





WARNING – This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment. For further advice please contact VEXO International or your reseller for additional information and guidance.

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SAFE WORKING DISTANCE STATEMENT

SAFE WORKING DISTANCE FROM THE X-POT XP+ SIDE STREAM FILTRATION UNIT

Range from X-POT XP+ (Meters)	Micro Tesla (µT)		
All magnets enclosed in vessel			
5M	0.01μΤ		
4M	0.02μΤ		
3M	0.02μΤ		
2M	0.02μΤ		
1M	0.04µT		
Stood against vessel	10.11µT		

Most health organisations would suggest that anyone fitted with an electro medical device should avoid magnetic field strengths in excess of 5 Gauss (500μ T), Although the X-POT XP+ (containing 13off rare earth magnets) will not cause any risk when stood by the units, BOSS stipulates the following:

IN THE INTEREST OF HEALTH AND SAFETY

Persons who have electra medical devices (e.g, pacemakers, eTC.) Must not operated or handle directly the magnets contained within the X-POT XP+ side stream filter.





LIABILITY

All technical information, data and information contained here in are correct at time of publication. This information is the sum of our current findings and experience to the best of our knowledge. We reserve the right to make technical changes subject to the future development of the BOSS[™] product referred to in this publication. Hence no rights may be derived from technical data, descriptions and illustrations. Technical pictures, drawings and graphs do not necessarily correspond to the actual assemblies or parts as delivered. Drawings and pictures are not to scale and may contain symbols for simplification.

WARRANTY

Active Period: Manufacturing defects for 30 months from the date of manufacture or 24 months from the date of commissioning, whichever is sooner.

This warranty covers manufacturing defects only.

Please note that removal of the identification data labels from the equipment will render the manufacturing warranty null and void.

If the unit is identified with a manufacturing defect then no charge is made for correcting the defect.

The warranty is conditional upon the following clauses.

- 1.1 The equipment must be commissioned by a trained, competent engineer or qualified person, who can verify the integrity of the equipment at that time. The qualified person must confirm in writing that the equipment is undamaged as a result of transportation and installation and is fit to begin the warranty period.
- 1.2 Photographic evidence must be collected at the time of commissioning to verify the condition of the equipment at that time.
- 1.3 The equipment must be serviced at least annually, by a trained competent engineer or qualified person.
- 1.4 This warranty covers the equipment against manufacturing defects, normal wear and tear is not covered by this agreement and should form part of a separate service agreement.
- 1.5 It may be anticipated that some components will become worn and be identified for change during the warranty period, the costs associated with the required parts and associated engineer costs are not covered by this warranty. This will be deemed as preventative maintenance and will not/does not constitute a manufacturing defect.
- 1.6 The equipment must be stored, installed and operated in a frost free area. Damage as a result of adverse temperature or other adverse environmental conditions will not be covered by this agreement.
- 1.7 Any and all non-warranty service visits and non-warranty inspection visits are chargeable and are not covered by this warranty.

If a defect or problem has arisen as a direct result of the connected system, misuse, incorrect handling, incorrect installation or incorrect commissioning then any service costs are chargeable.

If a defect is identified as a manufacturing defect it will be addressed as described above, additional remedial works as a result of misuse, incorrect handling, incorrect installation or incorrect commissioning remain chargeable.





COPYRIGHT

This manual must be used confidentially. It may be circulated among authorised personnel only. It must not be given to third parties. All documentation is protected by copyright. Distribution or other forms of reproduction of documents, even extracts, exploitation or notification of the contents hereof is not permitted, unless otherwise specified in writing by VEXO[®] International (UK) Ltd. Infringements are liable to prosecution and payment of compensation. We reserve the right to exercise all intellectual property rights.

GENERAL SAFETY INSTRUCTIONS

Disregard or lack of attention to the information and measures in this manual may pose a hazard to people, animals, the environment and tangible assets. Failure to observe the safety regulations and the neglect of other safety measures may lead to the lapse of liability for damages in the event of damage or loss.

Definitions

- Operator: Natural person or legal entity, who owns the product, uses it or to whom use of the product is entrusted on the basis of a contractual agreement.
- Principal: Legally and commercially liable client in relation to the system as a whole.
- Responsible person: The representative appointed to act by the installer or operator.
 Qualified person (QP): Any person whose professional training, experience and
- Qualified person (QP): Any person whose professional training, experience and recent professional activity gives them the requisite professional knowledge. This implies that such people have knowledge derived from relevant national and internal safety regulations.

ELECTRICAL WARNING SYMBOL



Danger - electric current

- Disregarding these warnings may:
- endanger health,
- cause death, fire or other damage,
- lead to the overloading of individual components and to damage,
- or otherwise impair the unit's function.

Caution - warning for mistakes and wrong basic assumptions Consider the implications of errors and incorrect set-up conditions carefully! Disregarding these warnings may lead to:

- serious personal injury
- overloading of individual components and damage
- impair the unit's function

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PURPOSE & USE OF THIS MANUAL

The following pages list the information, specifications, measures and technical data that allow the relevant personnel to use this product safely and for the intended purpose. Responsible persons or those engaged by them carrying out the required services must read this manual attentively and understand it. Such services include: storage, transportation, installation, electrical installation, commissioning and re-starting, operation, maintenance, inspection, repair and dismantling.

Where the product is to be used in plants/facilities which do not comply with harmonized European regulations and relevant technical rules and guidelines of professional associations for this field of application, the present document is purely for informative and reference purposes. As this unit may be subject to unlimited inspection at all times, this manual must be kept in the immediate vicinity of the installed unit, at least within the confines of the operations room.

QUALIFICATIONS REQUIRED, ASSUMPTIONS

All personnel must have relevant qualifications to carry out the required services, and be physically and psychologically capable.

Operating instructions are transferred by BOSS International representatives or others assigned by them during delivery negotiations or on demand. Training for the required services, installation, dismantling, commissioning, operation, inspection, maintenance and repair remain the responsibility of BOSS[®] or their nominated service partners. Such training covers information about on-site requirements rather than performance.

On-site requirements include logistics, manual handling, and the preparation of an installation location with the requisite foundation engineering to accommodate the unit, and the requisite hydraulic and electrical connections, the electrical installation for the power source of the equipment and installation of the BMS signal leads if required.

APPROPRIATE USE

This equipment is designed for use on sealed and un-sealed thermal systems (heating, chilled and condenser water). It is designed to remove particulate debris from the system. The maximum operating limits of this equipment are stated on the data labels affixed to each unit.

SUPPLIED GOODS

The items delivered must be compared against the items listed on the shipping note and inspected for conformity. Unpacking, installation and commissioning may be started only once the product has been checked as conforming with the intended use. In particular, exceeding the permissible operating or design parameters may lead to malfunctioning, component damage and personal injury.

If not in line with conformity statement or if the delivery is incorrect in any other way, the product must not be used.

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TRANSPORTATION, STORAGE, UNPACKING

The equipment is delivered in packing units in conformity with contract specifications or specifications required for the distributors method and climate zone.

They meet the requirements of the distributors packaging guidelines as a bare minimum. In conformity with these guidelines, equipment is shipped horizontally, each unit packed on disposable pallets. These pallets are suitable for horizontal transportation with approved fork-lift trucks.

The forks must be set to the widest possible outer dimensions in order to prevent the load from tipping over. When moving the equipment in question, the forks must be in the lowest possible position, with the article at right angles to the forks. If the packages are suitable for lifting gear, they will be marked at the appropriate lifting points.

Important note: Transport the packed goods as close as possible to the envisaged setup location and make sure there is a vertical, solid surface on which the goods can be mounted / secured.

Caution:

Please take precautions to make sure the equipment, once it has been removed from the pallet and the packaging, does not impact any other equipment or surface, tip over or rock.

Once it has been removed from the pallet and the packaging, the equipment must be transferred in a safe manner. Use methods that prevent uncontrolled falling, sliding or tipping over.

The equipment may also be warehoused in their packaging. Once it has been removed from its packaging, the equipment must be put in position, observing standard safety procedures. Do not stack the equipment. Use only permitted lifting gear and safe tools, and wear the required personal protective equipment.

EMERGENCY STOP / EMERGENCY OFF

In line with directive 2006/42/EC required EMERGENCY-STOP facility is made available by the rotary insulator on the BOSS[™] X-POT XP+, refer to the BOSS[™] X-POT XP+ Schematic, item 18 on page 10 of this document.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE must be used when carrying out potentially dangerous work and other activities, in order to prevent or minimize the risk of personal injury if other measures cannot be taken.

These must comply with the requirements referred by the main contractor or operator of the plant room or the site in question. If no requirements are set, to operate the equipment minimum requirements are safety goggles, hand protection, well-fitting clothing and sturdy, closed and skid-proof footwear.

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EXCEEDING PERMITTED PRESSURE &/OR TEMPERATURE LEVELS

Equipment used in combination with the BOSS[™] X-POT XP+ must guarantee that the permitted operating temperature and the permitted medium temperature (heat transfer medium) cannot be exceeded. Excess pressure and temperature may lead to component overload, irreparable damage to components, loss of function and, as a result, to severe personal injury and damage to property. Regular checks/inspections of these safeguards must be carried out.

SAFEGUARDS

The equipment supplied is equipped with the required safety devices. To test their effectiveness or restore the original set-up conditions, the equipment must first be taken out of service. Taking the system out of service implies that power should be isolated, hydraulics isolated and then vented.

EXTERNAL FORCES

Avoid any additional forces (e.g. forces caused by heat expansion, vibration or dead weights on the flow and return lines).

These can lead to damage / leakage in water-bearing pipework, loss of stability of the appliance and potentially failure of pressure bearing components.

ELECTRICAL EQUIPMENT INSPECTIONS

Regardless of the prescriptions of the property insurer / operator it is recommended to inspect demonstrably the electrical equipment of the BOSS[™] X-POT XP+ together with the heating or chilled installation at least every 12 months.

MAINTENANCE & REPAIR

These services may only be carried out when the X-POT XP+ is shut down. The BOSS™ X-POT XP+ equipment must be taken out of service and guarded against unintentional re-starting until the maintenance work is finished.

The control panel can be interconnected to a MODBUS BMS or alarm system to allow for indication that the filter is ready for change and the magnets are ready for cleaning.

The Grundfos Smart E-Pump will display a visual indication on screen and a general fault alarm as an indication of filter blockage.

The unit must be inspected on an annual basis, and the electrical and mechanical components verified for operation and integrity. **(See inspection table on page 9)**





Task	BOSS™ X-POT XP+
Visual inspection of components	6 mths - Site Engineer
Operational check of hydraulic components	12 mths - Annual Service - Qualified person
Operational check of electrical components	12 mths -Annual Service - Qualified person

OBVIOUS MISUSE

- Operation at incorrect voltage and/or frequency.
- Use in inappropriate system designs and environments.
- Use of non-permitted or inappropriate installation materials.

PRODUCT DESCRIPTION

The BOSS[™] X-POT XP+ is a sealed system, 2 stage side stream filtration and manual chemical dosing unit. It is a Patented, fully prefabricated, factory tested wall mounted unit incorporating:

- Grundfos CRiE Smart E-Pump (Pump Settings found on Page 20)
- Magnetic Filtration
- Bag Filter Filtration
- Air Separation
- Dirt Separation
- Manual Dosing Facility
- Working Pressure up to 16Bar
- Working temperature from 0°C up to 95°C

TECHNICAL DATA

	-	Maximum	Dimensions			Dry	y Wet	
Model	FIOW Rate (l/s)	System Size (litres)	Width (mm)	Depth (mm)	Height (mm)	Weight (Kg)	Weight (Kg)	
BOSS™ X-POT XP+ (3.5L)	1.0 - 3.5	302,400	1000	650	1630	126	151	

Model		Circulating Pu	mp	
Model	Pump Reference	Motor Rating	Electrical Supply	Current
BOSS™ X-POT XP+ (3.5L)	Grundfos IND-0-X-1-CRiE 10-2	1.5kW	230/1/50	9.10-7.60 Amps

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X-POT XP+® Operations & Maintenance Manual

SCHEMATICS & COMPONENT LIST





OPERATING PRINCIPLE

The BOSS[™] X-POT XP+[®] is designed to be a self-contained filtration equipment, with a dedicated inlet and outlet connection to a sealed and open vented system. The system fluid passes through the hydraulic components in the flow sequence below:



The system fluid is drawn from the main system return and into the BOSS® X-POT XP+® vessel. The fluid is drawn through a twin stage filtration system, in the first chamber, ferrous particulates are captured by the rare earth magnets contained in the magnet grate, the fluid then passes through the Baffle Plate and into the second chamber, where non-ferrous particulates are captured by the bag filter before the sampled water exits the BOSS® X-POT XP+® vessel, it then passes through the Side Stream Filtration Pump and back to the main system return.

The BOSS[®] X-POT XP+[®] is provided with a manual dosing facility comprising of a tundish, isolation valve and swing check valve arrangement. The equipment is also provided with an automatic air vent for the release of free air within the BOSS[®] X-POT XP+[®] assembly.

The equipment is provided with a proprietary BOSS® Grundfos CRIE Smart E-Pump, with BOSS® control methodology, that monitors the pressure drop across the BOSS® X-POT XP +® 'Filters' to determine the status of the filter media and to trigger the onsite cleaning and replacement of the filter media as appropriate.

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X-POT XP+® Operations & Maintenance Manual





INSTALLATION

BASIC INSTALLATION REQUIREMENTS

The equipment is to be connected from/to the return header pipework of the appropriate sealed system. The maximum pipe run length from the system pipework to the BOSS[®] X-POT XP+[®] is to be 10m.The 2 connections, from/to the return pipework, for the BOSS[®] X-POT XP+[®] is to be made at the bottom / underside of the return pipework to allow for any dense particulate solids to be drawn into the BOSS[®] X-POT XP+[®] for active removal from the system. A 1" drain with isolation valve is supplied at the bottom of the vessel. Extend this drain to a local floor gully with a minimum fall of 1:100.

The Power supply to the BOSS® X-POT XP+® is to be provided from the main system pump electrical supply. Therefore, the BOSS® X-POT XP+® will only be activated when the main system pump is running and active. **Ensure the power supply is 230V ~ 1 N PE 50Hz via a suitable Fused Spur and Isolator and Isolator.**



CRITICAL INSTALLATION REQUIREMENTS

The equipment must be sited:

- In a frost free area (> 5°C) and must also be protected from adverse environmental conditions
- In a well-lit area to allow for safe changing of the filter media and chemical dosing
- On a flat, vertical, level, solid wall with clear access to the electrical panel, pump and BOSS $^{\rm (B)}$ X-POT XP+ $^{\rm (e)}$ vessel itself

Care must be taken when handling this equipment. Appropriate safety measures must be in place in respect of use, handling and application of:

- Electrical equipment
- Pressure vessels
- Sealed system water
- Powerful Rare Earth magnets
- Filter media

- Hydraulic equipment
 - Manual handling
 - Chemical inhibitors and additives
 - Particulate debris

It is essential to ensure the environment that this equipment is installed in is safe to work and is free from trip hazards.

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X-POT XP+® Operations & Maintenance Manual

X-POTXP*

COMMISSIONING



WARNING

This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment.



For further advice please contact BOSS/BSS for additional information and guidance.

WARNING

This equipment uses Rare Earth Magnets with a strong magnetic field.



You should not use, service or work in the close vicinity (30cm / 1ft of this equipment if you are fitted with a pacemaker or other electromechanical medical devices.

1. General

The VEXO X-POT XP+ is a 'plug and play' unit. The BOSS X-POT XP+ is supplied with a Grundfos Smart E-Pump Pre-Commissioned for each site / project. Please find Pre-Set Configurations for Manual Configuration (If Required).

The operator should read this section prior to hand-over of the equipment from the installation operative to be confident on the operation of the Grundfos CRIE Smart E-Pump and the BOSS X-POT XP+ unit as a whole.

The control system is based around the Grundfos CRIE Smart E-Pump complete with 2no. Pressure Transducers for the purpose of measuring pressure differential across the X-POT Filter.

A Display Panel can be located on the Grundfos CRIE Smart E-Pump to allow for interrogation and adjustment of the parameters.

In the event of a power failure, the Grundfos CRIE Smart E-Pump will return to its Pre-Configured set operating mode once power has been restored.

The Power Supply to the BOSS X-POT XP+ is provided from a Fused Spur or Distribution Board rated to the power requirements of the pump. Therefore, the BOSS X-POT XP+ will be in continuous operation unless a blocked filter state is detected.

Ensure the power supply to the BOSS X-POT XP+ is 230V ~ 1 N PE 50Hz via a suitable Fused Spur.

The power supply is then connected to the main BOSS X-POT XP+ Mains Isolation Switch, refer to the unit schematic, item 22 on page 10 (Schematic) of this document.

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COMMISSIONING (continued)

1.1 X-POT XP+ Control Methodology

The Grundfos CRIE Smart E-Pump provides the control logic for the BOSS X-POT XP+ Unit. The Grundfos CRIE Smart E-Pump operates on Constant Curve Control based on a set Flow Rate and Pressure. Upon selection of the Set Curve to match Flow Rate and Pressure Set Points. The Grundfos CRIE Smart E-Pump will then operate Constant Pressure Curve.

MAX FLOW RATE SET POINT	MAX PRESSURE SET POINT	CURVE SELECTION	OPERATIONAL POWER %
3.501/s	140kPa	88%	920.9 watts
3.251/s	135kPa	84%	808 watts
3.00l/s	135kPa	81%	729.40 watts
2.501/s	130kPa	75%	573.50 watts
2.251/s	130kPa	73%	515.7 watts
2.00l/s	110kPa	66%	394.8 watts
1.75I/s	100kPa	62%	321.1 watts
1.50l/s	80kPa	55%	229 watts
1.251/s	70kPa	50%	176.9 watts
1.001/s	60kPa	46%	132.8 watts

The set point for maximum differential pressure will be set dependent on the Bag Filter installed in the BOSS X-POT XP+ 3.5 Unit. Please find the table below for set-points for corresponding Bag Filter Mesh Coarseness and Flow Rate Set Point

1.00I/s FLOW RATE				
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	8kPa	10kPa	16kPa	
50 Micron	8kPa	10kPa	16kPa	
25 Micron	12kPa	15kPa	24kPa	
5 Micron	20kPa	25kPa	40kPa	
1 Micron	28kPa	35kPa	56kPa	



COMMISSIONING (continued)

0.50l/s FLOW RATE				
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	8kPa	10kPa	16kPa	
50 Micron	8kPa	10kPa	16kPa	
25 Micron	12kPa	15kPa	24kPa	
5 Micron	20kPa	25kPa	40kPa	
1 Micron	28kPa	35kPa	56kPa	
	1.25I/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	9kPa	12kPa	18kPa	
50 Micron	9kPa	12kPa	18kPa	
25 Micron	15kPa	19kPa	30kPa	
5 Micron	21kPa	27kPa	42kPa	
1 Micron	30kPa	38kPa	60kPa	
	1.50l/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	10kPa	12kPa	20kPa	
50 Micron	10kPa	12kPa	20kPa	
25 Micron	20kPa	25kPa	40kPa	
5 Micron	30kPa	38kPa	60kPa	
1 Micron	40kPa	50kPa	80kPa	
	1.75l/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	11kPa	14kPa	22kPa	
50 Micron	11kPa	14kPa	22kPa	
25 Micron	22kPa	28kPa	44kPa	
5 Micron	35kPa	44kPa	70kPa	
1 Micron	46kPa	58kPa	92kPa	



COMMISSIONING (continued)

2.00I/s FLOW RATE				
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	12kPa	15kPa	24kPa	
50 Micron	12kPa	15kPa	24kPa	
25 Micron	28kPa	35kPa	56kPa	
5 Micron	40kPa	50kPa	80kPa	
1 Micron	55kPa	69kPa	110kPa	
	2.25I/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	14kPa	18kPa	28kPa	
50 Micron	14kPa	18kPa	28kPa	
25 Micron	29kPa	37kPa	58kPa	
5 Micron	45kPa	57kPa	90kPa	
1 Micron	57kPa	72kPa	114kPa	
	2.50l/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	16kPa	20kPa	32kPa	
50 Micron	16kPa	20kPa	32kPa	
25 Micron	34kPa	43kPa	64kPa	
5 Micron	50kPa	63kPa	100kPa	
1 Micron	65kPa	80kPa	130kPa	
	3.00l/s FL	OW RATE		
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	18kPa	22kPa	38kPa	
50 Micron	18kPa	22kPa	38kPa	
25 Micron	36kPa	45kPa	68kPa	
5 Micron	52kPa	65kPa	105kPa	
1 Micron	67kPa	82kPa	135kPa	



COMMISSIONING (continued)

3.50I/s FLOW RATE				
BAG FILTER MESH COARSENESS	CLEAN FILTER STATE DIFFERENTIAL PRESSURE	DIRTY FILTER STATE DIFFERENTIAL PRESSURE	BLOCKED FILTER STATE DIFFERENTIAL PRESSURE (SET POINT)	
100 Micron	20kPa	24kPa	42kPa	
50 Micron	20kPa	24kPa	42kPa	
25 Micron	38kPa	47kPa	72kPa	
5 Micron	54kPa	67kPa	110kPa	
1 Micron	69kPa	84kPa	140kPa	

2. Enable filtering

It is important to visually inspect the electrical connections, components and conduit serving the BOSS X-POT XP+ unit before commencement of the operation of the unit. It is important to visually inspect the BOSS X-POT XP+ unit hydronic connections before commencement of the operation of the unit to confirm the following;

- The integrity of all fittings and pipework connecting the heating / chilled system to the BOSS™ X-POT XP+ Ensure there are no leaks.
- The closure lid of the BOSS[™] X-POT XP+ is closed and sealed tight in accordance with the 'Bolt Tightening' method in Section 5 (page 26) of this document.
- All isolating valves 'as supplied' used to drain the BOSS[™] X-POT XP+ are closed with the valve handles at 90° to the pipework they are connected to. Refer to page 10 for the BOSS[™] X-POT XP+ Schematic, valve references 12, 16 & 19.
- All isolating valves 'as supplied' which connect the BOSS™ X-POT XP+ to the main heating / chilled system should be in the 'open' position. Rotate the valve handles to be in-line with the pipework it is connected to. Refer to page 10 for the BOSS X-POTXP+ Schematic, valve references 1, 3, 8 & 11.
- When the BOSS[™] X-POT XP+ has been filled with system water and pressurized, check the hydronic integrity of all fittings and pipework within the BOSS X-POT XP+ unit Ensure there are no leaks. To confirm the BOSS X-POT XP+ has been filled, check the Grundfos CRIE Smart E-Pump is displaying a pressure reading.
- Any system air will be drawn out through the Automatic Air Vent, item (18). This is a normal procedure.

2.1. Side Stream Circulation Pump

The Side Stream Circulation Pump (item 10) installed on the BOSS X-POT XP+ is a Grundfos CRIE Smart E-Pump. The pump is Pre-Configured Site /Project Specific Set Points. However, these Parameters can be check / altered via the Pre-Configuration Table.

2. Activation

The BOSS X-POT XP+ can be activated by turning the Isolator Switch from the 'Off' position to the 'On' position. The Grundfos CRIE Smart E-Pump will now activate.





PUMP CONFIGURATION



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X-POT XP+® Operations & Maintenance Manual

X-POTXP*

PUMP CONNECTION TABLE

TERMINAL	ТҮРЕ	FUNCTION
NC	Normally closed contact	
C1	Common	Signal relay 1 (LIVE or PELV)
NO	Normally open contact	
NC	Normally closed contact	
C2	Common	Signal relay 2 (PELV only)
NO	Normally open contact	
18	GND	Ground
11	DI4/OC2	Digital input/output, configurable. Open collector: Max. 24V resistive or inductive.
19	Pt100/1000	Pt100/1000
17	Pt100/1000	Pt100/1000
17	input 1	sensor input
12	AO	0-20 mA / 4-20 mA 0-10V
9	GND	Ground
14	AI3	Analog input: 0-20 mA / 4-20 mA 0-10V
1	DI2	Digital input, configurable
21	LiqTec sensor input 1	LiqTec sensor input (white conductor)
20	GND	Ground (brown and black conductors)
22	LiqTec sensor input 2	LiqTec sensor input (blue conductor)
10	DI3/OC1	Digital input/output, configurable. Open collector: Max. 24 V resistive or inductive.
4	Al1	Analog input: 0-20mA / 4-20 mA 0.5 - 3.5 V / 0-5 V / 0-10 V
2	DI1	Digital input, configurable
5	+5 V	Supply to potentiometer and sensor
9	GND	Ground

TERMINAL	ТҮРЕ	FUNCTION
А	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
В	GENIbus, B	GENIbus, B (-)
3	GND	Ground
15	+24 V	Supply
8	+24 V	Supply
26	+5 V	Supply to potentiometer and sensor
23	GND	Ground
25	GDS TX	Grundfos Digital Sensor output
24	GDS RX	Grundfos Digital Sensor output
7	AI2	Analog input: 0-20 mA / 4-20 mA 0.5-3.5 V / 0-5 V / 0-10V

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SIGNAL CABLES

Signal Cables

- Use screened cables with a cross-sectional area of at least 0.5mm² and a maximum of 1.5mm² for the external on/off switch, digital inputs, set-point, and sensor signals.
- Connect the screens of the cables to the frame at both ends with good connections. The screens must be as close as possible to the terminals.

(See figure. 1.)



- Always tighten screws for the frame connections whether a cable has been fitted or not.
- The wires in the motor terminal box must be as short possible.

Bus Connection Cable

New Installations

For the bus connection, use a screened 3-core cable with a cross-sectional area of at least 0.5mm² and a maximum of 1.5mm².

If the motor is connected to a unit with a cable clamp which is identical to the one on the motor, connect the screen to this clamp.

If the unit has no cable clamp leave the screen unconnected at this end. See **figure. 2**.

If a 2-core cable is used in the installation, connect it as shown in **figure. 3**.







Fig. 3 Connection with screened 2-core cable



Χ-ΡΟΤΧΡ+

PUMP CONFIGURATION

Standard Control Panel

The pumps are fitted with this control panel as standard.



POS.	SYMBOL	DESCRIPTION
1	\bigcirc	Grundfos Eye Shows the operating status of the pump.
2	-	Light fields for indications of set-point.
3	⇔ ⊗	Up and down. Changes the set-point.

POS. SYMBOL DESCRIPTION Allows radio communication with Grundfos GO Remote and other products of the same type. When you try to establish radio communication between the pump and Grundfos GO Remote or ())))() another pump, the green indicator light in Grundfos Eye on the pump flashes continuously. Press 🔊 on the pump control panel to allow radio communication with Grundfos GO Remote and other products of the same type. Makes the pump ready for operation or starts and stops the pump. START If you press the button when the pump is stopped, the pump only starts if no other functions with higher priority ()have been enabled. STOP If you press the button when

4

the pump is running, the pump always stops. The "Stop" text next to the button is on.

Set-point Setting

Set the desired set-point of the pump by $pressing(\widehat{\otimes}) \circ r(\widehat{\otimes})$. The green light fields on the control panel indicate the set-point stetting.

Pump in constant pressure control mode

The following example applies to a pump in an application where a pressure sensor gives a feedback to the pump. If the sensor is retrofitted to the pump, you must set it up manually as the pump does not automatically register a connected sensor.

As seen in the diagram on the right, it shows that the light fields 5 and 6 are activated, indicating a desired set-point of 3 bar with a sensor measuring range from 0 to 6 bar. The setting range is equal to the sensor measuring range.

[bar] 6 3 Y 0

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PUMP CONFIGURATION (Continued)

Pump in constant-curve control mode

In constant-curve control mode, the pump performance lies between the maximum and minimum curve of the pump, as seen on the right.

Setting to maximum curve:

- Press ⊗ continuously to change over to the maximum curve of the pump (top light field flashes). When the top light field is on, press ⊗ for 3 seconds until the light field starts flashing.
- To go back, press 🛞 continuously until the desired set-point is indicated.

Example: Pump set to maximum curve. Diagram on the right demonstrates that the top light field is flashing, indicating maximum curve.

Setting to minimum curve:

- Press ⊗ continuously to change over to the minimum curve of the pump (bottom light field flashes). When the bottom light field is on, press ⊗ for 3 seconds until the light field starts flashing.
- To go back, press log continuously until the desired set-point is indicated.

Example: Pump set to minimum curve.

Diagram on the right demonstrates that the bottom light field is flashing, indicating minimum curve.

Start-stop of pump

Stop the pump by pressing (a). When the pump is stopped, the "Stop" text next to the button is on. You can also stop the pump by continuously pressing (b) until none of the light fields are on.

Start the pump by pressing (a) or by continuously pressing (a) until the desired set-point is indicated. If you have stor d the pump pressing (a), it can only be free to operation by pressing (b) again. If you have stopped the pump by pressing (b), it can only be restarted by pressing (c).

You can also stop the pump with Grundfos GO Remote or via a digital input set to External stop.

Resetting of fault indications

You can reset a fault indication in one of the following ways:

- Via the digital input if you have set it to Alarm resetting.
- Briefly press (⊗) or (⊗) on the pump. This does not change the setting of the pump. You cannot reset a fault indication by pressing (⊗) or (⊗) if the buttons are locked.
- Switch off the power supply until the indicator lights are off.
- Switch the external start-stop input off and then on again.
- With Grundfos GO Remote.

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PUMP CONFIGURATION (Continued)

Advanced Control Panel

The pumps can be fit with the advanced control panel as an option.



POS.	SYMBOL	DESCRIPTION
1	\bigcirc	Grundfos Eye Shows the operating status of the pump.
2	-	Graphical colour display.
3	Ś	Goes one step back.
	< >>	Navigates between main menus, displays, and digits. When you change the menu, the display always shows the top display of the new menu.
4	⇒ ≫	Navigates between sub- menus. Changes value settings. Note: If you have disabled the possibility to change settings with the enable/ disable settings function, then you can enable it again temporarily by pressing the following buttons simultaneously for at least 5 seconds.

	Í	
POS.	SYMBOL	DESCRIPTION
4	OK	Saves changed values, resets alarms and expands the value field. Enables radio communication with Grundfos GO Remote and other products of the same type. When you try to establish radio communication between the pump and Grundfos GO Remote or another, the green indicator light in Grundfos Eye flashes. A note also appears in the pump display stating that a wireless device wants to connect to the pump. Press ©K on the pump control panel to allow radio communication with Grundfos GO Remote and other products of same type.
5		Makes the pump ready for operation or starts and stops the pump. START If you press the button when the pump is stopped, the pump only starts if no other functions with higher priority have been enabled. STOP If you press the button when the pump is running, the pump always stops. When you stop the pump via this button, the () icon appears in the bottom of the display.
6		Goes to the Home menu.

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PUMP CONFIGURATION (Continued)



POS.	SYMBOL		POS.	SYMBOL	DESCRIPTION
	Home This menu shows up to four user-defined parameters.	Home This menu shows up to four user-defined parameters.	5	G	Indicates that the pump has been stopped vis the button.
1		shown as a shortcut icon , & when pressing ©K you go directly to the "Settings"	6		Indicates that the pump is functioning as master pump in a multi-pump system.
		display for the selected parameter.	7		Indicates that the pump is functioning as slave pump in a multi-pump system.
2	-	Status This menu shows the status of the pump & system as well as warnings & alarms.	8	•	Indicates that the pump is operating in a multi-pump system.
3	-	Settings This menu gives access to all setting parameters. You can make detailed settings for the pump in this menu.	9	0	Indicates that the possibility to change settings has been disabled for protective reasons.
4	-	Assist This menu enables assisted pump setup, provides a short description of the control modes and offers			

fault advice.

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Menu overview for advanced control panel

НОМЕ	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
	•	•	٠

STATUS	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
Operating status	•	•	•
Operating mode, from	•	•	•
Control mode	٠	٠	•
Pump performance	٠	٠	•
Actual controller value	٠	•	•
Resulting set-point	٠	•	•
Speed	٠	•	•
Acc. flow and specific energy	•	٠	•
Power and energy consumption	٠	٠	•
Measured values	•	٠	•
Analog input 1	•	٠	•
Analog input 2	٠	٠	•
Analog input 3	•	•1)	•1)
Pt100/1000 input 1	•	•1)	•1)
Pt100/1000 input 2	٠	•1)	•1)
Analog output	•	•1)	•1)
Warning and alarm	•	•	•
Actual warning or alarm	٠	•	•
Warning log	٠	٠	•
Alarm log	٠	٠	•
Operating log	٠	•	•
Operating hours	٠	٠	•
Fitted modules	٠	٠	•
Data and time	٠	٠	•
Product identification	٠	٠	•
Motor bearing monitoring	٠	•	•
Multi-pump system			•
System operating status			•
System performance			•
System input power and energy			•
Pump 1, multi-pump system			•
Pump 2, multi-pump system			•
Pump 3, multi-pump system			•
Pump 4, multi-pump system			•

¹⁾ Only available if an advanced functional module, type FM 300, is fitted.





Control Panel Settings

SETTINGS	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
Set-point	•	•	•
Operating mode	•	•	•
Set manual speed	٠	•	•
Set user-defined speed	٠	•	•
Control mode	•	•	•
Setting the proportional pressure	•	•	•
Analog inputs	٠	•	•
Analog input 1, setup	٠	•	•
Analog input 2, setup	•	•	•
Analog input 3, setup	٠	•1)	•1)
Pt100/1000 inputs	•	•1)	•1)
Pt100/1000 input 1, setup	•	•1)	•1)
Pt100/1000 input 2, setup	٠	•1)	•1)
Digital inputs	٠	•	•
Digital input 1, setup	•	•	•
Digital input 2, setup	٠	•1)	•1)
Digital inputs/outputs	٠	•	•
Digital input/output 3, setup	٠	•	•
Digital input/output 4, setup	٠	•1)	•1)
Relay outputs	•	•	•
Relay output 1	٠	•	•
Relay output 2	٠	•	•
Analog output	٠	•1)	•1)
Output signal	٠	•1)	•1)
Function of analog output	•	•1)	•1)
Controller settings	•	•	•
Operating range	•	•	•
Set-point influence	•	•	•
Ext. set-point infl.	•	•	•
Predefined setpoints	•	•1)	•1)
Monitoring functions	•	•	•
Motor bearing monitoring	•	•	•
Motor bearing maintenance	•	•	•
Limit-exceeded function	•	•	•
LiqTec function	•	•	•
Alarm handling	•	•	•

¹⁾ Only available if an advanced function module, type FM 300, is fitted.

Continued on following page.





Control Panel Settings (Cont.)

SETTINGS	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
Special functions	•	•	•
Low-flow stop function	•	•	•
Stop at min. speed	•	•	•
Pipe filling function	•	•	•
Pulse flowmeter setup	•	•	•
Ramps	•	•	•
Standstill heating	•	•	•
Communication	•	•	•
Pump number	•	•	•
Enable/disable radio comm.	•	•	•
General settings	•	•	•
Language	•	•	•
Set date and time	•	•	•
Units	•	•	•
Enable/disable settings	•	•	•
Delete history	•	•	•
Define Home display	•	•	•
Display settings	•	•	•
Store actual settings	•	•	•
Recall stored settings	•	•	•
Run start-up guide	•	•	•

Assist

SETTINGS	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
Assisted pump setup	•	•	٠
Setup, analog input	•	•	•
Setting of date and time	•	•	٠
Setup of multi-pump system	•	•	٠
Description of control mode	•	•	•
Assisted fault advice	•	•	•





Grundfos GO Remote

The pump is designed for wireless radio or infrared communication with Grundfos GO Remote.

Grundfos GO Remote enables setting of functions and gives access to status overviews of functions and gives access to status overviews, technical product information and actual operating parameters.

Grundfos GO Remote offers the following mobile interfaces (MI).



Grundfos GO Remote communicating with the pump via radio or infrared connection (IR)

POS.	DESCRIPTION
1	Grundfos MI 301: Separate module enabling radio or infrared communication. You can use the module in conjunction with an Android or iOS-based smart device with Bluetooth connection.

Communication

When Grundfos GO Remote initiates communication with the pump, the indicator light in the middle of Grundfos Eye flashes green.

Furthermore, on pumps fitted with an advanced control panel a text appears in the display saying that a wireless device is trying to establish connection. Press $\otimes \mathbb{K}$ on the pump in order to establish connection with Grundfos GO Remote or press \mathbf{n} to reject connection.

Establish communication using one of these communication types:

- Radio communication
- Infrared communication.

Radio Communication

Radio communication can take place at distances up to 30m. The first time Grundfos GO Remote communicates with the pump, you must enable communication by pressing () or $\mathbb{O}\mathbb{K}$ on the pump control panel. Later when communication takes place, the pump is recognised by Grundfos GO Remote and you can select the pump from the "List" menu.

Infrared Communication

When communicating via infrared light, Grundfos GO Remote must be pointed at the pump control panel.





Menu overview for Grundfos GO Remote

DASHBOARD	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
	•	•	٠

STATUS	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
"System mode"			•2)
"Resulting set-point"	•	•	
"Resulting system set-point"			•2)
"Actual controlled value"	٠	٠	•2)
"Motor speed"	٠	٠	
"Power consumption"	٠	٠	
"Power cons., sys."			•2)
"Energy consumption"	٠	•	
"Energy cons., sys."			•2)
"Acc. flow, specific energy"	٠	٠	•2)
"Operating hours"	٠	•	
"Operating hours, system"			•2)
"Pt100/1000 input 1"	٠	•1)	
"Pt100/1000 input 2"	٠	•1)	
"Analog output"	٠	•1)	
"Analog input 1"	٠	•	
"Analog input 2"	٠	•	
"Analog input 3"	٠	•1)	
"Digital input 1"	٠	٠	
"Digital input 2"	٠	•1)	
"Digital in/output 3"	٠	•	
"Digital in/output 4"	٠	•1)	
"Fitted modules"	•	•	
"Pump 1"			•2)
"Pump 2"			•2)
"Pump 3"			•2)
"Pump 4"			•2)

¹⁾ Only available if an advanced function module, type FM 300, is fitted.

²⁾ Only available if Grundfos GO Remote is connected to a multi-pump system.

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PUMP CONFIGURATION (Continued)

"SETTINGS"	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
"Set-point"	•	•	•
"Operating mode"	•	•	•
"Set user-defined speed"	•	•	•
"Control mode"	•	•	•
"Setting the proportional pressure"	•	•	•
"Pipe-filling function"	•	•	•
"Buttons on product"	•	•	
"LiqTec"	٠	•1)	
"Stop function"	•	•	•
"Stop at min. speed"	•	•	•
"Controller"	•	•	•
"Operating range"	•	•	•
"Ramps"	•	•	
"Number"	•	•	
"Radio communication"	•	•	
"Analog input 1"	•	•	
"Analog input 2"	•	•	
"Analog input 3"	•	•1)	
"Pt100/1000 input 1"	•	•1)	
"Pt100/1000 input 2"	•	•1)	
"Digital input 1"	•	•	
"Digital input 2"	•	•1)	
"Digital in/output 3"	•	•	
"Digital in/output 4"	•	•1)	
"Pulse flowmeter"	•	•	
"Predefined set-point"	•	•	•
"Analog output"	•	•1)	
"External set-point funct."	•	•	
"Signal relay 1"	•	•	
"Signal relay 2"	•	•	
"Limit 1 exceeded"	•	•	•
"Limit 2 exceeded"	•	•	•
"Alternating operation, time"			•2)
"Sensor to be used"			•2)
"Time for pump changeover"			●1) + 2)
"Standstill heating"	•	•	
"Alarm handling"	•	•	•

¹⁾ Only available if an advanced function module, type FM 300, is fitted.

²⁾ Only available if Grundfos GO Remote is connected to a multi-pump system.

Continued on following page.





"SETTINGS"	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
"Motor bearing monitoring"	•	•	
"Service"	•	•	
"Date and time"	•	•1)	
"Store settings"	•	•	
"Recall settings"	٠	•	
"Undo"	•	•	•
"Pump name"	•	•	•
"Connection code"	•	•	•
"Unit configuration"	•	•	

¹⁾ Only available if an advanced function module, type FM 300, is fitted.

"Alarms and Warnings"	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
"Alarm log"	•	•	•
"Warning log"	•	٠	٠
"Reset alarm" button	•	•	•

"Assist	CRE, CRIE CRNE, SPKE, MTRE	СМЕ	MULTI-PUMP SYSTEM
"Assisted pump setup"	•	•	
"Assisted fault advice"	•	•	•
"Multi-pump setup"	•	•	•





Description of functions

Set-point

PUMP VARIANT	SETPOINT
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

You can set the set-point for all control modes when you have selected the desired control mode.

Operating Mode

PUMP VARIANT	OPERATING MODE
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

OPERATING MODES	DESCRIPTION	
Normal	The pump runs according to the selected control mode.	
Stop	The pump stops.	
Min.	You can use the minimum curve mode in periods in which a minimum flow is required. When operating according to the minimum curve, the pump is operating like an uncontrolled pump.	
Max.	You can use the maximum curve mode in periods in which a maxin flow is required. When operating according to the maximum curve the pump is operating like an uncontrolled pump.	
Manual	The pump is operating at a manually set speed.	
"User-defined speed"	The motor is operating at a speed set by user.	

Set manual speed

This menu is only available in the advanced control panel. With Grundfos GO Remote, you set the speed via the Set-point menu.

You can set the pump speed in % of the maximum speed. When you have set the operating mode to Manual, the pump starts running at the set speed. The speed can then be changed manually via Grundfos GO Remote or via the advanced control panel.

"Set user-defined speed"

You can set the motor speed in % of the maximum speed. When you have set the operating mode to "User-defined speed", the motor runs at the set speed.



All operating modes shown above

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PUMP VARIANT	CONTROL MODE
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

Possible control modes:

- "Proportional pressure"
- "Constant pressure" (Const. pressure)
- "Constant temperature" (Const. temp.)
- "Constant differential pressure" (Con. diff. press.)
- "Constant differential temperature" (Con. diff. temp.)
- "Constant flow rate" (Const. flow rate)
- "Constant level" (Const. level)
- "Constant other value" (Const. other val.)
- "Constant curve" (Const. curve.).

* Requires a measured differential pressure and pump data entered into the controller.

Proportional pressure

PUMP VARIANT	"PROPORTIONAL PRESSURE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

We recommend this control mode if the pump is installed in a circulating system.

The head of the pump is reduced at decreasing water demand and increased at rising water demand. See diagram to the right.



This control mode is especially suitable in systems with relatively

large pressure losses in the distribution pipes. The head of the pump increases proportionally to the system flow rate to compensate for the large pressure losses in the distribution pipes.

PUMP VARIANT	"CONSTANT PRESSURE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•



We recommend this control mode if the pump is to deliver a constant pressure, independently of the flow in the system. See diagram on the right.

This control mode uses the factory-fitted pressure sensor, if any, which measures the outlet pressure of the pump.

For pumps without a factory-fitted sensor, you must connect a pressure sensor to one of the analog inputs of the pump. You can set the pressure sensor in the Assist menu.



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Constant temperature

PUMP VARIANT	"CONSTANT TEMPERATURE"
CME	•
CRE, CRIE, CRNE,	_
SPKE, MTRE	•

This control mode ensures a constant temperature. Constant temperature is a comfort control mode that you can use in domestic hot-water systems to control the flow to maintain a fixed temperature in the system. See illustration to the right.

This control mode requires a temperature sensor placed at the location where the temperature is to be controlled. See the examples below:





Constant differential pressure

PUMP VARIANT	"CONSTANT DIFFERENTIAL PRESSURE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

The pump maintains a constant differential pressure, independently of the flow in the system. Seen on the right.

This control mode requires either a differential-pressure sensor or two external pressure sensors. See the examples below:



Examples

One differential-pressure sensor. The pump uses the input from the sensor to control the differential pressure. You can set the sensor manually or by using the Assist menu.





Two pressure sensors.

Constant differential-pressure control is achievable with two pressure sensors. The pump uses the inputs from the two sensors and calculates the differential pressure. Both sensors must have the same unit and must be set as feedback sensors. You can set the sensors manually, sensor by sensor, or by using the Assist menu.



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Constant differential pressure

PUMP VARIANT	"CONSTANT DIFFERENTIAL PRESSURE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

The pump maintains a constant differential temperature in the system and the pump performance is controlled according to this. See diagram to the right.

This control mode requires either two temperature sensors or one differential-temperature sensor. See the examples below. The temperature sensors can either be analog sensors connected to two of the analog inputs or two Pt100/Pt1000 sensors connected to the Pt100/1000 inputs, if these are available on the specific pump.



Examples



One differential-temperature sensor. The pump uses the input from the sensor to control the differential temperature. You can set the sensor manually or by using the Assist menu.



Two temperature sensors.

Constant differential-temperature control is achievable with two temperature sensors. The pump uses the input from the two sensors and calculates the differential temperature. Both sensors must have the same unit and must be set as feedback sensors. You can do this manually, sensor by sensor, or by using the Assist menu.

Constant flow rate

PUMP VARIANT	"CONSTANT FLOW PRESSURE"
CME	•
CRE, CRIE, CRNE,	-
SPKE, MTRE	•

The pump maintains a constant flow in the system, independently of the head.

This control mode requires a flow sensor as shown below.

"Constant Flow Rate"

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Constant level

PUMP VARIANT	"CONSTANT LEVEL"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

The pump maintains a constant level, independently of the flow rate. Which can be seen to the right.

This control mode requires a level sensor. The pump can control the level in a tank in two ways:

- As an emptying function where the pump draws the liquid from a feed tank.
- As a filling function where the pump pumps the liquid into a storage tank.



The type of level control function depends on the settings of the built-in controller.

Examples





One level sensor.

- filling function (storage tank).

One level sensor.

- emptying function (feed tank).

"Constant other value"

PUMP VARIANT	"CONSTANT OTHER VALUE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

Any other value is kept constant.

Use this control mode if you want to control a value which is not available in the Control mode menu. Connect a sensor measuring the controlled value to one of the analog inputs of the pump. The controlled value is shown in percentage of sensor range.





Constant curve

PUMP VARIANT	"CONSTANT CURVE"
CME	•
CRE, CRIE, CRNE,	
SPKE, MTRE	•

You can set the pump to operate according to a constant curve, like an uncontrolled pump. See diagram to the right.

The desired speed can be set in % of maximum speed in the range from 13 to 100 %.



Setting the proportional pressure

"Control-curve function"

You can set the proportional curve either to quadratic or linear to match the system curve.

"Zero-flow head"

You can set this value in percentage of the set-point and define how much the set-point must be reduced at a closed valve. With a setting of 100 %, the control mode is equal to the constant differential pressure.

"Fixed inlet pressure"

This menu enables the use of a fixed inlet pressure.

"Inlet pressure"

Enter the fixed inlet pressure that is to be supplied to the pump.

"Pump data"

To enable the pump to operate in proportional pressure, the controller needs to process the pump curve. Enter the maximum head, rated head and rated flow from the pump nameplate.

Analog inputs

Available inputs depend on the functional module fitted in the pump:

Function (Terminal)	FM200* (Standard)	FM300* (Standard)
Analog input 1, setup (4)	•	•
Analog input 2, setup (7)	•	•
Analog input 3 , setup (14)	-	•

If you want to set the analog input for a feedback sensor, we recommend that you do this via the Assisted pump setup menu.

If you want to set an analog input for other purposes, you can do this manually. You can set the analog inputs via the Setup, analog input menu.

If you make the manual setting via Grundfos GO Remote, you need to enter the menu for the analog input under the Settings menu.





Function

The analog inputs can be set to these functions:

- Not active
- Feedback sensor; The sensor is used for the selected control mode.
- Ext. set-point infl.
- Other function.

Measured parameter

Select one of the parameters listed below, i.e. the parameter to be measured in the system by the sensor connected to the actual analog input. See diagram below.





SENSOR FUNCTION/MEASURED PARAMETER	POS.
Inlet pressure	1
Diff. press., inlet	2
Discharge press.	3
Diff. press., outlet	4
Diff. press., pump	5
Press. 1, external	6
Press. 2, external	7
Diff. press., ext.	8
Storage tank level	9
Feed tank level	10
Pump flow	11
Flow, external	12
Liquid temp.	13
Temperature 1	14
Temperature 2	15
Diff. temp., ext.	16
Ambient temp.	Not shown
Other parameter	Not shown

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Unit

PARAMETER	POSSIBLE UNITS
Pressure	bar, m, kPa, psi, ft
Level	m, ft, in
Pump flow	m³/h, l/s, yd³/h, gpm
Liquid temperature	°C, °F
Other parameter	%

Electrical signal

Select signal type:

- 0.5 3.5 V
- 0 5 V
- 0 10 V
- 0 20 mA.
- 4 20 mA

Sensor range, minimum value

Set the minimum value of the connected sensor.

Sensor range, maximum value

Set the maximum value of the connected sensor.

Setting two sensors for differential measurement

In order to measure the difference of a parameter between two points, set the corresponding sensors as follows:

PARAMETER	ANALOG INPUT FOR SENSOR 1	ANALOG INPUT FOR SENSOR 2
Pressure, option 1	Differential pressure, inlet	Differential pressure, outlet
Pressure, option 2	Pressure 1, external	Pressure 2, external
Flow	Pump flow	Flow, external
Temperature	Temperature 1	Temperature 2

If you want to use the control mode "constant differential pressure", you must choose the function Feedback sensor for the analog input of both sensors.

Pt100/1000 inputs

Available inputs depend on the functional module fitted in the pump:

PARAMETER	FM 200* (STANDARD)	FM 300* (ADVANCED)
Pt100/1000 input 1, setup (17 and 18)	-	٠
Pt100/1000 input 2, setup (18 and 19)	-	•





If you want to set the Pt100/1000 input for a feedback sensor, we recommend that you do this via the Assisted pump setup menu.

If you want to set a Pt100/1000 input for other purposes, you can do this manually. You can set the analog inputs via the Setup, analog input menu.

If you make the manual setting via Grundfos GO Remote, you need to enter the menu for the Pt100/1000 input under the Settings menu.

Function

The Pt100/1000 inputs can be set to these functions:

- Not active.
- Feedback sensor; The sensor is used for the selected control mode.
- Ext. set-point infl.
- Other function.

Measured parameter

Select one of the parameters listed below, i.e the parameter to be measure in the system by the Pt100/1000 sensor connected to the actual Pt100/1000 input. See illustration below.



Overview of Pt100/ 1000 sensor locations.

PARAMETER	POS.
Liquid temp.	1
Temperature 1	2
Temperature 2	3
Ambient temp.	Not shown

Measuring range

-50°C to 204°C

Digital inputs

PUMP VARIANT	DIGITAL INPUTS
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

Available inputs depend on the functional module fitted to the pump:

FUNCTION (TERMINAL)	FM 200* (STANDARD)	FM 300* (ADVANCED)
Digital input 1, setup (2 and 6)	-	٠
Digital input 2, setup (1 and 9)	-	•





To set a digital input, make the settings below.

Function

Select one of these functions:

- Not active. When set to Not active, the input has no function.
- External stop. When the input is deactivated (open circuit), the pump stops.
- Min. (minimum speed). When the input is activated, the pump runs at the set minimum speed.
- Max. (maximum speed).

When the input is activated, the pump runs at the set maximum speed.

- "User-defined speed"

When the input is activated, the motor runs at a speed set by the user.

- External fault.

When the input is activated, a timer is started. If the input is activated for more than 5 seconds, the pump is stopped and a fault is indicated. This function depends on input from external equipment.

- Alarm resetting.

When the input is activated, a possible fault indication is reset.

- Dry running.

When this function is selected, lack of inlet pressure or water shortage can be detected. When lack of inlet pressure or water shortage (dry running) is detected, the pump is stopped. The pump cannot restart as long as the input is activated. This requires the use of an accessory, such as these:

- A pressure switch installed on the inlet side of the pump.
- A float switch installed on the inlet side of the pump.

- Accumulated flow.

When this function is selected, the accumulated flow can be registered. This requires the use of a flow meter which can give a feedback signal as a pulse per defined volume of water.

- Predefined set-point digit 1 (applies only to digital input 2).

When digital inputs are set to predefined set-point, the pump operates according to a set-point based on the combination of the activated digital inputs.

- Active output.

When the input is activated, the related digital output is activated. This is done without any changes to pump operation.

- Local motor stop.

When the input is activated, the given pump in a multipump system stops without affecting the performance of the other pumps in the system. The priority of the selected functions in relation to each other appears from section 15. Priority of settings.

A stop command always has the highest priority.



PUMP CONFIGURATION (Continued)

Activation delay

Select the activation delay (T1). It is the time between the digital signal and the activation of the selected function. Range: 0-6000 seconds.

Duration timer mode

T input > T1 + T2 T input < T1 + T2

Select the mode. See diagram to the right. - Not active

- active with interrupt (mode A)

- active without interrupt (mode B)
- active with after-run (mode C).

Select the duration time (T2).

It is the time which, together with the mode, determines how long the selected function is active. Range: 0 to 15,000 seconds.



Digital inputs/outputs

PUMP VARIANT	DIGITAL INPUTS/OUTPUTS
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

Available inputs/outputs depend on the functional module fitted in the pump:

FUNCTION (TERMINAL)	FM 200* (STANDARD)	FM 300* (ADVANCED)
Digital input/output 3, setup (6 and 10)	•	•
Digital input/output 4, setup (11 and 18)	-	•

You can select if the interface is to be used as input or output. The output is an open collector and you can connect it to e.g. an external relay or controller such as a PLC.

To set a digital input/output, see the settings below.

Mode

You can set the digital input/output 3 & 4 to as digital input or digital output:

- Digital input
- Digital output

Function

You can set the digital input/output 3 & 4 to the functions stated in the table on the following page.







Possible functions, digital input/output 3

Possible functions, digital input/output 4

FUNCTION IF INPUT	FUNCTION IF OUTPUT	FUNCTION IF INPUT	FUNCTION IF OUTPUT
Not active	Not active	Not active	 Not active
 External stop 	• Ready	 External stop 	• Ready
• Min.	• Alarm	• Min.	• Alarm
• Max.	Operation	• Max.	 Operation
 "User-defined 	Pump running	 "User-defined 	 Pump running
speed"	• Warning	speed"	• Warning
 External fault 	Limit 1 exceeded	 External fault 	 Limit 1 exceeded
 Alarm resetting 	• Limit 2 exceeded	 Alarm resetting 	 Limit 2 exceeded
 Dry running 	• Digital input 1, state	 Dry running 	• Digital input 1, state
 Accumulated flow 	• Digital input 2, state	 Accumulated flow 	• Digital input 2, state
Predefined set-point	• Digital input 3, state	Predefined set-point	• Digital input 3, state
digit 2	• Digital input 4, state	digit 3	• Digital input 4, state
 Active output 		 Active output 	
Local motor stop		Local motor stop	

Duration timer mode (only for input)

Select the duration timer mode.

- Not active
- Active with interrupt (mode A)
- Active without interrupt (mode B)
- Active with after-run (mode C)

Select the duration time (T2)

It is the time which, together with the mode, determines how long the selected function is active.

Range: 0 to 15,000 seconds.



T input < T1 + T2

T input > T1 + T2

1 T

PUMP VARIANT	"SIGNAL RELAYS" 1 & 2 (RELAY OUTPUTS)
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

The pump incorporates two signal relays for potential-free signalling.

Function

You can configure the signal relays to be activated by one of the following incidents:

- Not active.
- Ready.

The pump can be running or is ready to run and no alarms are present.

- Alarm.

There is an active alarm and the pump is stopped.

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PUMP CONFIGURATION (Continued)

- "Operating" (Operation).

"Operating" equals "Running" but the pump is still in operation when the pump is stopped due to low flow. See section "Low-flow detection" on page 46.

- "Running" (Pump running). The pump is running.
- Warning. There is an active warning.
- Digital input 1, state If digital input 1 is activated, the output is also activated.
- Digital input 2, state If digital input 2 is activated, the output is also activated.
- Digital input 3, state If digital input 3 is activated, the output is also activated.
- Digital input 4, state If digital input 4 is activated, the output is also activated.
- Limit 1 exceeded When this function is activated, the signal relay is activated.
- Limit 2 exceeded.

When this function is activated, the signal relay is activated.

- "External fan control" (Control of external fan). When you select "External fan control", the relay is activated if the internal temperature of the motor electronics reach a pre-set limit value.

PUMP VARIANT	ANALOG OUTPUT
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

Whether the analog output is available or not, depends on the functional module in the pump:

FUNCTION (TERMINAL)	FM 200* (STANDARD)	FM 300* (ADVANCED)
Analog output	-	•

The analog output enables the reading of certain operating data to external control systems.

To set the analog output, make the settings below.

Output signal

- 0 10 V
- 0 20 mA
- 4 20 mA

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PUMP CONFIGURATION (Continued)

Function of analog output

- Actual s	peed
------------	------

	ACTUAL SPEED [%]		D [%]
[V, mA]	0	100	200
0 - 10 V	0 V	5 V	10 V
0 - 20 mA	0 mA	10 mA	20 mA
4 - 20 mA	4 mA	12 mA	20 mA

The reading is a percentage of the range between the min. and max. value.

- Resulting set-point

	RESULTING SETPOINT [%]		
[V, mA]	0	100	
0 - 10 V	ΟV	10 V	
0 - 20 mA	0 mA	20 mA	
4 - 20 mA	4 mA	20 mA	

The reading is a percentage of the range between 0 & 200% of the max permissible load at the actual speed.

- Motor current

	MOTOR CURRENT [%]		
[V, mA]	0 100		200
0 - 10 V	ΟV	5 V	10 V
0 - 20 mA	0 mA	10 mA	20 mA
4 - 20 mA	4 mA	12 mA	20 mA

This function is typically used for monitoring of secondary parameters in the system. If the limit is exceeded, and output, a warning or an alarm is activated

- Flow rate

SIGNAL	FLOW RATE [%] 0 100 200		
[V, mA]			200
0 - 10 V	ΟV	5 V	10 V
0 - 20 mA	0 mA	10 mA	20 mA
4 - 20 mA	4 mA	12 mA	20 mA

The reading is a percentage of the rated speed.

- Actual value

	"ACTUAL VALUE"		
[V, mA]		SENSOR _{max}	
0 - 10 V	ΟV	10 V	
0 - 20 mA	0 mA	20 mA	
4 - 20 mA	4 mA	20 mA	

The reading is a percentage of the external set-point range.

- Motor load

	MOTOR LOAD [%]		
[V, mA]	0	100	
0 - 10 V	ΟV	10 V	
0 - 20 mA	0 mA	20 mA	
4 - 20 mA	4 mA	20 mA	

The reading is a percentage of the range between 0 & 200% of the rated current.

- Limit 1 exceeded and Limit 2 exceeded

	LIMIT-EXCEEDED FUNCTION		
[V, mA]	OUTPUT NOT ACTIVE	OUTPUT ACTIVE	
0 - 10 V	ΟV	10 V	
0 - 20 mA	0 mA	20 mA	
4 - 20 mA	4 mA	20 mA	

The reading is a percentage of the range between 0% and 200% of the nominal flow.

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"Controller" (Controller settings)

PUMP VARIANT	"CONTROLLER" (CONTROLLER SETTINGS)
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

The pumps have a factory default setting of gain (K_n) and integral time (T_i) .

However, if the factory setting is not the optimum setting, you can change the gain and the integral time:

- Set the gain within the range from 0.1 to 20.
- Set the integral-action time within the range from 0.1 to 3600 seconds. If you select 3600 seconds, the controller functions as a P controller.

Furthermore, you can set the controller to inverse control.

This means that if you increase the set-point, the speed is reduced. In the case of inverse control, you must set the gain within the range from -0.1 to -20.

Guidelines for setting of PI controller

The tables below show the recommended controller settings:



L1: Distance in meters between pump and sensor.

CONSTANT	К _р		-
TEMPERATURE	HEATING SYSTEM ¹⁾	COOLING SYSTEM ²⁾	'i
	0.5	-0.5	10 + 5L2
	0.5	-0.5	30 + 5L2

 In heating systems, an increase in pump performance results in a rise in temperature at the sensor.

 In cooling systems, an increase in pump performance results in a drop in temperature at the sensor.

L2: distance in meters between heat exchanger and sensor.



PUMP CONFIGURATION (Continued)



L2: Distance in meters between heat exchanger and sensor.

CONSTANT LEVEL	K _p	T _i
	-10	0
	10	0

CONSTANT FLOW RATE	K _p	T,
	0.5	0.5

CONSTANT PRESSURE	K _p	T _i
	0.5	0.5
	0.5	0.5

General rules of thumb.

If the controller is too slow-reacting, increase the gain.

If the controller is hunting or unstable, dampen the system by reducing the gain or increasing the integral time.

Operating range

PUMP VARIANT	OPERATING RANGE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

Set the operating range as follows:

- Set the minimum speed within the range from fixed minimum speed to user-set max speed.

- Set the maximum speed within the range from us-set minimum speed to fixed max speed.

The range between the user-set minimum and maximum speeds is the operating range. See diagram below.



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PUMP CONFIGURATION (Continued)

PUMP VARIANT	EXTERNAL SETPOINT FUNCTION
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

You can influence the set-point by an external signal, either via one of the analog inputs or, if an advanced functional module (FM 300) is fitted, via one of the Pt100/1000 inputs.

Before you can enable the function, you must set one of the analog inputs or Pt100/1000 inputs to *External set-point function*.

Example with constant pressure with linear influence

Actual set-point: actual input signal x (setpoint - sensor min.) + sensor min.

At a sensor min. of 0 bar, a setpoint of 2 bar and an external setpoint of 60%, the actual setpoint is $0.60 \times (2 - 0) + 0 = 1.5$ bar. See diagram to the right.

Example with constant curve with linear influence

Actual setpoint: actual input signal x (setpoint - user-set minimum speed) + user-set minimum speed.

At a user-set minimum speed of 25%, and a setpoint of 85% and an external setpoint of 60%, the actual setpoint is $0.60 \times (85 - 25) + 25 = 61\%$. See diagram to the right.

"Setpoint Influence" functions

You can select these functions:

- Not active.

When set to Not active, the setpoint is not influenced from any external function.

- Linear function.

The setpoint is influenced linearly from 0 to 100%. See diagram below.





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PUMP CONFIGURATION (Continued)

- Linear with Stop

In the input signal range from 20 to 100%, the setpoint is influenced linearly.

If the input signal is below 10%, the pump changes to operating mode Stop.

If the input signal is increased above 15%, the operating mode is changed back to normal. See Fig "A".

- Influence table.

The setpoint is influenced by a curve made out of two to eight points. There is a straight line between the points and a horizontal line before the first point and after the last point. See Fig "B".



Setpoint influence [%]



Predefined setpoints

PUMP VARIANT	PREDEFINED SETPOINTS
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

You can set and activate seven predefined setpoints by combining the input signals to digital inputs 2, 3 and 4. See the table below.

Set the digital inputs 2, 3 and 4 to Predefined setpoints if all seven predefined setpoints are to be used. You can also set one or two of the digital inputs to Predefined setpoints but this limits the number of predefined setpoints available.

DIGITAL INPUTS		\L S	SETDOINT
2	3	4	SETFORM
0	0	0	Normal setpoint or stop
1	0	0	Predefined setpoint 1
0	1	0	Predefined setpoint 2
1	1	0	Predefined setpoint 3
0	0	1	Predefined setpoint 4
1	0	1	Predefined setpoint 5
0	1	1	Predefined setpoint 6
1	1	1	Predefined setpoint 7



Fig. "C" shows how you can use the digital inputs to set seven predefined setpoints. Digital input 2 is open and digital inputs 3 and 4 are closed. If you compare with the table above, you can see that the Predefined setpoint 6 is activated.

If all digital inputs are open, the pump stops or runs at the normal setpoint. Set the desired action with Grundfos GO Remote or with the advanced control panel.





PUMP VARIANT	LIMIT-EXCEEDED FUNCTION			
CME	٠			

CRE, CRIE, CRNE, SPKE, MTRE

This function can monitor a measured parameter or one of the internal values such as speed, motor load or motor current. If a set limit is reached, a selected action can take place. You can set two limit-exceeded functions meaning that you can monitor two parameters or two limits of the same parameter simultaneously.

The function requires setting of the following:

"Measured"

Here you set the measured parameter which is to be monitored.

"Limit"

Here you set the limit which activates the function.

"Hysteresis band"

Here you set the hysteresis band.

"Limit exceeded when"

Here you can set if you want the function to activate when the selected parameter exceeds or drops below the set limit.

- Above limit.
- The function is activated if the measured parameter exceeds the set limit.
- Below limit.
- The function is activated if the measured parameter drops below the set limit.

"Action"

If the value exceeds a limit, you can set an action.

You can select the following actions:

- No action.

The pump remains in its current state. Use this setting if you only want to have a relay output when the limit is reached.

- Warning/alarm.
- A warning is given.
- Stop.
- The pump stops.

- Min..

- The pump reduces speed to minimum.
- Max..
- The pump increases speed to maximum.
- "User-defined speed"
- The pumps runs at a speed set by the user.
- Alarm + Stop
- An alarm is given, and the pump stops.
- Alarm + Min.
- An alarm is given, and the pump decreases speed to minimum.
- Alarm + Max.
- An alarm is given, and the pump increases speed to maximum.
- Alarm + User-defined speed
 - An alarm is given, and the pump runs at the speed set by the user.

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Detection delay

You can set a detection delay which ensures that the monitored parameter stays above or below a set limit in a set time before the function is activated.

Resetting delay

The resetting delay is the time from which the measured parameter differs from the set limit including the set hysteresis band and until the function is reset.

Example:

The function is to monitor the outlet pressure from a CRE pump. If the pressure is below 5 bar for more than 5 seconds, a warning must be given. If the outlet pressure is above 7 bar for more than 8 seconds, reset the limit exceeded warning.



POS.	SETTING PARAMETER	SETTING
1	"Measured"	Outlet pressure
2	"Limit"	5 bar
3	"Hysteresis band"	2 bar
4	"Limit exceeded when"	Below limit
5	"Detection delay"	5 seconds
6	"Resetting delay"	8 seconds
А	"Limit exceeded function active"	-
-	"Action"	Warning



GRUNDFOS EYE

Grundfos Eye

The operating condition of the pump is indicated by Grundfos Eye on the control panel.



GRUNDFOS EYE	INDICATION	DESCRIPTION		
	No lights are one.	The power is off. The pump is not running.		
ÔÔÔÔÔÔ	The two opposite green indicator lights are rotating in the direction of rotation of the pump when seen from the non-drive end.	The power is on. The pump is running.		
	The two opposite green indicator lights are permanently on.	The power is on. The pump is not running.		
ÔÔÔÔÔÔ	One yellow indicator light is rotating in the direction of rotation of the pump when seen from the non-drive end.	Warning. The pump is running.		
	One yellow indicator light is permanently on.	Warning. The pump is stopped.		
	The two opposite red indicator lights flash simultaneously.	Alarm. The pump is stopped.		
	The green indicator light in the middle flashes quickly four times.	This is a feedback signal which the pump gives in order to ensure identification of itself.		
	The green indicator light in the middle flashes continuously.	Grundfos GO Remote or another pump is trying to communicate with the pump. Press (a) on the pump control panel to allow communication.		
00000	The green indicator light in the middle is permanently on.	Remote control with Grundfos GO Remote via radio. The pump is communicating with Grundfos GO Remote via radio connection.		
	The green indicator light in the middle			



The green indicator light in the middle flashes quickly while Grundfos GO Remote is exchanging data with the pump. It takes a few seconds.

Remote control with Grundfos GO Remote via infrared light. The pump is communicating with Grundfos GO Remote via infrared communication.

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GRUNDFOS EYE (Continued)

Signal Relays

The pump has two outputs for potential-free signals via two internal relays.

You can set the signal outputs to Operation, Pump running, Ready, Alarm, and Warning.

The functions of the two signal relays appear from the table below;

DESCRIPTION		CONTACT POSITION OF SIGNAL RELAYS WHEN ACTIVATED				OPERATING	
GRUNDFOS EYE	OPERATION	PUMP RUNNING	READY	ALARM	WARNING	MODE	
The power is off.	Off	C NONC	NONC		C NONC	NONC	-
The pump runs in Normal mode.	G Green, rotating				C NONC	C NONC	Normal, Min. or Max.
The pump runs in Manual mode.	Green, rotating			C NONC	C NONC	C NONC	Manual
The pump is in operating mode Stop.	Green, steady	C NONC	C NO NC		C NONC	C NONC	Stop
Warning, but the pump is running	ÖÖÖÖÖÖ				C NONC		Normal, Min. or Max.
Warning, but the pump runs in Manual mode.	ÖÖÖÖÖÖ Yellow, rotating			C NONC	C NONC		Manual
Warning, but the pump was stopped via a Stop command.	Yellow, steady	C NONC	C NO NC		C NO NC		Stop
Alarm, but the pump is running.	OOOOO Red, rotating		C NONC	C NONC		C NONC	Normal, Min. or Max.
Alarm, but the pump runs in Manual mode.	ÔÔÔÔÔÔ Red, rotating					C NONC	Manual
The pump is stopped due to an alarm.	Red, flashing	C NONC	C NO NC	C NONC		C NO NC	Stop
The pump is stopped due to Low-flow stop function.	Green, steady		C NO NC		C NONC	C NONC	Normal



FILTER MAINTENANCE

1. Disassembly For Filter Replacement

The filter replacement may only be carried out when the X-POT XP+ is shut down and the BOSS X-POT XP+ has been hydraulically isolated from the main system water pressure and electrically isolated from the main system power supply.

The X-POT XP+ equipment must be taken out of service and guarded against unintentional re-starting until the maintenance work is finished.

NOTE:

- The safety circuits and data transmissions (if applicable) made or broken while shutting down could trigger the BMS Alarms or lead to false failure information.
- Operating instructions for relevant system heating or cooling units must be observed. To make the hydraulic components safe, isolate the relevant sections and vents using the relevant drain valves and relieve the pressure.
- The equipment is to be worked on only when in a safe and cool condition.
- Do not attempt to work on this equipment at elevated temperatures.
- Use of eye/face/hand protectors is required as the eyes or face could be injured by spraying fluids if the isolating valves have not been closed properly.



WARNING

This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment.



For further advice please contact BOSS/BSS for additional information and guidance.

WARNING

This equipment uses Rare Earth Magnets with a strong magnetic field.



You should not use, service or work in the close vicinity (30cm / 1ft of this equipment if you are fitted with a pacemaker or other electromechanical medical devices).

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FILTER MAINTENANCE (CONTINUED)

2. To Clean and Replace the Filters

- 1. The operative must wear protective gloves and eyewear for this operation.
- 2. Use of the BOSS[™] X-POT XP+ Schematic (Page 10) is required to follow the main part numbers.
- 3. Turn the power off to the BOSS[™] X-POT XP+ unit by turning the Mains ON/OFF Power Switch (22) through 90°.
- 4. Check to see the power is off, the power to the Grundfos CRIE Smart E-Pump (21). The screen should be blank and off and the pump will not run.
- 5. Manually close the 2" Isolating Valves (1 & 3) on the Dirty Flow into the BOSS[™] X-POT XP+.
- 6. Manually close the 2" Isolating Valves (8 & 11) on the Clean Return from the BOSS™ X-POT XP+.
- Manually open the 2" Isolating Valve (12). This will open the BOSS™ X-POT XP+ Vessel (4) to drain.
- 8. Remove the ½" plug and manually open the ½" Manual Vent Isolating Valve (19). This will open the BOSS X-POT XP+ Vessel (4) to atmosphere and will help the BOSS™ X-POT XP+ Vessel (4) drain quicker.

NOTE: If the system water is hot, leave enough time for the water to cool sufficiently before working on this vessel.

- 9. Un-tie and remove the top insulation cover and store in a clean and dry place.
- 10. Once you are content that all of the liquid within the vessel has been drained out;
- 11. Carefully loosen the 12off nuts which hold the lid in place. Please ensure the nuts are loosened in an opposite order, for example, front then back, then left to right and diagonals etc.
- 12. Once all of the nuts have been loosened sufficiently, undo the nut to the end of the bolt and swing the arms of the bolts down to the side of the Vessel.
- 13. The lid of the vessel can now be carefully removed and placed on a clean dry surface.
- 14. Remove the Magnet Grate (5) by the handle and place the Magnet Grate (5) onto a flat surface so the grate can be worked on.
- 15. Remove the Baffle Plate (6) by the lifting ring and place it onto a flat surface for cleaning.
- 16. Remove the dirty Bag Filter (7) and dispose of in an approved manner.
- 17. Replace the Bag Filter (7) with an approved new clean Bag Filter (7) and lower it into the Vessel Body (4) ensuring the spigot at the bottom of the Bag Filter (7) seats into the bottom connection out of Vessel Body (4).
- Clean the Baffle Plate (6) with a clean damp cloth and then place it into the Vessel Body (4). Ensure the 4off pins on the underside of the Baffle Plate locate into the 4off holes in the top of the new Bag Filter (7), press down gently to lock the Baffle Plate (6) into the Bag Filter (7).

(Continued on next page)



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FILTER MAINTENANCE (CONTINUED)

2. To Clean and Replace the Filters (continued)

- 19. To clean the Magnet Grate (5), un-screw and remove the 13off end caps with a flat headed screw driver and remove each magnet bar contained within using a pair of grips on the end of the magnet bar screw.
- 20. As each magnet bar is removed from the grate, dirt and debris will start to fall off the grate.
- 21. Once all of the magnet bars have been removed, carefully clean the bars with a dry cloth and store in a safe place. Maintain adequate separation between the magnet bars to avoid a potential pinching hazard.
- 22. When the Magnet Grate (5) has had all of the magnet bars removed, rinse the Magnet Grate under a tap or swill around in a bucket of water to remove any remaining dirt and debris.
- 23. Clean and dry the Magnet Grate (5) with a dry cloth, carefully replace all of the magnet bars with the crew facing outwards and then screw the caps back on with a flat screw driver.
- 24. Replace the now cleaned Magnet Grate (5) back into the Vessel Body (4) on top of the Baffle Plate (6).
- 25. Now repeat the operations of 11 to 13, in reverse by following the Bolt tightening sequence on page 26.
- 26. Ensure the nuts on the lid have been tightened to a torque of 40Nm.
- 27. Manually close the ½" Manual Vent Isolating Valve (19) and replace the ½" plug to prevent accidental opening of the Manual Vent Valve (19).
- 28. Manually close the 2" Isolating Valve (12). This will close the BOSS[™] X-POT XP+ Vessel (4) to drain.
- 29. Slowly manually open the 2" Isolating Valves (1 & 3) on the Clean Return into the BOSS™ X-POT XP+. This will now let system water into the BOSS™ X-POT XP+ Vessel.
- 30. At the start of the filling procedure, air will escape through the Automatic Air Vent. This will be signalled by a 'hissing'. When the air is fully omitted from the vessel.
- 31. Slowly manually open the 2" Isolating Valves (8 & 11) on the Dirty Flow from the BOSS™ X-POT XP+.
- 32. Replace the top cover of the Insulation Jacket and tie.
- 33. Turn the power on to the BOSS[™] X-POT XP+ unit by turning the Mains ON/OFF Power Switch (22) through 90°.
- 34. Check to see if the power is on. The power to the Grundfos CRIE Smart E-Pump (21). The screen will activate and the pump will run.

The BOSS[™] X-POT XP+'s filters have been cleaned and changed. The BOSS[™] X-POT XP+ is now active and is running in automatic mode and in-line with the controls philosophy.



DOSING & WATER TREATMENT ADDITIVES

To manually dose the system, it may only be carried when the system is shut down and the BOSSTM X-POT XP+ has been hydraulically isolated from the main system water pressure and also electrically isolated from the main system power supply.

The X-POT XP+ equipment must be taken out of service and guarded against unintentional re-starting until the Water Treatment Additives are dosed into the X-POT XP+ Vessel (4).

Dosing of Water Treatment Additives can only be achieved when the main System Pumps are operational, make sure they are working and the system is running.

Note:

The safety circuits and data transmissions (if applicable) made or broken while shutting down and could trigger the BMS Alarms or lead to false failure information.

- Operating instructions for relevant system heating or cooling units must be observed. To make the hydraulic components safe, isolate the relevant sections and vents using the relevant drain valves and relieve the pressure.
- The equipment is to be worked on only when in a safe and cool condition.
- Do not attempt to work on this equipment at elevated temperatures.
- Use of eye/face/hand protectors is required as the eyes or face could be injured by spraying fluids if the isolating valves have not been closed properly.



DOSING (CONTINUED)

3. Manually Dosing the System with Treatment Additives

WARNING

This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment.



For further advice please contact VEXO International or your reseller for additional information and guidance.

WARNING

This equipment uses Rare Earth Magnets with a strong magnetic field.



You should not use, service or work in the close vicinity (30cm / 1ft of this equipment if you are fitted with a pacemaker or other electromechanical medical devices.

- 1. The operative must wear protective gloves and eyewear for this operation.
- 2. Use of the main BOSS™ X-POT XP+ Schematic (page 10) is required to follow the main Item Numbers.
- 3. Turn the power off to the BOSS[™] X-POT XP+ unit by turning the Mains ON/OFF Power Switch (22) through 90°.
- 4. Check to see the power is off, the power to the Grundfos CRIE Smart E-Pump (21). The screen should be blank and off and the pump will not run.
- 5. Manually close the 2" Isolating Valves (1 & 3) on the Dirty Flow to the BOSS™ X-POT XP+.
- 6. Manually close the 2" Isolating Valves (8 & 11) on the Clean Return from the BOSS™ X-POT XP+.
- Manually open the 2" Isolating Valve (12). This will open the BOSS™ X-POT XP+ Vessel (4) to drain.
- 8. Remove the ½" plug and manually open the ½" Manual Vent Isolating Valve (19). This will open the BOSS™ X-POT XP+ Vessel (4) to atmosphere and will help the BOSS™ X-POT XP+ Vessel (4) drain quicker.

NOTE: If the system water is hot, leave enough time for the water to cool sufficiently before working on this vessel.

- 9. Un-tie and remove the top insulation cover and store in a clean and dry place.
- 10. Once you are content that all of the liquid within the vessel has been drained out;
- 11. Carefully loosen the 12off nuts which hold the lid in place. Please ensure the nuts are loosened in an opposite order, for example, front then back, then left to right and diagonals etc.
- 12. Once all of the nuts have been loosened sufficiently, undo the nut to the end of the bolt and swing the arms of the bolts down to the side of the Vessel.
- 13. The lid of the vessel can now be carefully removed and placed on a clean dry surface.
- 14. Remove the Magnet Grate (5) by the handle and place the Magnet Grate (5) onto a flat surface. **Continued on next page**



DOSING (CONTINUED)

3. Manually Dosing the System with Treatment Additives (Continued)

- 15. Remove the Baffle Plate (6) by the lifting ring and place it onto a flat surface.
- 16. Remove the Bag Filter (7) and place it onto a flat surface.
- 17. Now repeat the operations of 11 to 13, in reverse by following the bolt tightening section on page 26
- 18. Ensure the nuts on the lid have been tightened to a torque of 40Nm.
- 19. Manually close the 2" Isolating Valve (12). This will close the BOSS[™] X-POT XP+ Vessel (4) to drain.
- 20. Manually open the 2" Isolating Valve (16) below the Chemical Fill Tundish (15).
- 21. Decant your water treatment additives from the larger drums into an easily manageable container.
- 22. Pour the Water Treatment Additives into the Tundish (15) and therefore into the Vessel Body (4) itself.
- 23. The vessel will hold 25L of Water Treatment Additives in total, when you have filled the BOSS X-POT XP+ Vessel Body (4), a small amount of Water Treatment Additives will exit through the spout of the Manual Vent and into the Manual Vent Tundish (14). This over-spill will eventually lead to drain.
- 24. Manually close the 2" Isolating Valve (16) below the Tundish.
- 25. Replace the ½" plug and manually close the ½" Manual Vent Isolating Valve (19). This will close the BOSS X-POT XP+ Vessel (4) to atmosphere.
- 26. Slowly manually open the 1" Isolating Valves (1 & 3) on the Clean Return into the BOSS™ X-POT XP+. This will now let system water into the BOSS™ X-POT XP+ Vessel.
- 27. At the start of the filling procedure, air will escape through the Automatic Air Vent. This will be signaled by a 'hissing'. When the air is fully omitted from the vessel.
- 28. Slowly manually open the 2" Isolating Valves (8 & 11) on the Dirty Flow from the BOSS X-POT XP+.
- 29. Turn the power on to the BOSS[™] X-POT XP+ unit by turning the Mains ON/OFF Power Switch (22) through 90°.
- 30. Check to see if the power is on. The power to the Grundfos CRIE Smart E-Pump (21). The screen will activate and the pump will run.
- 31. The Water Treatment Additives are now dosed into the main system.

To carry on with further Dosing of Water Treatment Additives, follow instructions: 1 to 8, 10, 19 – 31 as Section, Manually Dose the System with Water Treatment Additives above.



DOSING (CONTINUED)

3.1. When manual dosing is complete

- 32. Repeat instructions 1 to 8, 10 to 13.
- 33. Replace the Bag Filter (7) and lower it into the Vessel Body (4) ensuring the spigot at the bottom of the Bag Filter (7) seats into the bottom connection out of Vessel Body (4).
- 34. Replace the Baffle Plate (6) and then place it into the Vessel Body (4). Ensure the 4off pins on the underside of the Baffle Plate locate into the 4off holes in the top of the Bag Filter (7), press down gently to lock the Baffle Plate (6) into the Bag Filter (7).
- 35. Replace the Magnet Grate (5) back into the Vessel Body (4) on top off the Baffle Plate (6).
- 36. Now repeat the operations of 11 to 13, in reverse by following the 'Reassembly After Inspection' below.
- 37. Ensure the nuts on the lid have been tightened to a torque of 40Nm.
- 38. Manually close the $\frac{1}{2}$ " Manual Vent Isolating Valve (19) and replace the $\frac{1}{2}$ " plug to prevent accidental opening of the Manual Vent Valve (19).
- 39. Manually close the 2" Isolating Valve (12). This will close the BOSS™ X-POT XP+ Vessel (4) to drain.
- 40. Slowly manually open the 2" Isolating Valves (1 & 3) on the Clean Return into the BOSS™ X-POT XP+. This will now let system water into the BOSS™ X-POT XP+ Vessel.
- 41. At the start of the filling procedure, air will escape through the Automatic Air Vent. This will be signalled by a 'hissing'. When the air is fully omitted from the vessel...
- 42. Slowly manually open the 2" Isolating Valves (8 & 11) on the Dirty Flow from the BOSS™ X-POT XP+.
- 43. Replace the top cover of the Insulation Jacket and tie.
- 44. Turn the power on to the BOSS[™] X-POT XP+ unit by turning the Mains ON/OFF Power Switch (22) through 90°.
- 45. Check to see if the power is on. The power to the Grundfos CRIE Smart E-Pump (21). The screen will activate and the pump will run.

The BOSS[™] X-POT XP+ has now been used to dose Water Treatment Additives, it is back in operational mode for Side Stream Filtration, it is now active and running in automatic mode and in-line with the controls philosophy.



BOLT TIGHTENING

4. Bolt Tightening notes

Important Note: The 12 off captive nuts, of the top flange plate, **must be tightened to a torque setting of 40 Nm.** The bolts must be tightened in the following sequence when standing in front of the vessel looking down.



When the BOSS[™] X-POT XP+ top flange plate is replaced, ensuring the seal faces are clean and unobstructed.

Ensure the Manual Air Vent spout is positioned directly over the Manual Vent Tundish (14).

The tightening sequence must be repeated 3 times to guarantee that all the nuts are to the required torque (40Nm).

A proprietary torque wrench must be used to perform this operation, failure to tighten the nuts to the correct torque may result in leakage, failure of the equipment, damage to the equipment and potential consequential damage.

5. Electrical Checks & Inspection



To stop electrical equipment (control unit, pumps, valves, peripheral equipment), cut power to the control unit by turning the Mains ON/OFF Power Switch (22) through 90° to the OFF position. The power supply must remain off for the period of the work.

It is forbidden to alter or use non-original components or replacement parts without written authorisation. Such acts may result in serious personal injury and endanger operational safety. They will also render any claim for damages against product liability void.

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DECOMMISSIONING & DISMANTLING

WARNING



This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment.



For further advice please contact BOSS/BSS for additional information and guidance.

$\underline{\check{A}}$

WARNING This equipment uses Rare Earth Magnets with a strong magnetic field.

You should not use, service or work in the close vicinity (30cm / 1ft of this equipment if you are fitted with a pacemaker or other electromechanical medical devices.

At the end of the lifespan or at the planned decommissioning of the equipment please make sure that:

- The control panel is separated from the power supply.
- The hydraulic system connections and top-up connections should be closed off.

Caution: Water areas should first be vented and then emptied. This water may be conditioned, contain anti-freeze or other substances and as such must be disposed of in accordance with the local legislative requirements.

The destination of and further processing of the construction components should be carried out in agreement with the relevant waste management service provider.



X-POT XP+® Operations & Maintenance Manual



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X-POT XP+® Operations & Maintenance Manual

BOSS X-POTX	P+ SERVICE HISTORY
WARNING! WEAR APPRO	DPRIATE PPE WHEN THE BOSS X-POT XP+
INSTALLATION BY QUALIFIED/EX	XPERIENCED TECHNICIANS ONLY
INSTALLED BY: DATE:	SERVICED BY: DATE:
NOTES:	NOTES:
SERVICED BY: DATE:	SERVICED BY: DATE:
NOTES:	NOTES:
SERVICED BY: DATE:	SERVICED BY: DATE:
NOTES:	NOTES:
SERVICED BY: DATE:	SERVICED BY: DATE:
NOTES:	NOTES:

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