Installation, Operation, and
Maintenance Manual

886072_5.0

FPG 411, FPG 412

Concertor™

FLYGT
a xylem brand

Table of Contents

1 Introduction and Safety

1.1 Introduction

Purpose of the manual

The purpose of this manual is to provide necessary information for installation, operation, and maintenance of the unit.

Read and keep the manual

Save this manual for future reference, and keep it readily available at the location of the unit.

CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

The equipment, and its functioning, may be impaired if used in a manner not specified by the manufacturer.

Intended use

WARNING:

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

1.2 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

Hazard level	Indication
 DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
 WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
 CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard	Magnetic fields hazard
 Electrical Hazard:	 CAUTION:

1.3 User safety

Introduction

All government regulations, local health and safety directives must be observed.

Prevent danger due to electricity

All danger due to electricity must be avoided. Electrical connections must always be carried out in compliance with the following:

- The standard connections shown in the product documentation that is delivered together with the product
- All international, national, state, and local regulations. (For details, consult the regulations of your local electricity supplier.)

For more information about requirements, see sections dealing specifically with electrical connections.

Power lock-out

DANGER: Electrical Hazard

Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.

Qualification of personnel

WARNING: Electrical Hazard

Risk of electrical shock or burn. A certified electrician must supervise all electrical work. Comply with all local codes and regulations.

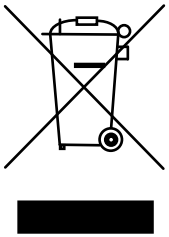
All work on the product must be carried out by certified electricians or Xylem authorized mechanics.

Xylem disclaims all responsibility for work done by untrained, unauthorized personnel.

1.4 End of life product disposal

Handle and dispose of all waste in compliance with local laws and regulations.

EU only: Correct disposal of this product – WEEE Directive on waste electrical and electronic equipment

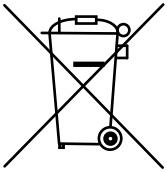


This marking on the product, accessories or literature indicates that the product should not be disposed of with other waste at the end of its working life.

To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.

Waste from electrical and electronic equipment can be returned to the producer or distributor.

EU only: Correct disposal of batteries in this product



This marking on the battery, manual or packaging indicates that the batteries in this product should not be disposed of with other waste at the end of its working life. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. If batteries are not properly disposed of, these substances can cause harm to human health or the environment.

To protect natural resources and to promote material re-use, please separate batteries from other types of waste and recycle them through your local, free battery return system.

1.5 Spare parts

CAUTION:

Only use the manufacturer's original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

1.6 Warranty

For information about warranty, see the sales contract.

1.7 Support

Xylem only supports products that have been tested and approved. Xylem does not support unapproved equipment.

2 Product Description

2.1 Product design

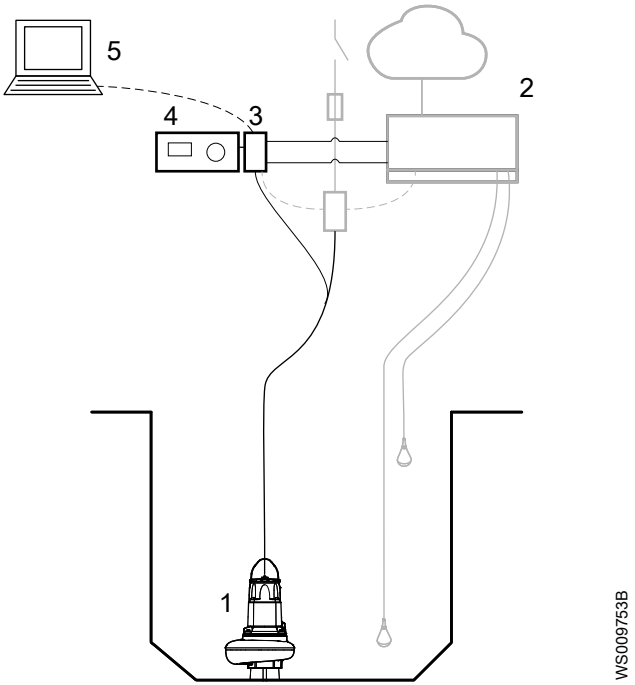
The products are part of the Concertor™ system. The gateways are connected to Flygt pumps 6020.180 or 6020.090. The gateway starts and stops the pump based on the input signal from the external control system. All the alarms are sent back to the external control system. Data is logged by and stored in the gateway.

Product name	Part number	Description
FPG 411	8012100	Gateway for Concertor™ EA. The pump performance is easily adjustable when the pump is stopped.
FPG 412	8012000	Gateway for Concertor™ DP. Dynamic pump performance change, through 4–20 mA or Modbus.

2.2 System overview

Concertor™ is a wastewater pumping system with integrated intelligent technology.

2.2.1 Concertor™ EA



Parts

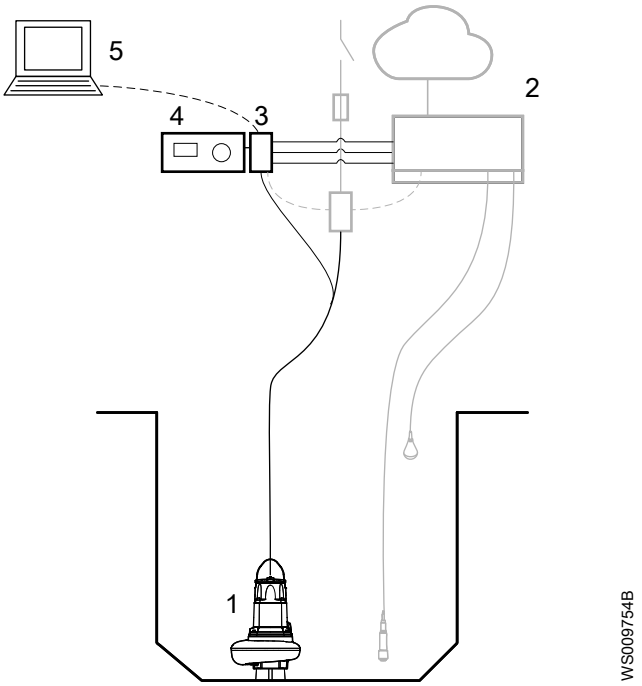
Number	Part	Description
1	Pump	A pump in the Concertor™ N system series.
2	Components outside of the Concertor™ system	• Contactors, fuses, relays • Controller / RTU / PLC • Level sensors • Cloud services • Pump sum-alarm I/O
3	Gateway, FPG 411	• The gateway starts and stops the pump based on the input signal from the external control system. – Digital input signal – Modbus • All the alarms are sent back to the external control system. • The operator changes the pump settings through the gateway. • Data is logged by and stored in the gateway.
4	HMI, FOP 312	The HMI is handheld, or mounted inside the cabinet or in the cabinet door. The HMI is optional.

Number	Part	Description
5	Embedded web server	The embedded web server is an alternative interface with access to the same menu system as the HMI.

Functions

- Pump clog detection
- Pump cleaning
- Soft-start
- Soft-stop
- Constant power
- Always correct rotation
- Set-up wizard from HMI or webserver
- Set pump performance (pump stopped)
- Pump alarms with priority A or B, through I/O
- Pump and motor control alarms, HMI or Modbus
- Alarm handling
- Status and alarm history

2.2.2 Concertor™ DP



Parts

Number	Part	Description
1	Pump	A pump in the Concertor™ N system series.
2	Components outside of the Concertor™ system	• Contactors, fuses, relays • Controller / RTU / PLC • Level sensors or flow meters • Cloud services • Pump sum-alarm I/O
3	Gateway, FPG 412	• The gateway starts and stops the pump based on the input signal from the external control system. – Digital input signal – Analog input signal – Modbus • All the alarms are sent back to the external control system. • The operator changes the pump settings through the gateway. • Data is logged by and stored in the gateway.
4	HMI, FOP 312	The HMI is handheld, or mounted inside the cabinet or in the cabinet door. The HMI is optional.
5	Embedded web server	The embedded web server is an alternative interface with access to the same menu system as the HMI.

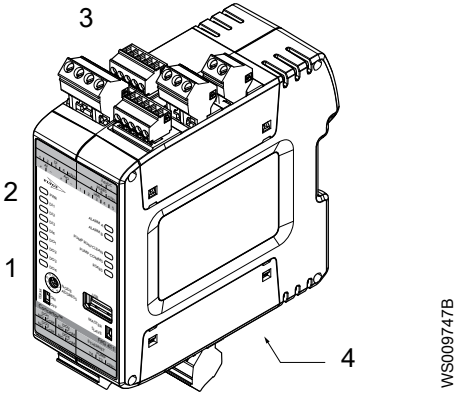
Functions

- External process control for dynamic pump performance, 4–20 mA or Modbus
- Pump clog detection
- Pump cleaning
- Soft-start
- Soft-stop
- Constant power
- Always correct rotation
- Set-up wizard from HMI or webserver
- Pump alarms with priority A or B, through I/O
- Pump and motor control alarms, HMI or Modbus
- Alarm handling
- Status and alarm history

2.3 Approvals

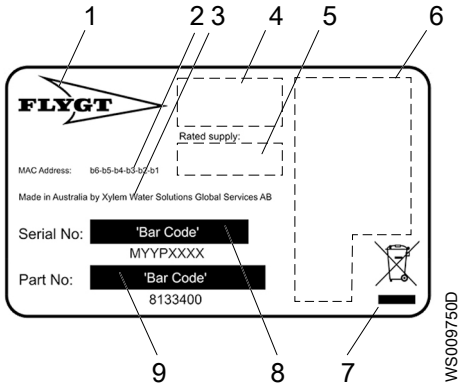
- CE
- UL
- CSA
- RCM

2.4 Parts



1. Front connections
2. Status LEDs
3. Top connections
4. Bottom connections

2.5 The data plate



1. Brand
2. MAC address
3. Country of origin. Manufacturer.
4. Product
5. Rated supply
6. Approvals
7. Waste disposal symbol
8. Serial number
9. Part number

3 Mechanical Installation

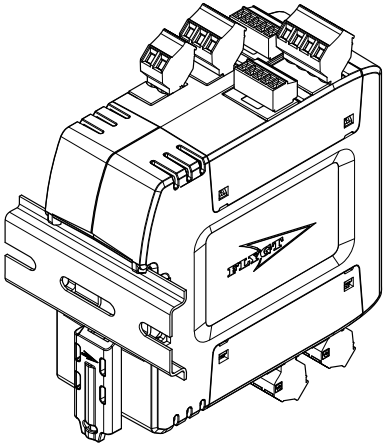
3.1 Do not install in an explosive zone

NOTICE:

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

3.2 Install the gateway

Snap the unit onto the DIN rail.



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4 Electrical Installation

Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 3 have been read and understood.

DANGER: Electrical Hazard

Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.

DANGER: Electrical Hazard

All electrical equipment must be grounded (earthed). Test the ground (earth) lead to verify that it is connected correctly and that the path to ground is continuous.

WARNING: Electrical Hazard

Risk of electrical shock or burn. A certified electrician must supervise all electrical work. Comply with all local codes and regulations.

WARNING: Electrical Hazard

There is a risk of electrical shock or explosion if the electrical connections are not correctly carried out, or if there is fault or damage on the product. Visually inspect equipment for damaged cables, cracked casings or other signs of damage. Make sure that electrical connections have been correctly made.

CAUTION: Electrical Hazard

Prevent cables from becoming sharply bent or damaged.

Requirements

These requirements apply for electrical installation:

- All fuses and circuit breakers must have the proper rating, and comply with local regulations.
- The cables must be in accordance with the local rules and regulations.

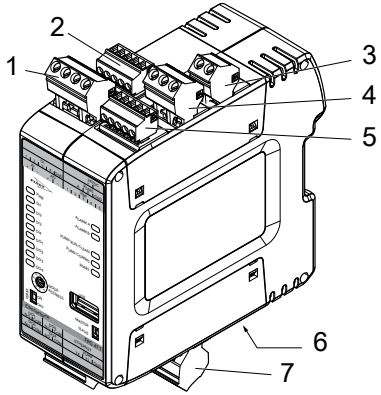
Cables

These requirements apply for cable installation:

- The cables must be in good condition, not have any sharp bends, and not be pinched.
- The sheathing must not be damaged and must not have indentations or be embossed (with markings, etc.) at the cable entry.
- The minimum bending radius must not be below the accepted value.
- Use cables with appropriate temperature rating.

4.1 Connect the cables, FPG 411

For more information about the connection terminals, see *Terminals* on page 24.



1. Analog output
2. Digital inputs
3. + 24 VDC
4. Modbus slave
5. HMI
6. Digital outputs
7. T3, T4

1. Connect T3 and T4 from the pump.
2. Connect the DeviceNet cable between the gateway and the HMI.

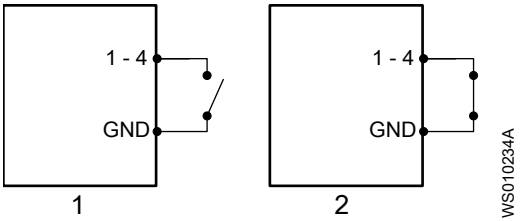
Description	HMI terminal	Cable color	FPG terminal
Ground	GND	Black	1
CAN low	L	Blue	2
Shield	–	Transparent	3

Description	HMI terminal	Cable color	FPG terminal
CAN high	H	White	4
Power	+24 V	Red	5

3. Connect the external control system.

   For more information about connections with Modbus, see separate documentation.

   a) Connect the digital input cables.

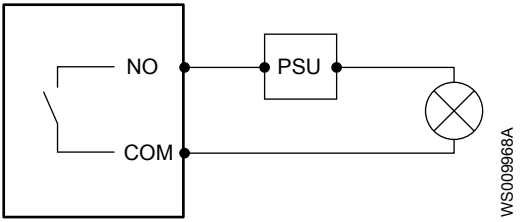


1. Open
2. Closed

Signal	Terminal
Call to run	DI1 DI1 is closed (active): The pump is active. DI1 is open (inactive): The pump is inactive
Alarm reset	DI2 DI2 is closed (active): Alarm reset. All active alarms that require manual reset, are reset by this signal. DI2 is open (inactive): No alarm reset.
High-level float switch	DI3 DI3 is closed (active): The gateway receives a high level indication from the high-level float switch. DI3 is open (inactive): No signal received.
External off switch	DI4 The following behavior is valid when the DI4 input is configured to **Auto**, and an external 0–Auto switch is connected. The external switch is in the auto position: DI4 is closed. The **Call to run** signal runs the pump. The external switch is in the 0, or Off, position: DI4 is open. The switch overrides the **Call to run** signal and stops the pump.

   b) Connect the digital output cables.

   The digital outputs are potential free relay outputs. Connect a power supply unit maximum 250 VAC or 30 VDC.



Signal	Terminal
Pump run feedback	DO1
Sum alarm A	DO2
Sum alarm B	DO3
Cleaning active / Contactor enable	DO4

c) Connect the analog output cables.

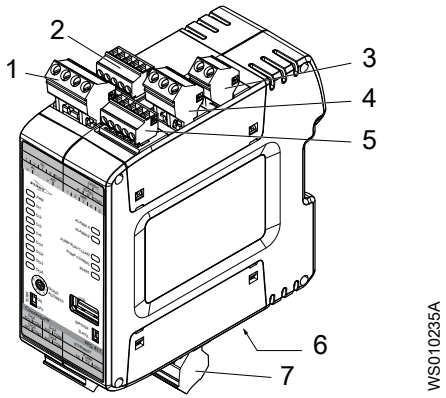
Signal	Terminal
Actual power / Actual speed	AO Minimum value: 4 mA Maximum value: 20 mA

4. Connect the power cables.

   The power supply unit must fulfill isolation class II.

4.2 Connect the cables, FPG 412

For more information about the connection terminals, see *Terminals* on page 24.



1. Analog input and output
2. Digital inputs
3. + 24 VDC
4. Modbus slave
5. HMI
6. Digital outputs
7. T3, T4

1. Connect T3 and T4 from the pump.
2. Connect the DeviceNet cable between the gateway and the HMI.

Description	HMI terminal	Cable color	FPG terminal
Ground	GND	Black	1
CAN low	L	Blue	2
Shield	–	Transparent	3
CAN high	H	White	4
Power	+24 V	Red	5

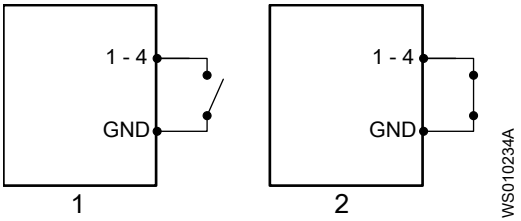
3. Connect the external control system.

   For more information about connections with Modbus, see separate documentation.

   a) Connect the analog input signal cables.

Signal	Terminal
Reference power / Reference speed	AI 4–20 mA 4 mA = Minimum power / Minimum speed 20 mA = Set power / Set speed

   b) Connect the digital input cables.



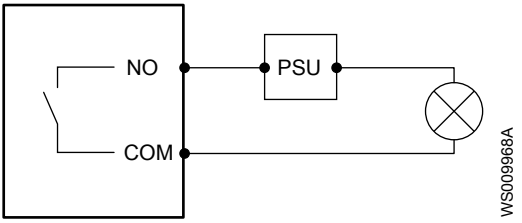
1. Open
2. Closed

Signal	Terminal
Call to run	DI1 DI1 is closed: The pump is active. DI1 is open: The pump is inactive
Alarm reset	DI2 DI2 is closed: Alarm reset. All active alarms that require manual reset, are reset by this signal. DI2 is open: No alarm reset.
High-level float switch	DI3 DI3 is closed: The gateway receives a high level indication from the high-level float switch. DI3 is open: No signal received.

Signal	Terminal
External off switch	DI4 The following behavior is valid when the DI4 input is configured to **Auto**, and an external 0–Auto switch is connected. The external switch is in the auto position: DI4 is closed. The **Call to run** signal runs the pump. The external switch is in the 0, or Off, position: DI4 is open. The switch overrides the **Call to run** signal and stops the pump.

c) Connect the digital output cables.

The digital outputs are potential free relay outputs. Connect a power supply unit maximum 250 VAC or 30 VDC.



Signal	Terminal
Pump run feedback	DO1
Sum alarm A	DO2
Sum alarm B	DO3
Cleaning active / Contactor enable	DO4

d) Connect the analog output cables.

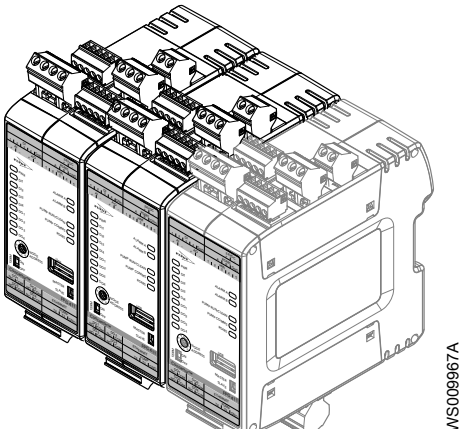
Signal	Terminal
Actual power / Actual speed	AO Minimum value: 4 mA Maximum value: 20 mA

4. Connect the power cables.

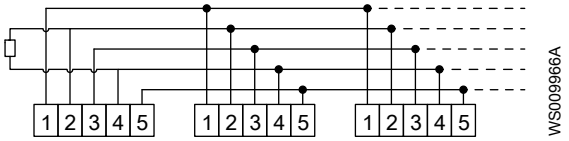
The power supply unit must fulfill isolation class II.

4.3 Connect multiple units

When multiple units are installed in the same application, cables are connected in parallel or separately.



1. Connect the HMI cables in parallel. Terminate the last connector in the chain with a 120 ohm resistor between cables 2 and 4.



2. Connect the start signal cables separately.
3. Connect the Modbus cable in parallel.
4. Connect the Ethernet cable through a switch to each gateway.
5. Connect the high-level switch separately or in parallel.
6. Connect the power cable separately or in parallel.
7. Connect each analog input signal cable separately.

   The analog input is applicable for FPG 412 only.

4.4 Set the switches

Set the switches.

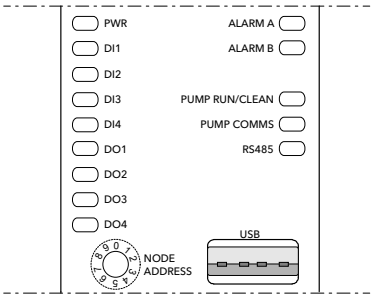
Switch	Correct setting
NODE ADDRESS, 0 – 9	All the node addresses in the system must be unique and not 0.
TERM, ON/OFF	All units in the system must have the termination switch set to the ON position.
MASTER/SLAVE	Not applicable

5 Operation

5.1 Start-up and operation

For instructions on how to operate the system, see the System Installation and Operation manual.

5.2 LED indicators



LED	Color	Indication
PWR	Green	On
DI1 – DI4	Green	On
DO1 – DO4	Green	On
ALARM A	Red	Active alarm with priority level A
ALARM B	Red	Active alarm with priority level B
PUMP RUN/CLEAN	Green/Red	Green: Pump running Red: Pump cleaning ongoing
PUMP COMMS	Green	On: Pump communication established
RS-485	Green	On: Modbus communication in progress

6 Maintenance

6.1 Preventive maintenance

Make sure that the unit is free from dust. Use a dry, soft cloth.

7 Troubleshooting

7.1 The unit does not work

Make sure that all wires are correctly connected according to the cable chart.

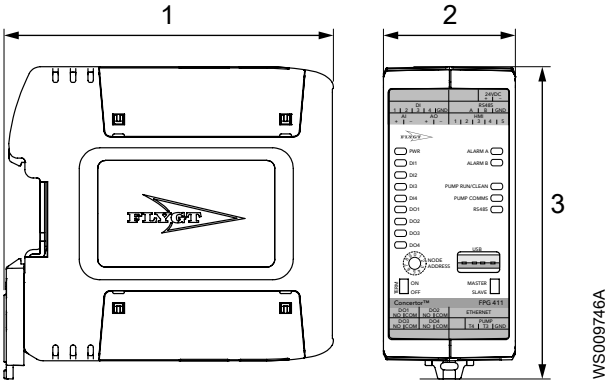
Cause	Remedy
The **PWR** LED is not lit.	• Make sure that the unit receives voltage. • Restart the unit.
The unit does not communicate with the pump.	• Make sure that the pump receives voltage. • Restart the pump and the unit.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

8 Technical Reference

8.1 Dimensions



1. 112 mm (4.4 in)
2. 45 mm (1.8 in)
3. 106 mm (4.2 in)

8.2 Environmental requirements

Parameter	Value
Operating temperature	-20°C – +65°C (-4°F – 149°F)
Storage temperature	-20°C – +70°C (-4°F – 158°F)
Operating humidity	Relative humidity, non-condensing: 5 – 95%
Sunlight exposure	UV-resistant
Maximum altitude	• With UL approval: Maximum 2000 m (6562 ft) • Without UL approval: 4000 m (13 123 ft)

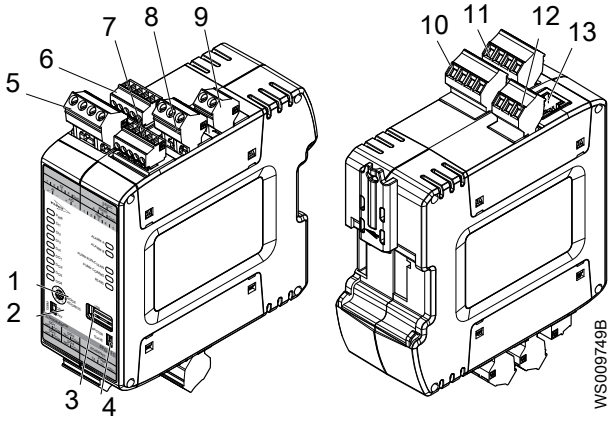
8.3 IP-rating

IP20

8.4 Electrical data

Parameter	Value
Supply voltage	+ 24 VDC
Supply voltage tolerance	± 10%
Current consumption	< 700 mA. Typical: 150 mA

8.5 Terminals



Section	Terminal		Description
1	NODE ADDRESS		Node address 0–9, rotary switch. 0 is not used.
2	TERM		120 ohm termination on or off switch. Always ON
3	USB		Standard type A USB socket
4	MASTER, SLAVE		Not applicable
5	+	AI	Isolated analog input, 4–20 mA Maximum 24 VDC Not applicable for FPG 411
	–		
	+	AO	Analog output, 4–20 mA Maximum 24 VDC
	–		
6	1	DI	1–4: Digital inputs GND: Common ground (earth) Maximum 24 VDC
	2		
	3		
	4		
	GND		
7	1	HMI	Flygt FOP 312 1: Ground 2: CAN low 3: Shield 4: CAN high 5: + 24 VDC output
	2		
	3		
	4		
	5		

Section	Terminal		Description
8	A	RS485	RS-485 Modbus slave
	B		
	GND		
9	+	24 VDC	24 VDC ±10% The power supply unit must fulfill isolation class II. < 700 mA. Typical: 150 mA Fuse: 1 A
	–		
10	NO	DO3	Potential free relay output Maximum 250 VAC, or 30 VDC, 5 A External fuse required, 5 A
	COM		
	NO	DO4	Potential free relay output Maximum 250 VAC, or 30 VDC, 5 A External fuse required, 5 A
	COM		
11	NO	DO1	Potential free relay output Maximum 250 VAC, or 30 VDC, 5 A External fuse required, 5 A
	COM		
	NO	DO2	Potential free relay output Maximum 250 VAC, or 30 VDC, 5 A External fuse required, 5 A
	COM		
12	T4	PUMP	Pump interface RS-485 Not used: GND
	T3		
	GND		
13	–		Ethernet

Xylem |ˈzīləm|

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 advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services, and agricultural settings. With its October 2016 acquisition of Sensus, Xylem added smart metering, network technologies and advanced data analytics for water, gas and electric utilities to its portfolio of solutions. 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 with a strong focus on developing comprehensive, sustainable solutions.

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

xylem
Let's Solve Water

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Visit our Web site for the latest version of this document and more information

The original instruction is in English. All non-English instructions are translations of the original instruction.

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