Installation, Operation, and Maintenance Guide

For the X-POT XP+ side stream unit with integrated Franklin 10VR-2 multi-stage pump.

Version: 0.1

Author: VEXO Technical Publications

Preface

Welcome to the instruction manual for the patented VEXO X-POT XP+ Filtration and Chemical Feed Unit, manufactured by VEXO International. This manual provides the information required to ensure the safe, effective, and efficient operation of your X-POT unit.

This document includes:

Important Safety Information: Please read and understand the safety precautions outlined before operating your X-POT unit.

Introduction to the X-POT: An overview of the X-POT functionalities, including filtration and chemical dosing capabilities.

Installation and Start-up Requirements: A roadmap to navigate the manual for ease of use.

For optimal performance and equipment longevity, we highly recommend that you thoroughly read and familiarize yourself with the contents of this manual. Should you have any questions, please contact VEXO International. Our contact details are located on the back cover.

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Notice: VEXO International reserves the right to revise this publication and make changes to the content without obligation to notify any person of such revisions.

Section 1: Introduction & Safety

About the X-POT XP+

The X-POT XP+ is an advanced, pre-fabricated skid designed for the efficient conditioning and protection of closed-loop hydronic heating and cooling systems. It serves as a comprehensive water treatment solution, combining filtration and chemical feeding into a single, compact device designed for ease of installation and system reliability.

Safety First

Warnings

Indicates a risk of death or serious injury.

Indicates a risk of injury or structural damage.

Important Information

This symbol indicates important information where there is no risk to people or property.

Additional Symbols

Symbol	Meaning
1.	A numbered step in an action sequence.
▶	A step in an action sequence
→	A reference to a related part in the document or to other related documents.
(1)	A reference number to identify or refer to a part or item.
•	A list entry.
◦	A list entry (Secondary level).

Examples of additional symbols used A numbered step in an action sequence.

A sequence of numbered steps or actions carried out in a specific order to complete a task.

1. First action
2. Second action
3. Third action
4. etc.

A step in an action sequence.

A sequence of defined actions or steps carried out in order to complete a task.
▶ Action
▶ Next action
▶ etc.

A reference to a related part in the document or to other related documents.

To refer the reader to a specific figure/table/section within the manual.
→ e.g., figure 1.

A reference number to identify or refer to a part or item.

In a related figure, items or parts identified by a sequential number.

List entries, first and second levels
- A single component/item
- A component/list, made up of multiple parts/items.
    - Subcomponent or sub list of main component/list.

General Precautions

Thoroughly read the following safety precautions prior to installation. Observe these precautions carefully to ensure safety.

All electrical work must be performed by qualified personnel.

This application is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

To reduce the risk of injury or electric shock, stop the operation and switch off the power supply before cleaning, maintaining, or inspecting the X-POT Side Stream Filtration and Dosing Unit.

To reduce the risk of shorting, current leakage, electrical shock, malfunctions, smoke, or fire, do not wash the X-POT controller with water or any other liquid.

To reduce the risk of electrical shock, malfunctions, smoke, or fire, do not operate the switches/buttons or touch other electrical parts with wet hands.

Properly install all required covers to keep moisture and dust out of the X-POT controller. Dust accumulation and water can cause electric shock, smoke, or fire.

To reduce the risk of injury, keep children away while installing, inspecting, or repairing the X-POT.

To reduce the risk of injury, wear protective gear when operating on the X-POT.

To reduce the risk of damage to the X-POT, do not directly use incompatible components or chemicals associated with hydronic systems.

To reduce the risk of fire or explosion, do not place flammable materials or use flammable sprays around the X-POT.

To reduce the risk of injury, avoid contact with sharp edges of certain parts.

To avoid deformation and malfunction, do not install the X-POT controller in direct sunlight or where the ambient temperature may exceed 113°F or drop below 41°F. Enclosure is IP45 rated.

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	0.02 µT
3m	0.02 µT
2m	0.02 µT
1m	0.04 µT
Stood up against vessel	10.11 µT

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

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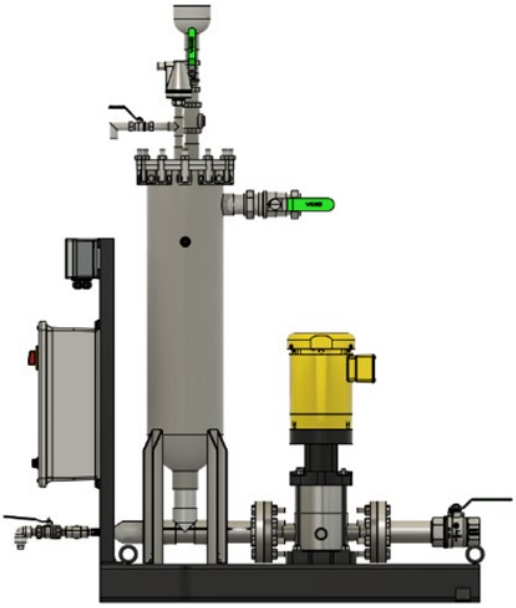
Section 2: Product Description & Technical Data

Product Overview



The VEXO™ X-POT XP+ is a revolutionary side stream filtration and dosing unit designed to safeguard and enhance the performance of your closed-loop water systems. By removing impurities and maintaining chemical efficiency of inhibitors and biocides, the X-POT offers a comprehensive solution for:

- **System Lifespan:** Protects boilers, chillers, and other equipment from wear and tear caused by contaminants.
- **Enhanced Efficiency:** Maintains and/or optimizes heat transfer and system performance, leading to potential energy cost savings.
- **Reduced Maintenance:** Minimizes system downtime and maintenance needs associated with fouling and corrosion.
- **Improved System Health:** Maintains clean, clear water for optimal system operation.

The X-POT is a reliable and cost-effective investment for building owners and facility managers seeking to optimize their closed-loop hydronic water systems. With its user-friendly design and robust construction, the X-POT XP+ delivers long-lasting performance and peace of mind.

Features

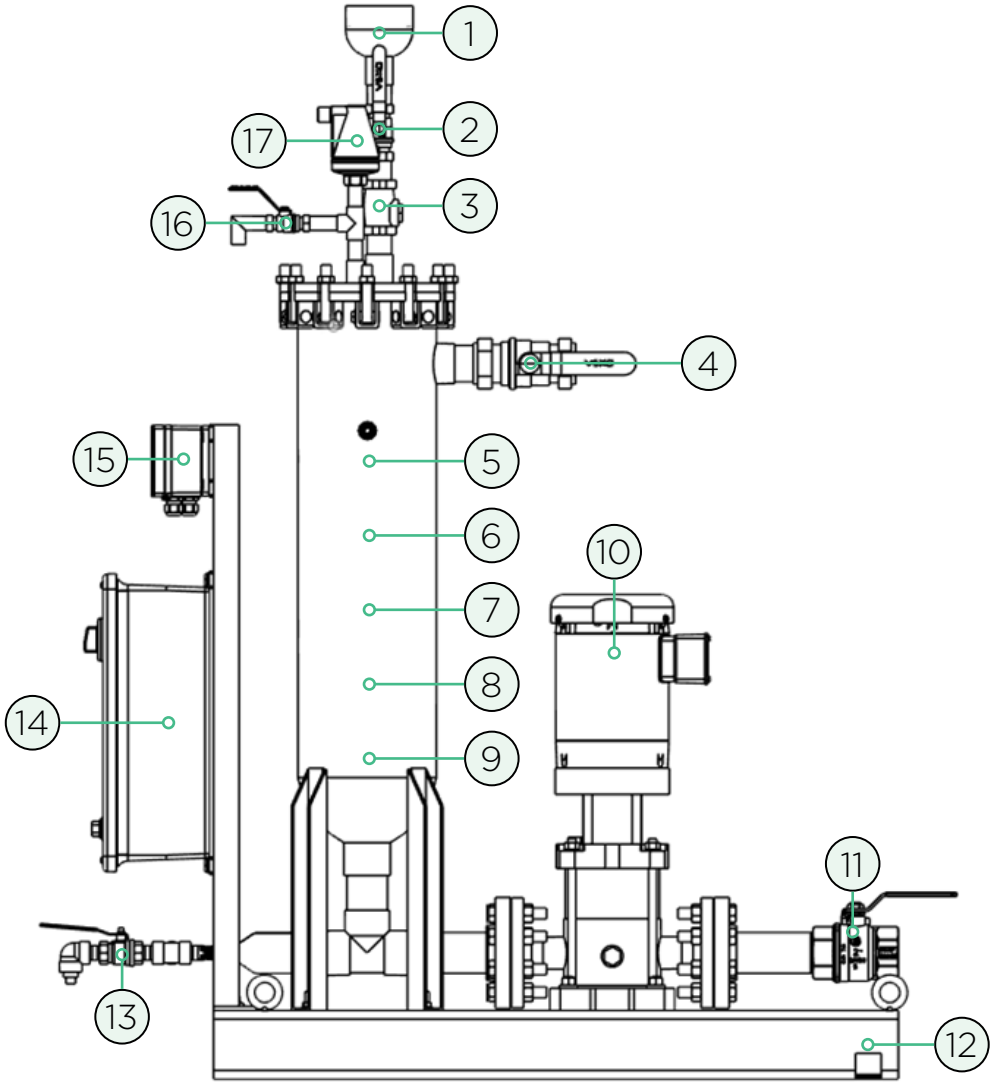
The XP+ unit includes the features of the standard X-POT, which are:

- **Magnetic Filtration:** Uses powerful rare earth magnets encased in stainless steel to remove ferrous (magnetic) corrosion debris and magnetite sludge.
- **Fine Filtration:** Includes a separate bag filter to remove non-magnetic debris, biofilm, and suspended solids down to very fine levels (as low as 1 micron).
- **Chemical Shot Feeder:** A tundish/vessel for the safe and controlled introduction of liquid water treatment chemicals (like inhibitors or biocides) into the closed-loop system.
- **Automatic Air & Dirt Separator:** Incorporates an Automatic Air Vent (AAV) and other components to remove air and micro-bubbles from the system water, which helps reduce corrosion and cavitation.

The additional features of the XP+ model is the integrated monitoring and circulation components:

- **Integrated Circulating Pump:** Includes a built-in, high-efficiency 3-phase Franklin Multistage Vertical pump to continuously draw water from and return it to the main system, ensuring a consistent and dedicated flow through the filtration unit.
- **Pressure Differential (PD) Monitoring:** The unit is equipped with pressure sensors to monitor the pressure drop across the fine filter. This is crucial for:
    - **Dirty Filter Warning:** Notifying maintenance staff when the filter is becoming blocked and needs replacement.
    - **Performance Monitoring:** Ensuring the unit is operating effectively.
- **BMS Compatibility / Monitoring Controller:** The unit often includes an integrated controller which provides a clear display, fault alarm, and Building Management System (BMS) compatibility.
- **Pre-Assembled / Fabricated Skid:** These units are supplied pre-assembled on a skid frame, simplifying the installation process to be “plug-and-play” with minimal on-site fabrication required.

Schematic & Component List



PART NO.	PART DESCRIPTION
1	316 Stainless Steel Dosing Tundish
2	1" Isolation Valve (Dosing Shut Off)
3	2x 316 Stainless Non-Return Valve
4	2" Isolation Valve (Entry/Supply)
5	304 Stainless Steel Magnetic Grates (Shells)
6	316 Stainless Steel Baffle Plate
7	Polypropylene Needle Felt Bag Filter
8	Strainer Basket
9	316 Stainless Steel Vessel Body

PART NO.	PART DESCRIPTION
10	Franklin 10VR-02 Multi-Stage Circulating/ Booster Pump
11	2" Isolation Valve (Exit/Return/Discharge)
12	Skid Mounting Plate
13	1/2" Isolation Valve (Drain Valve)
14	Electrical Supply Enclosure
15	VEGAMET 842 Monitor
16	1/2" Isolation Valve (Manual Vent)
17	316 Stainless Steel Automatic Air Vent

Technical Specifications

FEATURES		
Weight	Dry: 167.56 lb	Operational: 266.69 lb
Height	62.80”	
Width	40.00”	
Depth	13.44”	
Supply connection	50mm - 2” (NPT Female)	
Return connection	50mm - 2” (NPT Female)	
Drain connection	25mm - 1/2” (NPT Female)	
Minimum working temperature	32°F	
Maximum working temperature	203°F	
Maximum system working pressure	232 PSI	
Suitable for systems volumes up to;	79,885 US Gal	
Minimum flow rate (unit)	1.31 G/min	
Maximum flow rate (unit)	55.47 G/min	
Filtration rate	Down to 1 Micron	

MATERIAL SPECIFICATION	
Vessel body	316 Stainless Steel
Vessel mounting	316 Stainless Steel
Baffle plate	316 Stainless Steel
Magnet grate	316 Stainless Steel
Magnets x13 no.	304 Stainless Steel Shells
Bag filter x1 no.	Polypropylene Spun Bonded Fiber
Isolation valves, NRV and fittings.	25mm - 1” (NPT Female)
Dosing Pot	316 Stainless Steel
AAV (Automatic air vent)	316 Stainless Steel

APPROVALS	
Compliance	ASME BPVC Section VIII Div. 1 (U-Stamp)
BSRIA Approval	Engineered inline with BSRIA BG29 and BG50 Guidance for Chemical Dosing, Magnetic Filtration, Fine Filtration, Passive Deaeration and Side Stream Filtration.
Peer Reviewed	For Energy Saving Benefits at CIBSE/ASHRAE Technical Symposium 2023.

Product Markings

Magnet Warning

Product Brand

Electrical Warning

Regulatory Standard

The X-POT XP+ side stream filtration and dosing unit adheres to the ASME Boiler and Pressure Vessel Code (BPVC) Section VIII, Division 1 (for pressure vessels). This directive ensures that pressure equipment placed in North America markets meet essential safety requirements for design, material selection, manufacturing, and conformity assessment.

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. Manufacturing defects confirmed within the active warranty period will be corrected at no charge.

For terms and conditions, please refer to the sales terms and conditions from VEXO distributor.
The warranty is conditional upon the following clauses:

1.1 *The equipment must be commissioned by a trained, competent technician or qualified person, who can verify the integrity of the equipment at that time. The qualified person must confirm in writing that the equipment is undamaged as a result of transportation and installation and is fit to begin the warranty period.*

1.2 *A trained, competent technician or qualified person must test the equipment annually.*

1.3 *This warranty covers the equipment against manufacturing defects. Normal wear and tear is not covered by this agreement and should form part of a separate service agreement.*

1.4 *The equipment must be stored, installed, and operated in a frost-free and dry area. Damage resulting from exposure to adverse temperatures or other adverse environmental conditions will not be covered by this agreement.*

1.5 *Any and all non-warranty service visits and non-warranty inspection visits are chargeable and are not covered by this warranty.*

Any service costs are applicable if a defect or problem manifests as a direct result of the connected system, misuse, incorrect handling, incorrect installation, or incorrect commissioning of the unit. Confirmed manufacturing defects will be addressed as per the above. Additional remedial works due to the misuse, incorrect handling, incorrect installation, or incorrect commissioning of the unit remain chargeable.

Section 3: Installation Procedure

Unpacking and Storage

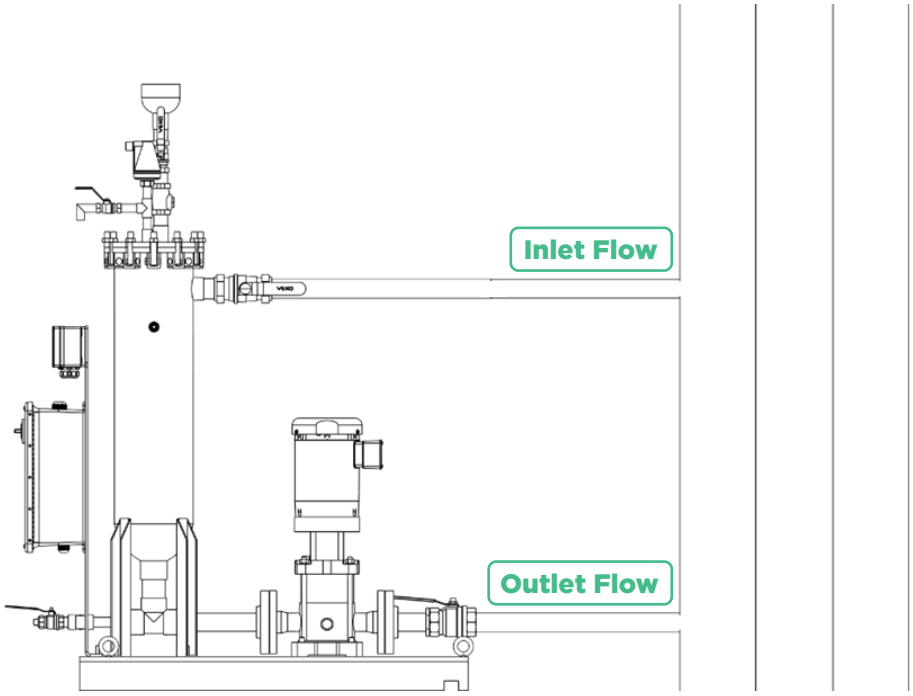
The following points should be observed during unpacking:

- Check the delivery immediately upon receipt for completeness and transport damage.
- Carefully unpack the unit.
- In the event of transportation damage, immediately notify your reseller or distributor.
- Do not use damaged components.
- Responsibly dispose of packaging supplied with the X-POT.

Siting and Mounting:

- **Location:** Install in a dry, secure, indoor location. The unit must be protected from freezing (> 34°F).
- **Floor Requirements:** The surface must be level, rigid, and non-combustible.
- **Anchoring:** Secure the unit to the floor using M8 (or 5/16") anchor bolts. Torque to 18.5 ft-lb (25Nm).
- **Clearance:** Ensure at least 24" of vertical clearance above the unit to allow for the removal of the magnet grate and filter bags.

Pipework Connection



The X-POT XP+ should be piped in a side-stream configuration, typically across the main system pipe section away from any main system pumps.

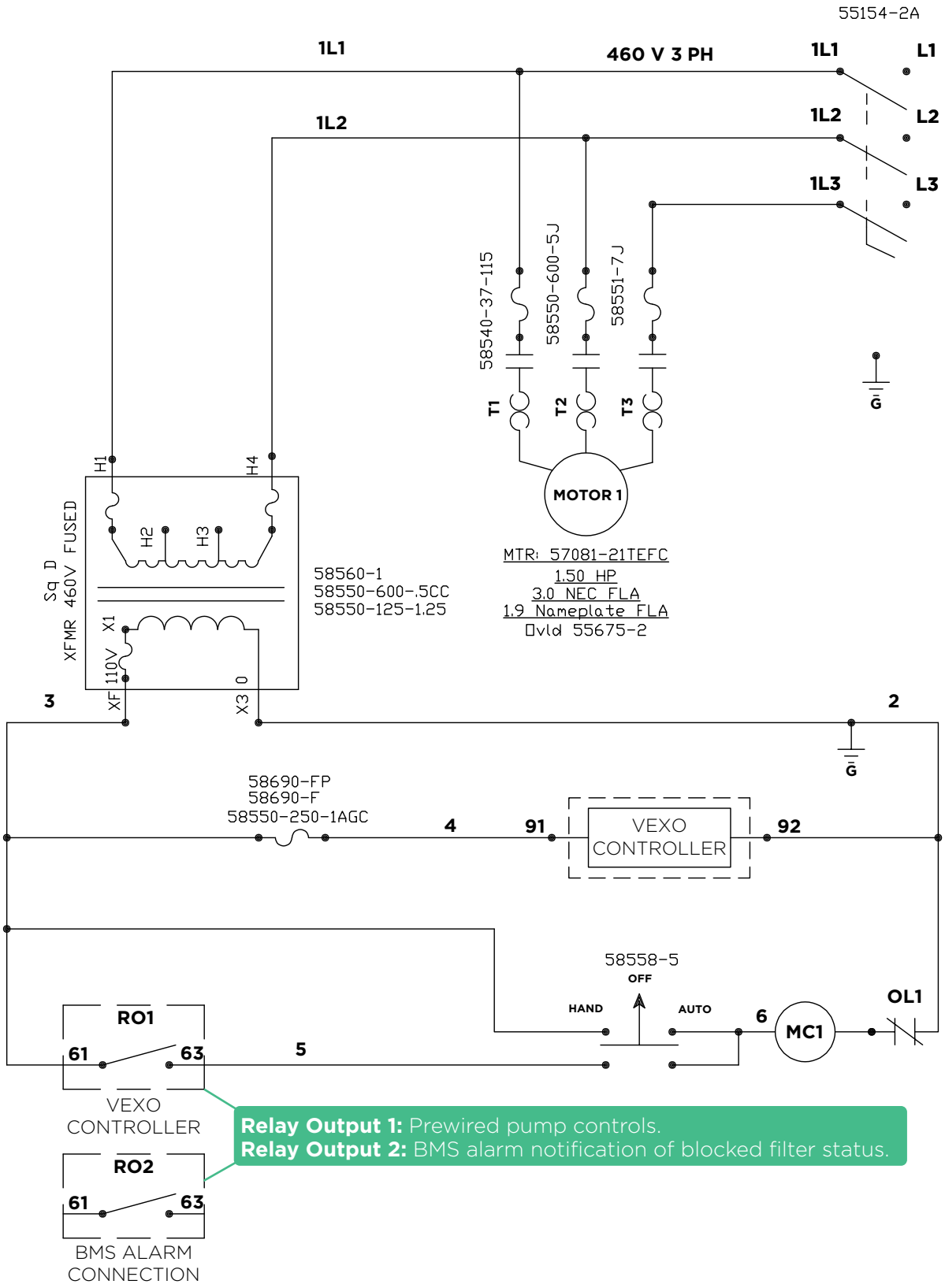
- **Supply/Return:** The supply should ideally be taken from the bottom of the main system header to capture heavy solids.
- **Drain:** Extend the 1/2" drain line to a local floor drain using an indirect connection (air gap) to prevent backflow.
- **Max Run:** Keep piping runs between the system and the unit under 33 ft (10m) for optimal performance.

The equipment must be sited:

- In a frost-free area (> 33.8°F) and must also be protected from adverse environmental conditions
- In a well-lit area to allow for safe changing of the filter media and chemical dosing
- On a flat, vertical, level, solid wall with clear access to the VEXO™ X-POT XP+ vessel.

Electrical and Signaling Connections

Electrical Schematic



Relay Output 1: Prewired pump controls.
Relay Output 2: BMS alarm notification of blocked filter status.

Section 4: Installation Procedure

Pre-Commissioning Checks

1. Physical & Mechanical Installation

Before any water enters the unit, verify the structural integrity of the setup.

- **Orientation & Level:** Confirm the unit is mounted and securely fixed to the floor.
- **Clearance:** Ensure there is sufficient "headroom" above the unit to remove the magnet grate and change the bag filters.
- **Connections:** Check that all threaded or flanged connections are tight.
  - **Note:** Ensure the flow direction matches the arrows on the unit (Inlet to the side/bottom, Outlet from the top/side depending on the specific model layout).
- **Isolation Valves:** Verify that the primary system isolation valves (Inlet and Outlet) are present and currently in the Closed position.

2. Internal Components Check

Open the vessel to ensure the internals are seated correctly.

- **Magnet Grate:** Ensure the rare-earth magnetic rods are clean and fully inserted into their cases.
- **Filter Media:** Check that the correct micron-rated bag is properly seated in the basket.
- **O-Rings & Seals:** Inspect the main lid O-ring for any grit or nicks. Apply a light coating of WRAS-approved silicone grease if necessary to ensure a watertight seal.

3. Venting & Drainage Setup

The XP+ handles air and sludge, so the escape routes must be ready.

- **Manual/Auto Air Vent:** Ensure the air vent on the lid is clear. If it's an automatic vent, ensure the small cap is loosened by a half-turn.
- **Drain Valve:** Confirm the drain valve at the base of the unit is closed and, if required by local code requirements, piped to a suitable foul drain or tundish.
- **Tundish/Discharge:** If a discharge pipe is fitted, ensure it has a visible air gap if required for backflow prevention.

Start-Up Procedure

1. Hydraulic Filling & Manual Venting

Important: Do not turn on the power until the unit is hydraulically full. Running the pump dry can damage the mechanical seals.

1. **Isolate the Unit:** Ensure the Inlet and Outlet valves to the main system pipework are Closed.
2. **Open the Lid Vent:** Open the manual air vent on top of the X-POT lid.
3. **Slow Fill:** Slowly open the Inlet Valve (the side or bottom port). Allow the unit to fill gradually.
4. **Vent Air:** Keep the vent open until a steady stream of water (no bubbles) exits the vent.
5. **Close Vent & Open Outlet:** Close the manual vent and slowly open the Outlet Valve. The unit is now hydraulically "online" but under passive flow.

2. Electrical Power-Up

Ensure all wiring to the VEXO panel and the pump conforms to local regulations before turning on the switch.

1. **Pre-Power Check:** Verify that the pump cable and sensor cables (pressure/temperature) are securely connected to the VEXO controller terminals as the wiring diagram.
2. **Mains Power On:** Switch on the isolator for the electrical panel via the top right hand disconnect switch.
3. **VEXO Initializing:** The VEXO controller will undergo a boot sequence.
    - **Check Display:** Ensure the screen lights up and shows the home dashboard.

3. Pump Commissioning

The XP+ typically uses a high-efficiency circulator.

1. **Manual Pump Venting:** If the pump has a central bleed screw, loosen it slightly to ensure no air is trapped in the impeller housing, then re-tighten.
2. **Start the Pump:** Via the VEXO control panel, set the pump to 'Manual' or 'Hand'.
3. **Set Mode:** Once satisfied with the flow, switch the VEXO controller to its intended operating mode (e.g., 'Auto').

4. Setting the Differential Pressure Alarm

The VEXO Controller monitors the pressure drop across the filter bag to alert the user when the bag is full of debris and requires changing.

1. Determine the Alarm Setpoint

Before programming the controller, you must identify the correct limit for your specific installation (based on flow rate and filter micron rating).

Action: Visit the VEXO Online Calculator to generate your site-specific differential setpoint.

Note: Exceeding the calculated setpoint may reduce system flow or risk damaging the filter media.

2. Navigating the VEXO Controller Menu

Follow these steps to input the values into the controller:

1. **Access Configuration:** From the home screen, press OK to enter the Configuration menu.
2. **Select Measuring Point:** Scroll to 'Measuring Point 3' (this represents the calculated differential pressure). Press OK.
3. **Enter Outputs:** In the sub-menu, scroll to and select 'Outputs'.
4. **Select Relay:** Choose 'Relay 1'. This relay is responsible for controlling the pump/alarm logic based on your pressure setpoint.
5. **Adjust Switching Points:** Select 'Switching Points' to view the current thresholds.
6. **Switching Off Point:** This is your Calculated Differential Setpoint. This is the pressure at which the unit will trigger a "Filter Change Required" status.
7. **Switching On Point:** This is the "Reset" value, typically defaulted to 2 PSI. This ensures the alarm clears once a clean bag is installed and pressure drops.
8. **Edit & Save:** Press OK on the value you wish to change. Use the directional keys to adjust the number, then press OK again to Save the input.
9. **Exit:** Press the ESC button repeatedly to back out of the menus until you return to the main dashboard.

Section 5: Operation & Maintenance

Normal Operation

The side stream filtration unit is designed to continuously filter a portion of the total circulating water volume. During normal operation, the unit should function automatically with minimal intervention apart from filter replacements.

Routine Maintenance

Filter elements must be replaced when the Differential Pressure (Delta P) reaches the manufacturer's blocked filter setpoint or as part of a scheduled preventative maintenance cycle.

Chemical Dosing via X-POT

This procedure outlines how to safely introduce chemical additives (such as inhibitors or biocides) using the X-POT vessel while the unit is isolated from the main system flow.

1. System Isolation & Power

- **Switch to OFF:** Turn the control selector to the OFF position. This stops the integrated pump and closes any automated valves (if equipped).
- **Manual Isolation:** Close the Inlet and Outlet isolation valves to the X-POT unit to ensure no system pressure remains in the vessel.

2. Draining and Preparation

- **Venting:** Slowly open the Air Vent (usually located on the top of the lid) to release any residual internal pressure.
- **Drain Down:** Open the Drain Valve at the base of the unit. Drain enough water to accommodate the volume of chemical additive being introduced.
  - **Tip:** You do not always need to drain the entire unit—only enough to make "headroom" for the dose.
- **Close Drain:** Once the required volume is drained, close the drain valve.

3. Adding Chemical Additive

- **Open the Vessel:** Unscrew the top lid/clamp assembly.
- **Inspection:** Quickly check the internal bag filter. If it is heavily fouled, this is the ideal time to replace it (see Routine Maintenance section).
- **Dosing:** Pour the chemical additive directly into the X-POT vessel.
  - **Warning:** Always wear appropriate PPE (Gloves/Goggles) as concentrated chemicals can splash during manual pouring.
- **Reseal:** Replace the lid and hand-tighten the clamps/bolts securely.

4. Venting and Re-Introduction

To avoid air-locking the pump or introducing air pockets into the main system, follow this specific sequence:

STEP	ACTION	PURPOSE
1	**Open Inlet Valve**	Allow system water to slowly enter and mix with the chemical.
2	**Vent Air**	Keep the top **Air Vent** open until a steady stream of water appears.
3	**Close Vent**	Seal the unit once all air is purged.
4	**Open Outlet Valve**	Re-establish the flow path to the main system.
5	**Switch to ON/AUTO**	Activate the integrated pump to circulate the “shot” dose into the loop.

Troubleshooting

ISSUE	POTENTIAL CAUSE	RECOMMENDED ACTION
High Differential Pressure	Heavily fouled filter or magnetic rod.	Switch to **OFF**, isolate the unit, and clean the magnetic rod or replace the filter element.
Low or No Flow	Air lock in the pump or vessel.	Perform the **Air Purge** procedure: crack the air vent while the inlet is open until water flows steadily.
Pump Not Starting	No power or tripped breaker.	Check the control panel for power lights and reset the internal circuit breaker if necessary.
Noisy Operation	Cavitation or debris in pump.	Check that the suction (Inlet) valve is fully open and the filter is not completely blocked.
Leaking from Lid	Damaged O-ring or loose bolts.	Isolate and depressurize. Inspect the lid O-ring for nicks or debris; replace if compressed or cracked.
System Pressure Drop	Internal bypass or drain leak.	Ensure the manual drain valve is fully closed and the vent is tight.