X-POT XP+®

OPERATION & MAINTENANCE MANUAL

www.VEXOint.com
technical@VEXOint.com
+44 (0)1767 500 150

VEXO®

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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.

Safe Working Distance Statement

VEXO®

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	0.01 µT
4m	0.02µT
3m	0.02µT
2m	0.02µT
1m	0.04µT
Stood up 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 (500µT), although the X-POT XP+ (containing 13off rare earth magnets) will not cause any risk when stood by the units, VEXO stipulates the following:

IN THE INTEREST OF HEALTH AND SAFETY

PERSONS WHO HAVE ELECTRO MEDICAL DEVICES (E.G. PACEMAKERS ETC.) MUST NOT OPERATE OR HANDLE DIRECTLY THE MAGNETS CONTAINED WITHIN THE X-POT XP+ SIDE STREAM FILTER.

For and on behalf of Vexo International (UK) Limited

Darren Wilkinson, Managing Director

Vexo International (UK) Ltd. 6 The Granary Building, Millow Hall Farm, Millow, Biggleswade, Bedfordshire SG18 8RH.
T: 01767 500 150. Registered in England & Wales No: 072 05096

Liability

All technical information, data and information contained herein 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 VEXO® 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: 24 months from the date of purchase.

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:

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.

Photographic evidence must be collected at the time of commissioning to verify the condition of the equipment at that time.

The equipment must be serviced at least annually, by a trained competent engineer or qualified person.

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.

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.

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.

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 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:

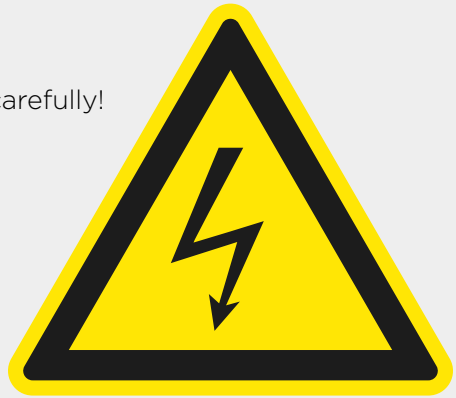
- Endanger health.
- Cause death, fire or other damage.
- Lead to overloading of individual components and to damage.
- Impair the unit's function.

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



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 VEXO® 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 VEXO® 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.

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 reusable 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 set-up 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 isolator on the X-POT XP+®, refer to the VEXO® X-POT XP+® Schematic, item 16 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.

Exceeding Permitted Pressure &/Or Temperature Levels

Equipment used in combination with the VEXO® 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 VEXO® 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 VEXO® 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 below)**.

Task	VEXO® X-POT XP+®
Visual inspection of components	6 Months - Qualified Person
Operational check of hydraulic components	12 Months - Annual Service - Qualified Person
Operational check of electrical components	12 Months - 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 VEXO® 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/floor mounted unit incorporating:

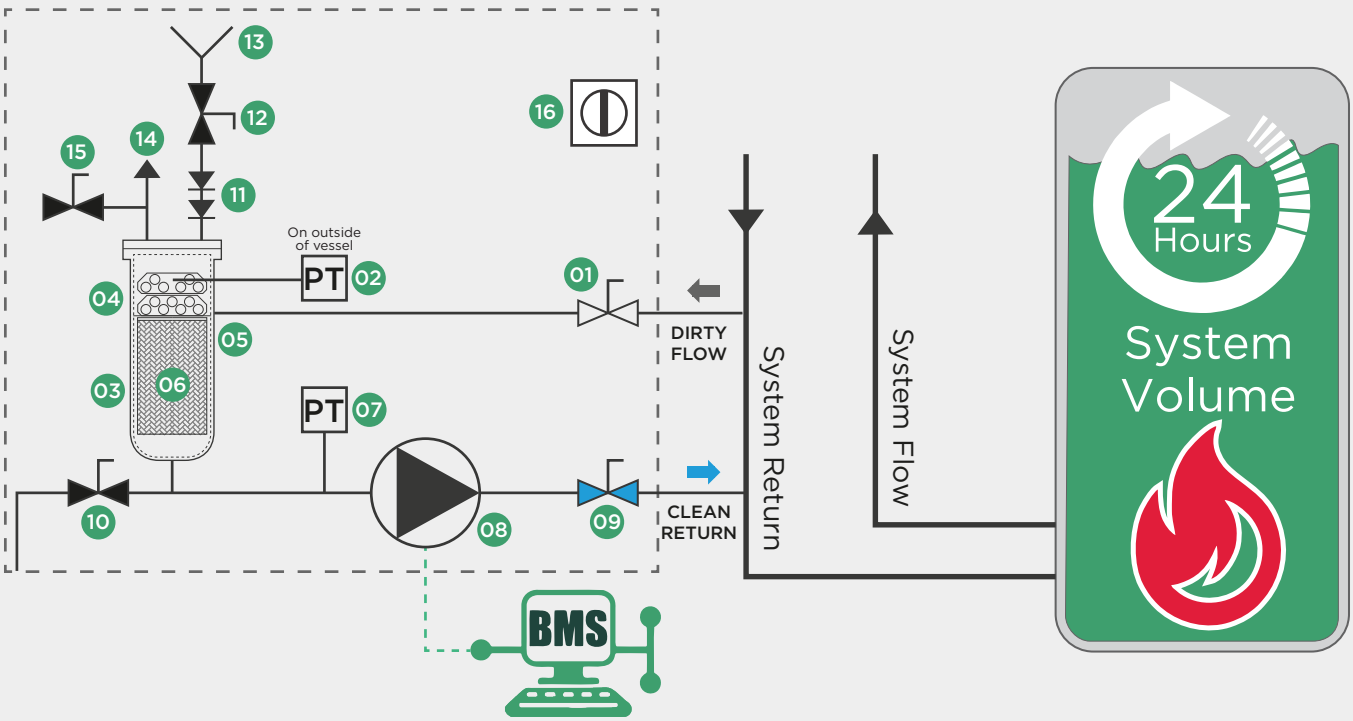
- Grundfos CRiE Smart E-Pump (Pump Settings found on Page 19)
- Magnetic Filtration
- Bag Filter Filtration
- Air Separation
- Dirt Separation
- Manual Dosing facility
- Working Pressure up to 16Bar
- Working temperature from O°C up to 95°C

Technical Data

Unit Model	Flow Rate (l/s)	Maximum System Size (litres)	Dimensions			Dry Weight (KG)	Wet Weight (KG)
			Width (mm)	Depth (mm)	Height (mm)		
VEXO® X-POT XP+	1.0 - 3.5	302,400	1000	650	1688	126	151

Unit Model	Circulating Pump			
	Grundfos Reference	Motor Rating	Electrical Supply	Current
VEXO® X-POT XP+	Grundfos IND-0-X-1-CRiE 10-2	1.5kW	230 V ~ 1N PE 50/60 Hz	9.10 - 7.60 Amps

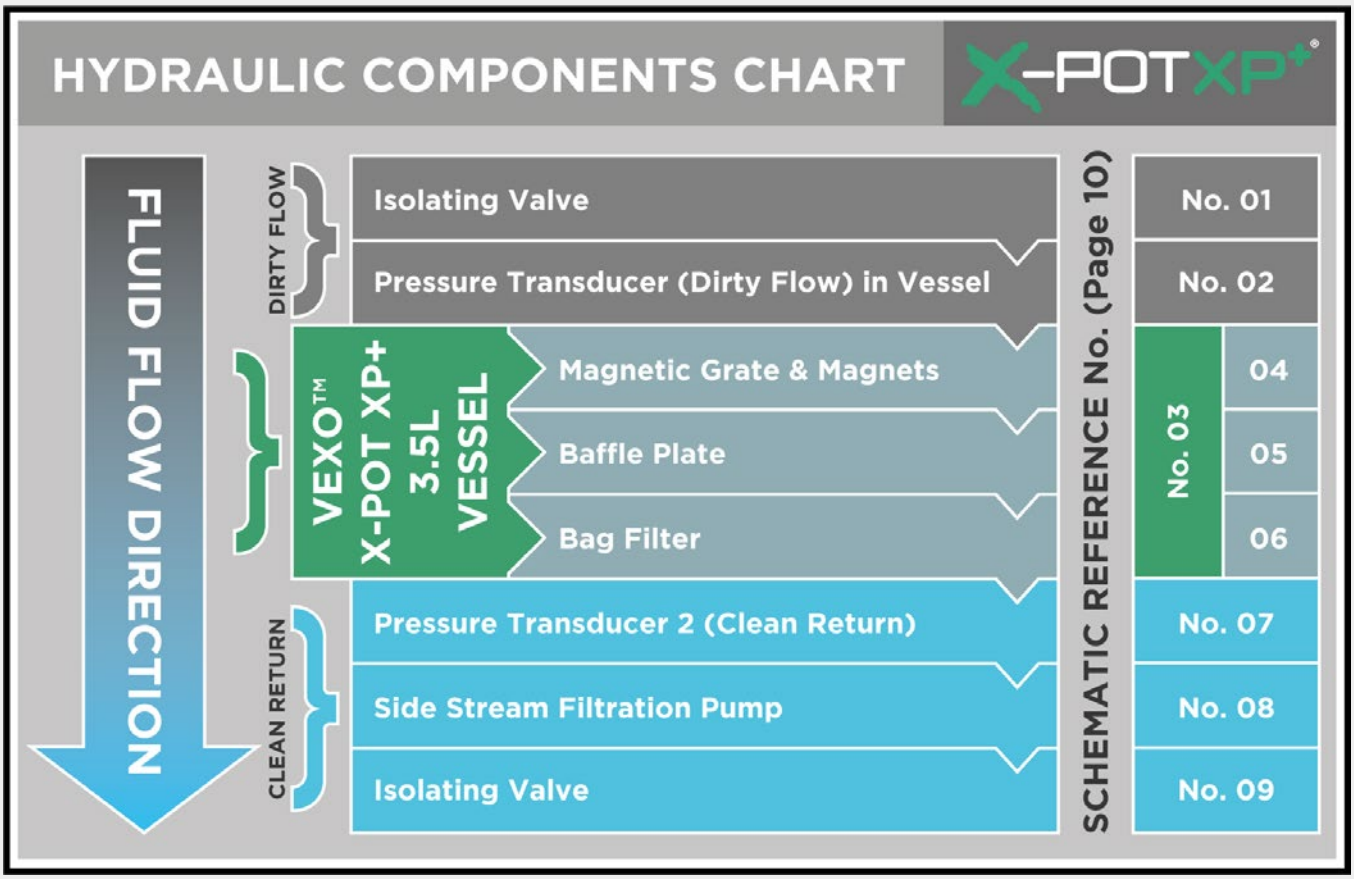
Schematics & Component List



01	Isolating Valve	09	Isolating Valve
02	Pressure Transducer 1 (Dirty Flow)	10	Drain Valve
03	VEXO® X-POT XP+ (25L) Vessel Body	11	2x Non-Return Valve
04	Magnet Grate (Internal) 13 Magnets	12	Isolating Valve
05	Baffle Plate (Internal)	13	Chemical Fill Tundish
06	Bag Filter & Filter Basket (Internal)	14	Automatic Air Vent
07	Pressure Transducer 2 (Clean Return)	15	Manual Vent Isolating Valve
08	Grundfos CRIE (Smart Circulator E Pump)	16	Mains On/Off Power Switch

Operating Principles

The VEXO® 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:



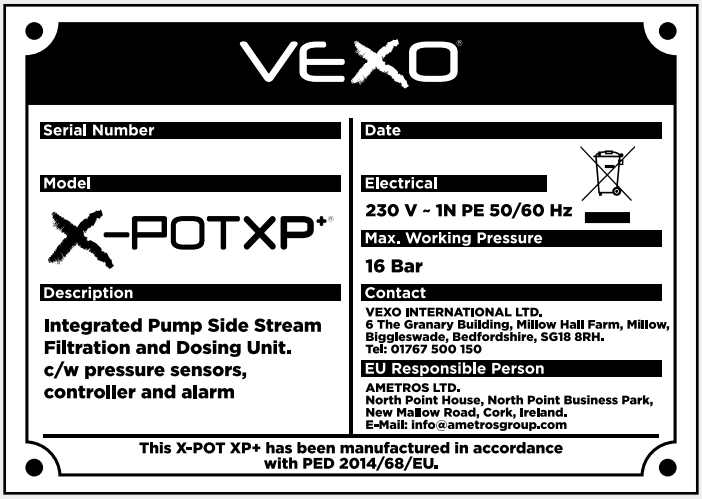
The system fluid is drawn from the main system return and into the VEXO® X-POT XP+® vessel. The fluid is drawn through a twin stage filtration system, in the first chamber, ferrous particulates are captured by the rare earth magnets contained in the magnet grate, the fluid then passes through the Baffle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

The VEXO® 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 VEXO® X-POT XP+® assembly.

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

Product Markings

THE FOLLOWING MARKINGS AND WARNINGS ARE INSTALLED ON THE X-POT XP+ UNIT

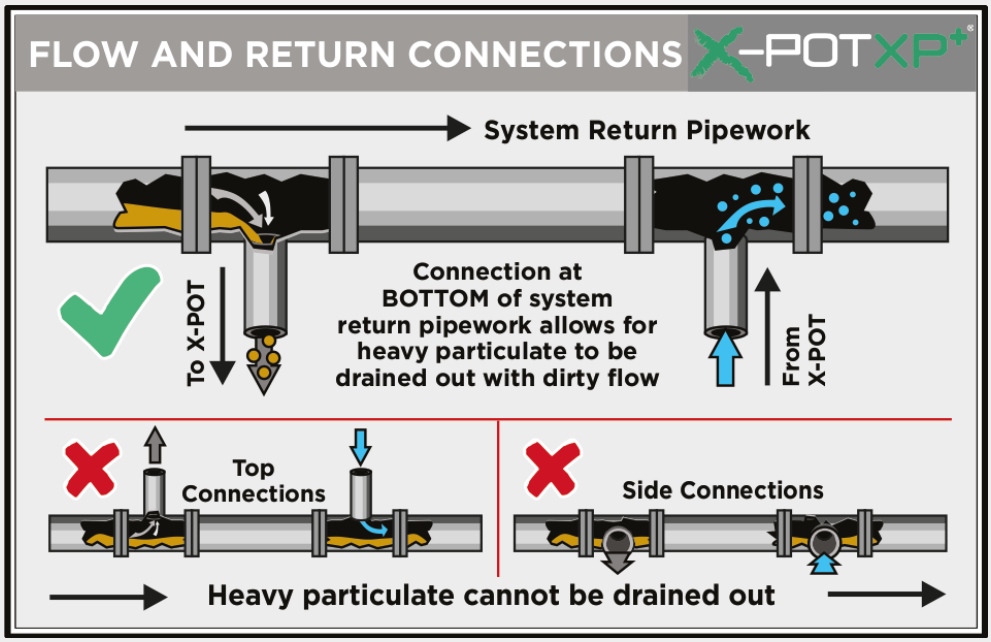


Installation

Basic Installation Instructions

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 VEXO® X-POT XP+® is to be 10m. The 2 connections, from/to the return pipework, for the VEXO® 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 VEXO® X-POT XP+® for active removal from the system. A 3/4" 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 VEXO® X-POT XP+® is to be provided from the main system pump electrical supply. Therefore, the VEXO® X-POT XP+® will only be activated when the main system pump is running and active. **Ensure the power supply is 230V ~ 1N PE 50/60Hz via a suitable Fused Spur 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, horizontal, level, solid floor with access to the electrical panel, pump and VEXO® X-POT XP+® 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

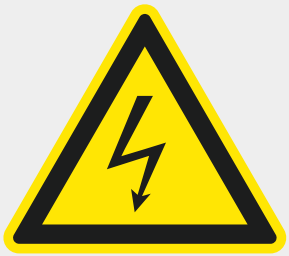
It is essential to ensure the environment that this equipment is installed in is safe to work and is free from trip hazards.

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 VEXO International (UK) Ltd 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. General

The VEXO® X-POT XP+® is a 'Plug and Play' unit. The VEXO® 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 on Page.19 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 VEXO® 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 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 VEXO® X-POT XP+® is provided from a Fused Spur or Distribution Board rated to the power requirements of the pump. Therefore the VEXO® X-POT XP+® will be in continuous operation unless a blocked filter state is detected.

Ensure the power supply to the VEXO® X-POT XP+® is 230V ~ 1N PE 50/60Hz via a suitable Fused Spur.

The power supply is then connected to the main VEXO® X-POT XP+® Mains Isolation Switch (16), refer to the unit schematic, on page 10 (Schematic) of this document.

1.1 X-POT XP+® Control Methodology

The Grundfos CRIE Smart E-Pump provides the control logic for the VEXO® 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 %
3.50l/s	140kPa	88%	920.9 watts
3.25l/s	135kPa	84%	808 watts
3.00l/s	135kPa	81%	729.40 watts
2.50l/s	130kPa	75%	573.50 watts
2.25l/s	130kPa	73%	515.7 watts
2.00l/s	110kPa	66%	394.8 watts
1.75l/s	100kPa	62%	321.1 watts
1.50l/s	80kPa	55%	229 watts
1.25l/s	70kPa	50%	176.9 watts
1.00l/s	60kPa	46%	132.8 watts

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

1.00l/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

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
1.25l/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	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 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	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 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	11kPa	14kPa	22kPa
50 Micron	11kPa	14kPa	22kPa
25 Micron	22kPa	28kPa	44kPa
5 Micron	35kPa	44kPa	70kPa
1 Micron	46kPa	58kPa	92kPa

2.00l/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
2.25l/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	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 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	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 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	18kPa	22kPa	38kPa
50 Micron	18kPa	22kPa	38kPa
25 Micron	36kPa	45kPa	68kPa
5 Micron	52kPa	65kPa	105kPa
1 Micron	67kPa	82kPa	135kPa

3.50l/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	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 VEXO® X-POT XP+® unit before commencement of the operation of the unit. It is important to visually inspect the VEXO® 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 VEXO® X-POT XP+® - ensure there are not leaks.
- The lid closure of the VEXO® X-POT XP+® is closed and sealed tight in accordance with the 'Bolt Tightening' method (Page 66) of this document.
- All isolating valves 'as supplied' used to drain the VEXO® X-POT XP+® are closed with the valve handles at 90° to the pipework they are connected to. Refer to page 10 for the VEXO® X-POT XP+® Schematic, valve references 10 & 15.
- All isolating valves 'as supplied' which connect the VEXO® X-POT XP+® to the main heating / chilled system should be in the 'open' position. Rotate the valved handles to be in-line with the pipework it is connected to. Refer to page 10 for the VEXO® X-POT XP+® Schematic, valve references 1 & 9.
- When the VEXO X-POT XP+ has been filled with system water and pressurized, check the hydronic integrity of all fittings and pipework within the VEXO® X-POT XP+® unit - Ensure there are no leaks. To confirm the VEXO® 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 (14). This is a normal procedure.

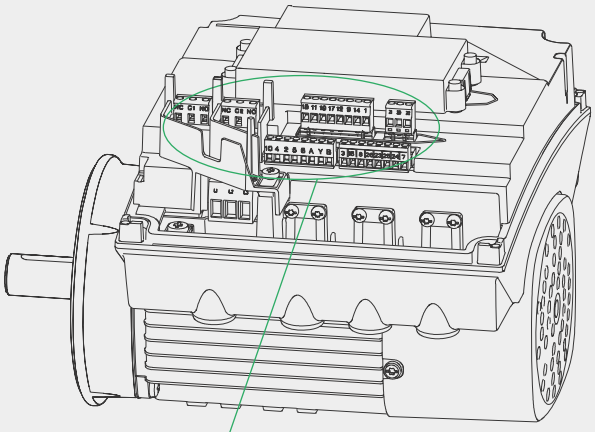
2.1 Side Stream Circulation Pump

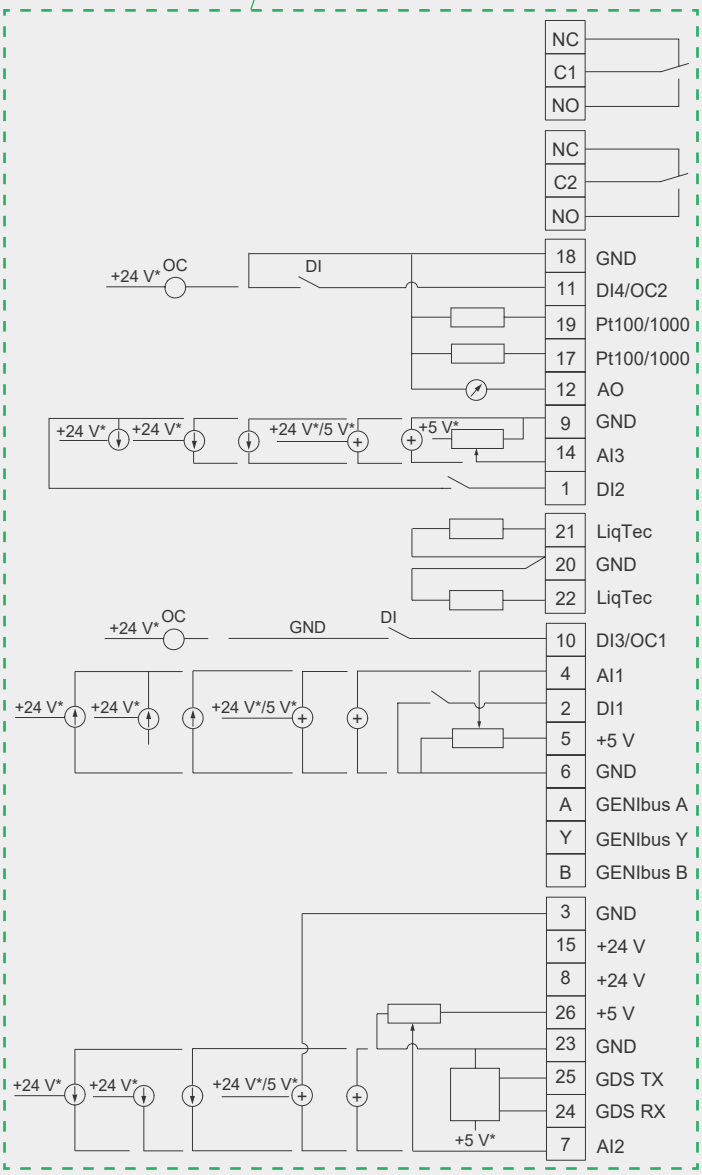
The Side Stream Circulation Pump (Item 8) installed on the VEXO ® X-POT XP+ ® is a Grundfos CRIE Smart E-Pump. The pump is Pre-Configured Site / Project Specific Set-Points. However, these parameters can be checked / altered via the Pre-Configuration Table. Which can be found on the following page.

2. Activation

The VEXO ® 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 be activated.

Pump Configuration





Pump Configuration Table

TERMINAL	TYPE	FUNCTION
NC	Normally closed contact	Signal relay 1 (LIVE or PELV)
C1	Common	
NO	Normally open contact	
NC	Normally closed contact	Signal relay 2 (PELV only)
C2	Common	
NO	Normally open contact	
18	GND	Ground
11	DI4/OC2	Digital input/output, configurable. Open collector: Max. 24V resistive or inductive.
19	Pt100/1000 input 2	Pt100/1000 sensor input
17	Pt100/1000 input 1	Pt100/1000 sensor input
12	AO	Analog output: 0-20 mA / 4-20 mA 0-10V
9	GND	Ground
14	AI3	Analog input: 0-20 mA / 4-20 mA 0-10V
1D	I2	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.
4A	I1	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	TYPE	FUNCTION
A	GENIbus, A	GENIbus, A (+)
Y	GENIbus, Y	GENIbus, GND
B	GENIbus, B	GENIbus, B (-)
3	GND	Ground
15	+24 VS	upply
8	+24 VS	upply
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

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.**)

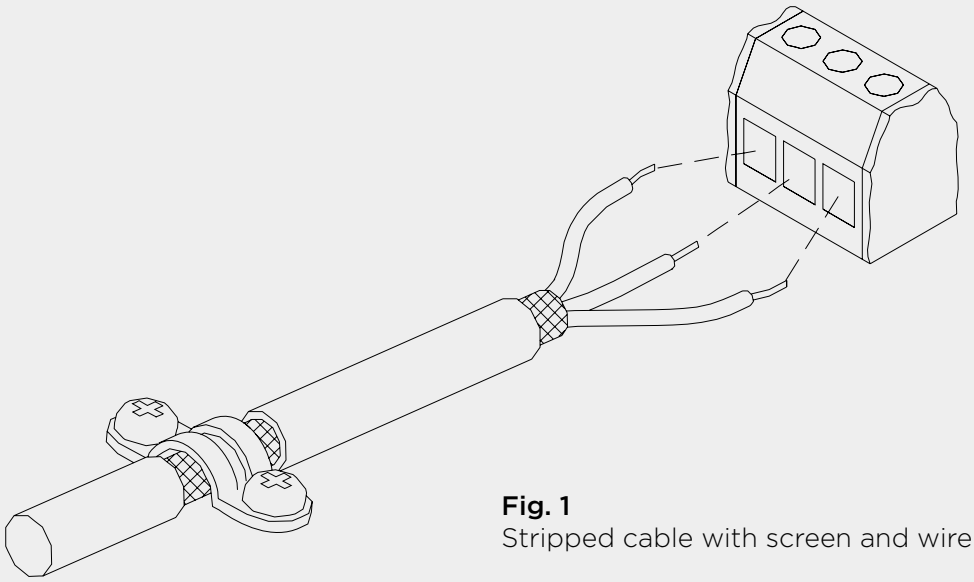


Fig. 1
Stripped cable with screen and wire connections.

- 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.**

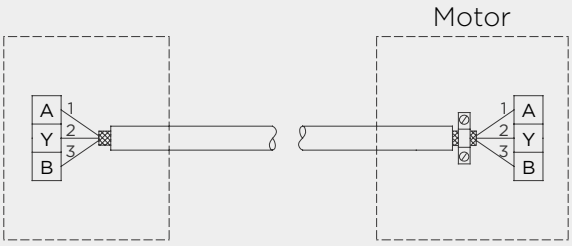


Fig. 2 Connection with screened 3-core cable.

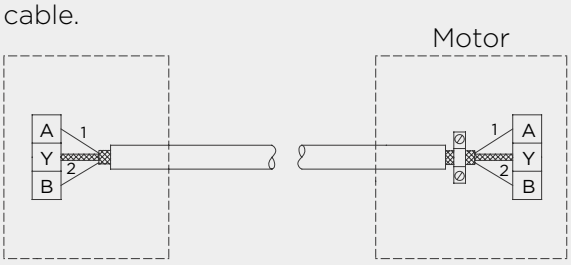
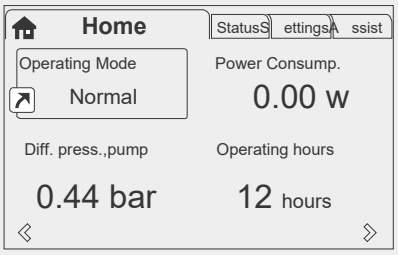
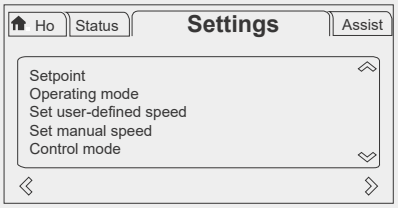


Fig. 3 Connection with screened 2-core cable.

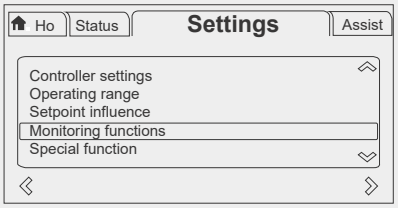
Pump Configuration - Adjust Pressure Differential Setpoint



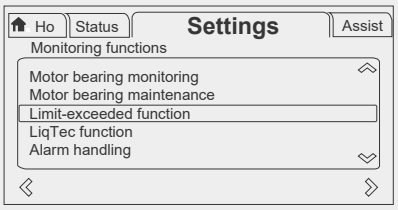
1. Home Screen.



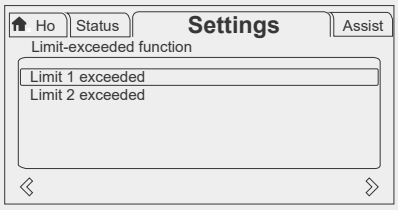
2. Press right arrow twice to move to settings menu.



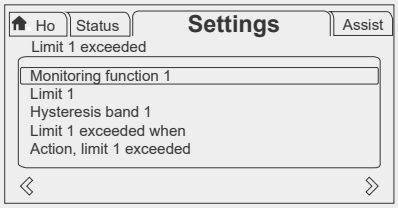
3. Once on Settings Menus use “down” and “up” arrows to locate “monitoring functions” press “OK” to enter menu.



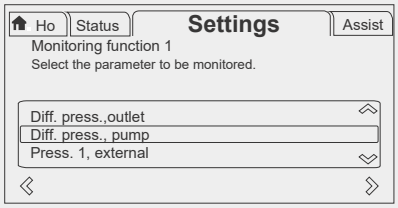
4. In “monitoring functions” located “Limit-exceeded functions” press “OK” to enter menu.



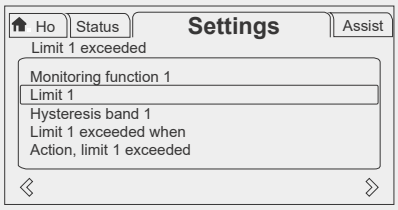
5. In “Limit-exceeded functions” locate “Limit 1 exceeded” press “OK” to enter menu.



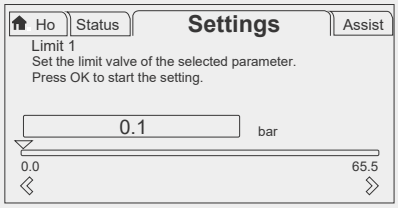
6. In “Limit 1 exceeded” locate “Monitoring function 1” press “OK” to enter menu.



7. In “Monitoring function 1” located “diff. press., pump” press “OK” to enter menu.



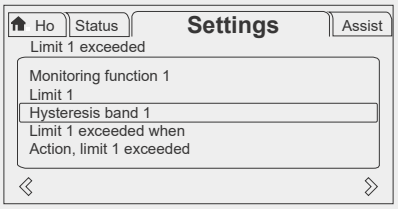
8. In “Diff. press.,pump” locate “limit 1” press “OK” to enter menu.



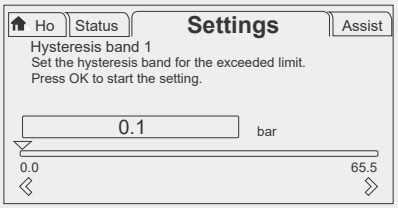
9. Using the “down and ”up” arrows, adjust the setpoint to the setpoints as listed below for your system configuration.

10. Press “OK” to confirm.

11. Press return to return to the “Limit 1 exceeded” menu.



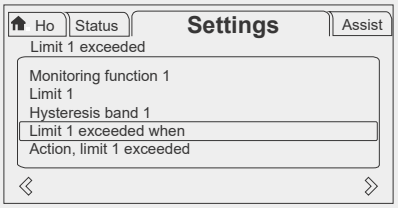
12. In “Limit 1 exceeded” locate “Hysteresis band 1” press “OK” to enter menu.



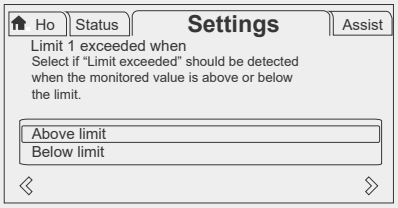
13. Using the “down” and “up” arrows, adjust the setpoint, Factory Setpoint - 00.1Bar.

14. Press “OK” to confirm selection.

15. Press return to return to the “Limit 1 exceeded” menu.



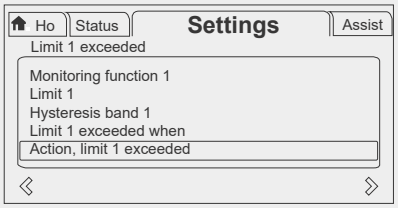
16. In “Limit 1 exceeded” locate “Limit 1 exceeded when” and press “OK” to enter menu.



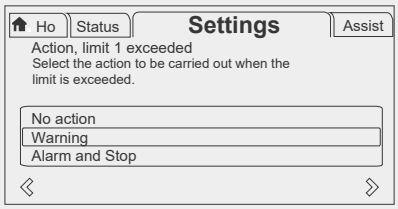
17. Using the “down” and “up” arrows, select “Above limit”.

18. Press “OK” to confirm.

19. Press return to return to the “Limit 1 exceeded” menu.



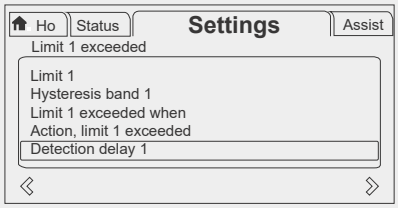
20. In “Limit 1 exceeded” locate “Action, limit 1 exceeded” press “OK” to enter menu.



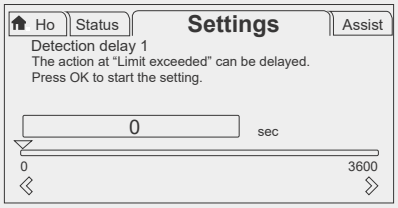
21. Using the “down” and “up” arrows, select “Warning”

22. Press “On” to confirm selection.

23. Press return to return to the “Limit 1 exceeded” menu.



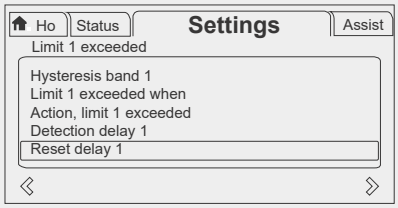
24. In “Limit 1 exceeded” locate “Detection delay 1” press “OK” to enter menu.



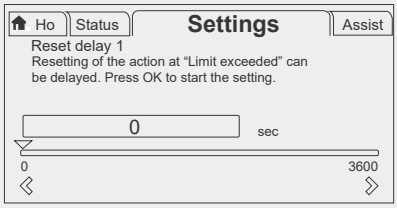
25. Using the “down” and “up” arrows, select “0”.

26. Press “OK” to confirm selection.

27. Press return to return to the “Limit 1 exceeded” menu.

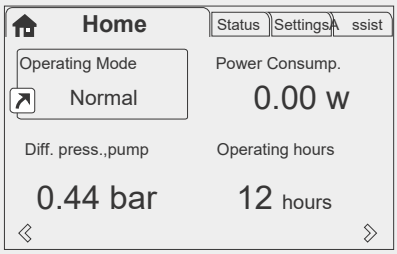


28. In “Limit 1 exceeded” locate “Reset delay 1” press “OK” to enter menu.



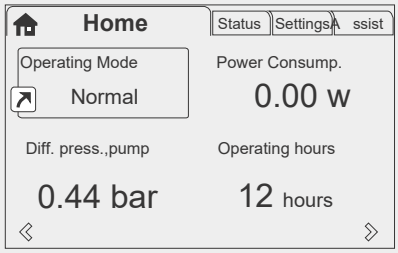
29. Using the “down” and “up” arrows, select “0”.

30. Press “OK” to confirm selection.

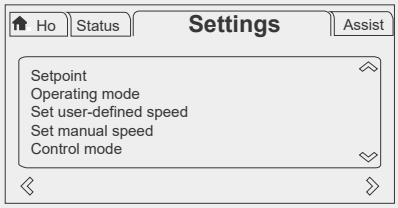


31. Now press “Home” to return to the Home Screen.

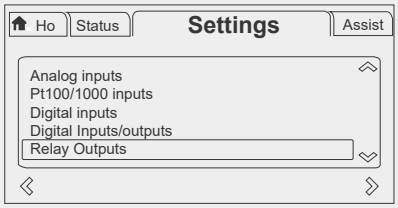
Pump Configuration - Relay Output



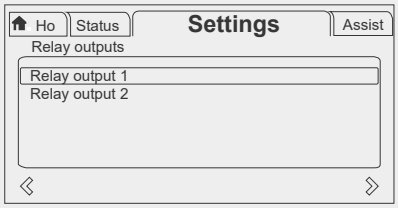
1. Home Screen



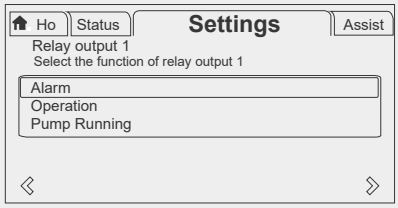
2. Press right arrow twice to move to settings menu.



3. Once on settings menu use “down” and “up” arrows to locate “Relay Outputs” press “OK” to enter menu.



4. In “Relay Outputs” locate “Relay output 1” press “OK” to enter menu.

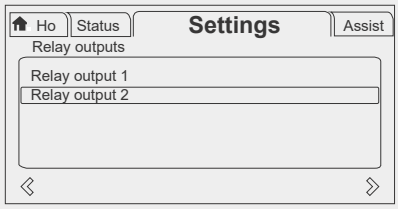


5. In “Relay Output 1” you can select:

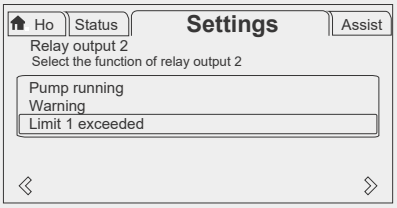
   - Alarm (Factory Setpoint - General Alarm)
   - Operation
   - Pump Running
   - Warning
   - Limit 1 exceeded
   - Limit 2 exceeded

6. Press “OK” to confirm selection.

7. Press return to return to the “Relay Outputs” menu.



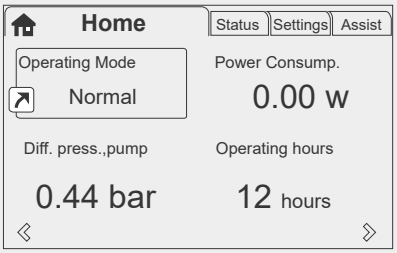
8. In “Relay Outputs” locate “Relay output 2” press “OK” to enter menu.



9. In “Relay Output ” you can select:

   - Alarm
   - Operation
   - Pump Running
   - Warning
   - Limit 1 exceeded (Factory Setpoint - Pressure Differential Alarm)
   - Limit 2 exceeded

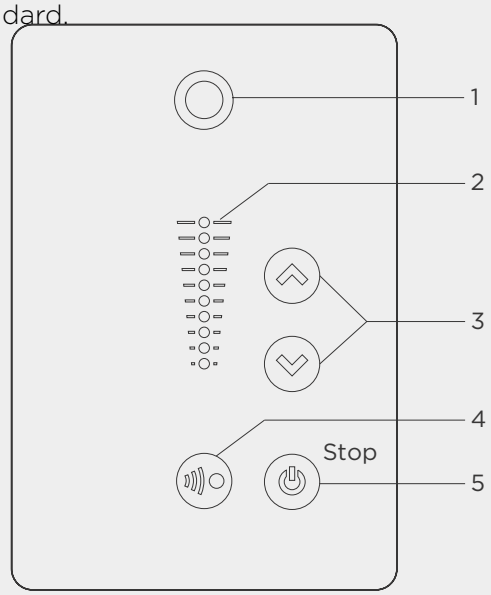
10. Press “OK” to confirm selection.



11. Now press “Home” to return to the home screen.

Pump Configuration - Standard Control Panel

The pumps are fitted with this control panel as standard.



POS.	SYMBOL	DESCRIPTION
1		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.
4		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.
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. The “Stop” text next to the button is on.

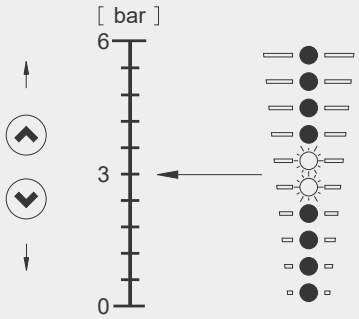
Pump Configuration - Set-point Setting

Set the desired set-point of the pump by pressing or .
The green light fields on the control panel indicate the set-point setting.

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.

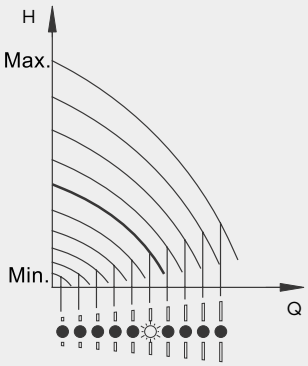
As seen in the diagram on the right, it shows that the light fields 5 and 6 are activated, indicating a desired set-point of 3 bar with a sensor measuring range from 0 to 6 bar.
The setting range is equal to the sensor measuring range.



Pump Configuration - Constant-Curve Control Mode

Pump in constant-curve control mode

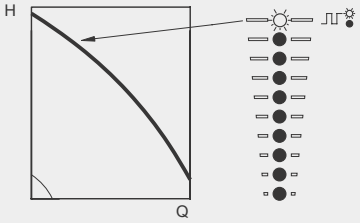
In constant-curve control mode, the pump performance lies between the maximum and minimum curve of the pump, as seen on the right.



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.

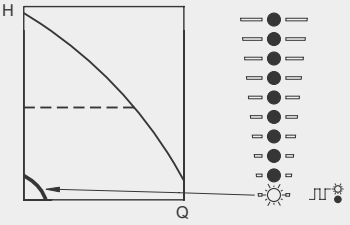
Example: Pump set to maximum curve. Diagram on the right demonstrates that the top light field is flashing, indicating maximum curve.



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 ⌃ 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 ⏻ . When the pump is stopped , the "Stop" text next to the button is on. You can also stop the pump by continuously pressing ⌄ until none of the light fields are on.

Start the pump by pressing ⏻ or by continuously pressing ⌃ until the desired set-point is indicated. If you have stopped the pump pressing ⏻ , it can only be free to operation by pressing ⏻ again. If you have stopped the pump by pressing ⌄ , it can only be restarted by pressing ⌃.

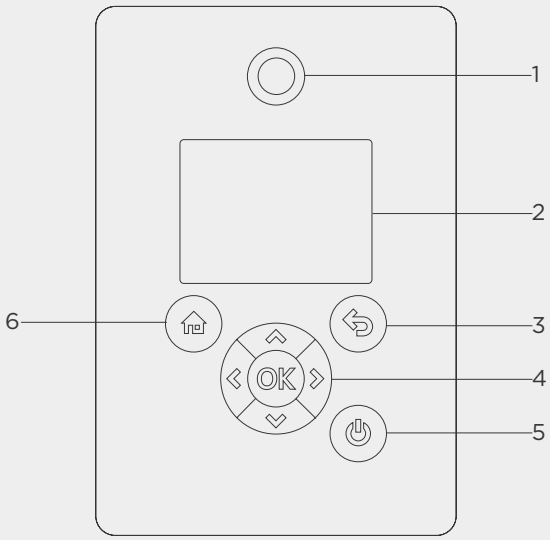
You can also stop the pump with Grundfos GO Remote or via a digital input set to External stop.

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.

Pump Configuration - Advanced Control Panel

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



POS.	SYMBOL	DESCRIPTION
1		Grundfos Eye Shows the operating status of the pump.
2	-	Graphical colour display.
3		Goes one step back.
4		Navigates between main menus, displays, and digits. When you change the menu, the display always shows the top display of the new menu.
		Navigates between submenus. 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.
5	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 OK on the pump control panel to allow radio communication with Grundfos GO Remote and other products of same type.
6		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.
7		Goes to the Home menu.

POS.	SYMBOL	DESCRIPTION
1		**Home** This menu shows up to four user-defined parameters. You can select parameters shown as a shortcut icon, & when pressing OK you go directly to the “Settings” display for the selected parameter.
2	-	**Status** This menu shows the status of the pump & system as well as warnings & alarms.
3	-	**Settings** This menu gives access to all setting parameters. You can make detailed settings for the pump in this menu.
4	-	**Assist** This menu enables assisted pump setup, provides a short description of the control modes and offers fault advice.

POS.	SYMBOL	DESCRIPTION
5		Indicates that the pump has been stopped via the button.
6		Indicates that the pump is mfunctioning as master pump in a multi-pump system.
7		Indicates that the pump is functioning as slave pump in a multi-pump system.
8		Indicates that the pump is operating in a multi-pump system.
9		Indicates that the possibility to change settings has been disabled for protective reasons.

Pump Configuration - Advanced Control Panel Menu Overview

HOME	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
	•	•	•

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

Pump Configuration - Control Panel Settings

STATUS	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
Set-point	•	•	•
Operating mode	•	•	•
Set manual speed	•	•	•
Set user-defined speed	•	•	•
Control mode	•	•	•
Setting the proportional pressure	•	•	•
Analog inputs	•	•	•
Analog input 1, setup	•	•	•
Analog input 2, setup	•	•	•
Analog input 3, setup	•	•[1)]	•[1)]
Pt100/1000 inputs	•	•[1)]	•[1)]
Pt100/1000 input 1, setup	•	•[1)]	•[1)]
Pt100/1000 input 2, setup	•	•[1)]	•[1)]
Digital inputs	•	•	•
Digital input 1, setup	•	•	•
Digital input 2, setup	•	•[1)]	•[1)]
Digital inputs/outputs	•	•	•
Digital input/output 3, setup	•	•	•
Digital input/output 4, setup	•	•[1)]	•[1)]
Relay outputs	•	•	•
Relay output 1	•	•	•
Relay output 2	•	•	•
Analog output	•	•[1)]	•[1)]
Output signal	•	•[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 functional module, type FM 300 is fitted.

Continued on following page...

Control Panel Settings (Cont.)

STATUS	CRE, CRIE, CRNE, SPKE, MTRE	CME	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

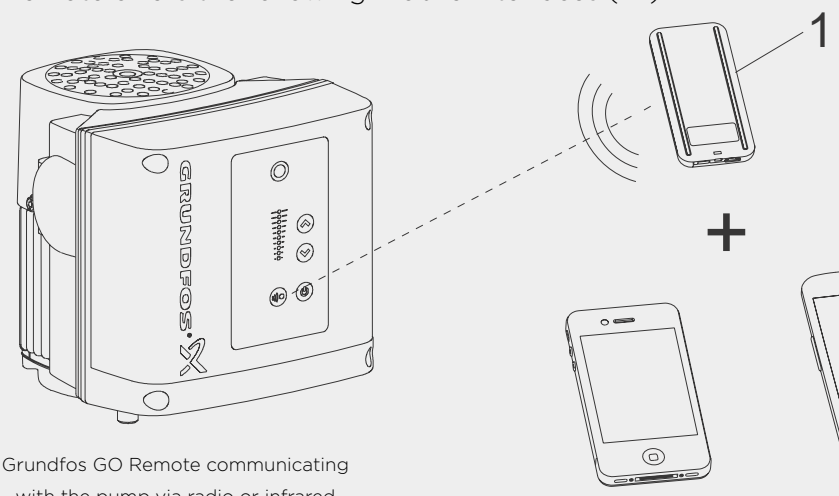
STATUS	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
Assisted pump setup	•	•	•
Setup, analog input	•	•	•
Setting of date and time	•	•	•
Setup of multi-pump system	•	•	•
Description of control mode	•	•	•
Assisted fault advice	•	•	•

Pump Configuration - 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 OK on the pump in order to establish connection with Grundfos GO Remote or press 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 OK 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.

Pump Configuration - Grundfos GO Remote Menu Overview

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

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

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

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

SETTINGS	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
“Set-point”	•	•	•
“Operating mode”	•	•	•
“Set user-defined speed”	•	•	•
“Control mode”	•	•	•
“Setting the proportional pressure”	•	•	•
“Pipe-filling function”	•	•	•
“Buttons on product”	•	•	
“LiqTec”	•	•[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 functional 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	CME	MULTI-PUMP SYSTEM
“Motor bearing monitoring”	•	•	
“Service”	•	•	
“Date and time”	•	•[1)]	
“Store settings”	•	•	
“Recall settings”	•	•	
“Undo”	•	•	•
“Pump name”	•	•	•
“Connection code”	•	•	•
“Unit configuration”	•	•	

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

ALARMS AND WARNINGS	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
“Alarm log”	•	•	•
“Warning log”	•	•	•
“Reset alarm” button	•	•	•

ASSIST	CRE, CRIE, CRNE, SPKE, MTRE	CME	MULTI-PUMP SYSTEM
“Assisted pump setup”	•	•	
“Assisted fault advice”	•	•	•
“Multi-pump setup”	•	•	•

Pump Configuration - Function Descriptions

Set-point

PUMP VARIANT	SET-POINT
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

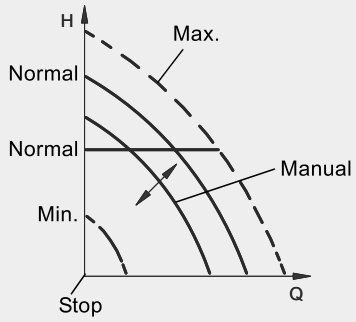
PUMP VARIANT	OPERATING MODE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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 maximum 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.

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.

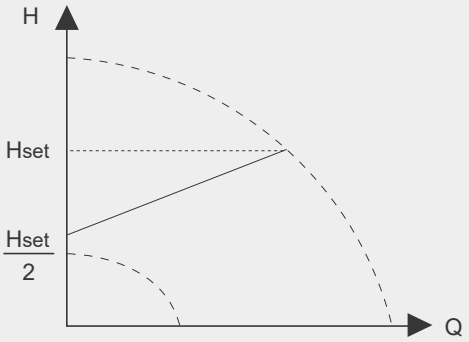
Proportional Pressure

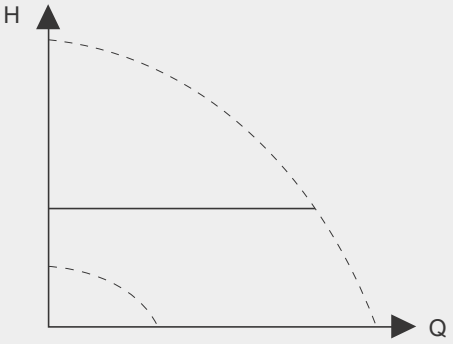
PUMP VARIANT	PROPORTIONAL PRESSURE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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.



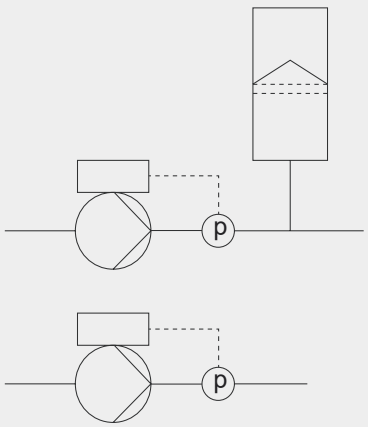


PUMP VARIANT	CONSTANT PRESSURE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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.

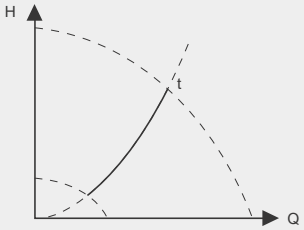
For pumps without a factory-fitted sensor, you must connect a pressure sensor to one of the analogue inputs of the pump. You can set the pressure sensor in the Assist menu.



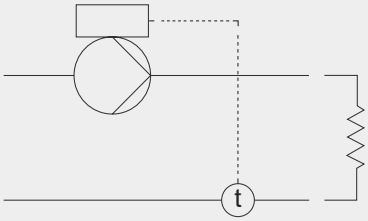
Constant Temperature

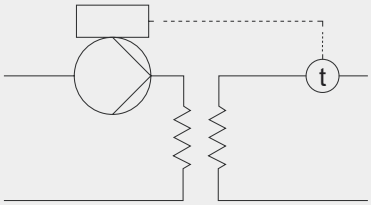
PUMP VARIANT	CONSTANT TEMPERATURE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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:

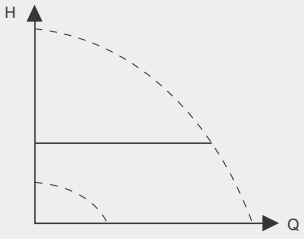




Constant Differential Pressure

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

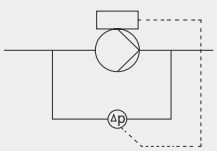
The pump maintains a constant differential pressure, independently of the flow in the system. Seen on the right.

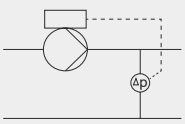


This control mode requires either a differential-pressure sensor or two external pressure sensors. See the examples below:

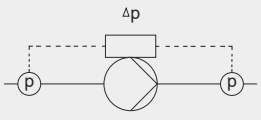
Examples

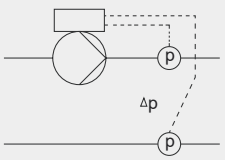
One differential-pressure sensor.
The pump uses the input from the sensor to control the differential pressure.
You can set the sensor manually or by using the Assist menu.





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.

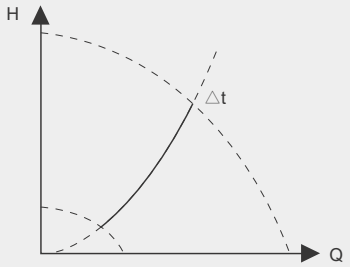




Constant Differential Pressure

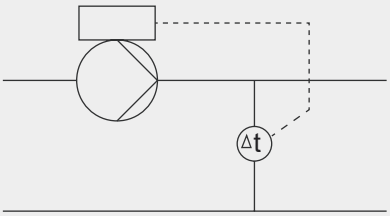
PUMP VARIANT	CONSTANT DIFFERENTIAL PRESSURE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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

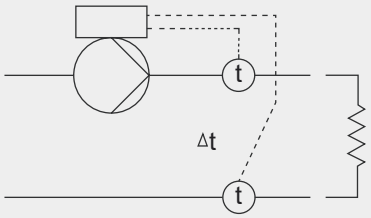


This control mode requires either two temperature sensors or one differential-temperature sensor. See the examples below. The temperature sensors can either be analogue sensors connected to two of the analogue inputs or two Pt100/Pt1000 sensors connected to the Pt100/1000 inputs, if these are available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



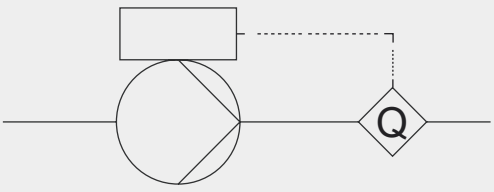
Two temperature sensors.
Constant differential-temperature control is achievable with two temperature sensors. The pump uses the input from the two sensors and calculates the differential temperature. Both sensors must have the same unit and must be set as feedback sensors. You can do this manually,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

Constant Flow Rate

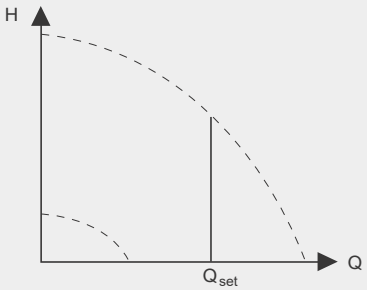
PUMP VARIANT	CONSTANT FLOW PRESSURE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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"

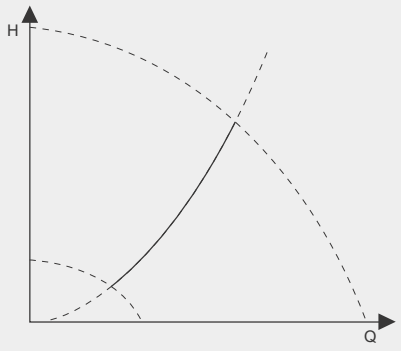


Constant Flow Rate

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.



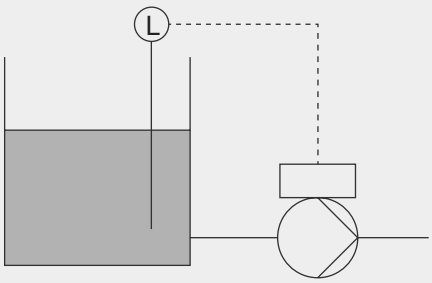
Constant Level

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

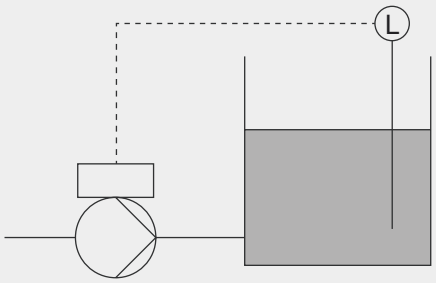
- As an emptying function where the pump draws the liquid from a feed tank.
- As a filling function where the pump pumps the liquid into a storage tank.

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

Examples



One level sensor.
- emptying function (feed tank).



One level sensor.
- filling function (storage tank).

Constant Other Value

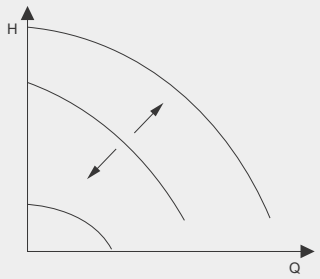
PUMP VARIANT	CONSTANT OTHER VALUE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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 analogue 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.

Analogue 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 analogue input for a feedback sensor, we recommend that you do this via the Assisted pump setup menu.

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

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

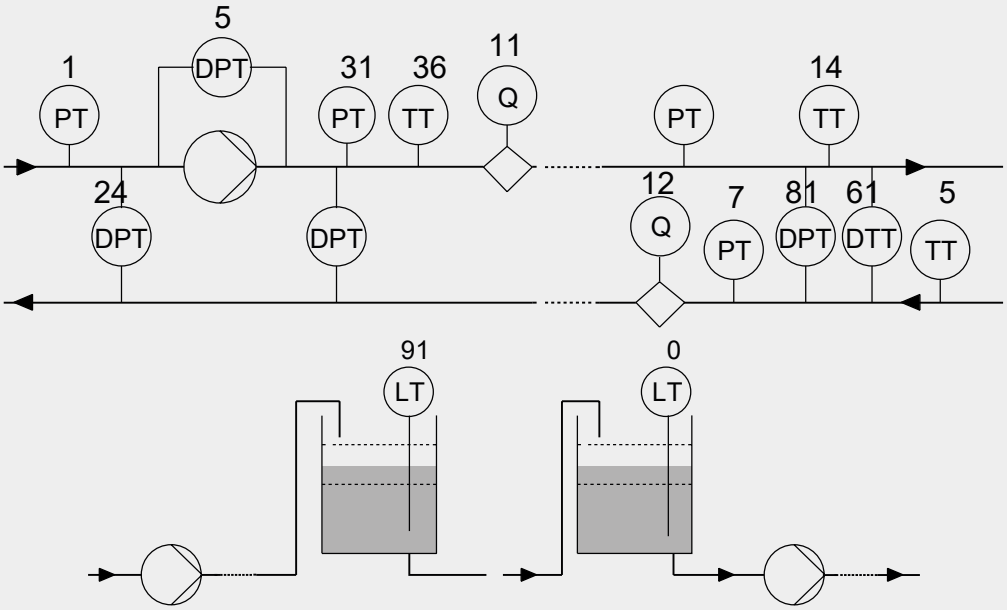
Function

The analogue 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 analogue 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

Unit

SENSOR FUNCTION/ MEASURED PARAMETER	SENSOR FUNCTION/MEASURED PARAMETER
Pressure	bar, m, kPa, psi, ft
Level	m, ft, in
Pump Flow	m^3/h, l/s, yd^3/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	ANALOGUE INPUT FOR SENSOR 1	ANALOGUE 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	PARAMETER	PARAMETER
Pt100/1000 input 1, setup (17 and 18)	-	•
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 analogue inputs via the Setup, analogue 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.

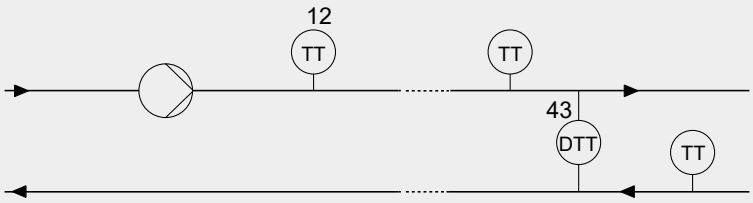
Function

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

PARAMETER	PARAMETER
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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

FUNCTIONAL (TERMINAL)	FM200* (STANDARD)	FM300* (STANDARD)
Digital input 1, setup (2 and 6)	-	•
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 multi-pump 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.

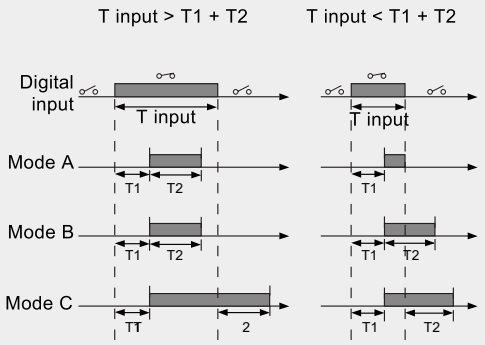
Activation delay

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

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

PARAMETER	PARAMETER
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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

FUNCTIONAL (TERMINAL)	FM200* (STANDARD)	FM300* (STANDARD)
Digital input/output 3, setup (6 and 10)	•	•
Digital input/output 4, setup (11 and 18)	-	•

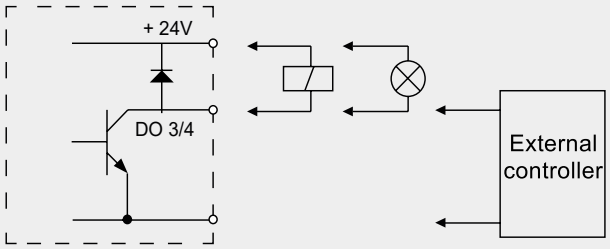
You can select if the interface is to be used as input or output. The output is an open collector and you can connect it to e.g. an external relay or controller such as a PLC.

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

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

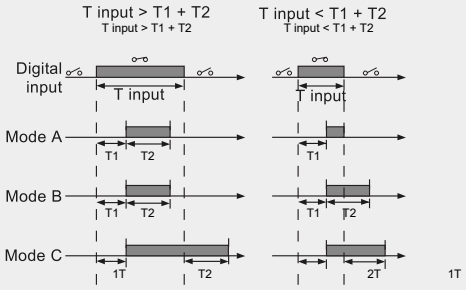
Possible functions, digital input/output 4

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



PARAMETER	“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.

- **"Operating" (Operation)**
  "Operating" equals "Running" but the pump is still in operation when the pump is stopped due to low flow.

- **"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.

PARAMETER	ANALOGUE OUTPUT
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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

FUNCTIONAL (TERMINAL)	FM200* (STANDARD)	FM300* (STANDARD)
Analogue Output	-	•

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

To set the analogue output, make the settings below.

Output signal

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

Function of analogue output

Actual speed

SIGNAL RANGE (V, mA)	ACTUAL SPEED (%)		
	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

SIGNAL RANGE (V, mA)	RESULTING SET-POINT (%)	
	0	100
0 - 10 V	0 V	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.

Limit 1 exceeded and Limit 2 exceeded

SIGNAL RANGE (V, mA)	LIMIT-EXCEEDED FUNCTION	
	OUTPUT NOT ACTIVE	OUTPUT ACTIVE
0 - 10 V	0 V	10 V
0 - 20 mA	0 mA	20 mA
4 - 20 mA	4 mA	20 mA

Flow rate

SIGNAL RANGE (V, mA)	ACTUAL SPEED (%)		
	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 0% and 200% of the nominal flow.

Actual value

SIGNAL RANGE (V, mA)	"ACTUAL VALUE"	
	$SENSOR_{min}$	$SENSOR_{max}$
0 - 10 V	0 V	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

SIGNAL RANGE (V, mA)	MOTOR LOAD (%)	
	0	100
0 - 10 V	0 V	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.

Motor current

SIGNAL RANGE (V, mA)	MOTOR CURRENT (%)		
	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

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

“Controller” (Controller Settings)

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

The pumps have a factory default setting of gain (Kp) and integral time (Ti).

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

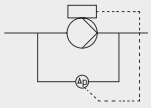
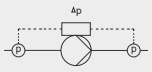
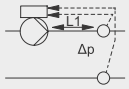
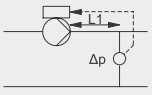
- Set the gain within the range from 0.1 to 20.
- Set the integral-action time within the range from 0.1 to 3600 seconds. If you select 3600 seconds, the controller functions as a P controller.

Furthermore, you can set the controller to inverse control.

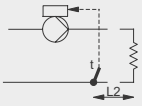
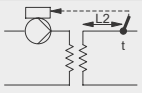
This means that if you increase the set-point, the speed is reduced. In the case of inverse control, you must set the gain within the range from -0.1 to -20.

Guidelines for setting of PI controller

The tables below show the recommended controller settings:

CONSTANT DIFFERENTIAL PRESSURE	K_P	T_I
	0.5	0.5
		
	0.5	L1 < 5m: 0.5 L1 > 5m: 3 L1 > 10m: 5
		

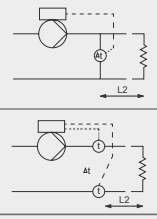
L1: Distance in meters between pump and sensor.

CONSTANT TEMPERATURE	K_P VARIANT		T_I
	HEATING SYSTEM [1]	HEATING SYSTEM [2]	
	0.5	-0.5	10 + 5L2
	0.5	-0.5	30 + 5L2

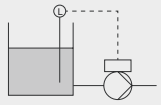
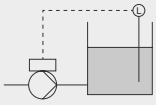
1) In heating systems, an increase in pump performance results in a rise in temperature at the sensor.

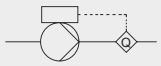
2) In cooling systems, an increase in pump performance results in a drop in temperature at the sensor.

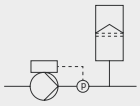
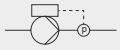
L2: Distance in meters between heat exchanger and sensor.

CONSTANT DIFFERENTIAL TEMPERATURE	K_P	T_I
	0.5	10 + 5L2

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_I
	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

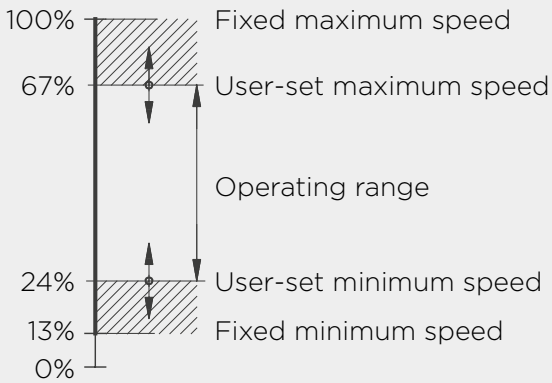
PUMP VARIANT	OPERATING RANGE
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

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.



PUMP VARIANT	EXTERNAL SET-POINT FUNCTION
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

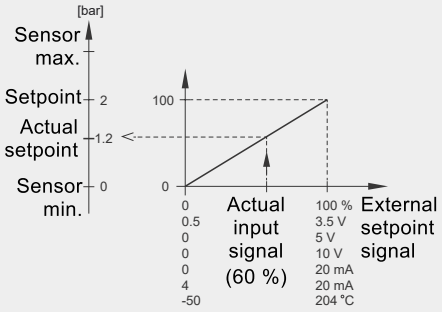
You can influence the set-point by an external signal, either via one of the analog inputs or, if an advanced functional module (FM 300) is fitted, via one of the Pt100/1000 inputs.

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 (set-point - sensor min.) + sensor min.

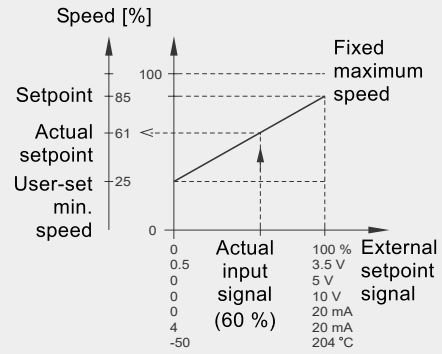
At a sensor min. of 0 bar, a set-point of 2 bar and an external set-point of 60%, the actual set-point is 0.60 x (2 - 0) + 0 = 1.5 bar. See diagram to the right.



Example with constant curve with linear influence

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

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

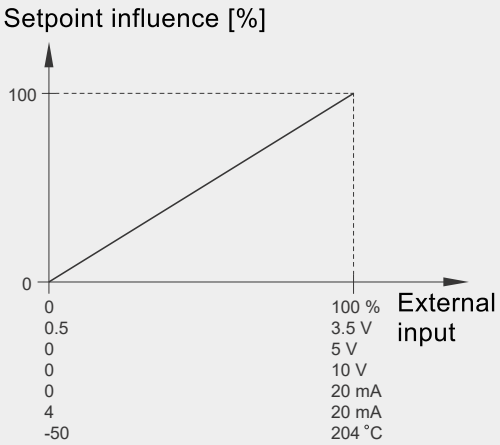


"Set-point Influence" functions

You can select these functions:

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

- Linear function.
  The set-point is influenced linearly from 0 to 100%. See diagram below.



- Linear with Stop
  In the input signal range from 20 to 100%, the set-point 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 set-point 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”.

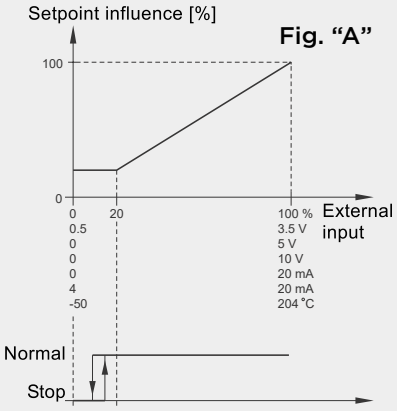


Fig. “A”

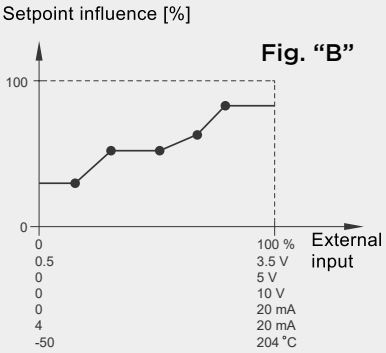


Fig. “B”

Predefined set-points

PUMP VARIANT	EXTERNAL SET-POINT FUNCTION
CME	•
CRE, CRIE, CRNE, SPKE, MTRE	•

You can set and activate seven predefined set-points 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 set-points if all seven predefined set-points are to be used. You can also set one or two of the digital inputs to Predefined set-points but this limits the number of predefined
set-points available.

DIGITAL INPUTS			SET-POINT
2	3	4	
0	0	0	Normal set-point or stop
1	0	0	Predefined set-point 1
0	1	0	Predefined set-point 2
1	1	0	Predefined set-point 3
0	0	1	Predefined set-point 4
1	0	1	Predefined set-point 5
0	1	1	Predefined set-point 6
1	1	1	Predefined set-point 7

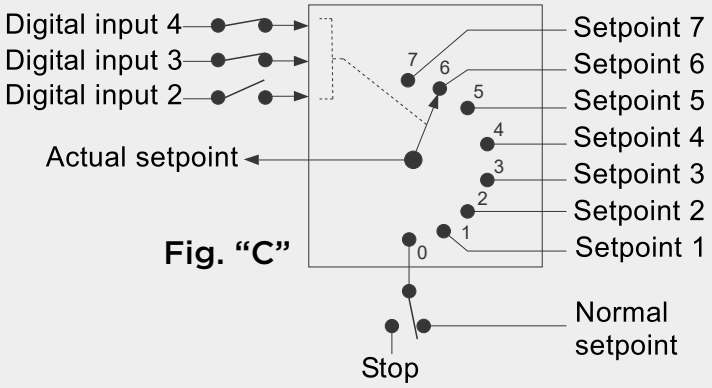


Fig. “C”

Fig. “C” shows how you can use the digital inputs to set seven predefined set-points. 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 set-point 6 is activated.

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

PUMP VARIANT	LIMIT-EXCEEDED FUNCTION
CME	•
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.

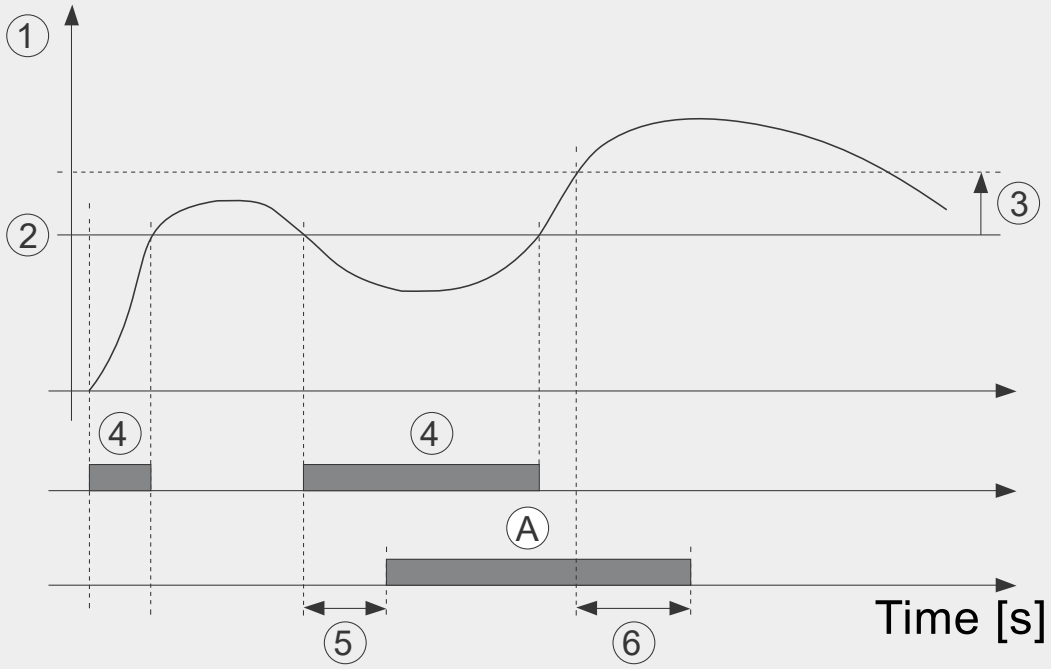
You can select the following actions:

- 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.

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.

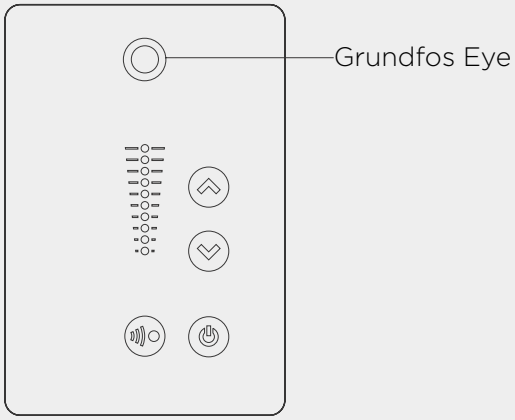
Example:
The function is to monitor the outlet pressure from a CRE pump. If the pressure is below 5 bar for more than 5 seconds, a warning must be given. If the outlet pressure is above 7 bar for more than 8 seconds, reset the limit exceeded warning.



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
A	“Limit exceeded function active”	-
-	“Action”	Warning

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.
	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.
	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 on the pump control panel to allow communication.
	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 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.

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

2. To Replace the Filters

1. The operative must wear protective gloves and eye wear for this operation.
2. Use of the main VEXO® X-POT XP+® Schematic (Page 10) is required to follow the main part numbers.
3. Turn the power off to the VEXO® X-POT XP+® unit by turning the Mains ON/OFF Power Switch (16) through 90°.
4. Check to see the power is off, the power to the Grundfos CRIE (Smart Circulator E Pump) (8). The screen should be blank and off and the pump will not run.
5. Manually close the 2" Isolating Valve (1) on the Dirty Flow into the VEXO® X-POT XP+®.
6. Manually close the 2" Isolating Valves (9) on the Clean Return from the VEXO® X-POT XP+®.
7. Manually open the 3/4" Isolating Valve (10). This will open the VEXO® X-POT XP+® Vessel (3) to drain.
8. Remove the 1/2" plug and manually open the 1/2" Manual Vent Isolating Valve (15). This will open the VEXO® X-POT XP+® Vessel (3) to atmosphere and will help the VEXO® X-POT XP+® Vessel (3) drain quicker.

   NOTE: If the system water is hot, leave enough time for the water to cool sufficiently before working on this vessel.
9. Untie 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 13 Magnet Grate (4) by the handle and place the Magnet Grate (4) onto a flat surface so the grate can be worked on.
15. Remove the Baffle Plate (5) by the lifting ring and place it onto a flat surface for cleaning.
16. Remove the dirty Bag Filter (6) and dispose of in an approved manner.
17. Replace the Bag Filter (6) with an approved new clean Bag Filter (6) and fix the filter around internal diameter of the Strainer Basket (6) ensuring that the filter is fully expanded to the bottom to maximum surface area for debris collection.
18. Clean the Baffle Plate (5) with a clean damp cloth and then place it into the Vessel Body (3). Ensure the Baffle Plate is seated correctly on the Filter Basket (6), press down gently to lock the Baffle Plate (5) into the Filter Basket/Bag Filter (6).
19. To clean the Magnet Grate (4), unscrew 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.

Continues on following page...

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 (4) 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 (4) with a dry cloth, carefully replace all of the magnet bars with the screw facing outwards and then screw the caps back on with a flat screw driver.

24. Replace the now cleaned Magnet Grate (4) back into the Vessel Body (3) on top of the Baffle Plate (5).

25. Now repeat the operations of 11 to 13, in reverse by following the Bolt tightening sequence on page 66.

26. Ensure the nuts on the lid have been tightened to a torque of 40Nm.

27. Manually close the 1/2" Manual Vent Isolating Valve (15) and replace the 1/2" plug to prevent accidental opening of the Manual Vent Valve (15).

28. Manually close the 3/4" Isolating Valve (10). This will close the VEXO® X-POT XP+® Vessel (3) to drain.

29. Slowly manually open the 2" Isolating Valves (1) on the Dirty Flow into the VEXO® X-POT XP+®. This will now let system water into the VEXO® 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 (9) on the Clean Return from the VEXO® X-POT XP+®.

32. Replace the top cover of the Insulation Jacket and tie.

33. Turn the power on to the VEXO® X-POT XP+® unit by turning the Mains ON/OFF Power Switch (16) through 90°.

34. Check to see if the power is on. The power to the Grundfos CRIE (Smart Circulator E Pump) (8) will activate it.

The VEXO® X-POT XP+® filters have been cleaned and changed. The VEXO® 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 VEXO® 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 (3).

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.

VEXO International (UK) Ltd recommend the 'X-PO' Range of Water Treatment Additives for use in Commercial Heating and Cooling Systems.

VEXO International (UK) Ltd recommends the 'X-PO' Range of Water Treatment Additives for use in Commercial Heating and Cooling Systems.

X-PO10
Commercial Inhibitor

X-PO20
De-Scaling Agent

X-PO35
Non-Flush Cleanser

X-PO40
Heavy Duty De-Sludger

X-PO45
New System Cleaner

X-PO50
Monopropylene
Ready Mixed

X-PO55
Monopropylene
Concentrate

X-PO80
Non-Potable Biocide

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.

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 (UK) Ltd 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 eye wear for this operation.
2. Use of the main VEXO® X-POT XP+® Schematic (page 10) is required to follow the main item Numbers.
3. Turn the power off to the VEXO® X-POT XP+® unit by turning the Mains ON/OFF Power Switch (16) through 90°.
4. Check to see the power is off, the power to the Grundfos CRIE (Smart Circulator E Pump) (8). The screen should be blank and off and the pump will not run.
5. Manually close the 2" Isolating Valves (1) on the Dirty Flow to the VEXO® X-POT XP+®.
6. Manually close the 2" Isolating Valves (9) on the Clean Return from the VEXO® X-POT XP+®.
7. Manually open the 3/4" Isolating Valve (10). This will open the VEXO® X-POT XP+® Vessel (3) to drain.
8. Remove the 1/2" plug and manually open the 1/2" Manual Vent Isolating Valve (15). This will open the VEXO® X-POT XP+® Vessel (3) to atmosphere and will help the VEXO® X-POT XP+® Vessel (3) drain quicker.

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

9. Untie 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 13 Magnet Grate (4) by the handle and place the Magnet Grate (4) onto a flat surface.

Continues on following page...

15. Remove the Baffle Plate (5) by the lifting ring and place it onto a flat surface.

16. Remove the Bag Filter (6) and place it onto a flat surface.

17. Now repeat the operations of 11 to 13, in reverse by following the bolt tightening sequence on page 66.

18. Ensure the nuts on the lid have been tightened to a torque of 40Nm.

19. Manually close the 3/4" Isolating Valve (10). This will close the VEXO® X-POT XP+® Vessel (3) to drain.

20. Manually open the 1" Isolating Valves (12) below the Chemical Fill Tundish (13).

21. Decant your water treatment additives from the larger drums into an easily manageable container.

22. Pour the Water Treatment Additives into the Tundish (13) and therefore into the Vessel Body (3) itself.

23. The vessel will hold 25L of Water Treatment Additives in total, when you have filled the VEXO® X-POT XP+® Vessel Body (3), a small amount of Water Treatment Additives will exit through the spout of the Manual Vent. This over-spill will eventually lead to drain.

24. Manually close the 1" Isolating Valves (12) below the Tundish.

25. Replace the 1/2" plug and manually close the 1/2" Manual Vent Isolating Valve (15). This will close the VEXO® X-POT XP+® Vessel (3) to atmosphere.

26. Slowly manually open the 2" Isolating Valves (1) on the Dirty Flow into the VEXO® X-POT XP+®. This will now let system water into the VEXO® X-POT XP+® Vessel.

27. 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...

28. Slowly manually open the 2" Isolating Valves (9) on the Clean Return from the VEXO® X-POT XP+®.

29. Turn the power on to the VEXO® X-POT XP+® unit by turning the Mains ON/OFF Power Switch (16) through 90°.

30. Check to see if the power is on. The power to the Grundfos CRIE (Smart Circulator E Pump) (8) will activate it.

31. The Water Treatment Additives are now dosed into the main system.

32. Repeat instructions 1 to 8, 10 to 13.

33. Replace the Bag Filter (6) and fix the filter around internal diameter of the Strainer Basket (6) ensuring that the filter is fully expanded to the bottom to maximum surface area for debris collection.

To carry on with further dosing of water treatment additives, follow instructions: 1 - 8, 10 - 13 & 19 - 31 as above.

Continues on following page...

Replace the Baffle Plate (5) and then place it into the Vessel Body (3).

35. Replace the Magnet Grate (4) back into the Vessel Body (3) on top off the Baffle Plate (5).

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 1/2" Manual Vent Isolating Valve (15) and replace the 1/2" plug to prevent accidental opening of the Manual Vent Valve (15).

39. Manually close the 3/4" Isolating Valve (10). This will close the VEXO® X-POT XP+® Vessel (3) to drain.

40. Slowly manually open the 2" Isolating Valves (1) on the Dirty Flow into the VEXO® X-POT XP+®. This will now let system water into the VEXO® 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 (9) on the Clean Return from the VEXO® X-POT XP+®.

43. Replace the top cover of the Insulation Jacket and tie.

44. Turn the power on to the VEXO® X-POT XP+® unit by turning the Mains ON/OFF Power Switch (16) through 90°.

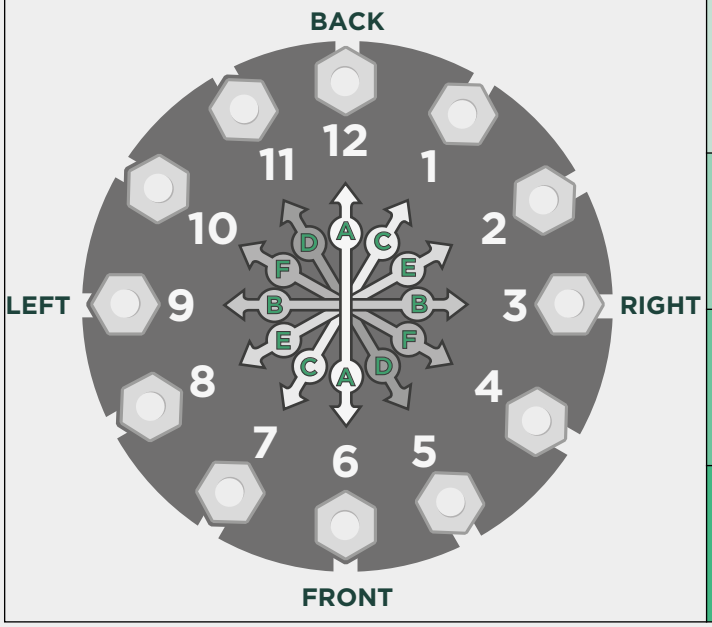
Check to see if the power is on. The power to the Grundfos CRIE (Smart Circulator E Pump) (8) will activate it.

The VEXO® 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.



Bolt Tightening Sequence (All nuts must be tightened to 40Nm torque)	
Sequence A	Bolt 12 -> Bolt 6
Sequence B	Bolt 3 -> Bolt 9
Sequence C	Bolt 1 -> Bolt 7
Sequence D	Bolt 5 -> Bolt 11
Sequence E	Bolt 2 -> Bolt 8
Sequence F	Bolt 4 -> Bolt 10
REPEAT 3 TIMES TI GUARANTEE ALL NUTS ARE TO (40NM)	

When the VEXO® X-POT XP+® top flange plate is replaced, ensure the seal faces are clean and unobstructed.

Ensure the Manual Air Vent spout is positioned directly over the Manual Vent Tundish (15).

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.

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 (16) 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.

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 VEXO International (UK) Ltd 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.

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.

  The steel can be recycled, while the Grundfos CRiE Smart E-Pump is subject to WEEE regulations.

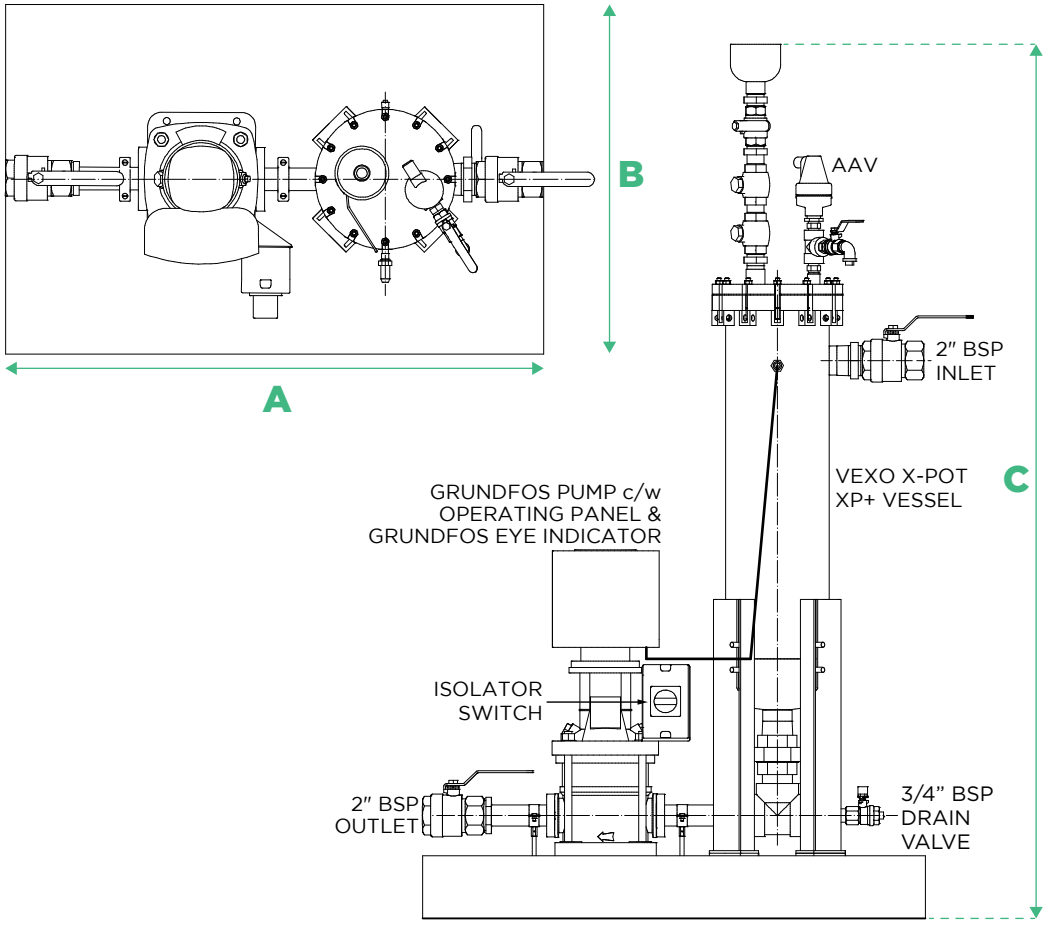
General Assembly Drawing (VEXO® X-POT XP+)

VEXO® X-POT XP+®

GENERAL ASSEMBLY

WARNING! WEAR APPROPRIATE PPE WHEN OPERATING THE VEXO® X-POT XP+®

INSTALLATION BY QUALIFIED/EXPERIENCE TECHNICIANS ONLY



Dimensions Refer to corresponding letter in drawing above		
A	Total unit width (with mounts)	**1000mm**
B	Total Length	**650mm**
C	Total unit height (with tundish)	**1688mm**

Electrical	
Pump rating	**1.5Kw**
Connection	**230 V ~ 1N PE 50/60 Hz**

Specifications	
Connection Size	**2" BSP**
Weight when empty	**126kg**
Weight when full	**151kg**
Max. test pressure	**25 Bar**
Max. working pressure	**16 Bar**
Max. flow rate	**3.5l/s**
Max. system size	**302,400L**
Working temperature	**0°C - 95°C**

General Access Drawing (VEXO® X-POT XP+)

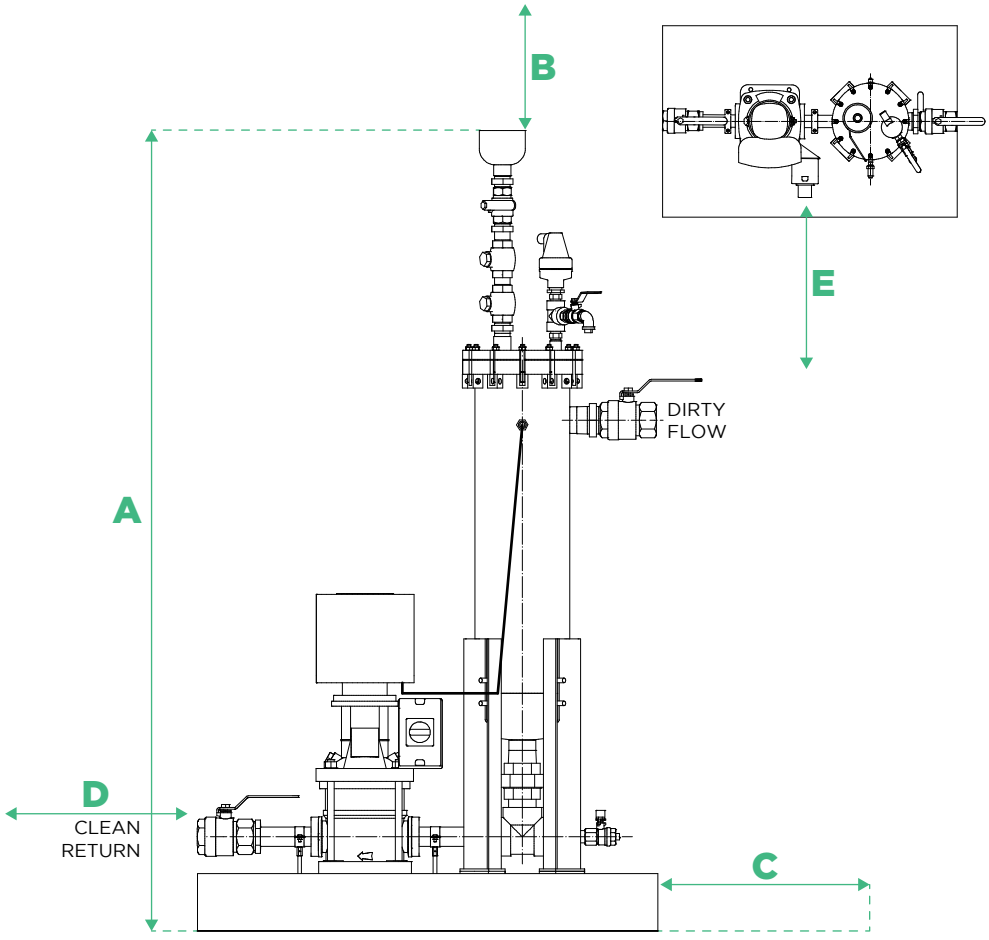
VEXO® X-POT XP+®

GENERAL ACCESS

WARNING! WEAR APPROPRIATE PPE WHEN OPERATING THE VEXO® X-POT XP+®

INSTALLATION BY QUALIFIED/EXPERIENCE TECHNICIANS ONLY

NOTE: ALL MEASUREMENTS ARE FOR GUIDANCE



Recommended General Access Measurements Refer to corresponding letter in drawing above		
A	Maximum height of the tundish above ground	1300mm
B	Minimum unobstructed space required above tundish for dosing chemicals	400mm
C	Minimum unobstructed space required to the left of the unit for servicing	500mm
D	Minimum unobstructed space required to the right of the unit for install and service flow and return connections to the system	500mm
E	Minimum unobstructed space required to the front of unit for servicing	1000mm

Declaration of Conformity

VEXO® | X-POT XP+®

DECLARATION OF CONFORMITY

MANUFACTURER	DISTRIBUTOR
VEXO International (UK) Ltd.	PLEASE STAMP OR FILL OUT
6 The Granary Building, Millow Hall Farm Millow (Dunton), Biggleswade, Bedfordshire, SG18 8RH, United Kingdom	

Range Name
X-POT XP+ **(Up to 210 l/min)**

Operating Conditions (Working Pressure Range)
X-POT XP+ **(0 Bar - 16 Bar)**

Operating Conditions (Working Temperature)
X-POT XP+ **(0°C - 95°C)**

Addition Information
All appropriate components CE/UKCA marked prior to assembly, and are bound by their individual applicable directives including but not limited to:
Pressure Equipment Directive: PED 2014/68/EU – Category 2 (Module A2) – Group 1 Liquids
Low Voltage Directive: 2014/35/EU
Electromagnetic Compatibility Directive: 2004/108/EC
Machinery Directive: 2006/42/EC

VEXO®

For and on behalf of
VEXO International (UK) Limited

Darren Wilkinson, Managing Director

6 The Granary Building, Millow Hall Farm
Millow (Dunton), Biggleswade
Bedfordshire, SG18 8RH

+1 (800) 917-6735

Service History

VEXO® X-POT XP+®

SERVICE HISTORY

WARNING! WEAR APPROPRIATE PPE WHEN OPERATING THE VEXO® X-POT XP+®

INSTALLATION BY QUALIFIED/EXPERIENCE TECHNICIANS ONLY

INSTALLED BY: _____ **DATE:** Y Y • M M • D D **NOTES:** _____	**SERVICED BY:** _____ **DATE:** Y Y • M M • D D **NOTES:** _____
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Notes