.
7. Remove the drive, unscrewing the side and centre screws with the Torx spanner, taking care not to drop the centre screw inside the motor.
8. Lift the drive slowly, paying attention to possible sudden load shifts, and separate it from the motor.

New drive assembly

1. Check the correct positioning and integrity of the spacers of the new drive.
2. Screw an M6 male eyebolt to the drive.
3. Attach the crane rope to the eyebolt.
4. Lift the drive slowly, paying attention to possible sudden load shifts.
5. Fit the new drive and tighten the screws.
   Tightening torque: 15 Nm (132 lbf·in) ± 15%.
6. Remove the crane rope and remove the eyebolt.
7. Reconnect the phase conductors respecting the original phase sequence to the motor:
   U = brown
   V = blue
   W = black.
8. Fit the cover and tighten the screws.
   Tightening torque: 3 Nm (27 lbf·in) ± 15%.
9. Reconnect any sensors to the drive.

10.3 Long periods of inactivity

1. Press the ON/OFF button on the operation panel or open the provided enable contact (if used).
2. Disconnect the power supply.
3. Shut the suction and discharge on-off valves.
4. Comply with the instructions on **Storage** page 9.
5. Before starting the unit, check the status of the connections of the electric conductors on the unit and the control panel and ensure the screws are correctly tightened.
6. Start the unit complying with the instructions in the pump unit manual.

10.4 Identification of spare parts

Identify the spare parts with the product codes directly on the site spark.xylem.com.
Contact Xylem or the Authorised Distributor for further technical information.

11 Troubleshooting

11.1 Precautions

WARNING: Physical and thermal hazards

- Always wear personal protective equipment.
- Always use suitable working tools.
- In the case of liquids that are excessively hot or cold, pay attention to the risk of injury.

Before starting work:

- Make sure to read and understand all the safety instructions in **Introduction and Safety**.
- Allow the pump and all system components to cool down before touching them.
- Ensure that the unit is isolated from the system and that the pressure is zero before disassembling the pump, removing the fill and drain plugs or disconnecting the piping system.

Voltage-free work

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.
- After disconnecting the system from the power supply, wait 2 min for the discharge of the residual current.

Motor magnetic field

The disassembly or installation of the rotor in the motor casing generates a strong magnetic field:

DANGER: Magnetic hazard

The magnetic field may be dangerous for anyone wearing pacemakers, or any other medical devices sensitive to magnetic fields.

NOTE:

The magnetic field may attract metal debris on the rotor surface, causing damage to the same.

Sites exposed to ionizing radiations

WARNING: Ionizing radiation hazard

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

11.2 List of alarms

Code	Name	Description
A05	Bad files configuration	There is a mismatch in the configuration files or the files didn't load properly. Power off, wait 1 minute, power on.
A08	Derating active	The switching frequency has been reduced due to the high ambient temperature. Clean the unit, verify unit fan and ambient condition.
A11	Analog Input 1 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A12	Analog Input 2 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A13	Analog Input 3 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A14	Analog Input 4 Alarm	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
A15	Flow/Temperature Sensor Alarm	The embedded flow/temperature sensor is malfunctioning.
A16	External DI Alarm	The external alarm has been activated. Verify the external device contact.
A17	Internal Communication lost	There is a communication problem between the drive boards. Power off, wait 1 minute, power on.
A18	Multipump Communication Lost	The unit is set to multipump but there are no other units communicating. Verify multipump connection and communication port configuration.
A19	Multipump Address conflict	There are other units in the multipump sysytem with the same multipump address. Verify that each unit of has an unique multipump adddress.
A20	Multipump Incompatibility	A unit connected in the multipump system has incompatible features or a different multipump protocol. Do not use the incompatible feature or update all units to the same firmware version.
A21	Cloning failure	Cloning failure
A23	Wrong analog input configuration	None of the analog input is set to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M05.
A24	Wrong Setpoint configuration	None of the setpoint selected correspond to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M04, M05.
A28	Fieldbus Communication lost	The communication with the remote fieldbus device is lost. Verify the status of the remote device and the correct configuration of fieldbus communication parameters.
A29	Pipe Filling Alarm	The pipe filling function filling pressure has not been reached within the pipe filling time. Verify the system integrity and the pipe filling parameters.
A35	HMI Communication lost	There is an internal communication issue between user interface board and control board. Power off, wait 1 minute, power on.
A36	BTLE Communication Lost	There is an internal communication issue between user interface board and wireless interface. Power off, wait 1 minute, power on.
A50	Files revision mismatch	The HMI board and the Control Card contain different revisions of the same configuration files.

11.3 List of errors

Code	Name	Description
E01	Speed limit exceeded	The motor speed is out of expected range. Power off, wait 1 minute, power on.
E02	Overcurrent	The current drawn by the motor is above the limit.
E03	Undervoltage	The voltage is below the minimum limit.
E04	Locked rotor	The rotor is blocked and cannot rotate. Verify the presence of dirt or other material in the wet parts of the pump that can cause the rotor to be blocked.
E05	Data Memory corrupted	There is a part of the memory that is incorrectly initialized or not working. Power off, wait 1 minute, power on.
E06	Input phase loss	One or more phases are missing.
E07	Motor Overheating	The motor temperature is outside the safe limits. Clean the unit, verify unit fan and ambient condition.
E08	Inverter Overheating	The drive internal temperature is outside the safe limits. Clean the unit, verify unit fan and ambient condition.
E09	Motor Disconnected	The connection of one or more motor phases (between drive and motor) is interrrupted.
E10	Dry Run	The drive detected no water inside the pump. Verify that the pump is running with water, apply the air purge procedure.
E11	Sensor 1 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E12	Sensor 2 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E13	Sensor 3 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E14	Sensor 4 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E15	Flow/Temperature Sensor Error	The embedded flow/temperature sensor is malfunctioning.
E16	External DI Error	The external error has been activated. Verify the external device contact.
E17	Internal Communication lost	There is a communication problem between the drive boards. Power off, wait 1 minute, power on.
E21	Lack of water (LOW)	The LOW digital input is open. Check the status of the lack of water device, if not used keep a loop between LOW terminals.
E22	Minimum Threshold	The minimum threshold set has not been reached within the minimum threshold delay. Verify that the pump has water. Verify the correct settings of the minimum threshold parameters.
E23	Wrong analog input configuration	None of the analog input is set to the measured quantity of the control mode. Verify the correct configuration of parameters in menu M05.
E25	Control Card supply error	There is a power supply issue between the power board and the control board.
E26	Hardware configuration error	The motor-drive configuration parameters are not correct. Power off, wait 1 minute, power on. Contact Xylem service network.

Code	Name	Description
E27	Current leakage to ground	The motor insulation to ground is compromised.
E29	Pipe Filling Error	The pipe filling function filling pressure has not been reached within the pipe filling time. Verify the system integrity and the pipe filling parameters.
E30	Overload	The motor is overloaded. Verify the pumped liquid characteristics.
E31	External Reference 1 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E32	External Reference 2 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E33	External Reference 3 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E34	External Reference 4 Error	The analog input value is too low or too high. Verify the device connected to the analog input or the correct analog input configuration.
E36	Mains undervoltage	The power supply voltage is below the minimum accepted limit.
E43	Overvoltage	The DC-Bus voltage is above the maximum limit. Verify that there are no other pumps creating flow through the pump that can cause energy re-generation.
E46	Grid Overvoltage	The power supply voltage is above the maximum accepted limit.
E50	Configuration files mismatch	There is a mismatch between HMI board and Control Card configuration files.
E51	Drive is a spare part	The HMI board and the Control Card don't contain the configuration files.
E52	Control Card is a spare part	The Control Card is a spare part without configuration files. Use parameter P09.3.10 to upgrade the control card with the files included in the HMI board.
E60	Multipump Protocol Incompatibility	There is an incompatibility between the multipump protocol between the units, align the units to the same firmware version.
E61	Hydrovar X connected to X+	Hydrovar X and Hydrovar X+ cannot be linked together. the two models use different multipump protocols.
E65	Missing Hydraulic Curves	Hydraulic curves are missing or corrupted. Deactivate all functions requiring hydraulic curves, such as "Sensorless delta pressure".

12 Specifications

12.1 Operating environment

Data	Description
Atmosphere	Non-aggressive and non-explosive
Temperature	-20 to 50°C (-4 to 122°F)
Relative air humidity	≤ 95% without condensation
Absolute air humidity	≤ 30 g/kg (dry air)
Altitude (above sea level)	• Up to 1000 m (3280 ft): optimal condition • From 1000 to 2000 m (3280 - 6562 ft): the built-in automatic thermal protection may trigger • Above 2000 m (6562 ft), contact Xylem or the Authorised Distributor

12.2 Technical characteristics

Also see the EXM motor assembly data plate in section **Data plates**.

Data	Description
Power supply voltage and frequency	Depending on the model: • 200 V, ..., 240 V 50/60 Hz, or • 380 V, ..., 480 V 50/60 Hz
Permitted tolerance for the supply voltage	±10%
Leakage current (EN 61800-5-1)	≤ 3.5 mA (alternating current, AC)
Protection degree, enclosure type	IP 55, NEMA enclosure Type 4
Efficiency Class (IEC 61800-9-2)	• IES2 for the complete PDS unit (Power Drive System) • IE5 for the motor

Electrical data

Rated motor power, kW (hp)	Type of motor		Rotation speed range, min^{-1}	Maximum input current, A	
	IEC	NEMA		200 V, ..., 240 V (EXM…./3……)	380 V, …, 480 V (EXM…./4……)
1.5 (2.0)	EXM……./..015B..4..	EXM……./..020B..4..	1500 … 2000	5.7 - 4.9	4.0 - 3.8
2.2 (3.0)	EXM……./..022B..4..	EXM……./..020B..4..		7.9 - 6.7	5.0 - 4.6
3.0 (4.0)	EXM……./..030C..4..	EXM……./..040C..4..		11.0 - 9.8	7.9 - 7.0
4.0 (5.5)	EXM……./..040C..4..	EXM……./..055C..4..		14.0 - 12.3	9.2 - 8.5
5.5 (7.5)	EXM……./..055C..4..	EXM……./..075C..4..		21.6 - 20.4	11.2 - 10.2
	EXM……./..055D..4..	EXM……./..075D..4..		20.5 - 18.8	15.3 - 13.6
7.5 (10)	EXM……./..075D..4..	EXM……./..100D..4..		27.5 - 24.8	18.7 - 17.4
11 (15)	EXM……./..110D..4..	EXM……./..150D..4..		39.0 - 34.5	24.5 - 22.8

Rated motor power, kW (hp)	Type of motor		Rotation speed range, min^{-1}	Maximum input current, A	
	IEC	NEMA		200 V, ..., 240 V (EXM…./3……)	380 V, …, 480 V (EXM…./4……)
3.0 (4.0)	EXM……./..030B..2..	EXM……./..040B..2..	3000 … 4000	10.7 - 8.9*	6.7 – 5.3
4.0 (5.5)	EXM……./..040B..2..	EXM……./..055B..2..		-	7.7 - 6.6
5.5 (7.5)	EXM……./..055B..2..	EXM……./..075B..2..		-	10.2 - 8.7
	EXM……./..055C..2..	EXM……./..075C..2..		18.9 - 16.2	11.4 - 11.0
7.5 (10)	EXM……./..075C..2..	EXM……./..100C..2..		-	14.4 - 12.5
11 (15)	EXM……./..110C..2..	EXM……./..150C..2..		-	20.3 - 16.5
	EXM……./..110D..2..	EXM……./..150D..2..		38.4 - 34.1	24.5 - 22.8
15 (20)	EXM……./..150D..2..	EXM……./..200D..2..		50.0 - 44.1*	30.2 - 27.1
18.5 (25)	EXM……./..185D..2..	EXM……./..250D..2..		-	33.5 - 28.6
22 (30)	EXM……./..220D..2..	EXM……./..300D..2..		-	38.9 - 32.4

* 3600 ... 4000 min^{-1}

12.3 Electromagnetic compatibility (EMC)

- HVX and HVX+ drives comply with the THDi requirements of the IEC 61000-3-12 standard. Compliance is valid only if the Ssc (short-circuit power) at the point of connection between the system and the public grid is equal to or greater than the values shown in the table:

Motor	Ssc, kVA
EXM…/3….B.., EXM…/4….B..	2300
EXM…/3….C.., EXM…/4….C..	4600
EXM…/3….D.., EXM…/4….D..	9200

  Make sure that the device is connected to a network with Ssc meeting the minimum values: if in doubt, consult your network operator.
- An external harmonic filter can allow installation in networks with low Ssc and ensure compliance, even for single harmonics and PWHC.
- In IT systems (neutral isolated from ground), it may be necessary to use the W version (without EMI filters) of hydrovar X and X+, suitable for category C4. See also **Electrical connections**.

For EXM series motors, refer to items 6 and 9 of the **Declarations of Conformity**.

12.4 Conformity of radio frequency characteristics

EU/EEA/GB

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

U.S.A.

HVX FCC ID: 2AYCGXSI02
HVX+ FCC ID: 2AYCGXSI03

The variable speed drive complies with Part 15 of the FCC rules (FCC 15.247).
Operation is subject to the following two conditions:
1. This device must 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 a mobile device, and complies with the safety requirements for radio frequency exposure according to FCC Part 2.1093 and KDB 447498 D01, as demonstrated in the analysis of radio frequency exposure.
Installers must ensure that (i) this device is not placed or used together with other antennas or transmitters, except in accordance with FCC procedures for multi-transmitter products, (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

Unauthorised repairs, changes or modifications could cause permanent damage to the equipment and void the warranty and the authorisation to operate this device in accordance with Part 15 of the FCC Rules.

Canada

HVX ISED IC: 26881-XSI02
HVX+ ISED IC: 26881-XSI03

The variable speed drive complies with standard RSS-247
Operation is subject to the following two conditions:
1. This device must 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 a mobile device, and complies with the safety requirements for radio frequency exposure in accordance with RSS-102 version 5.
Installers must ensure that during normal use, there is always a minimum distance of at least 20 cm.

This device complies with the RSS requirements of ISED for licence-exempt radio products.

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

Australia & New Zealand

HVX : ACMA-compliant
HVX+ : ACMA-compliant

This list is subject to updates.
For information on the countries where the product is authorised for sale and use, and its versions, contact the Xylem or the Authorised Distributor.

12.5 Other conformities and approvals

EU/EEA/GB

EXM motor
CE and UKCA markings (see **Declarations of Conformity**)

U.S.A.

EXM motor: cURus (file number E488280)

Australia & New Zealand

HVX : RCM
HVX+ : RCM

Bacnet

HVX : BTL certification
HVX+ : BTL certification

12.6 Characteristics of inputs and outputs

Features	Description
Communication ports	2, RS-485
Digital inputs	3 for hydrovar X, 5 for hydrovar X+: • 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 hydrovar X, 4 for hydrovar X+: • Configurable as 0-20 mA current or 0-10 V voltage • 24V signal for sensor power supply with current limitation 60 mA
Analogue output	Configurable as either 0-20 mA current signal or 0-10 V voltage signal
Relay 1	• With NC and NO changeover contact • Up to 250 V 0.25 A (alternating current, generic use) or 30 V 2 A (direct current, resistive load)
Relay 2	• With NC and NO changeover contact • Up to 30 V 0.25 A (alternating current, generic use) or 30 V 2 A (direct current, resistive load)

12.7 Lithium battery

The EXM motor with HVX+ drive contains a lithium battery that complies with international regulations for land, sea and air transport.

12.8 Magnetic fields

The EXM motor contains permanent magnets. With the product intact, the magnetic field value is within the IATA limits for air transport.

12.9 Sound pressure (EN 60034-9, CLC/TS 60034-25)

Sound power measured in free field at a distance of one metre from the unit, with no-load operation according to ISO 9614-2 and sound pressure recalculation according to ISO 11203.

Size of the HVX or HVX+ drive	Rated power, kW (hp)	Rotation speed, min^{-1}	Sound pressure, dB(A) ± 2
B	1.5 (2), 2.2 (3.0)	1500	48
		1800	48
		2000	50
	3.0 (4.0), 4 (5.5), 5.5 (7.5)	3000	61
		3600	64
		4000	70
C	3.0 (4.0), 4 (5.5), 5.5 (7.5)	1500	48
		1800	53
		2000	55
	5.5 (7.5), 7.5 (10), 11 (15)	3000	65
		3600	71
		4000	78
D	5.5 (7.5), 7.5 (10), 11 (15)	1500	49
		1800	52
		2000	54
	11 (15), 15 (20), 18.5 (25), 22 (30)	3000	64
		3600	68
		4000	75

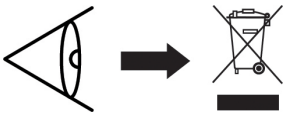
13 Disposal

13.1 Precautions

WARNING: Environmental risk

- The unit must be disposed of through approved companies specialised in the identification of different types of materials: steel, copper, plastic, lithium, ferrite etc...
- It is prohibited to dispose of lubricant liquids and other hazardous substances in the environment.

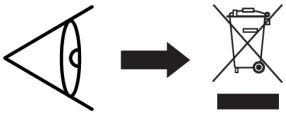
13.2 WEEE (EU/EEA)



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

WEEE from users other than private households[3]: the separate collection of this equipment at the end of its life is organized and managed by the producer[4].
The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

13.3 WEEE (UK)



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

WEEE from users other than private households[5]: the separate collection of this equipment at the end of its life is organized and managed by the producer[6].
The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

3 Classification according to product type, use and current local laws
4 Producer of EEE as per Directive 2012/19/EU
5 Classification according to product type, use and current local laws
6 Producer of EEE as per WEEE Regulations 2013

14 Declarations of Conformity

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

CE

EU Declaration of Conformity (No 75)

1. RED - Radio equipment: EXM… (see label on the last page of *"Safety and Other Information"* manual)
   RoHS - Unique identification of the EEE: EXM
2. Name and address of the manufacturer:
   Xylem Service Italia S.r.l.
   Via Vittorio Lombardi 14
   36075 Montecchio Maggiore VI
   Italy
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: permanent magnet-assisted synchronous reluctance motor (PMaSynRM), equipped with integrated variable speed drive - HVX series - having wireless functions.
5. The object of the declaration described above is in conformity with the relevant Union harmonization legislation:
   - Directive 2014/53/EU of 16 April 2014 and subsequent amendments (radio equipment).
   - Directive 2011/65/EU of 8 June 2011 and subsequent amendments including directive (EU) 2015/863 (restriction of the use of certain hazardous substances in electrical and electronic equipment).
6. References to the relevant harmonised standards used or references to the other technical specifications, in relation to which conformity is declared:
   - EN 60034-1:2010, EN 60034-5:2001+A1:2007, EN IEC 60034-5:2020, EN 60034-6:1993, EN 60034-9:2005+A1:2007, EN 61800-5-1:2007+A1:2017+A11:2021, EN 62311:2008, EN IEC 62311:2020, EN 61800-3:2004+A1:2012, EN IEC 61800-3:2018, EN 61000-3-3:2013+A1:2019 +A2:2021, ETSI EN 300 328 V2.2.2 (2019-07)
   - EN IEC 63000:2018.
7. Notified body: - - -
8. RED - Any accessories/components/software: - - -
9. Additional information:

   EMC EN 61800-3:2004+A1:2012, EN IEC 61800-3:2018
   - Emission: Category 2 (C2) in standard version, Category 4 (C4) in W version for IT systems
   - Immunity: product suitable for second environment (e.g. industrial areas).

   EN 61000-3-2:2014, EN IEC 61000-3-2:2019+A1:2021
   This product is classifiable as 'professional equipment with a rated power greater than 1 kW'. In the case of connection to a public power grid, the installer must refer to the applicable technical standards.

   EN 61000-3-12:2011+A1:2024
   See installation conditions in 12.2.

   RoHS Annex III – Applications exempted from the restrictions: lead as a binding element in steel, aluminium and copper alloys [6(a), 6(b), 6(c)], in solders and in electrical/electronic components [7(a), 7(c)-I].

   Eco-design 2009/125/EC and subsequent amendments.

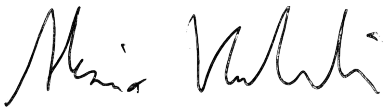
The EXM series motor includes an integrated variable speed drive, and the energy performances of the two cannot be tested independently of each other (Regulation (EU) 2019/1781, Article 2(2)(b), (3)(a)). The marking shown (IE...-IES...) is that required by the technical standard IEC 61800-9-2.

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

Montecchio Maggiore, 27/05/2025

Alessio Vendraminelli
Managing Director

rev.00



UK
CA

UK Declaration of Conformity (No 75)

1. RED - Radio equipment: EXM … (see label on the last page of "Safety and Other Information" manual)
   RoHS - Unique identification of the EEE: EXM
2. Name and address of the manufacturer:
   Xylem Service Italia S.r.l.
   Via Vittorio Lombardi 14
   36075 Montecchio Maggiore VI
   Italy
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: permanent magnet-assisted synchronous reluctance motor (PMaSynRM), equipped with integrated variable speed drive - HVX series - having wireless functions.
5. The object of the declaration described above is in conformity with the relevant UK legislative acts:
   - S.I. 2017/1206 - The Radio Equipment Regulations 2017, as amended.
   - S.I. 2012/3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, as amended.
6. References to the relevant designated standards used or references to the other technical specifications, in relation to which conformity is declared:
   - EN 60034-1:2010, EN 60034-5:2001+A1:2007, EN IEC 60034-5:2020, EN 60034-6:1993, EN 60034-9:2005+A1:2007, EN 61800-5-1:2007+A1:2017+A11:2021, EN 62311:2008, EN IEC 62311:2020, EN 61800-3:2004+A1:2012, EN IEC 61800-3:2018, EN 61000-3-3:2013+A1:2019 +A2:2021, ETSI EN 300 328 V2.2.2 (2019-07)
   - EN IEC 63000:2018.
7. Approved body: - - -
8. RED - Any accessories/components/software: - - -

9. Additional information:
   EMC
   EN 61800-3:2004+A1:2012, EN IEC 61800-3:2018
   - Emission: Category 2 (C2) in standard version, Category 4 (C4) in W version for IT systems.
   - Immunity: product suitable for second environment (e.g. industrial areas).

   EN 61000-3-2:2014, EN IEC 61000-3-2:2019+A1:2021
   This product is classifiable as 'professional equipment with a rated power greater than 1 kW'. In the case of connection to a public power grid, the installer must refer to the applicable technical standards.

   EN 61000-3-12:2011+A1:2024
   See installation conditions in 11.2

   RoHS

   RoHS – S.I. 2020/1647 - The Hazardous Substances and Packaging (Legislative Functions and Amendment) (EU Exit) Regulations 2020 – regulation 3(1), Schedule A2, Table 1 – Exempted applications from the restrictions: lead as a binding element in steel, aluminium and copper alloys [12, 15, 18], in solders and in electrical/electronic components [19, 21].

   The Ecodesign for Energy-Related Products and Energy Information Regulations 2021 (S.I. 2021/745)

   The EXM series motor includes an integrated variable speed drive, and the energy performances of the two cannot be tested independently of each other (Schedule 16, 10(1)(b), 10(2)(a)). The marking shown (IE...-IES...) is that required by the technical standard IEC 61800-9-2.

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

Montecchio Maggiore, 27/05/2025

Alessio Vendraminelli
Managing Director

rev.00

15 Warranty

For information on the warranty refer to the commercial documentation.

Xylem |’zīləm|

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

We’re a global team unified in a common purpose: creating innovative solutions to meet our world’s water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyse, 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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