

Floccell XFM20 Modular Filtration System

INSTALLATION & OPERATING MANUAL

TERMS & CONDITIONS



PLEASE READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLATION
AND COMMISSIONING



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1. Introduction

The Flocell XFM20 is a semi-automated, modular filtration unit designed for high-efficiency water treatment with low hydraulic loss and minimal operating costs. Engineered to handle 20 litres per second (72 m³/h), this advanced system delivers high-performance filtration across a broad range of applications.

As a self-contained and modular unit, the Flocell XFM20 is capable of operating in both gravity-fed and pump-fed configurations. It features four 1200mm diameter filter housings, providing a total filtration bed surface area of 4.52 m², ensuring the effective removal of suspended solids and fine particulates.

The Flocell XFM20 is equipped with a series of connections to enhance installation flexibility:

- One set of connections is located on the rear side of the unit.
- Another set of connections is on the right side when viewing the unit from the side access doors.

These connections allow for ease of integration into various site configurations, ensuring that the unit can be connected efficiently and conveniently based on site-specific requirements.

The sludge outlet on the rear side is pumped out using an integrated sludge pump.

The sludge outlet on the right side allows sludge to flow out under gravity where applicable.

Additionally, these connections provide the flexibility to link multiple Flocell XFM20 units in series or parallel configurations, allowing for scalability and customised system designs to meet specific treatment demands.

The semi-automated operation requires minimal user input via manual push-button controls. Once activated, key functions—such as the blower and sludge pump—operate for preset durations, ensuring a consistent and efficient cleaning cycle. The system incorporates air sparging technology to clean the filtration media, significantly reducing water and energy consumption while maintaining peak filtration efficiency.

Designed for a maximum operating pressure of 2 bar, the Flocell XFM20 is ideal for industrial, municipal, and commercial water treatment applications. The integrated sludge management system effectively removes accumulated solids, while frost protection and ventilation systems enhance reliability across various environmental conditions.

The 20ft modular filtration unit is designed for rapid deployment and ease of installation. It features full side access with double-fold doors, in addition to standard shipping container doors, ensuring convenient maintenance and operation.

As a plug-and-play solution, the Flocell XFM20 combines efficient filtration, user-friendly semi-automated controls, and modular adaptability, making it a cost-effective and reliable choice for modern water treatment systems.

2. Health and Safety

a. General Safety Precautions

The Flocell XFM20 is a containerised filtration unit designed for safe and efficient operation. Proper handling, operation, and maintenance are essential to ensure user safety and system longevity. Operators must follow all safety guidelines to prevent injury, equipment damage, or environmental hazards.

b. Personal Protective Equipment (PPE)

Operators and maintenance personnel must wear appropriate Personal Protective Equipment while handling, operating, or maintaining the system, including:

- Safety gloves – to protect against sharp edges, contaminants, and potential chemical exposure.
- Protective eyewear – to prevent debris or accidental splashes from entering the eyes.
- Steel-toe boots – to protect against heavy equipment hazards.
- High-visibility clothing – when working in industrial or construction environments.
- Hearing protection – if working near operating blowers or pumps for extended periods.

c. Electrical Safety

- The unit requires a three-phase power supply, and all electrical connections must be installed and maintained by a qualified electrician.
- Before performing any maintenance, disconnect power at the main switch and ensure the system is electrically isolated.
- Do not operate the system if electrical components appear damaged, loose, or wet.
- Ensure cables and connections are kept secure and free from physical damage.

d. Container Access and Door Safety

- The Flocell XFM20 is equipped with full side access double-fold doors, allowing for easy operation and maintenance.
- The unit also features standard shipping container doors for additional access.
- Before operating the system, ensure all doors are fully opened and secured in place using the provided door stay latches.
- Ensure doors are latched securely to prevent accidental movement or sudden closure due to wind or external forces.
- Do not operate the unit if doors are partially open or unsecured, as this may pose a risk of injury.

e. Handling and Lifting

- The Flocell XFM20 must be installed on a flat, stable surface to prevent structural strain and misalignment of pipework.
- Use appropriate lifting equipment and mechanical assistance when moving heavy components.
- Ensure all lifting points and securing mechanisms are in good condition before moving or repositioning the unit.

f. **Operational Safety**

- Only trained personnel should operate the semi-automated controls to prevent improper use.
- During cleaning cycles, ensure all valves are set correctly before activating the blower or sludge pump.
- Do not override or bypass preset cleaning cycle durations, as this may impact system performance.
- The filter media is sealed inside the filter bodies and does not require user inspection.

g. **Water Handling and Hygiene**

- Operators may be exposed to contaminated or chemically treated water, requiring hygiene precautions to avoid potential health risks.
- Ensure hands are thoroughly washed after handling system components, particularly after sludge removal.
- Use proper disposal methods for filtered solids and sludge in compliance with local environmental regulations.

h. **Emergency Procedures**

- In the event of an electrical fault, immediately shut down the system and isolate the power supply.
- If a leak or spill occurs, contain the affected area and address the issue promptly.
- In case of fire, evacuate personnel and use appropriate fire extinguishing equipment (do not use water on electrical fires).
- If an operator experiences injury or contamination exposure, seek immediate medical attention.

i. **Routine Safety Checks**

- Perform regular inspections of pumps, valves, air blower, and control panel to detect potential issues before failure occurs.
- Ensure that all side access doors are secured in place before operation.
- Keep the work area clean and dry to prevent slips, trips, and falls.
- Ensure all emergency shut-off switches are accessible and functional.
- Follow the manufacturer's maintenance schedule to maintain optimal system performance and safety.

By following these safety guidelines, operators can ensure the safe and efficient operation of the Flocell XFM20 while minimising risks to personnel and the surrounding environment.

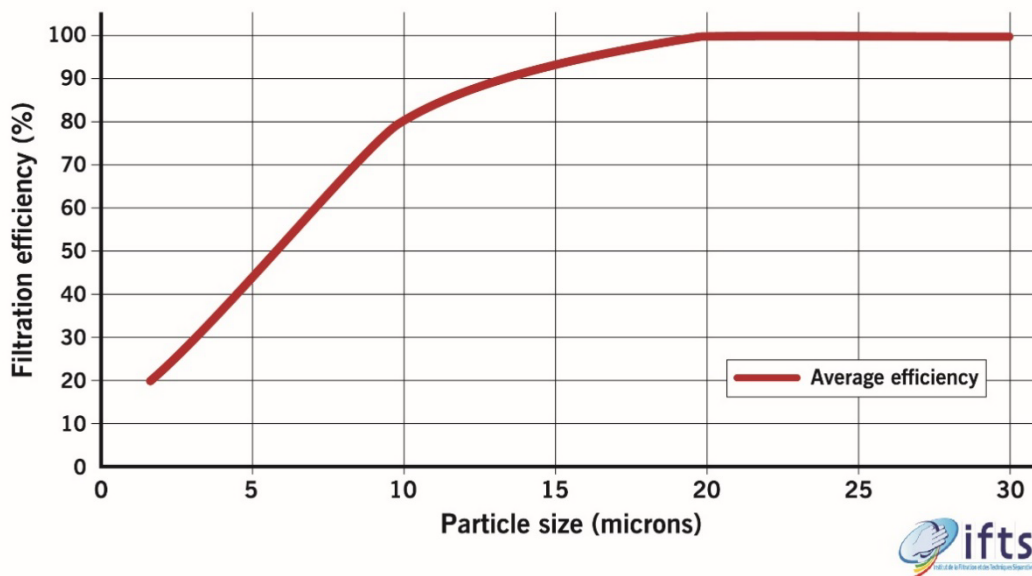
2. Specification Details

Parameter	Specification
Unit Type	Modular Filtration Unit
Unit Size	20ft High Cube Modular System
Flow Rate	20 litres per second (72 m ³ /h)
Maximum Operating Pressure	2 bar
Filtration System	Four 1200mm Diameter Filter Bodies
Total Filtration Surface Area	4.52 m ² (1.13 m ² per filter)
Cleaning Method	Air Sparging with Semi-Automated Controls
Control System	Semi-Automated
Power Supply	3-Phase, 32A, 400V
Feed Pump Supply	3-Phase 415V, 50Hz, 16A 4-Pin Plug, 5.5 kW Max
Float Switch Supply	Single Phase, 16A 2-Pin Plug, 0-24V DC
Sludge Pump	3-Phase, 1.5 kW, 20 L/s
Air Blower	4.6 kW, 8.6A, 190 m ³ /hr (2BH1610-1HQ37)
Ventilation Fan	Axial Fan, IP54, Single Phase
Frost Protection	0.5 kW Tubular Heater, IP66
Lighting	Single LED, 240V
Inlet Connection	4" PN16 Flange with Bauer Adapter (One Connection Side Only)
Outlet Connection	4" PN16 Flange with Bauer Adapter (One Connection Side Only)
Sludge Outlet	4" PN16 Flange with Bauer Adapter (One Connection Side Only)
Return Outlet	4" PN16 Flange with Bauer Adapter (One Connection Side Only)
Dry Weight	5750 kg
Operating Weight	11,700 kg
Footprint	14.88 m ²

3. Media

Flocell XFM filters use a proprietary open-cell media that has been optimised for fine particle mechanical filtration.

The table above shows expected performance as a function of the particles present, this can be used for mass balance calculations with the appropriate gravimetric test results to optimise cleaning frequency.



4. Recommended Installation Setup

The Flocell XFM20 is designed for ease of installation, requiring minimal on-site assembly. To ensure optimal performance and longevity, the following installation setup is recommended:

a. Site Preparation

- The unit must be placed on a flat, stable surface capable of supporting the full operating weight (11,700 kg).
- A reinforced concrete base is recommended, with a minimum footprint of 6.1m x 2.44m to accommodate the containerised unit.
- The installation site should have adequate drainage to prevent water accumulation around the unit.

b. Positioning and Transport Lock Removal

- The filter bodies inside the unit have been pre-fitted with turnbuckle hooks, which must be removed before starting the filter.
- These hooks are used to secure the filter bodies during transport and must only be removed once the container is placed and installed at the desired location.
- If the unit needs to be relocated in the future, the turnbuckle hooks must be refitted before transportation to prevent movement of the filter bodies inside the container.

c. Pipework Connections

Ensure all inlet, outlet, sludge outlet, head of works, and vent connections are properly installed:

- Inlet: Connects to the raw water supply, either from a pump-fed or gravity-fed source.
- Outlet: Connects to the treated water discharge point.
- Sludge Outlet (Rear Side): Pumped out using an integrated sludge pump.
- Sludge Outlet (Right Side): Flows out under gravity, allowing for natural sludge removal where applicable.
- Head of Works Outlet: This connection bypasses the water back to the head of works to maintain flow control and system efficiency.
- Vent Line: Must be opened whenever the blower is in operation to allow proper air circulation and prevent pressure build-up inside the filter bodies.

The Flocell XFM20 comes with a series of connections on the rear and right side, designed for installation flexibility. These connections can also be used to link multiple units in series or parallel configurations, allowing for scalability and customised system layouts.

All connections are 4" PN16 flanges, with Bauer adapters provided on one side only, ensuring a secure and leak-free installation.

d. Feed Pump Supply and Power Requirements (Including Float Switch and Terminal Looping)

The Flocell XFM20 control panel is designed to supply power to the feed pump, ensuring compatibility with the system's electrical configuration. Below are the specifications and requirements for the feed pump power supply and float switch functionality.

i. Feed Pump Power Supply Details

- The customer must supply the feed pump as per site-specific needs.
- Flocell recommends using a non-impeller pump, such as a progressive cavity pump or peristaltic pump, to prevent breaking down solid particles into smaller pieces, which could reduce filtration efficiency.

- The power supply for the feed pump is three-phase (3Ph, 415V, 50Hz) and is provided from the container, ensuring seamless integration with the control system.
- The feed pump connection uses a 16A, 4-Pin Plug, allowing for direct connection to the pre-wired socket on the control panel.
- The control panel supports a maximum feed pump power rating of 5.5 kW.
- The feed pump power cable should be connected to the pre-wired socket on the control panel for proper operation.

ii. Pump Float Switch Functionality

The float switch acts as a safety device to ensure that the feed pump only runs when there is sufficient water in the system. It prevents dry running, which could cause pump overheating and damage.

iii. How the Float Switch Works:

- When the water level is sufficient, the float switch closes the circuit, allowing the feed pump to operate.
- If the water level drops, the circuit opens, stopping the pump to prevent dry running.

iv. Bypassing the Float Switch (When Not Required)

In situations where the float switch is not needed, the control panel requires the float switch terminals to be looped for the pump to function.

Process for Looping the Float Switch Terminals:

- Identify the float switch terminals inside the control panel.
- Locate Terminals 45 and 1 (dedicated to the float switch connection) (see Pg. 26).
- Insert a jumper wire between Terminals 45 and 1 to create a closed circuit.
- Secure the jumper connection and use a multimeter to check continuity.
- Restart the control system and verify that the feed pump operates without the float switch.

For detailed wiring instructions, see the control panel wiring diagram in the schematics in the appendices.

Summary of Feed Pump Electrical Specifications

Parameter	Specification
Power Supply	3-Phase, 415V, 50Hz
Max Pump Rating	5.5 kW
Float Switch Terminals	45 and 1
Looping Required When No Float Switch?	Yes (connect 45 and 1 with a jumper wire)
Pre-Wired Socket?	Yes

e. Power Supply

- The unit requires a three-phase, 32A, 400V electrical supply.
- The control panel is pre-wired with a 5-pin 32A appliance inlet socket for a plug-and-play setup.
- A qualified electrician should perform the final electrical connection to ensure compliance with local safety regulations.

f. Door Setup and Access

- The full side access double-fold doors must be fully opened and secured using the provided door stay latches before starting the system.

- The unit also includes standard shipping container doors for additional access.
- Ensure the doors remain latched securely during operation to prevent accidental closure due to wind or external forces.

g. **Commissioning and Start-Up**

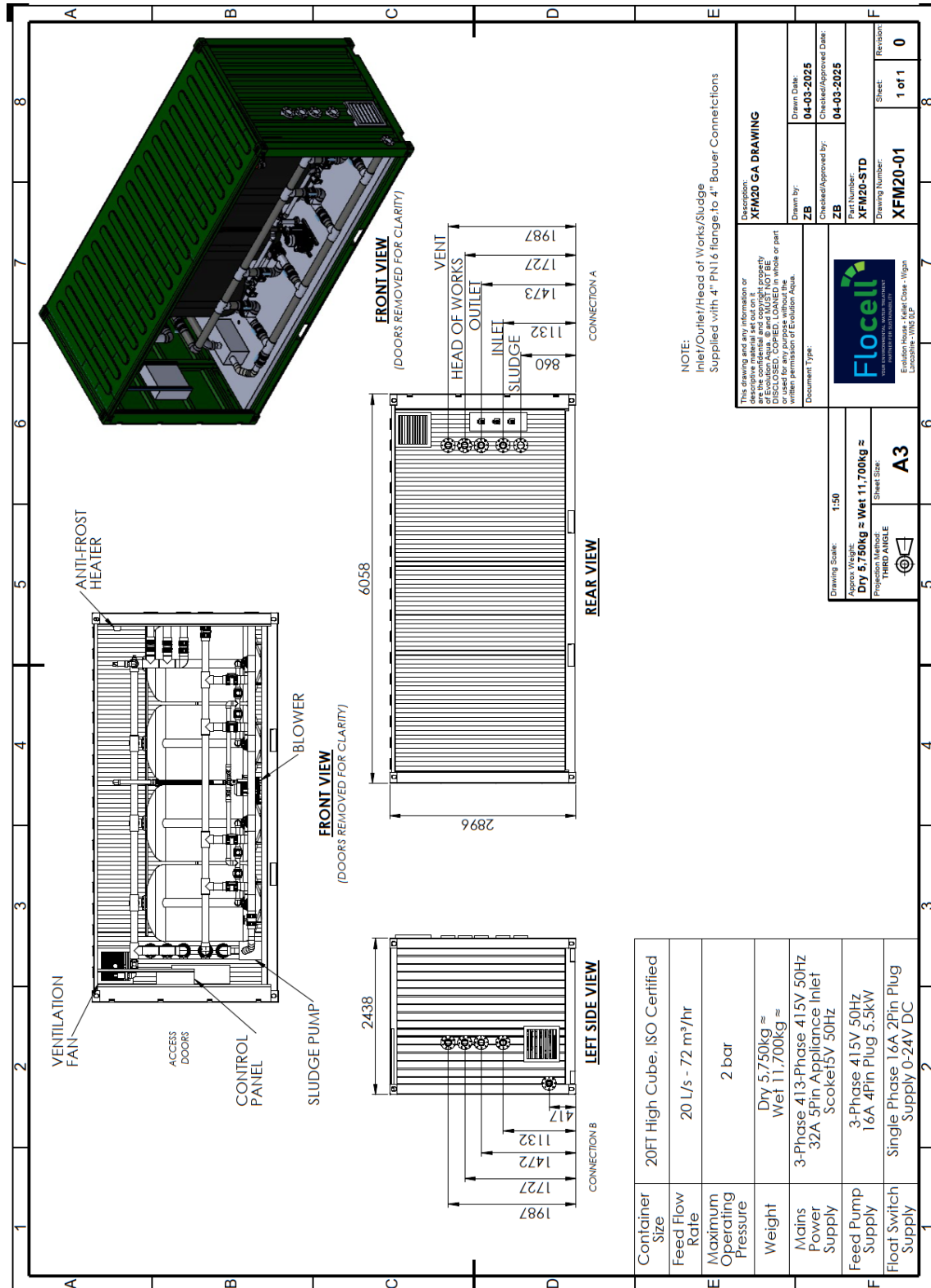
- Before starting the system, double-check all connections and remove transport locks (turnbuckle hooks).
- Power on the control panel and test each component (feed pump, sludge pump, air blower) by activating them individually.
- Ensure the vent line is open when the blower is in operation to allow proper airflow and prevent pressure buildup.
- Initiate a manual cleaning cycle to ensure the system is functioning correctly before beginning filtration operations.

h. **Ongoing Maintenance and Future Relocation**

- If the unit needs to be relocated, turnbuckle hooks must be refitted before transportation to secure the filter bodies.
- Regularly inspect pipe connections, control panel function, and system integrity to maintain optimal performance.

By following this recommended installation setup, the Flocell XFM20 will operate efficiently and safely, ensuring reliable filtration performance while minimising the risk of operational issues.

5. General Arrangement Drawing



6. Operational design



Flocell XFM filters are not designed to filter gross solids, and it is paramount that a pre-filter screen is present in any situation where this may occur.



The Flocell XFM20 is designed for safe and efficient operation, ensuring long-term reliability while minimising maintenance requirements. Operators must adhere to the following operational guidelines to maintain optimal performance and prevent damage to the system.

1. Power Isolation and Maintenance Safety

- Before performing any maintenance on the filter or valves, ensure that the feed pump (if installed) is switched off and the filter is fully depressurised.
- For additional safety, disconnect the feed pump and any electrical installations from the power supply before servicing the unit.
- Never attempt to perform maintenance while the system is in operation.

2. Pressure Limitation and Water Supply

- The Flocell XFM20 must not be directly connected to a pressurised water supply.
- Mains water pressure may exceed the maximum operating pressure of 2 bar, which could damage the system.
- If a pressurised supply is used, an appropriate pressure-reducing valve must be installed to prevent overloading the filter.
- The vent line must be opened during blower operation to allow proper airflow and prevent pressure buildup.

3. Sealing Components and Connection Integrity

- The filter connections are sealed using O-rings, ensuring a secure and leak-free fit.
- Do not overtighten nuts or bolts, as excessive force may damage the seals and plastic components, leading to leaks or operational issues.
- Always ensure that all pipe connections are correctly aligned and fitted before operation.
- Regularly inspect seals and connection points for signs of wear or leakage.

4. Chemical Exposure and Material Protection

- Do not use solvents or harsh chemicals to clean plastic components of the system.
- Certain chemicals may degrade or weaken the material, leading to potential failures or leaks.
- Use only mild detergents or water when cleaning external surfaces.
- Ensure that chemical dosing within the treatment process is compatible with the system materials to prevent degradation.

5. Safety and Unauthorised Access

- The Flocell XFM20 contains moving components, electrical connections, and pressurised water lines—it should be kept out of reach of children to prevent accidental operation or injury.
- Ensure that side access doors are securely closed when the unit is not in use to prevent unauthorised access.
- Only trained personnel should operate and perform maintenance on the system.

6. Cold Weather Protection

- If the unit is installed in an area subject to freezing temperatures, appropriate frost protection measures must be in place.
- Ice expansion can cause structural damage to pipes, filter bodies, and internal components.
- The Floccell XFM20 is fitted with a 0.5 kW tubular heater for frost protection, but additional insulation or heating may be required in extreme conditions.
- In cold climates, check for ice formation inside pipes and valves before operation.

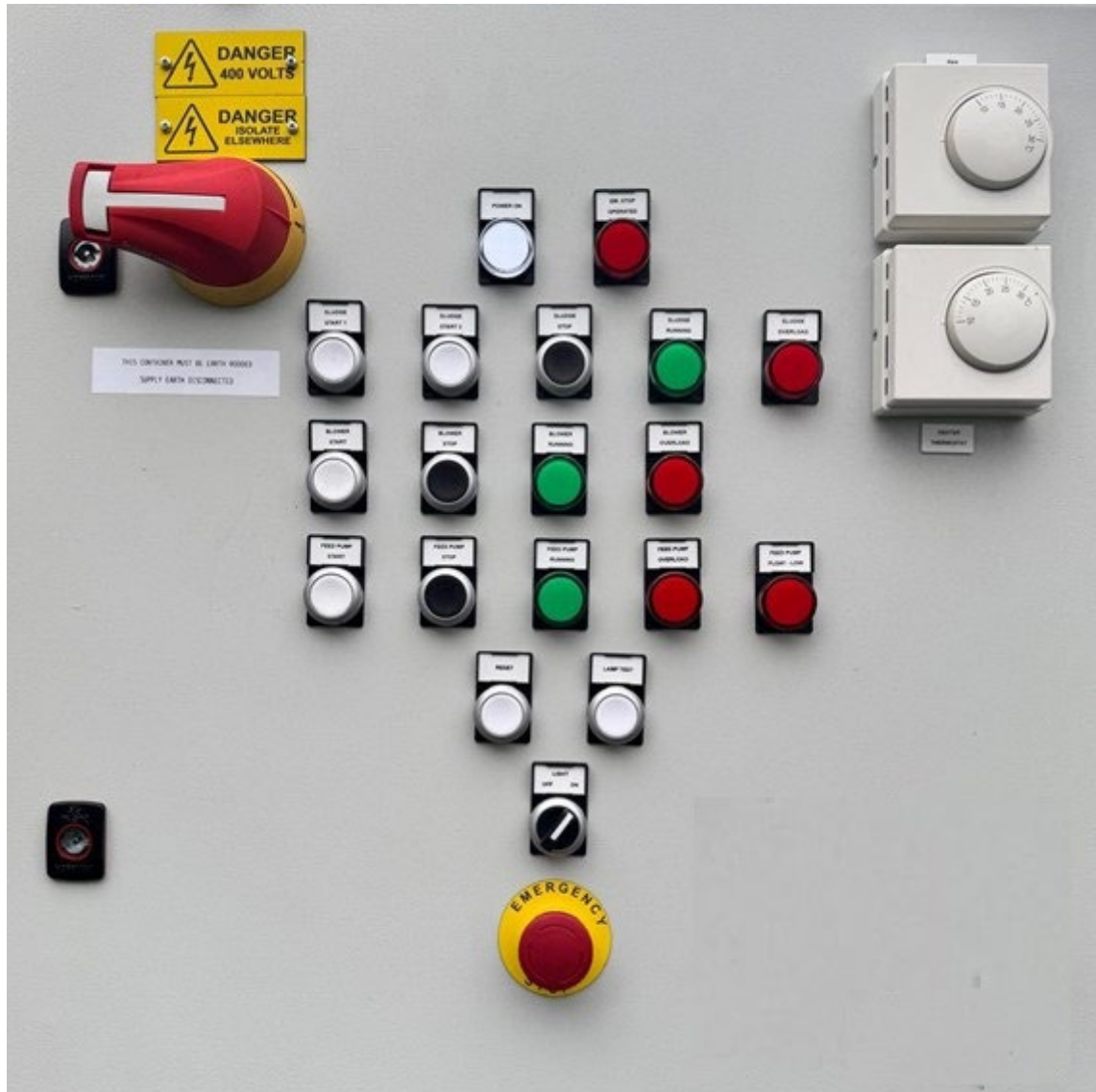
7. Installation Environment and Positioning

- The Floccell XFM20 must be installed in a well-ventilated area with proper drainage to prevent water accumulation.
- The unit should be positioned as close as possible to the water source and below the water level to minimise airlocks and vacuum formation.
- The vent line must be opened during blower operation to allow proper airflow and prevent pressure buildup.

By following these operational guidelines, the Floccell XFM20 will provide efficient and safe filtration performance, ensuring long-term durability and reliability.

7. Operational Details

a. Control Panel Operational Functionality



Control Panel Component	Function
Main Power Isolator (Red Rotary Switch)	Turns the entire control panel ON/OFF . Must be locked off during maintenance.
Power ON Button (White)	Indicates that the control panel is powered.
Emergency Stop (Yellow/Red Button)	Immediately shuts down all operations in case of an emergency.
Sludge Start 1 (White Button)	Starts the first stage of the sludge removal process, creating headspace.
Sludge Start 2 (White Button)	Starts the final stage of sludge removal, emptying the filter.
Sludge Running (Green Indicator)	Illuminates when the sludge pump is active .
Sludge Overload (Red Indicator)	Indicates an overload or fault in the sludge pump .
Blower Start (White Button)	Activates the air blower for the cleaning cycle.
Blower Running (Green Indicator)	Illuminates when the blower is operational .
Blower Overload (Red Indicator)	Indicates an overload or fault in the blower system .
Feed Pump Start (White Button)	Starts the feed pump , supplying raw water to the filter.
Feed Pump Running (Green Indicator)	Illuminates when the feed pump is operating .
Feed Pump Flashlight (Red Indicator)	Alerts when the feed pump encounters a fault .
Reset Button (White Button)	Resets any fault conditions in the system.
Light Test Button (White Button)	Tests all indicator lights on the control panel.
Internal Light Switch (Black Knob)	Controls the internal lighting inside the unit.
Thermostat - Ventilation	Regulates fan operation for air circulation.
Thermostat - Frost Protection	Activates heating system to prevent freezing.

b. Telemetry Signals for Customer Connection

The Flocell XFM20 control panel includes dedicated terminals for telemetry integration, allowing customers to monitor and control key system functions remotely. The table below outlines the available telemetry signals and their functions.

Signal Type	Terminal Numbers	Function	Connection Type
Sludge Pump Overload	80 & 81	Indicates an overload condition in the sludge pump	Volt-free relay contact (NO)
Blower Overload	82 & 83	Indicates an overload condition in the blower	Volt-free relay contact (NO)
Feed Pump Overload	84 & 85	Indicates an overload condition in the feed pump	Volt-free relay contact (NO)
Emergency Stop Activated	86 & 87	Signals when the emergency stop button has been pressed	Volt-free relay contact (NO)
Feed Pump Float - Low Level	88 & 89	Indicates a low water level, preventing the feed pump from running dry	Volt-free relay contact (NO)

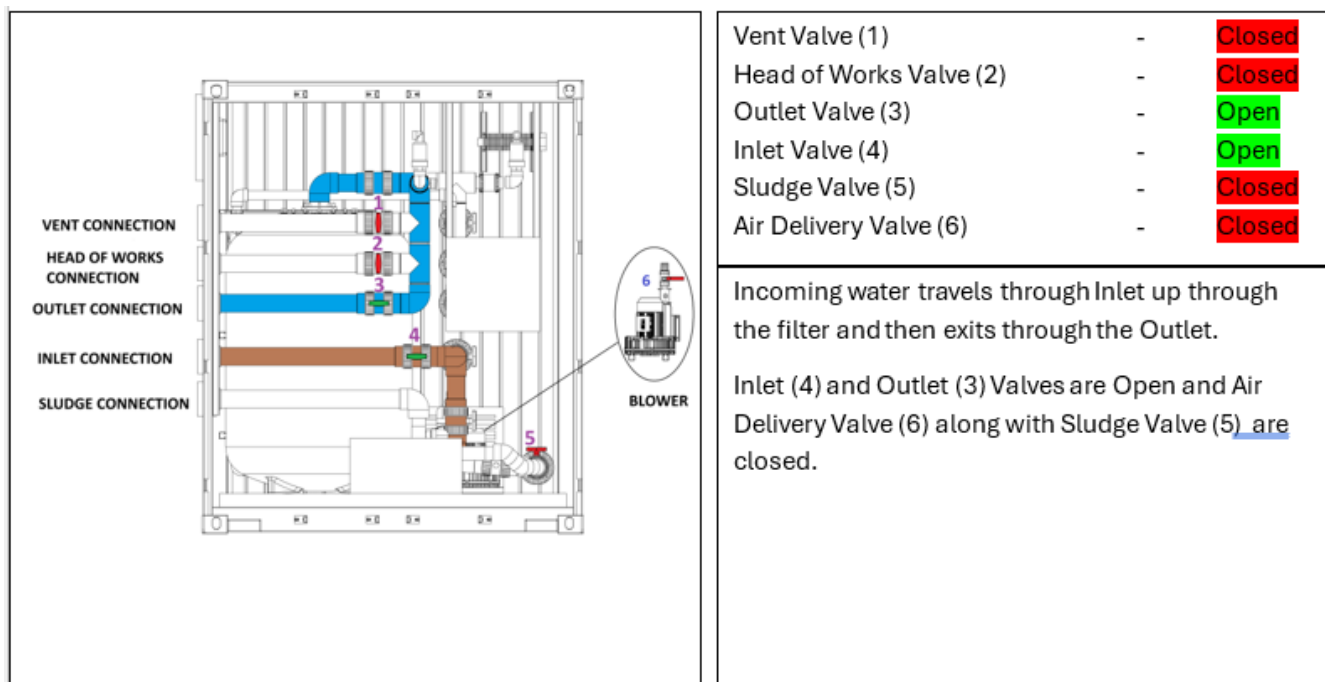
Connection Guidelines:

- All telemetry signals are provided as volt-free relay contacts to allow integration with various SCADA, BMS, or remote monitoring systems.
- NO (Normally Open) contacts close when the signal is active, while NC (Normally Closed) contacts open on a fault condition.
- Customers should ensure that their monitoring equipment is compatible with these signals before connection.
- For terminal locations and wiring details, refer to the control panel wiring diagram in the schematics.


c. XFM20 Operational Functionality

The Flocell XFM20 filtration unit operates in multiple modes to ensure efficient filtration, cleaning, and sludge removal. The unit uses a combination of manual valve adjustments and semi-automated cleaning cycles, controlled via the push-button panel.

I. Filtration Mode



II. Cleaning Mode



Vent Valve (1)	-	Open
Head of Works Valve (2)	-	Closed
Outlet Valve (3)	-	Closed
Inlet Valve (4)	-	Closed
Sludge Valve (5)	-	Closed
Air Delivery Valve (6)	-	Open

Turn Off Feed Pump on Panel.

Isolate the unit by closing (IN ORDER) the Inlet Valve (4), Outlet Valve (3), Head of Works Valve (2).

Open Sludge Valve (5)

On the Control Panel, Activate Sludge Pump Start 1 – This runs for preset time to depressurise filter. Activate Sludge Start 1 – A small volume of water will be removed to alleviate system pressure and create a headspace. After Sludge pump stops, activate Blower Start 2 on control panel and open Air Delivery Valve (6) – the filter will shake as air agitates the media pack.

IMPORTANT – For effective cleaning and proper media movement, the media must be able to circulate freely inside the filter. To ensure this, the VENT line must be OPEN, and the Vent Valve must be OPEN to allow air to escape from the unit.

III. Sludge Removal Mode

Vent Valve (1)	-	Open
Head of Works Valve (2)	-	Closed
Outlet Valve (3)	-	Closed
Inlet Valve (4)	-	Closed
Sludge Valve (5)	-	Open
Air Delivery Valve (6)	-	Closed

Ensure Sludge Delivery Valve (5) is open.

Activate Sludge Pump Start 2, and the filter will be emptied of sludge.

When sludge pump stop running, close Sludge Delivery Valve (5) and Vent Valve (1).

IV. Refill on Head of Works Bypass Mode

Vent Valve (1)	-	Closed
Head of Works Valve (2)	-	Open
Outlet Valve (3)	-	Closed
Inlet Valve (4)	-	Open
Sludge Valve (5)	-	Closed
Air Delivery Valve (6)	-	Closed

Open Head of Works Valve (2) and Inlet Valve (4).

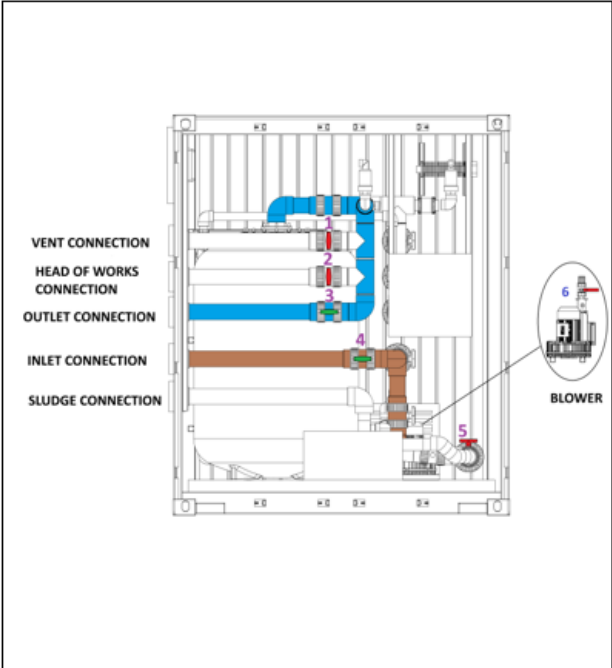
Start Feed Pump on Panel.

Filter will refill with carryover diverted to Head of Works / Sludge line.

Allow carryover to clear (normally around 10 minutes to optimal outlet quality)

NOTE – allow time for filter to fill first.

V. Return to Operating Mode



Vent Valve (1)	-	Closed
Head of Works Valve (2)	-	Open
Outlet Valve (3)	-	Closed
Inlet Valve (4)	-	Open
Sludge Valve (5)	-	Closed
Air Delivery Valve (6)	-	Closed

When carryover has cleared, open Outlet Valve (3) **BEFORE** closing Head of Works valve (2) (to prevent inadvertently pressurising the unit) to return to normal Operating mode.

8. Maximising efficiency / performance

As all installations are different, cleaning frequency will need to be determined in order to limit cleaning when necessary.

In single and parallel installations, it may be optimal to run more than one cleaning cycle to prevent carry-over of dirty water transferred to the top of the filter during air sparging but it is unlikely that more than 2 cleaning cycles will be needed in even the most loaded systems.

It is quite normal for some solids to appear in the outlet immediately after cleaning. This occurs as diluted material becomes trapped during cleaning. It will clear after a few minutes of filtering.

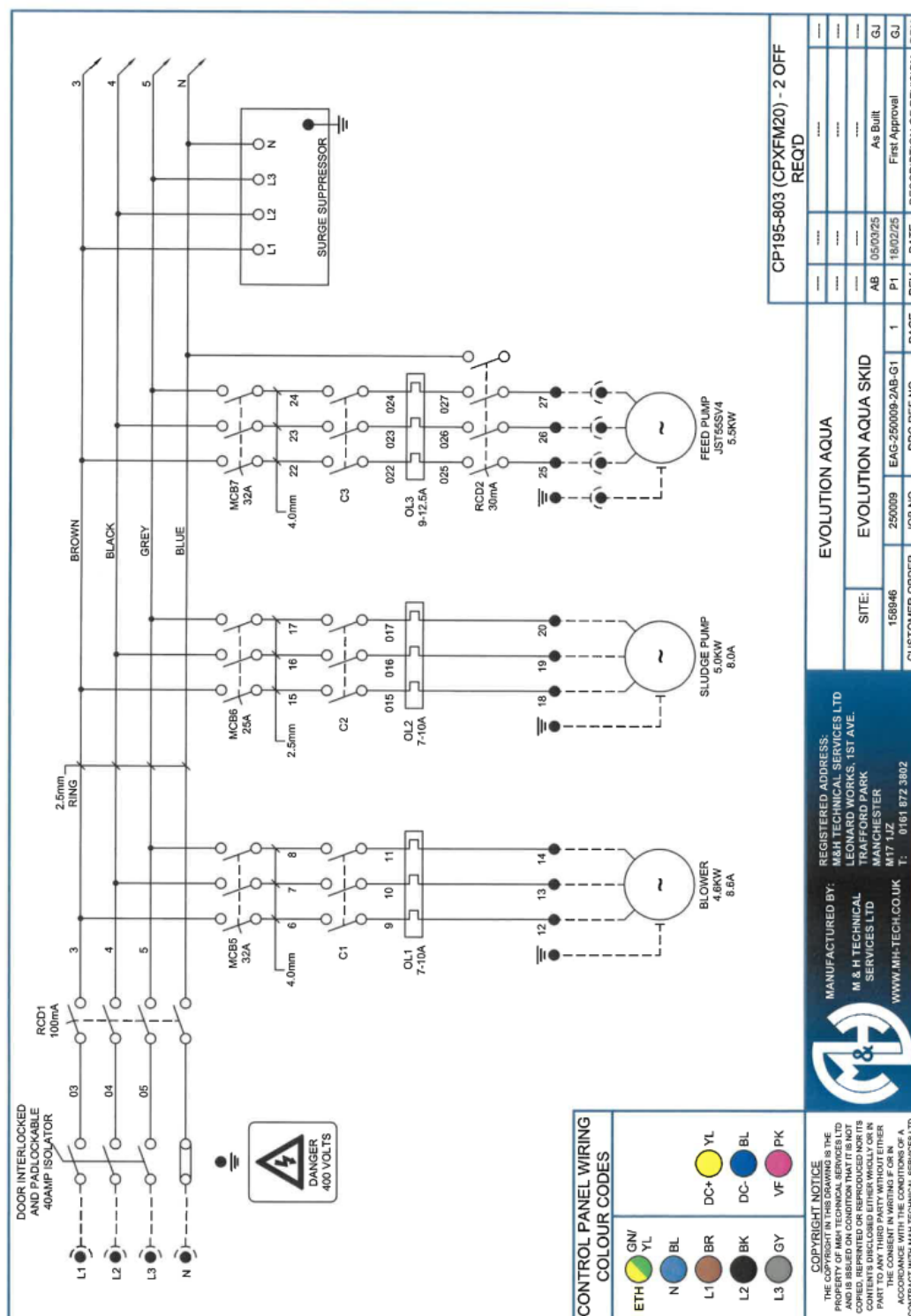
9. Troubleshooting

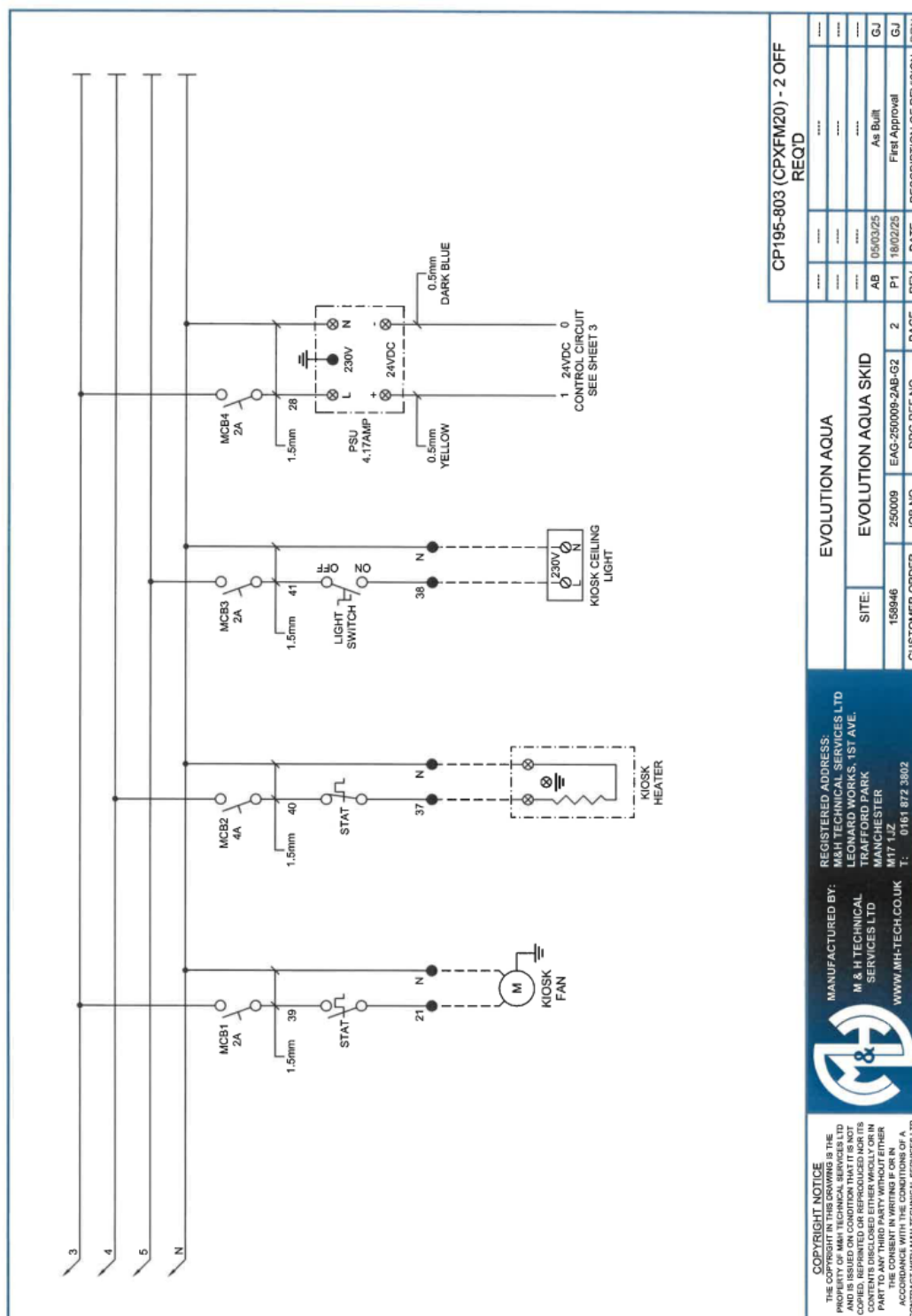
The following table outlines common issues, potential causes, and corrective actions for the Flocell XFM 1200 Filter:

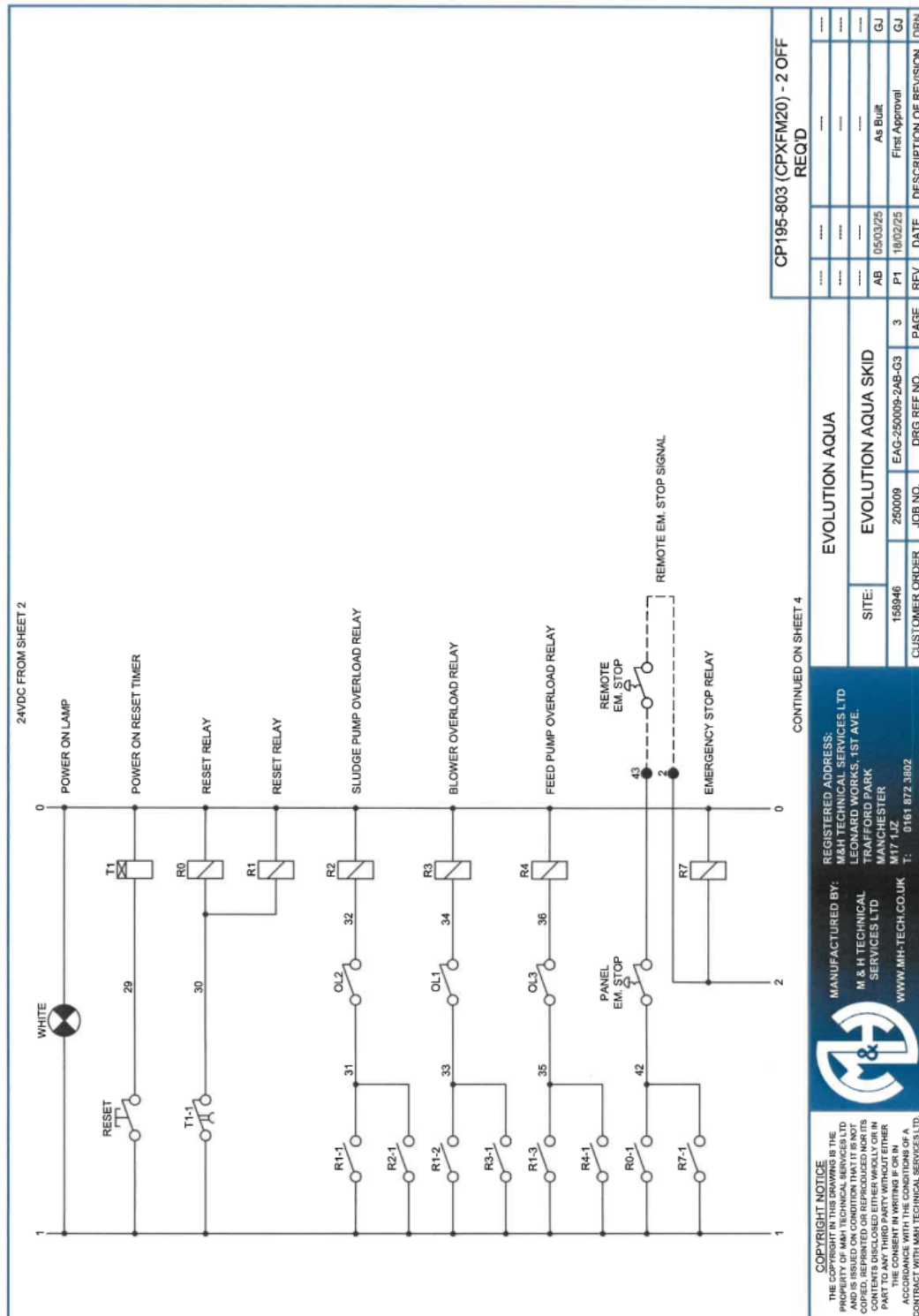
Issue	Possible Cause	Solution
No inlet flow	- Inlet Valve (4) is closed - Feed pump is not running - Blockage in inlet line	- Open Inlet Valve (4) - Check and start the feed pump - Inspect and clear any blockages in the inlet pipe
No outlet flow	- Outlet Valve (3) is closed - Blockage in the filter or outlet pipe	- Open Outlet Valve (3) - Inspect for blockages and clear if necessary
Low inlet flow	- Partial blockage in inlet pipe - Feed pump not operating at full capacity - Airlock in the system	- Inspect and clear inlet blockages - Check feed pump operation - Ensure the system is fully primed to remove airlocks
Dirty outlet water	- Cleaning cycle not performed regularly - Filter media is overloaded with solids	- Run a cleaning cycle - Increase cleaning frequency if needed
No air delivery during cleaning	- Air Blower is not running - Air Delivery Valve (6) is closed - Vent Valve (1) is closed	- Check and start the air blower - Ensure Air Delivery Valve (6) and Vent Valve (1) are OPEN
No media movement during cleaning	- Insufficient airspace inside filter - Vent Valve (1) is closed	- Open Vent Valve (1) to allow air to escape - Ensure sufficient headspace in the filter by running a sludge removal cycle before cleaning
Sludge not being removed properly	- Sludge Pump is not running - Sludge Valve (5) is closed - Blockage in sludge outlet	- Check and start the sludge pump - Open Sludge Valve (5) - Inspect sludge line for blockages and clear if necessary
Unable to empty filter after cleaning	- Sludge Valve (5) is closed - Sludge pump is not functioning properly	- Open Sludge Valve (5) - Check sludge pump operation
Overload alarm on blower or sludge pump	- Motor is overloaded - Electrical fault or blockage in airflow/pump	- Reset the fault using the reset button - Inspect for blockages in air or sludge lines - Check electrical connections
Unit not powering on	- Power isolator switch is OFF - No electrical supply - Fault in control panel	- Turn ON the main power isolator - Verify power supply connection - Contact an electrician or manufacturer if issue persists

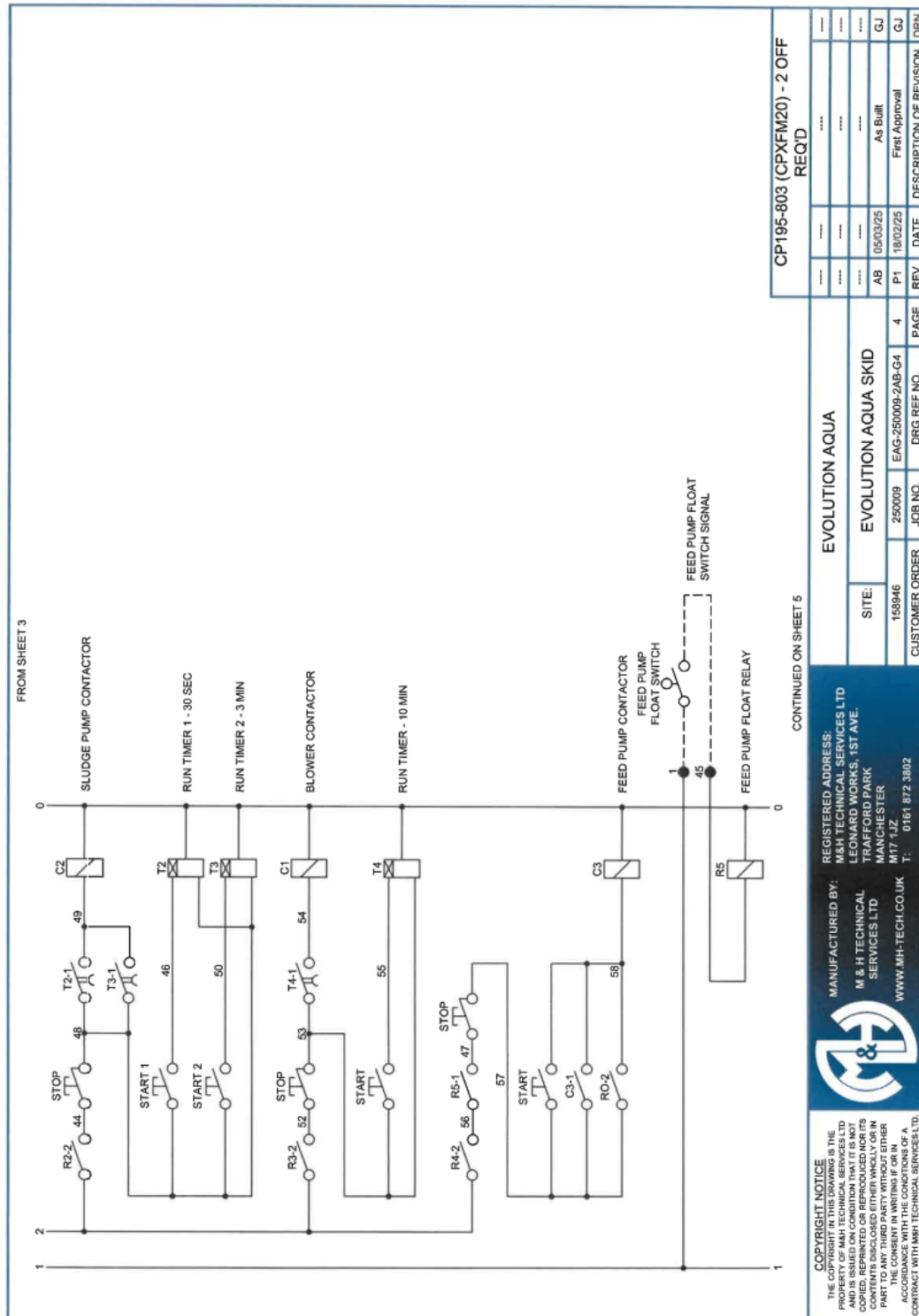
10. Appendices

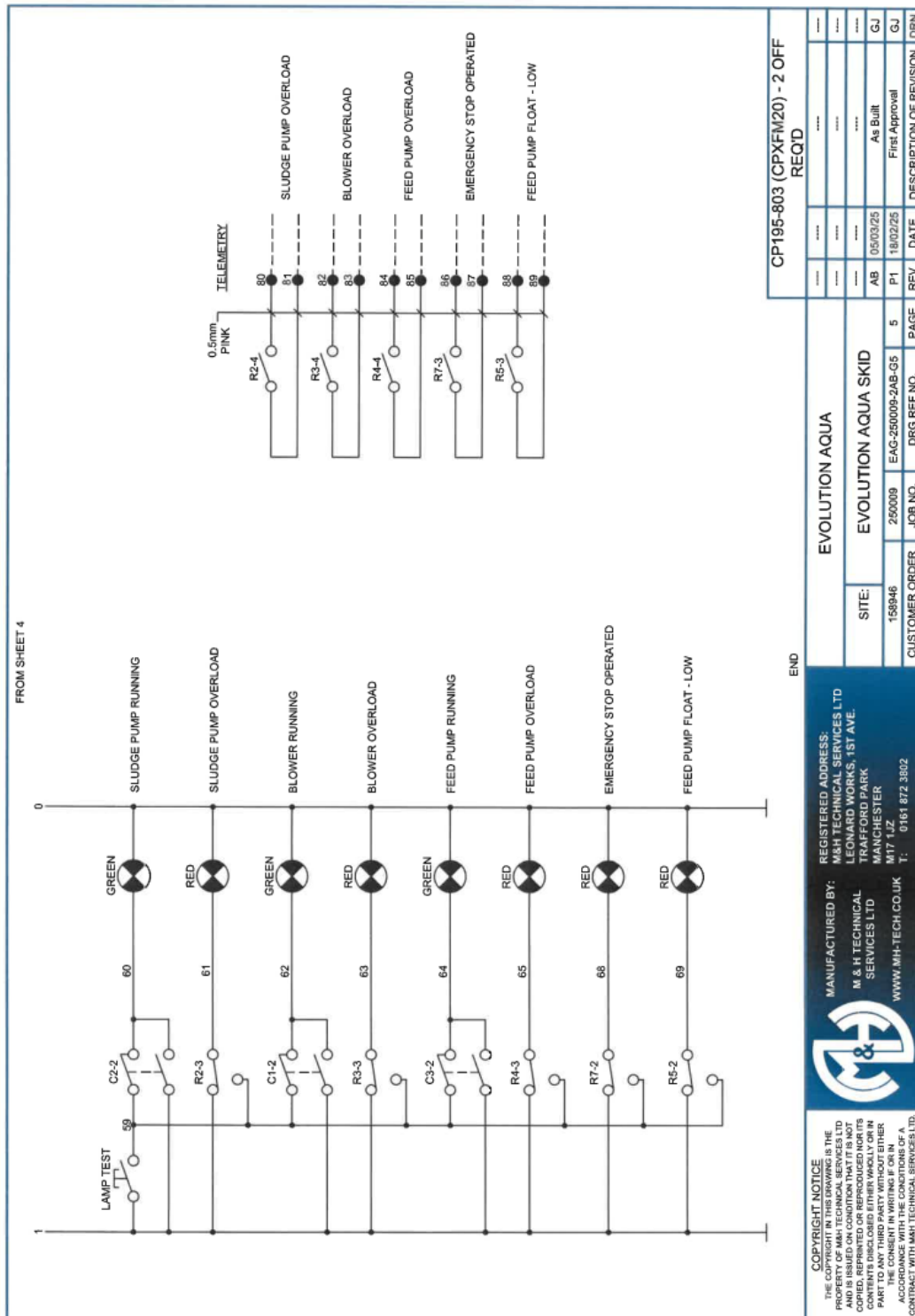
a. Control Panel Schematic











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EVOLUTION AQUA

SITE: EVOLUTION AQUA SKID

159946 250009 EAG-250009-2AB-G5 5 P1 18/02/25

CUSTOMER ORDER JOB NO. DRG REF NO. PAGE REV DATE DESCRIPTION OF REVISION DRN

CP195-803 (CPXFM20) - 2 OFF REQ'D

b. Blower Specification (2BH1610-1HQ37)



G-BH 1 N

Data sheet 2BH1 610

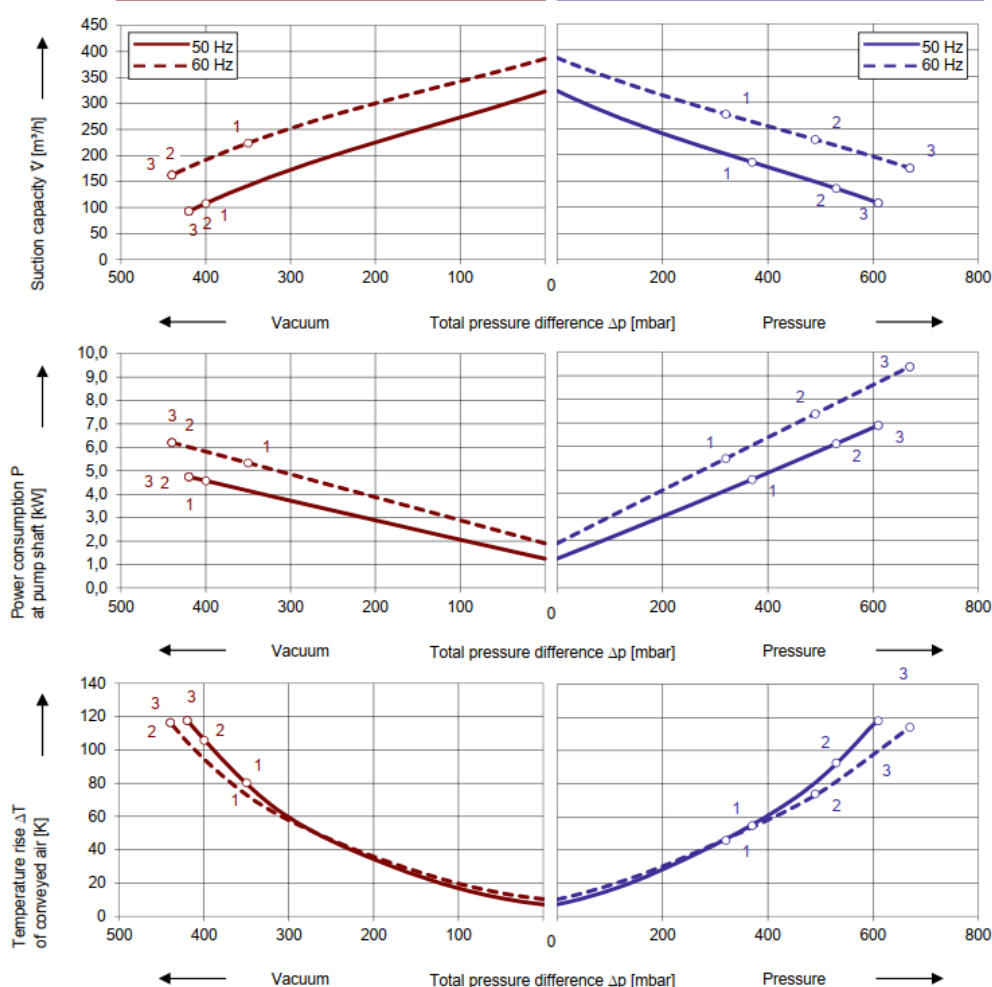
Side channel blower with IE3-motors



Performance curves

Vacuum operation

Compressor operation



The performance curves are based on air at a temperature of 15 °C and an atmospheric pressure of 1013 mbar with a tolerance of $\pm 10\%$. The total pressure differences are valid for suction and ambient temperature up to 25 °C. For other conditions please get in touch with us.

Every G-BH pump can be used both as vacuum pump and compressor in continuous operation over the total performance curve range. The motors are available as standard in protection category IP 55 and insulation class F. The vacuum pumps / compressors are UL and CSA approved.

Selection and ordering data											
Type											
No.	Fre- quency	Rated			Max. differential pressure ²⁾		Sound pres. Level ³⁾ dB(A)	Efficiency class ⁴⁾	Weight approx. kg	Order No.	
		Voltage ¹⁾		Power	Vacuum	Pressure					
		Hz	V								A
IE3 3~ 50/60 Hz, IP55, Insulation material class F, UL 1004 and CNA/CSA 22.2 No 68-09 (certificate number E225239)											
1	50	190-210 Δ	17,1 Δ	4,6	-400	370	73	IE3	67	2BH1610-1HK31	
	60	190-210 YY / 380-420 Y	19,6 YY / 9,8 Y	5,3	-350	320	75	IE3			
	60	200 YY	19,6 YY	5,3	-350	320	75	NP			
2	50	190-210 Δ	23,5 Δ	6,3	-420	530	73	IE3	77	2BH1610-1HK41	
	60	190-210 YY / 380-420 Y	26,6 YY / 13,3 Y	7,3	-440	490	75	IE3			
	60	200 YY	26,6 YY	7,3	-440	490	75	NP			
3	50	190-210 Δ	30,8 Δ	8,6	-420	610	73	IE3	88	2BH1610-1HK51	
	60	190-210 YY / 380-420 Y	35,2 YY / 17,6 Y	9,9	-440	670	75	IE3			
	60	200 YY	35,2 YY	9,9	-440	670	75	NP			
IE3 3~ 50/60 Hz, IP55, Insulation material class F, UL 1004 and CNA/CSA 22.2 No 68-09 (certificate number E225239)											
1	50	220-240 Δ / 380-420 Y	14,9 Δ / 8,6 Y	4,6	-400	370	73	IE3	67	2BH1610-1HK36	
	60	220-240 YY / 440-480 Y	17,0 YY / 8,5 Y	5,3	-350	320	75	IE3			
	60	230 YY / 460 Y	17,0 YY / 8,5 Y	5,3	-350	320	75	NP			
2	50	220-240 Δ / 380-420 Y	20,4 Δ / 11,6 Y	6,3	-420	530	73	IE3	77	2BH1610-1HK46	
	60	220-240 YY / 440-480 Y	23,2 YY / 11,6 Y	7,3	-440	490	75	IE3			
	60	230 YY / 460 Y	23,2 YY / 11,6 Y	7,3	-440	490	75	NP			
3	50	220-240 Δ / 380-420 Y	26,8 Δ / 15,5 Y	8,6	-420	610	73	IE3	88	2BH1610-1HK56	
	60	220-240 YY / 440-480 Y	30,6 YY / 15,3 Y	9,9	-440	670	75	IE3			
	60	230 YY / 460 Y	30,6 YY / 15,3 Y	9,9	-440	670	75	NP			
IE3 3~ 50/60 Hz, IP55, Insulation material class F, UL 1004 and CNA/CSA 22.2 No 68-09 (certificate number E225239)											
1	50	500 Δ	6,9 Δ	6,9	-350	320	73	IE3	67	2BH1610-1HQ35	
	60	575 Δ	6,8 Δ	5,3	-350	320	75	NP			
	50	500 Δ	9,5 Δ	6,3	-420	530	73	IE3			
2	60	575 Δ	9,3 Δ	7,3	-440	490	75	NP	77	2BH1610-1HQ45	
	50	500 Δ	12,4 Δ	8,6	-420	610	73	IE3			
	60	575 Δ	12,2 Δ	9,9	-440	670	75	NP			
3	60	575 Δ	12,2 Δ	9,9	-440	670	75	NP	88	2BH1610-1HQ55	
IE3 3~ 50/60 Hz, IP55, Insulation material class F, UL 1004 and CNA/CSA 22.2 No 68-09 (certificate number E225239)											
1	50	380-420 Δ / 660-725 Y	8,5 Δ / 4,90 Y	4,6	-400	370	73	IE3	67	2BH1610-1HQ37	
	60	440-480 Δ	8,3 Δ	5,3	-350	320	75	IE3			
	60	460 Δ	8,3 Δ	5,3	-350	320	75	NP			
2	50	380-420 Δ / 660-725 Y	11,8 Δ / 6,8 Y	6,3	-420	530	73	IE3	77	2BH1610-1HQ47	
	60	440-480 Δ	11,6 Δ	7,3	-440	490	75	IE3			
	60	460 Δ	11,6 Δ	7,3	-440	490	75	NP			
3	50	380-420 Δ / 660-725 Y	15,5 Δ / 8,9 Y	8,6	-420	610	73	IE3	88	2BH1610-1HQ57	
	60	440-480 Δ	15,3 Δ	9,9	-440	670	75	IE3			
	60	460 Δ	15,3 Δ	9,9	-440	670	75	NP			















- In case of frequency converter operation the standard motor insulation system is suitable for converter input voltages up to 500 V.
- Relief valves available for limiting differential pressure.
- Measuring surface sound pressure level acc. to EN ISO 3744, measured with an equivalent unit at a distance of 1 m. The pump is throttled to an average suction pressure, with piping connected, but no relief valves fitted, tolerance ±3 dB (A).
- The motors according to NEMA MG1-12. NP=NEMA Premium

All G-BH match the 2006/42/EC (machinery) and 2006/95/EC (low voltage) directives and the EN 60034 norm "Rotating electrical machines".

Service factor (SF) and motor efficiency according NEMA MG1-12.

Voltage tolerances for three phase motors are +/-10%.

The frequency tolerance is +/- 2 % maximum.

Motor for alternate voltages									
Voltage range				Wirkungs-grad		US			
50 Hz		60Hz							
				60 Hz	2BH1...-1.  				
3~									
200 V Δ		200 V YY / 230 V Δ / 400 VY			•		K		1
190-210 V Δ		190-210 VYY / 220-240 V Δ / 380-420VY							
200 V Δ / 230 V Δ / 400 VY		230 V YY / 480 VY			•		K		6
190-210 VYY / 220-240 V Δ / 380-420VY		220-240 VYY / 440-480VY							
475-525 V Y		550-800 V Y			•		Q		3
475-525 V Δ		550-800 V Δ							
400 V Δ / 890 V Y		480 V Δ			•		Q		7

c. Sludge Pump Specification

Specification Sheet – Part Number – 2404550333EUM

Waterco Hydrostar MKIV Datasheet

WATERCO®
Water, the liquid of life

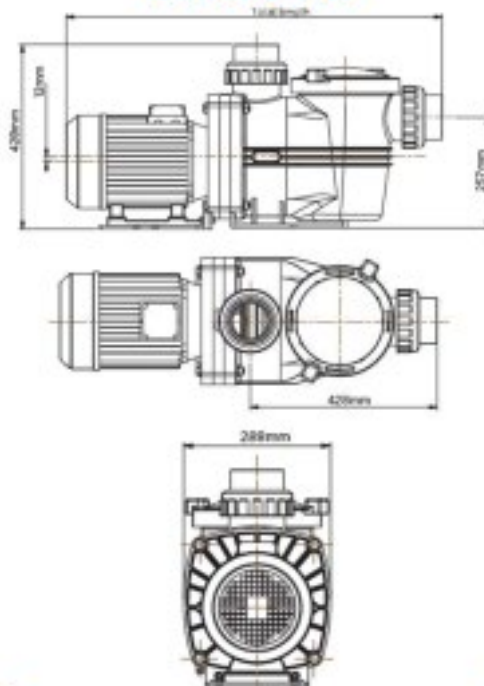
WATERCO 5.5HP Hydrostar MKIV Pump

The Hydrostar Plus range is purpose built for aquatic facilities, water parks and large commercial swimming pools. Hydrostar Plus pumps are high performance corrosion resistant thermoplastic pumps.

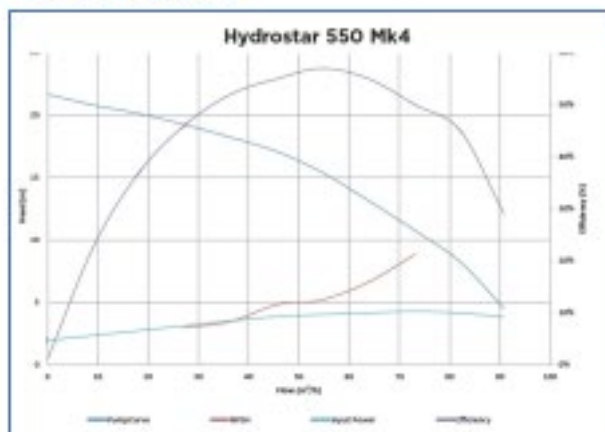
The range has been designed with cost and practicality in mind, adding value to our customers.



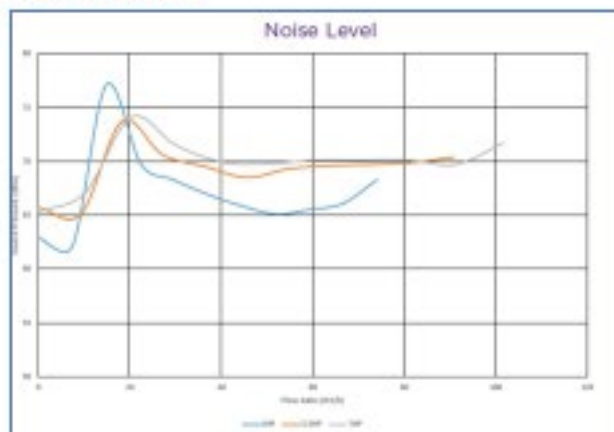
Dimensions



Flow curve



Noise curve



Specifications

Model	HP	Pmax kW	Amps	Total Length	Motor Frame	Flow Rate Qmax	Voltage	Hertz	RPM
Hydrostar MKIV 550	5.7	4.26	8.1	867	112	68m³/hr	380-415	50	2900

d. Tubular Heater for Frost Protection (SWD-U-500)



**INSTRUCTIONS FOR:-
FINNED TUBULAR HEATERS
SWD SERIES**

Thank you for purchasing a BN Thermic product. Manufactured to a high standard, this product will, if used according to these instructions and properly maintained, give you years of trouble free performance. Please ensure instructions remain with your customer for their reference.

REGISTER: PLEASE REGISTER THIS PRODUCT ONLINE TO ACTIVATE YOUR GUARANTEE AT
www.bnthermic.co.uk

IMPORTANT: PLEASE READ THESE INSTRUCTIONS, NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS, AND CAUTIONS. USE THIS PRODUCT CORRECTLY, AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY.

1. SAFETY INSTRUCTIONS

1.1 ELECTRICAL SAFETY

WARNING! It is the responsibility of the owner and the operator to read, understand and comply with the following:

You must check all electrical products, before use, to ensure that they are safe. You must inspect power cables, plugs, sockets and any other connectors for wear or damage. You must ensure that the risk of electric shock is minimised by the installation of appropriate safety devices. A Residual Current Circuit Breaker (RCCB) should be incorporated in the main distribution board. If in any doubt consult a qualified electrician.

You must also read and understand the following instructions concerning electrical safety.

- The Health & Safety at Work Act 1974 makes owners of electrical appliances responsible for the safe condition of those appliances and the safety of the appliance operators. If in any doubt about electrical safety, contact a qualified electrician.
- Installation should always be carried out by a qualified electrician or a competent person in accordance with current electrical regulation.
- Ensure that the insulation of all the cables on the appliance is undamaged and safe, before connecting it to the power supply.
- Ensure that the cables are always protected against short circuit and overload.
- Regularly inspect the power supply cables and plugs etc. for wear or damage and check all connections to ensure that none are loose.
- Important: Ensure that the voltage marked on the appliance matches the power supply to be used and that a correctly rated fuse is fitted.
- DO NOT use worn or damaged cables, plugs or connectors. Immediately have any faulty item repaired or replaced by a qualified electrician.
- The unit should be protected by a suitably rated isolator and fuse or MCB.
- Tubular heaters are IP66 rated.
- Do not attach this tubular heater to an extension cord it must be hard wired in position.

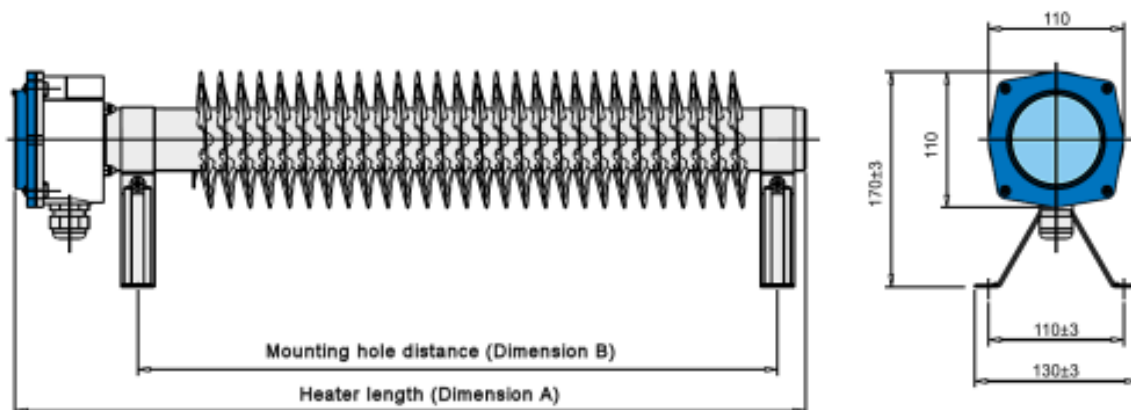
1.2 GENERAL SAFETY INSTRUCTIONS

- ✓ Remove all packaging and store it away from children, check the package and heater for visible damage or tampering.
- ✓ Familiarise yourself with the applications and limitations of the tubular heater.
- ✓ Ensure the tubular heater is in good order and condition both physically and electrically before use. If in any doubt, do not use the unit and contact your supplier.
- ✓ Only use recommended attachments and parts. To use unauthorised parts may be dangerous and will invalidate your warranty.
- ✓ Keep tools and other items away from the tubular heater when it is in use.
- ✓ Keep children and unauthorised persons away from the heater, as it gets very **hot**. An optional grille is available.
- ✓ Disconnect from mains and allow to cool before attempting any cleaning or maintenance.
- X **DO NOT** use in areas where hazardous gasses or dusts may be present.
- X **DO NOT** locate the heater directly below the power outlet.
- X **DO NOT** disassemble the heater for any reason. This heater must be checked by qualified personnel only.
- X **DO NOT** use this tubular heater to perform a task for which it has not been designed.
- ❑ **WARNING!** Some models (U Type) are not equipped with a built-in device to control the room temperature. Do not use this heater in a small room if it is occupied by people not capable of leaving the room on their own, unless constant supervision is provided.
- ❑ **WARNING!** Ensure you observe the safety distances and mounting heights and there is no possibility of inflammable materials coming into contact.



2. INTRODUCTION & SPECIFICATION

This tubular heater produces a totally dry heat, no condensation, no gas, no fumes. It reaches maximum heat output within a few minutes from being turned on. It is quick and easy to install reducing installation costs.



Model	Volts	Watts	Dimension A (mm)	Dimension B (mm)	IP Rating	Built-in Thermostat	Thermostat Range	Weight (kg)	Optional Guard
SWD-A-500	230	500	440	320	66	Yes	+5 to +30°C	3.0	SWG-1
SWD-A-1000	230	1000	640	520	66	Yes	+5 to +30°C	4.8	SWG-2
SWD-A-1500	230	1500	840	720	66	Yes	+5 to +30°C	6.2	SWG-3
SWD-A-2000	230	2000	1040	920	66	Yes	+5 to +30°C	7.7	SWG-3
SWD-A-3000	230	3000	1440	1320	66	Yes	+5 to +30°C	10.9	SWG-4
SWD-U-500	230	500	440	320	66	No	N/A	3.0	SWG-1
SWD-U-1000	230 or 400/3P	1000	640	520	66	No	N/A	4.8	SWG-2
SWD-U-1500	230 or 400/3P	1500	840	720	66	No	N/A	6.2	SWG-3
SWD-U-2000	230 or 400/3P	2000	1040	920	66	No	N/A	7.7	SWG-3
SWD-U-3000	230 or 400/3P	3000	1440	1320	66	No	N/A	10.9	SWG-4
SWD-U-4000	230 or 400/3P	4000	1840	1720	66	No	N/A	13.7	SWG-5
SWD-U-500-1	110	500	440	320	66	No	N/A	3.0	SWG-1
SWD-U-1000-1	110	1000	640	520	66	No	N/A	4.8	SWG-2
SWD-U-1500-1	110	1500	840	720	66	No	N/A	6.2	SWG-3

All Heaters – Ø Main Heater Tube – 50mm, Ø Outer Fins – 110mm, Finned Tube Material – 409 Stainless Steel, Cable Gland Entry – M20 x 1.5, Maximum Surface Temperature – 240°C.

Note – All heaters are supplied with a cable gland.

3. LOCATION OF TUBULAR HEATER

- ❑ **IMPORTANT!** DO NOT mount the heater directly below the socket outlet.
- ❑ **IMPORTANT!** Ensure that the mounting surface can take the weight of the heater.
- ❑ **IMPORTANT!** Do not allow any object to come closer than 0.3m to the heater.

The heater is intended to be mounted horizontally at either high level or low level.

It must be fixed securely to a wall or floor using the mounting brackets provided.

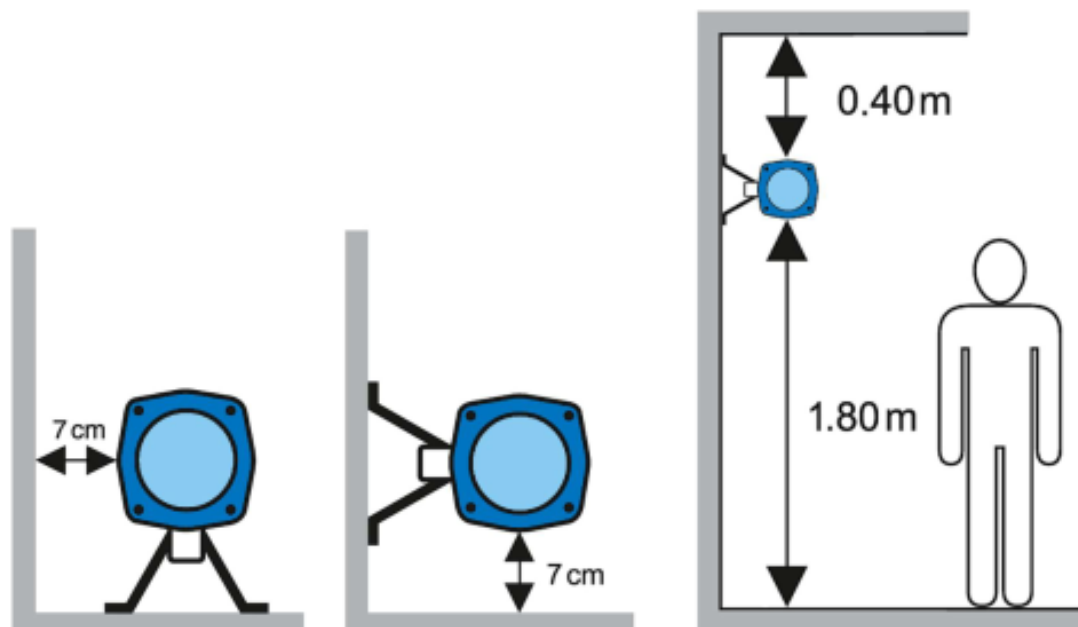
When the heater is installed in an area to which personnel have access the SWG protective guard must be used.

When in use the stainless steel tube and fins become very hot and contact must be avoided.

A minimum clearance of 400mm (40cm) above the heater should be allowed for.

Ensure the heater is installed where it cannot be covered.

A minimum 300mm area around the heater must be observed and no object should be placed within this area.



Please Note – The 1.80m mounting height is the minimum recommended height if you wish to mount high on a wall, are not using the protective guard and people are present.

4. ELECTRICAL CONNECTIONS

4.1 230V SINGLE PHASE.

Please make sure you have read the Safety instructions and that you are a suitably qualified electrician before continuing.

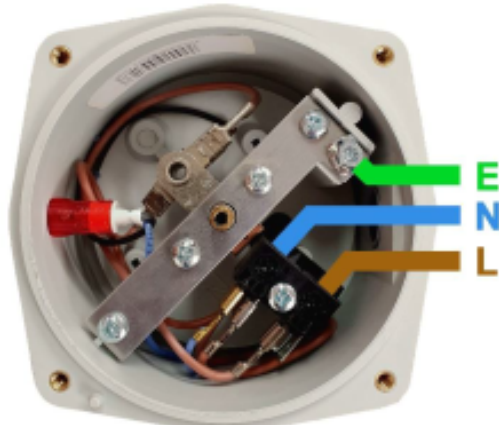
Pictures below show connections inside the terminal box on the heater. **Do NOT use power tools to undo or do up terminal or enclosure screws.**

Please Note:- Specified cable sizes are for typical installations, correction factors may need to be used when determining actual cable sizes.

Use 1.5mm² 3 core mains cable for all 230V heaters under 3kW and 110V 500W and 1000W (see note above).

Use 2.5mm² 3 core mains cable for 230V 3kW, 4kW and 110V 1500W heaters (see note above).

All Thermostat Model Heaters



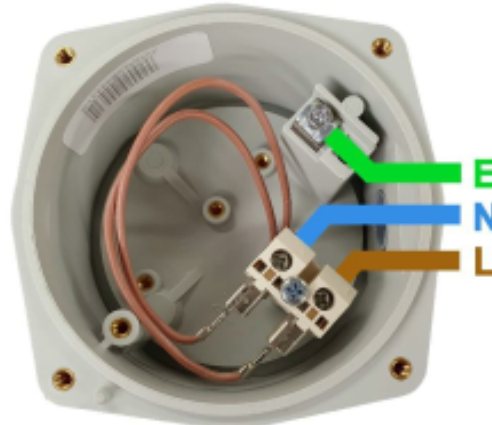
Connect Brown wire – Terminal L.

Connect Blue wire – Terminal N.

Connect Green / Yellow wire - Terminal E

PLEASE NOTE:- If you remove the terminal block when wiring, it must be screwed back onto its holder making sure it does not touch the thermostat. Please also ensure that the mains cables do not touch the thermostat workings and stop it operating correctly.

500W Model No. SWD-U-500



Connect Brown wire – Terminal L.

Connect Blue wire – Terminal N.

Connect Green / Yellow wire - Terminal E

Ensure you correctly tighten the cable gland before securing the terminal box cover using the four screws.

PTO for installation of non-thermostat 1000W – 4000W heaters + 3 Phase

All Non-Thermostat Model Heaters 1000W – 4000W

Connect Brown wire – Terminal L.

Connect Blue wire – Terminal N.

Connect Green / Yellow wire - Terminal E

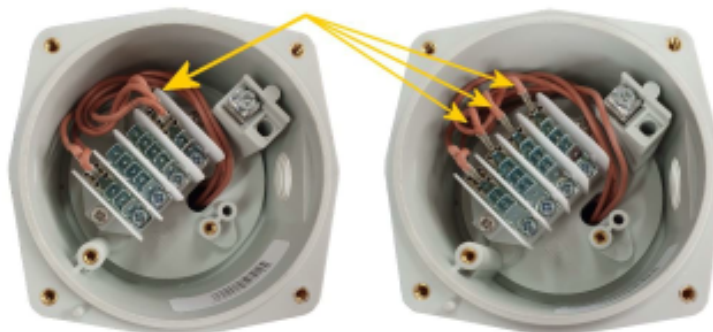
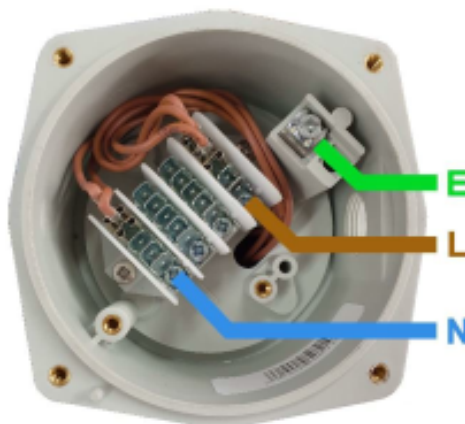
Ensure you correctly tighten the cable gland before securing the terminal box cover using the four screws.

4.2 400V THREE PHASE.

Please make sure you have read the Safety instructions and that you are a suitably qualified electrician before continuing.

Pictures show connections inside the terminal box on the heater. **Do NOT use power tools to undo or do up terminal screws or the enclosure screws.**

Please Note:- Specified cable sizes are for typical installations, correction factors may need to be used when determining actual cable sizes.



Use minimum 1mm² 5 Core Cable for 1000W, 1500W and 2000W heaters (see note above).

Use minimum 1.5mm² 5 Core Cable for 3000W and 4000W heaters (see note above).

Move two of the push on connections from the right terminal block over to the empty connections as per picture to the left.

DO NOT MOVE THE TWO NEUTRAL CONNECTIONS WHICH ARE TO THE LEFT END OF THE TERMINAL BLOCK.

Connect Brown wire (Phase 1) – Terminal L1.

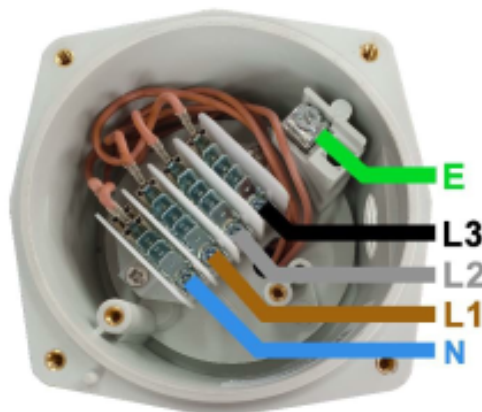
Connect Grey wire (Phase 2) – Terminal L2.

Connect Black wire (Phase 3) – Terminal L3.

Connect Blue wire – Terminal N.

Connect Green / Yellow wire - Terminal E

Ensure you correctly tighten the cable gland before securing the terminal box cover using the four screws.



5. MAINTENANCE

BN Thermic electric heaters are factory assembled and tested and are non-user serviceable. they are intended to operate for many years problem free.

Maintenance is limited to periodic cleaning to ensure there is no build-up of dust. Before cleaning ensure the supply to the heater is completely isolated and the heater has cooled down

If in any doubt always consult a qualified electrician for advice.

NOTE: It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.



WEEE REGULATIONS:

This appliance bears the symbol of the crossed waste bin. This indicates that, at the end of its useful life, it must not be disposed of as domestic waste, but must be taken to a collection centre for waste electrical and electronic equipment. It is the user's responsibility to dispose of this appliance through the appropriate channels. Failure to do so may incur penalties established by laws governing waste disposal.

IMPORTANT: No liability is accepted for incorrect use of this product.

WARRANTY: Your BN Thermic product is guaranteed for one year from date of purchase. We will repair or replace at our discretion any part found to be defective. We cannot assume any consequential liability. This guarantee in no way prejudices your rights under common law and is offered as an addition to consumer liability rights.

REGISTER: Activate your warranty by registering online at www.bnthermic.co.uk and retain this installation data for future reference.

BN Thermic Ltd,
34 Stephenson Way,
Crawley, RH10 1TN
Tel: 01293 547361
sales@bnthermic.co.uk
www.bnthermic.co.uk

SWDINS-v01-2

e. Check Valve Specification



Flow Check Valve 180°

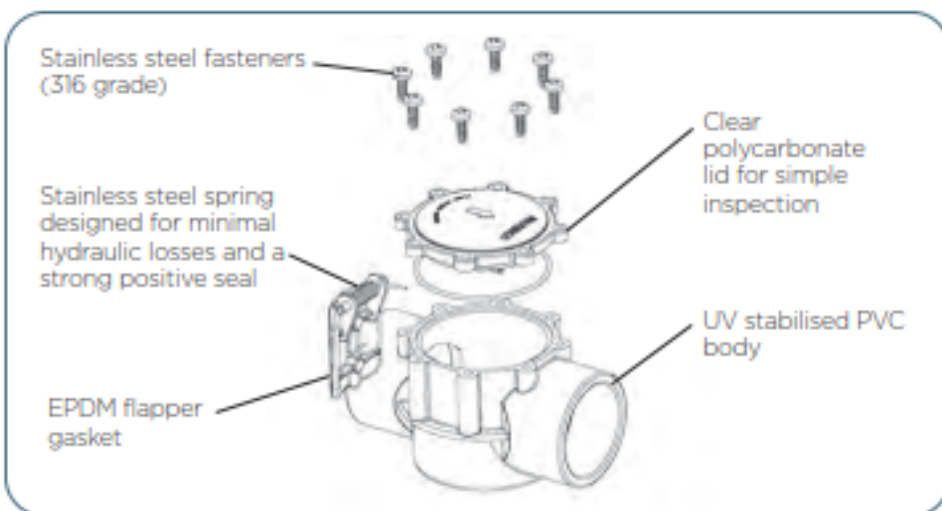


Flow Check Valve 90°

FLOW CHECK NON RETURN VALVE

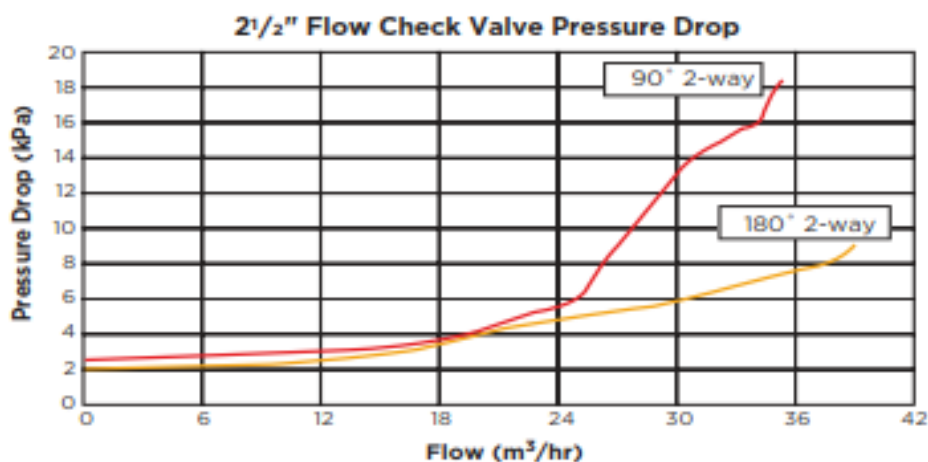
Part No.	Product Description	Nom. Size
14653	Flow Check Valve 180°	63/75mm
14651	Flow Check Valve 180°	2"/2 1/2"
146539	Flow Check Valve 90°	63/75mm
146519	Flow Check Valve 90°	2"/2 1/2"

The Flow Check Valve has been designed to be simple to install, inspect and service. With a stainless steel spring designed for minimal hydraulic losses and a stronger positive seal, it is ideal for both inlet and return lines.



The Flow Check Valve's pressure rating of 4 bar (58 psi) and its 316 stainless steel fasteners make it suitable for domestic and commercial applications.

- Eliminate the loss of prime on the suction side of a pump.
- Prevent the drain down of water towards pumps and filters.
- Prevent water flow in an unwanted direction.



f. Ventilation Fan Specification (315mm ESP31514)

EuroSeries® (ESP)

- Die cast aluminium impellers
- Fully speed controllable
- Protected to IP54
- Operating Temperatures from -40°C up to +70°C Motor
- Insulation Class F
- Thermal overload for motor protection
- Most models reversible - Supply or Extract
- Tough epoxy paint finish
- Quality Assurance to BS EN ISO 9001:2015
- Performance tested to ISO 5801



The EuroSeries® ESP axial blade plate fans, feature a single shot die cast aluminium blade and external rotor motor design.

All units are designed for speed controllable.

Impellers

All sizes are supplied with cast aluminium impellers, ensuring performance when working against outdoor conditions and abrasive airflow. Where fans are reversible for intake a -30% drop in performance can be expected.

Motors

External rotor motors are specially designed and styled for this range of fan. Ball bearings are greased for life. Rotors are dynamically balanced to ISO 1940. Motors are protected to IP54, against dust and moisture complying with BS EN 60529:1992. They are ribbed aluminium body castings for efficient cooling. Motor insulation is Class 'F' (from -40°C to +70°C).

Electrical

Single phase 220-240V 50Hz. Capacitor start and run. Three phase 380-415V 50Hz. An IP54 terminal box are supplied with 20mm and PGII entry. All motors are fitted with thermal overload protection which should be wired into all controller circuits and into starter contactors.

Terminal Box

Terminal Box to IP54 as standard, protected against dust and water from any angle allowing outside applications.

Performance

The fan performance is in accordance with tests to BS848 Part 1 1980.

Sound Levels

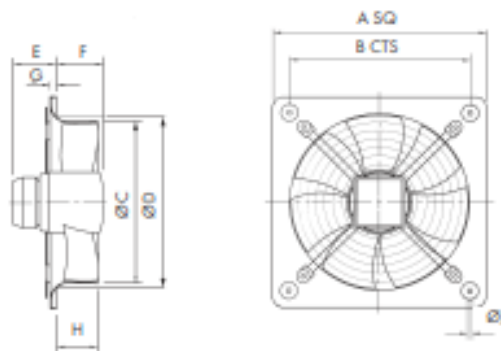
Fan sound levels are measured in a reverberant chamber in accordance with BS848 Part 2 1985. Published dB(A) figures are free field sound pressure levels at 3m with spherical propagation at a reference level of 2×10^{-5} Pa (20 micro-Pascal). The sound power level spectra figures are dB with reference level of 10^{-12} Watts (1 pico-watt). To ensure minimum noise levels during speed control, an auto transformer speed control is recommended.

Accessories

A full range of accessories:

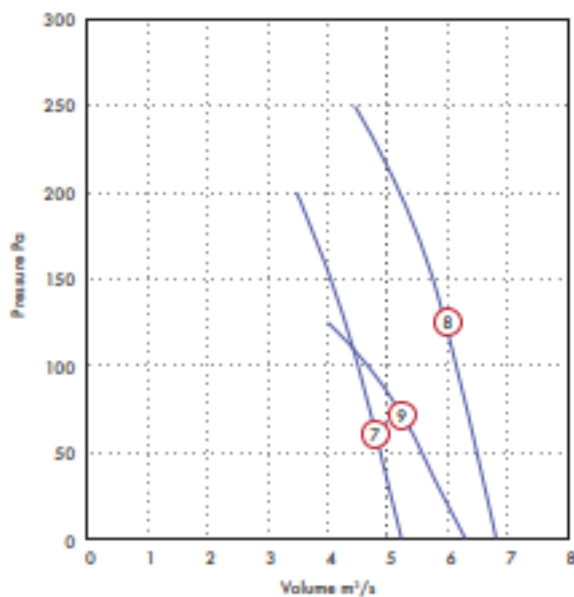
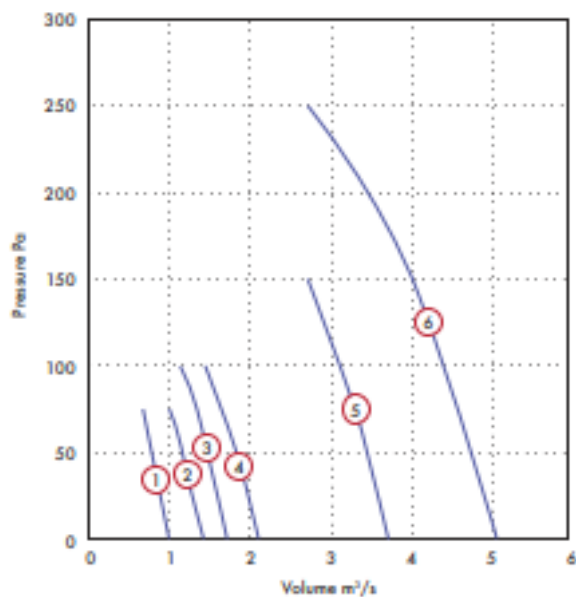
- Electronic Speed Controllers
- Auto Transformer Speed Controllers
- D.O.L. Starters & Overloads
- Discharge Guards
- Louvre Shutters

Dimensions (mm)



Dia	A	B	ØC	ØD	E	F	G	H	ØJ	kg
355	485	435	367	372	86	97	21	75	9	7.3
400	540	490	412	420	93	100	12	88	9	10.2
450	575	535	463	480	86	139	14	96	11	15.8
500	655	615	517	528	84	141	16	104	11	17.3
560	725	675	568	589	81	142.5	16	119	11	24
630	805	750	643	664	82	142.5	20	130	11	45
710	850	810	720	763	37	176.5	20	150	14.5	31
800	970	910	804	869	34	244	17	193	14.5	38

Performance Guide



Dia.	Motor Phase	Stock Ref	Poles	r.p.m	IP Rating	Curve Ref.	0	50	m³/s @ Pa	100	150	200	250	Motor kW	S.C. Amps	F.L.C Amps	dB(A) @ 3m
355	1	ESP35514	4	1330	IP54	1	0.96	0.76						0.19	1.45	0.84	53
400	1	ESP40014	4	1350	IP54	2	1.4	1.16						0.29	2.4	1.45	56
450	1	ESP45014	4	1370	IP54	3	1.72	1.46	1.11					0.36	3.6	1.6	61
500	1	ESP50014	4	1290	IP54	4	2.1	1.82	1.41					0.51	4.3	2.3	55
560	1	ESP56014	4	1320	IP54	5	3.72	3.44	3.11	2.71				1.35	9.3	6	63
630	1	ESP63014	4	1320	IP54	6	5.09	4.77	4.41	4.02	3.47	2.72		2.2	28	9.9	70
630	3	ESP63034	4	1360	IP54	7	5.19	4.86	4.47	4.02	3.41			1.9	17	3.2	64
710	3	ESP71034	4	1290	IP54	8	6.81	6.49	6.16	5.72	5.22	4.42		2.9	20	5.3	72
800	3	ESP80036	6	900	IP54	9	6.3	5.58	4.67					1.4	9.8	2.7	64

For fans wired to reverse run, duty reduced by 30%.

Sound Power Level Spectra dB (ref 10⁻¹² Watts)

Dia.	Motor Phase	Stock Ref	Poles	Spectrum	63	125	250	500	1k	2k	4k	8k	dB(A) @ 3m
355	1	ESP35514	4	Inlet	65	70	67	65	64	64	62	55	50
355	1	ESP35514	4	Outlet	65	70	67	65	64	64	62	55	50
400	1	ESP40014	4	Inlet	70	72	67	66	65	65	64	56	51
400	1	ESP40014	4	Outlet	70	72	67	66	65	65	64	56	51
450	1	ESP45014	4	Inlet	69	76	73	72	70	71	70	62	57
450	1	ESP45014	4	Outlet	69	76	73	72	70	71	70	62	57
500	1	ESP50014	4	Inlet	65	75	69	70	70	71	69	62	56
500	1	ESP50014	4	Outlet	65	75	69	70	70	71	69	62	56
630	1	ESP63014	4	Inlet	82	86	79	79	80	78	75	70	64
630	1	ESP63014	4	Outlet	82	86	79	79	80	78	75	70	64
630	3	ESP63034	4	Inlet	71	88	82	83	82	81	78	72	67
630	3	ESP63034	4	Outlet	71	88	82	83	82	81	78	72	67
710	3	ESP71034	4	Inlet	80	87	86	88	89	86	83	79	72
710	3	ESP71034	4	Outlet	80	87	86	88	89	86	83	79	72
800	3	ESP80036	6	Inlet	73	83	79	75	75	77	74	64	62
800	3	ESP80036	6	Outlet	73	83	79	75	75	77	74	64	62