# Flocell XFM10 Modular Filtration System

## INSTALLATION & OPERATING MANUAL

## TERMS & CONDITIONS

**PLEASE READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLATION AND COMMISSIONING**

| | |
|---|---|
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## 1. Introduction

The Flocell XFM10 is a semi-automated, containerised filtration unit designed to provide efficient and reliable water treatment with low hydraulic loss and minimal operating costs. Engineered to handle 10 litres per second (36 $m^3/h$), this system offers high-performance filtration for a wide range of applications.

As a self-contained unit, the Flocell XFM10 operates in both gravity-fed and pumped-feed configurations. It features dual 1200mm diameter filter housings, providing a total filtration bed surface area of 2.26 $m^2$, ensuring effective removal of suspended solids and fine particulates.

The semi-automated operation requires user input via manual push-button controls, but once activated, key functions such as the blower and sludge pump run for preset durations, ensuring consistent and efficient cleaning cycles. The system utilises air sparging for media cleaning, reducing water and energy consumption while maintaining peak filtration performance.

With a maximum operating pressure of 2 bar, the Flocell XFM10 is suited for industrial, municipal, and commercial water treatment applications. The integrated sludge management system ensures efficient removal of retained solids, while frost protection and ventilation features maintain reliability in different environmental conditions.

Designed as a plug-and-play solution, the Flocell XFM10 combines efficient filtration with user-friendly semi-automated controls, making it a cost-effective and dependable choice for modern water treatment systems.

## 2. Health and Safety

### a. General Safety Precautions

The Flocell XFM10 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 XFM10 is supplied with full side access doors, allowing easy operation and maintenance.
- Before operating the system, all side doors must be 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 XFM10 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 XFM10 while minimising risks to personnel and the surrounding environment.

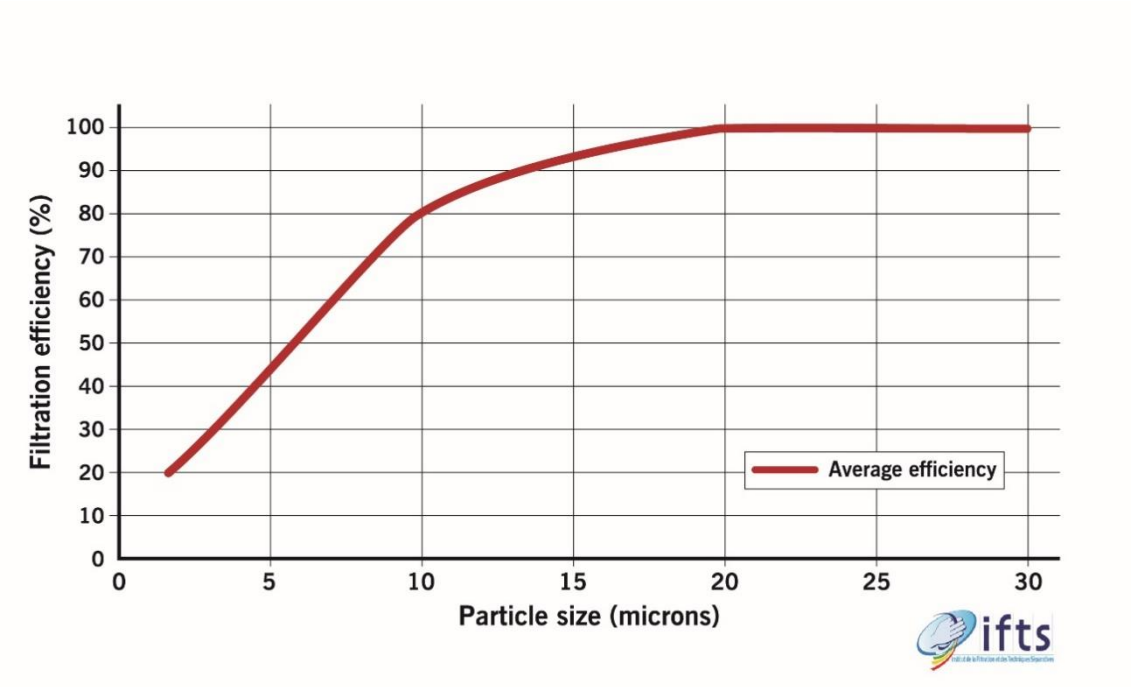
## 2. Specification Details

| Parameter | Specification |
|---|---|
| **Unit Type** | Containerised Filtration Unit |
| **Container Size** | 10ft Modified Shipping Container |
| **Flow Rate** | 10 litres per second (36 $m^3/h$) |
| **Maximum Operating Pressure** | 2 bar |
| **Filtration System** | Dual 1200mm Diameter Filter Bodies |
| **Total Filtration Surface Area** | 2.26 $m^2$ (1.13 $m^2$ per filter) |
| **Cleaning Method** | Air Sparging with Semi-Automated Controls |
| **Control System** | Semi-Automated |
| **Power Supply** | 3-Phase, 415V, 50Hz, 32A 5-Pin Appliance Inlet Socket |
| **Feed Pump Supply** | 3-Phase, 415V, 50Hz, 16A 4-Pin Plug, 2.2 kW Max |
| **Float Switch Supply** | Single Phase, 16A 2-Pin Plug, 0-24V DC |
| **Sludge Pump** | 3-Phase, 1.5 kW, 10 L/s |
| **Air Blower** | 3.45 kW, 6.7A, 95 $m^3/hr$ |
| **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 |
| **Outlet Connection** | 4” PN16 Flange with Bauer Adapter |
| **Sludge Outlet** | 4” PN16 Flange with Bauer Adapter |
| **Return Outlet** | 4” PN16 Flange with Bauer Adapter |
| **Dry Weight** | 2700 kg |
| **Operating Weight** | 5650 kg |
| **Footprint** | 7.44 $m^2$ |

## 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 XFM10 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 (5650 kg).
- A reinforced concrete base is recommended, with a minimum footprint of 3.1m x 2.5m 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: Connected to the raw water supply, either from a pump-fed or gravity-fed source.
- Outlet: Connected to the treated water discharge point.
- Sludge Outlet: Routed to a sludge collection or waste management system.
- 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.

All connections are 4” PN16 flanges with Bauer adapters, ensuring secure and leak-free installation.

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

The Flocell XFM10 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, 400V) 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 2.2 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).
- 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 appendices.

Summary of Feed Pump Electrical Specifications

| **Parameter** | **Specification** |
|---|---|
| **Power Supply** | 3-Phase, 400V |
| **Max Pump Rating** | 2.2 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 doors must be fully opened and secured using the provided door stay latches before starting the system.
- Ensure the doors remain latched securely during operation to prevent accidental closure due to wind or external forces.

### g. Commissioning and Start-Up

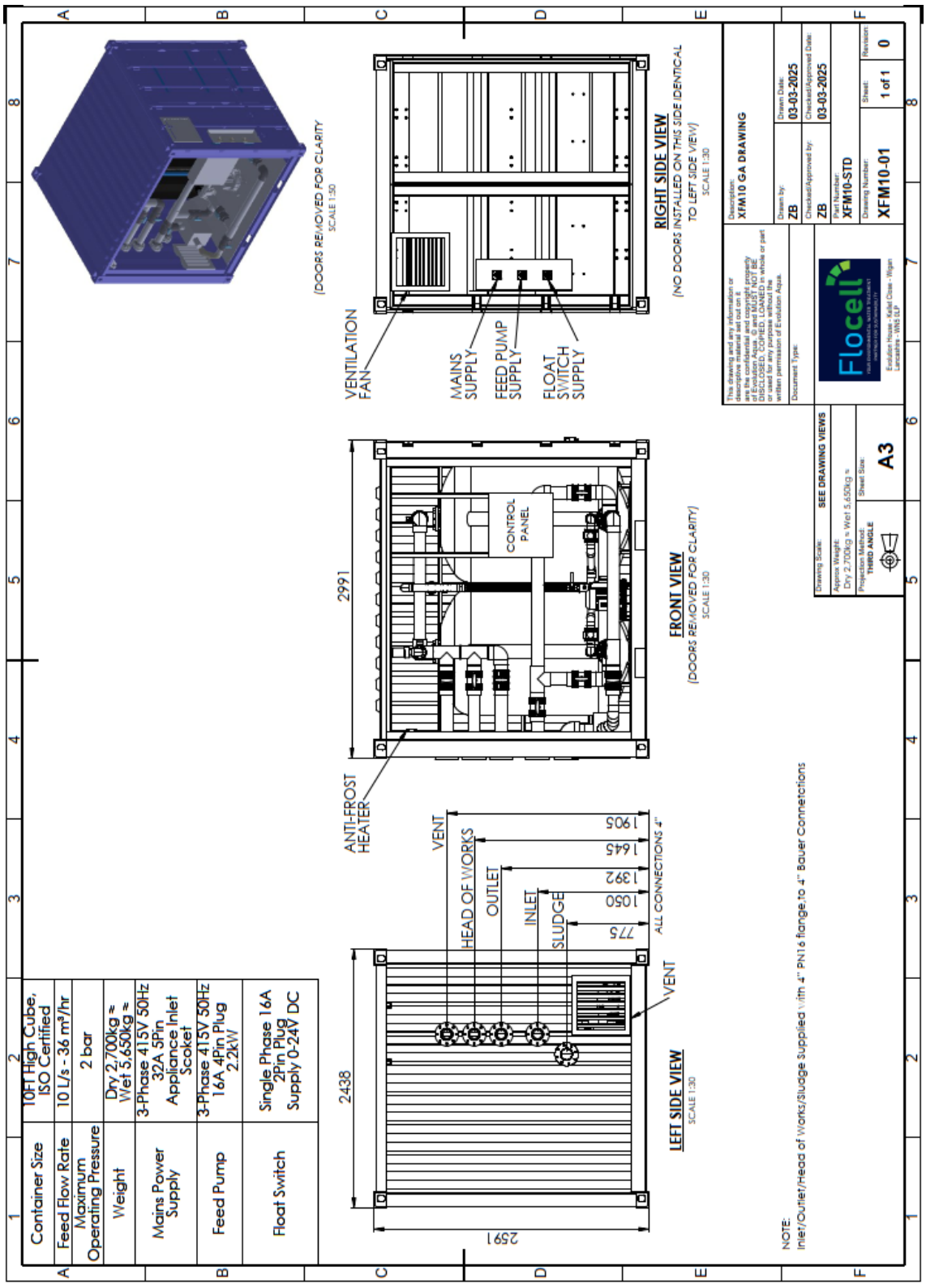
- Before starting the system, double-check all connections and remove transport locks (turnbuckle hooks).
- Power on the control panel and test each component (feed pump, sludge pump, air blower) by activating them individually.
- Ensure the vent line is open when the blower is in operation to allow 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 XFM10 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 XFM10 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 XFM10 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 XFM10 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.

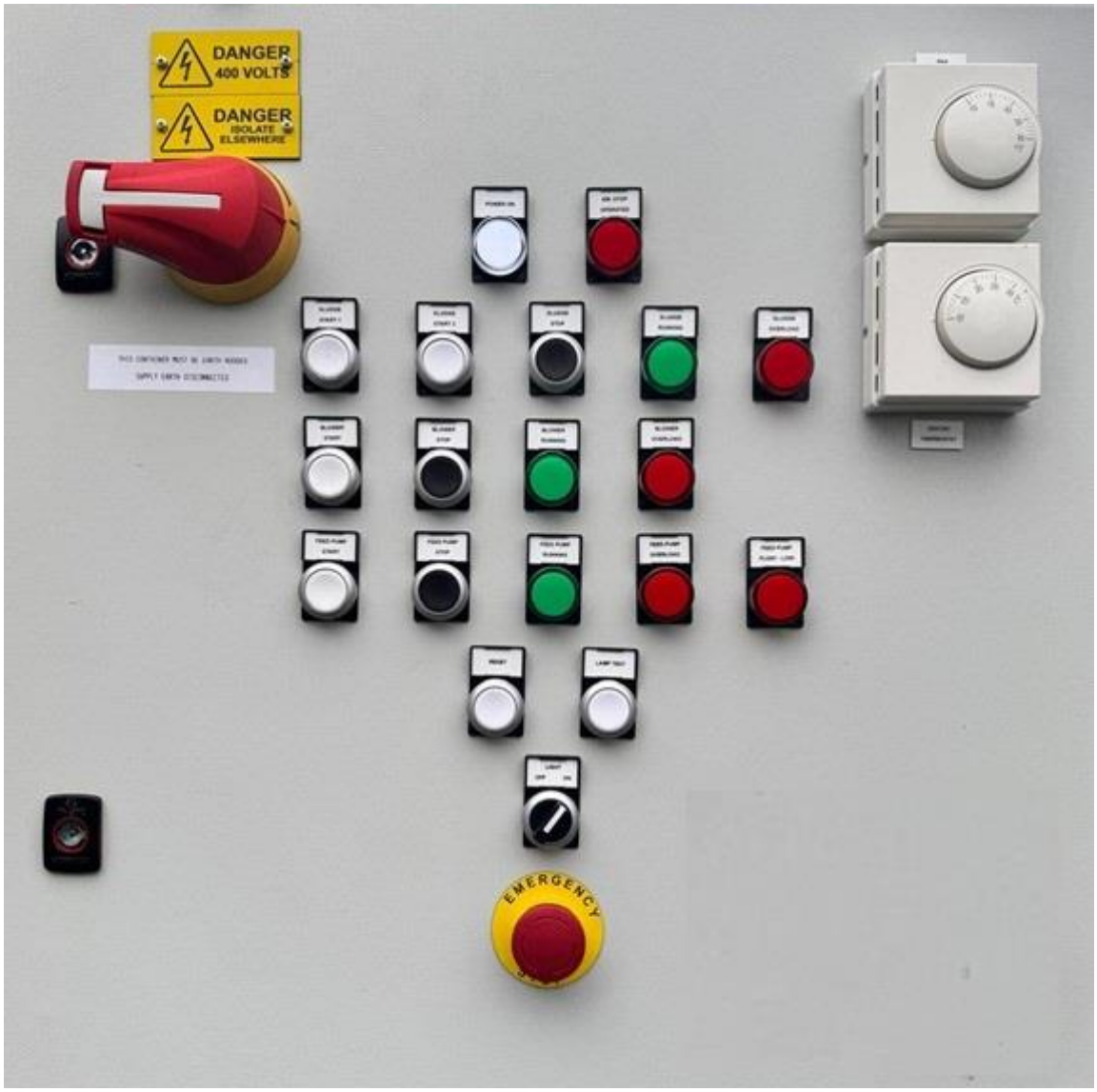
- Ice expansion can cause structural damage to pipes, filter bodies, and internal components.
- The Flocell XFM10 is fitted with a 0.5 kW tubular heater for frost protection, but additional insulation or heating may be required in extreme conditions.
- In cold climates, check for ice formation inside pipes and valves before operation.

7. Installation Environment and Positioning
    - The Flocell XFM10 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 Flocell XFM10 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 XFM10 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) |

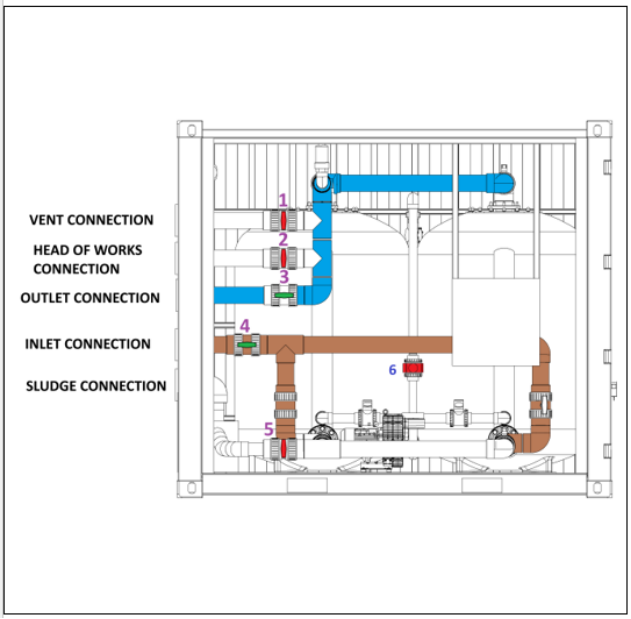
Connection Guidelines:

- 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. XFM10 Operational Functionality

The Flocell XFM10 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

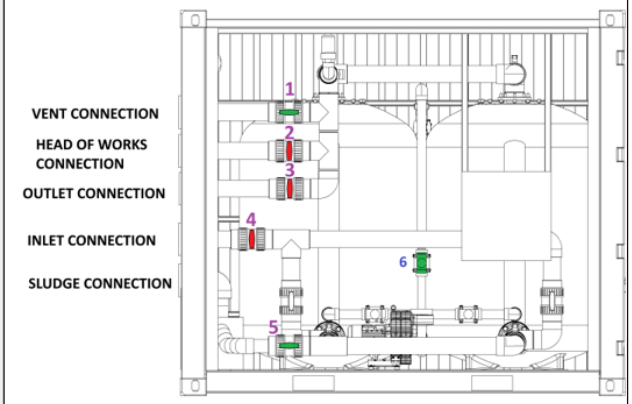



| | | |
|---|---|---|
| Vent Valve (1) | - | Closed |
| Head of Works Valve (2) | - | Closed |
| Outlet Valve (3) | - | Open |
| Inlet Valve (4) | - | Open |
| Sludge Valve (5) | - | Closed |
| Air Delivery Valve (6) | - | Closed |

Incoming water travels through Inlet up through the filter and then exits through the Outlet.

Inlet (4) and Outlet (3) Valves are Open and Air Delivery Valve (6) along with Sludge Valve (5) Valves are closed.

## II. Cleaning Mode

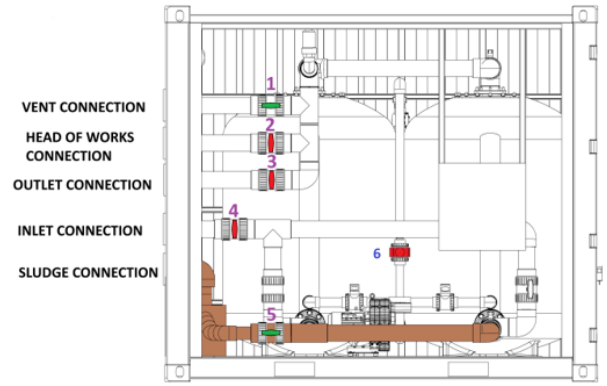



| | | |
|---|---|---|
| Vent Valve (1) | - | Open |
| Head of Works Valve (2) | - | Closed |
| Outlet Valve (3) | - | Closed |
| Inlet Valve (4) | - | Closed |
| Sludge Valve (5) | - | Closed |
| Air Delivery Valve (6) | - | Open |

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



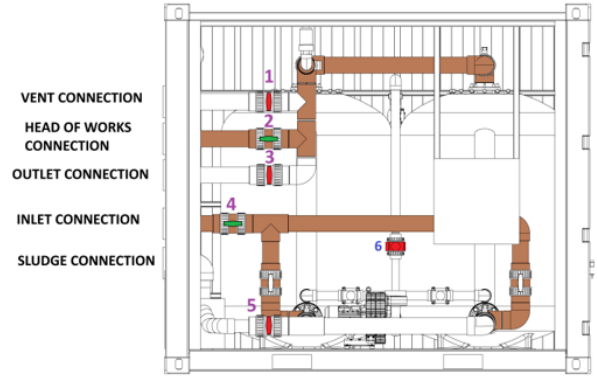

| | | |
|---|---|---|
| Vent Valve (1) | - | Open |
| Head of Works Valve (2) | - | Closed |
| Outlet Valve (3) | - | Closed |
| Inlet Valve (4) | - | Closed |
| Sludge Valve (5) | - | Open |
| Air Delivery Valve (6) | - | Closed |

Ensure Sludge Valve (5) is open.

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

When sludge pump stop running, close Sludge 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).

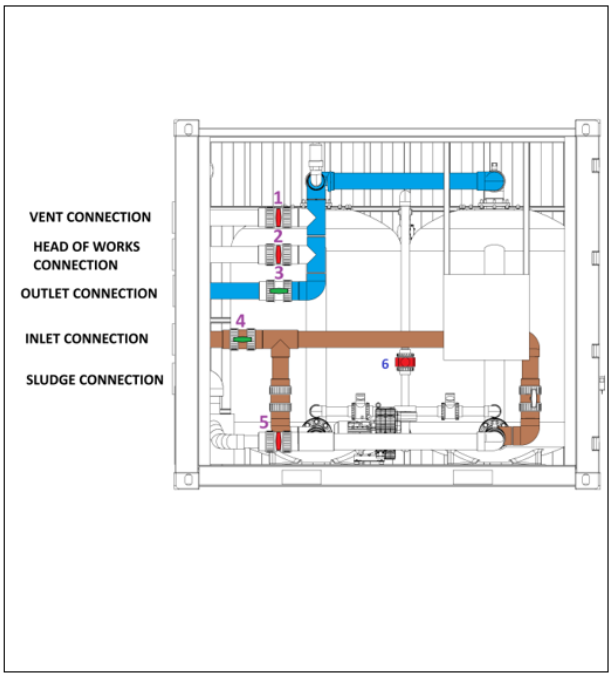
Start Feed Pump on Panel.

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.

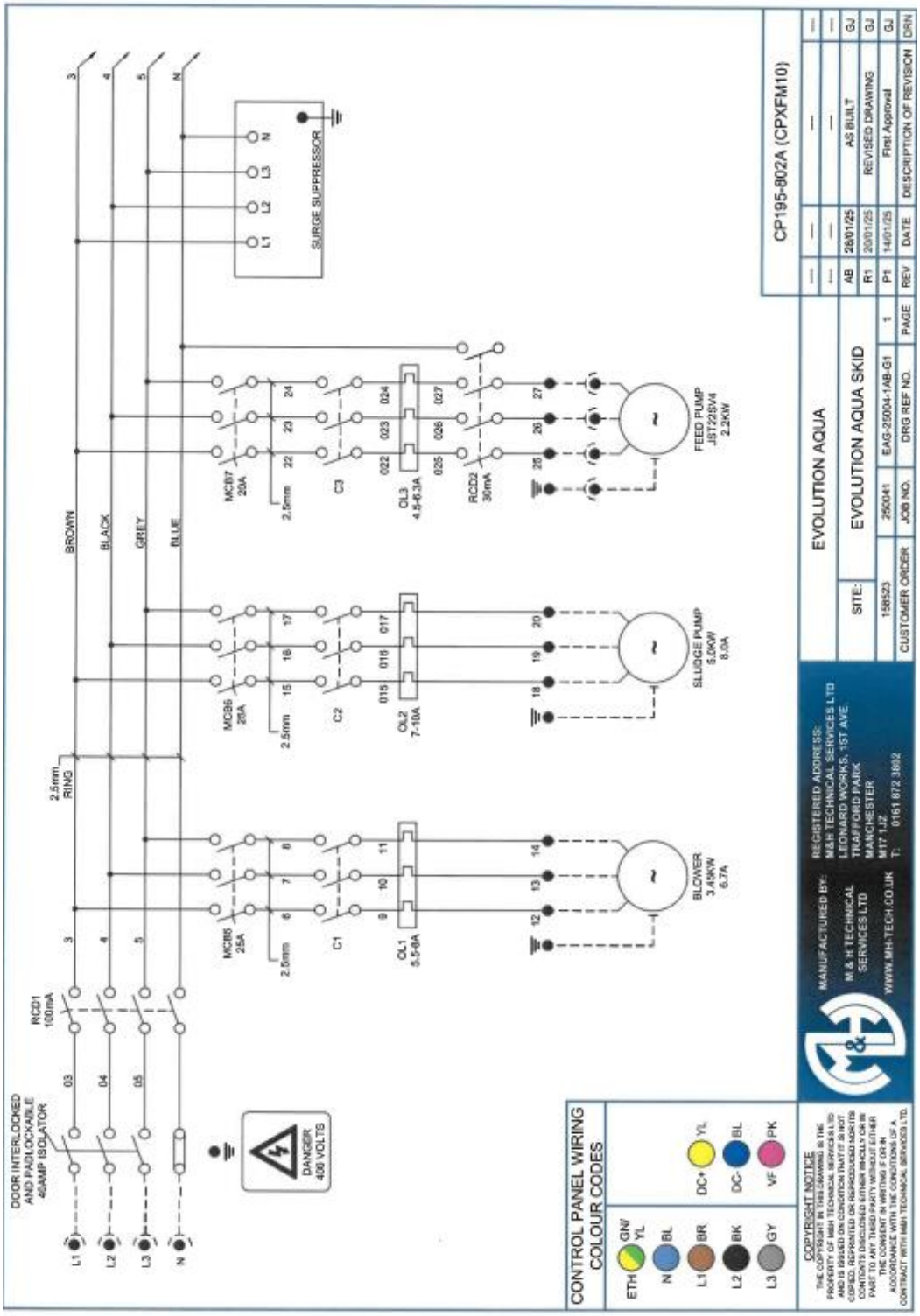
## 9. Troubleshooting

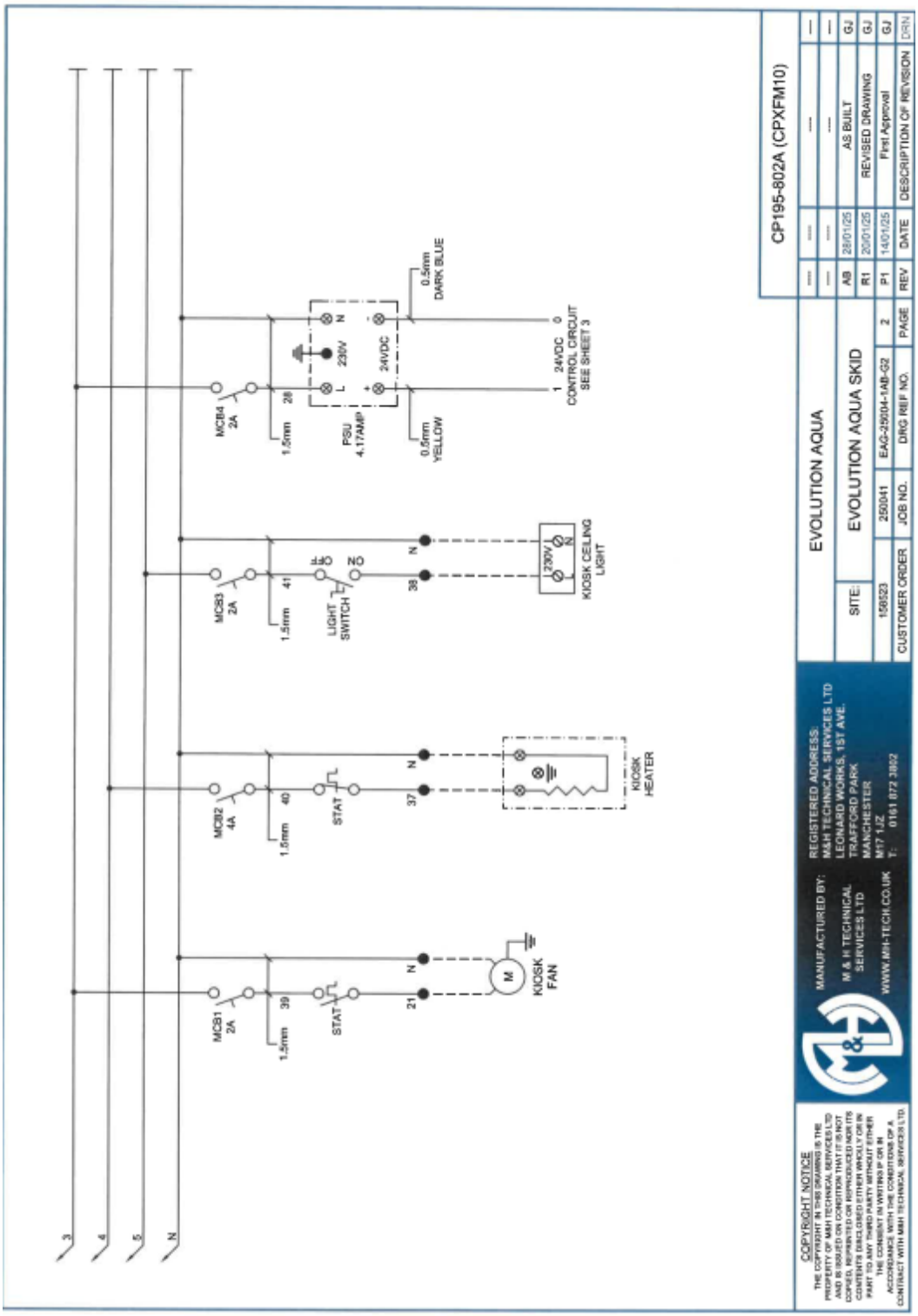
**The following table outlines common issues, potential causes, and corrective actions for the Flocell XFM 1200 Filter:**

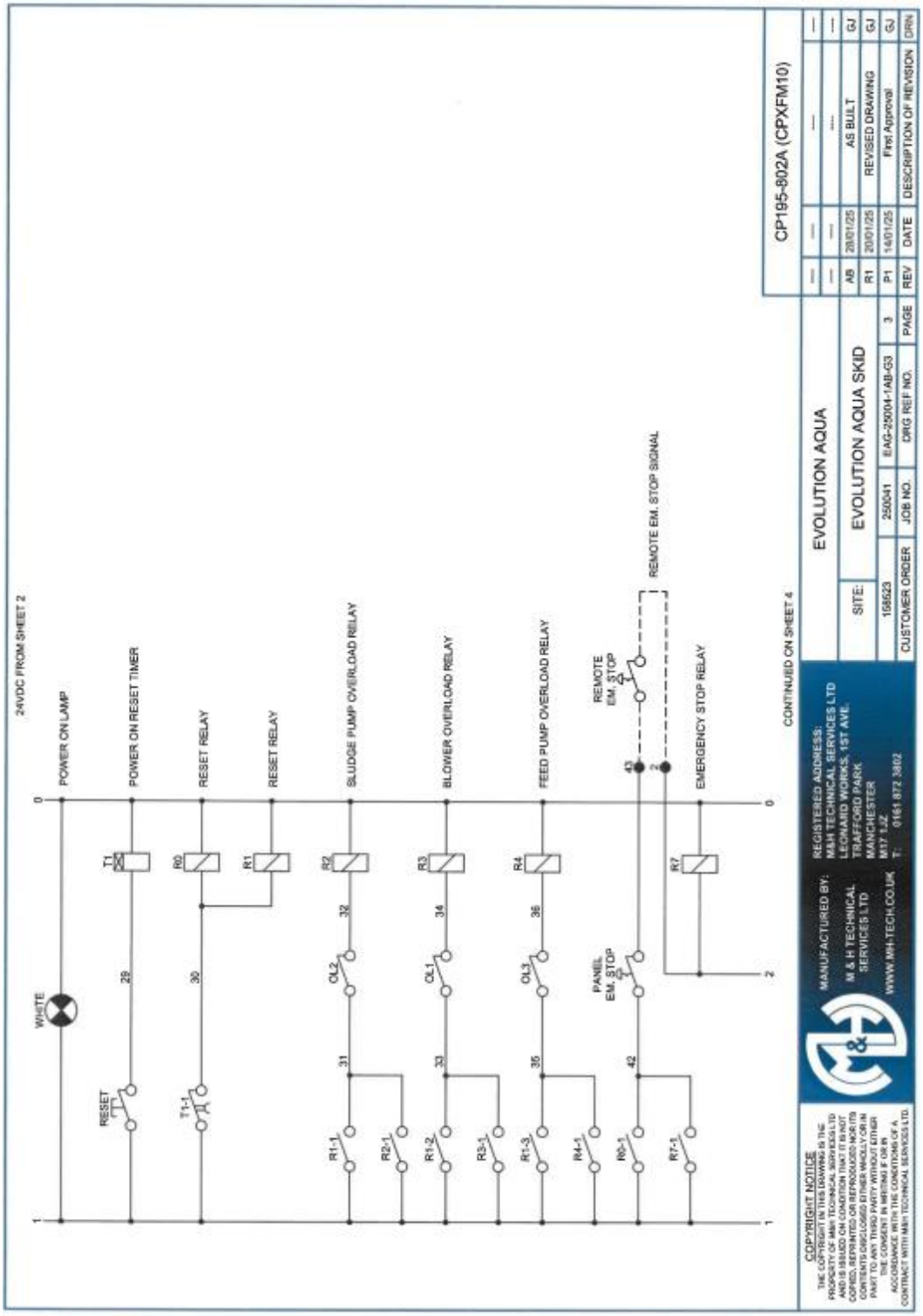
| Issue | Possible Cause | Solution |
|---|---|---|
| **No inlet flow** | - Inlet Valve (4) is closed - Feed pump is not running - Blockage in inlet line | - Open Inlet Valve (4) - Check and start the feed pump - Inspect and clear any blockages in the inlet pipe |
| **No outlet flow** | - Outlet Valve (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




CP195-802A (CPXFM10)
EVOLUTION AQUA
SITE: EVOLUTION AQUA SKID
158523
250041
EAG-25004-1AB-G2
2
CUSTOMER ORDER
JOB NO.
DRG REF NO.
PAGE
REV
DATE
DESCRIPTION OF REVISION
AB 28/01/25 AS BUILT GJ
R1 26/01/25 REVISED DRAWING GJ
P1 14/01/25 First Approval GJ
MANUFACTURED BY: M & H TECHNICAL SERVICES LTD
REGISTERED ADDRESS: M&H TECHNICAL SERVICES LTD LEONARD WORKS, 1ST AVE. TRAFFORD PARK MANCHESTER M17 1JZ
WWW.MH-TECH.CO.UK T: 0161 872 3802
COPYRIGHT NOTICE
MCB4 2A
MCB3 2A
MCB2 4A
MCB1 2A
PSU 4.17AMP
24VDC
230V
0.5mm DARK BLUE
0.5mm YELLOW
1.5mm
CONTROL CIRCUIT SEE SHEET 3
LIGHT SWITCH
KIOSK CEILING LIGHT
KIOSK HEATER
KIOSK FAN
STAT
N
L
M
3
4
5
N


24VDC FROM SHEET 2
POWER ON LAMP
POWER ON RESET TIMER
RESET RELAY
RESET RELAY
SLUDGE PUMP OVERLOAD RELAY
BLOWER OVERLOAD RELAY
FEED PUMP OVERLOAD RELAY
REMOTE EM. STOP
REMOTE EM. STOP SIGNAL
EMERGENCY STOP RELAY
CONTINUED ON SHEET 4
CP195-802A (CPXFM10)
EVOLUTION AQUA
EVOLUTION AQUA SKID
SITE:
158523
250041
EAG-250041-1AB-G3
CUSTOMER ORDER
JOB NO.
DRG REF NO.
PAGE
DESCRIPTION OF REVISION
AS BUILT
REVISED DRAWING
Final Approval
DATE
REV
M & H TECHNICAL SERVICES LTD
REGISTERED ADDRESS:
M&H TECHNICAL SERVICES LTD
LEONARD WORKS, 1ST AVE.
TRAFFORD PARK
MANCHESTER
M17 1JZ
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T: 0161 872 3802
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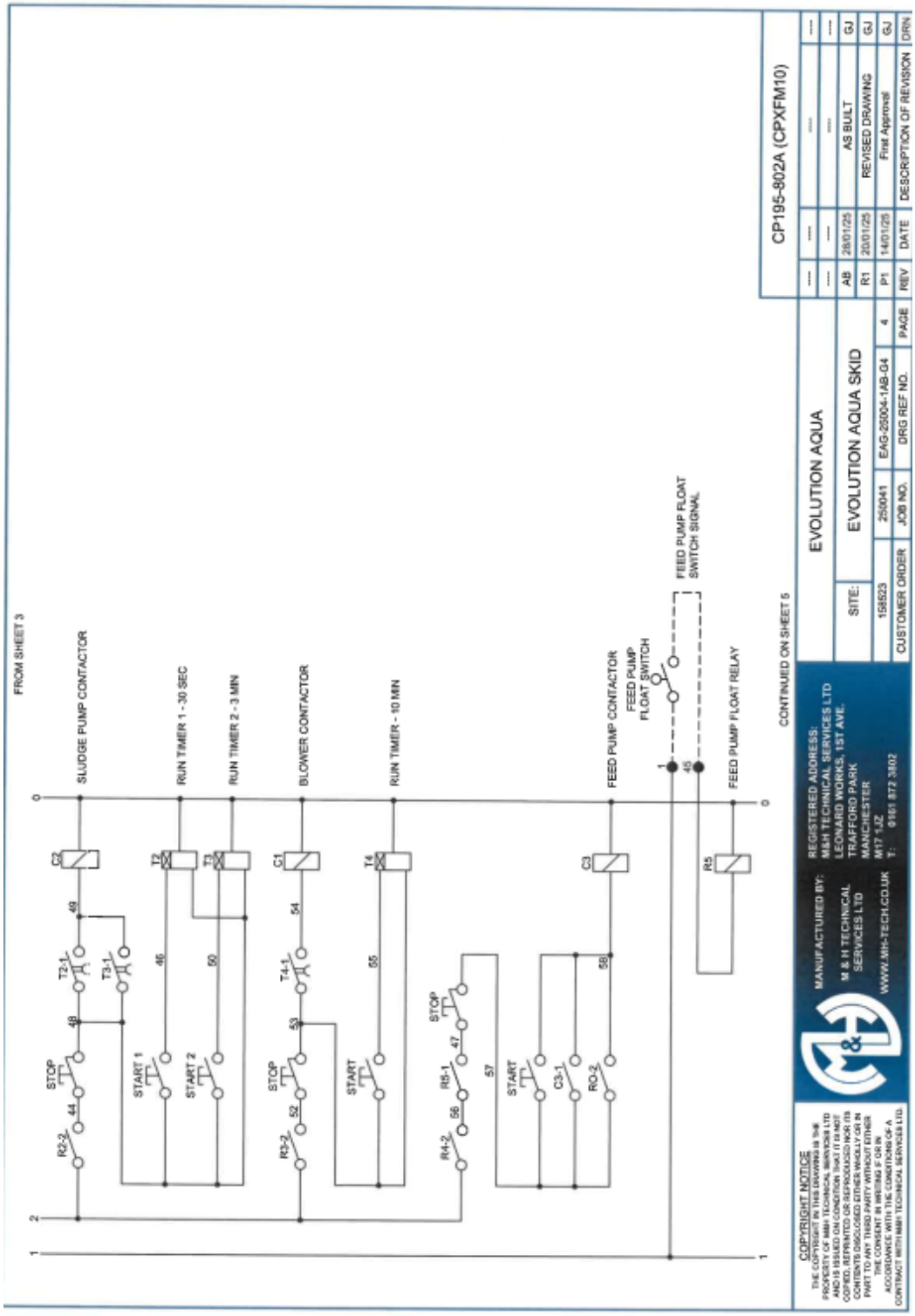
FROM SHEET 3
SLUDGE PUMP CONTACTOR
RUN TIMER 1 - 30 SEC
RUN TIMER 2 - 3 MIN
BLOWER CONTACTOR
RUN TIMER - 10 MIN
FEED PUMP CONTACTOR
FEED PUMP FLOAT SWITCH
FEED PUMP FLOAT SWITCH SIGNAL
FEED PUMP FLOAT RELAY
CONTINUED ON SHEET 5
STOP
START 1
START 2
START
STOP
START
STOP
START
C2
T2
T3
C1
T4
C3
R5
T2-1
T3-1
T4-1
R2-2
R3-2
R4-2
R5-1
C3-1
RO-2
CP195-802A (CPXFM10)
EVOLUTION AQUA
EVOLUTION AQUA SKID
SITE:
158623
CUSTOMER ORDER
250041
JOB NO.
EAG-25004-1AB-G4
DRG REF NO.
4
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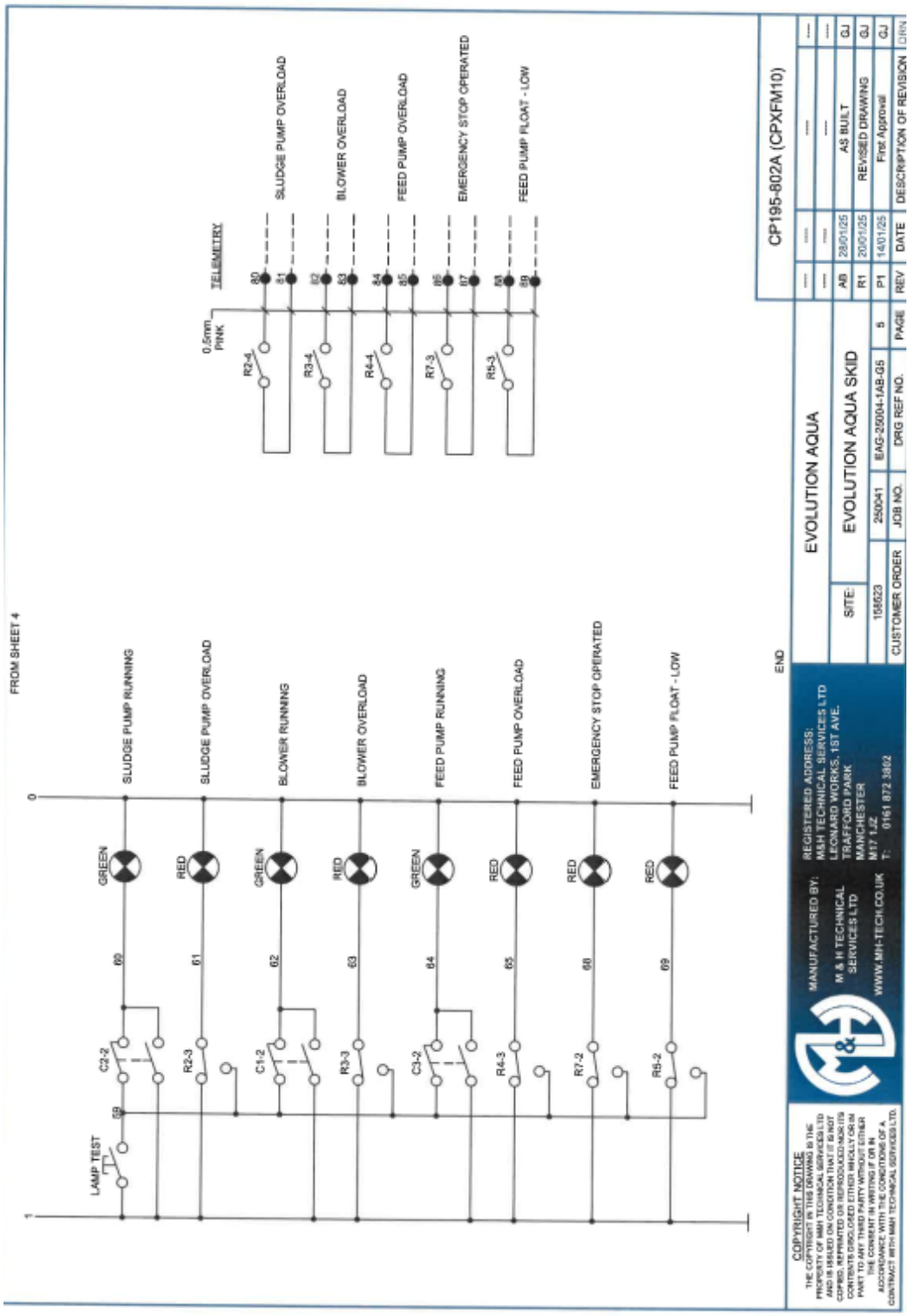
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EVOLUTION AQUA SKID
SITE
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P1 14/01/25 First Approval GJ
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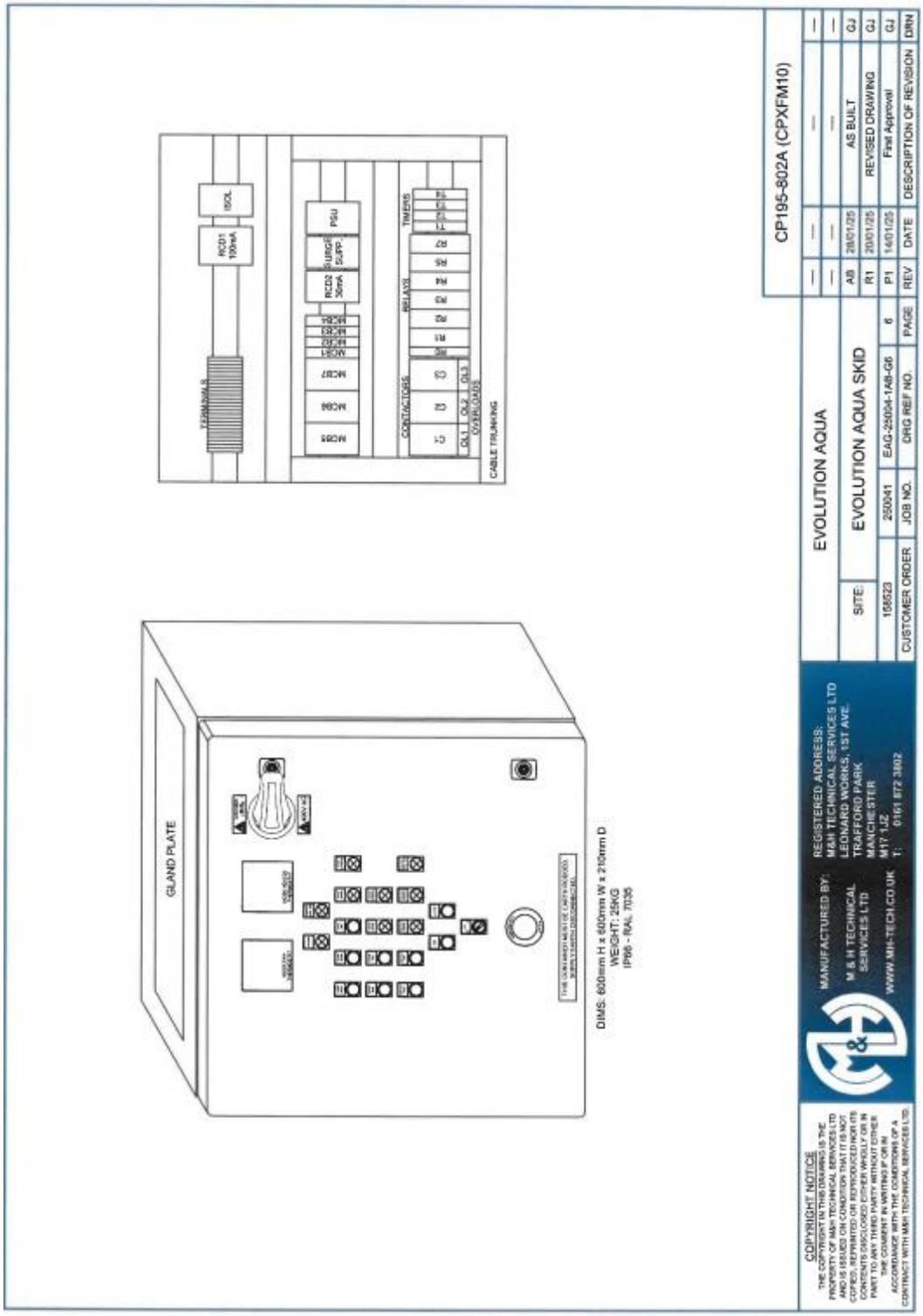
REGISTERED ADDRESS:
M&H TECHNICAL SERVICES LTD
LEONARD WORKS, 1ST AVE.
TRAFFORD PARK
MANCHESTER
M17 1JZ
T: 0161 872 3862
MANUFACTURED BY:
M & H TECHNICAL SERVICES LTD
WWW.MH-TECH.CO.UK
COPYRIGHT NOTICE
FROM SHEET 4
END
SLUDGE PUMP RUNNING
SLUDGE PUMP OVERLOAD
BLOWER RUNNING
BLOWER OVERLOAD
FEED PUMP RUNNING
FEED PUMP OVERLOAD
EMERGENCY STOP OPERATED
FEED PUMP FLOAT - LOW
LAMP TEST
GREEN
RED
TELEMETRY
0.5mm PINK
C2-2
R2-3
C1-2
R3-3
C3-2
R4-3
R7-2
R5-2
R2-4
R3-4
R4-4
R7-3
R5-3


CP195-802A (CPXFM10)
EVOLUTION AQUA
SITE: EVOLUTION AQUA SKID
156523
CUSTOMER ORDER
250041
JOB NO.
EAG-25004-1AB-G6
DRG REF NO.
6
PAGE
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20/01/25
14/01/25
DATE
AS BUILT
REVISED DRAWING
First Approval
DESCRIPTION OF REVISION
GJ
DRN
MANUFACTURED BY:
M & H TECHNICAL SERVICES LTD
WWW.MH-TECH.CO.UK
REGISTERED ADDRESS:
M&H TECHNICAL SERVICES LTD
LEONARD WORKS, 1ST AVE.
TRAFFORD PARK
MANCHESTER
M17 1JZ
T: 0161 872 3802
COPYRIGHT NOTICE
ISOL
RCD1 100mA
RCD2 30mA
PSU
SURGE SUPP.
MCB8
MCB7
MCB6
MCB5
CONTACTORS
OL1
OL2
OL3
OVERLOADS
RELAYS
TIMERS
CABLE TRUNKING
GLAND PLATE
DIMS: 600mm H x 400mm W x 210mm D
WEIGHT: 25KG
IP66 - RAL 7035

b. Blower Specification (2BH1510-1HK46)

Elmo Rietschle

**G-BH 1 N**

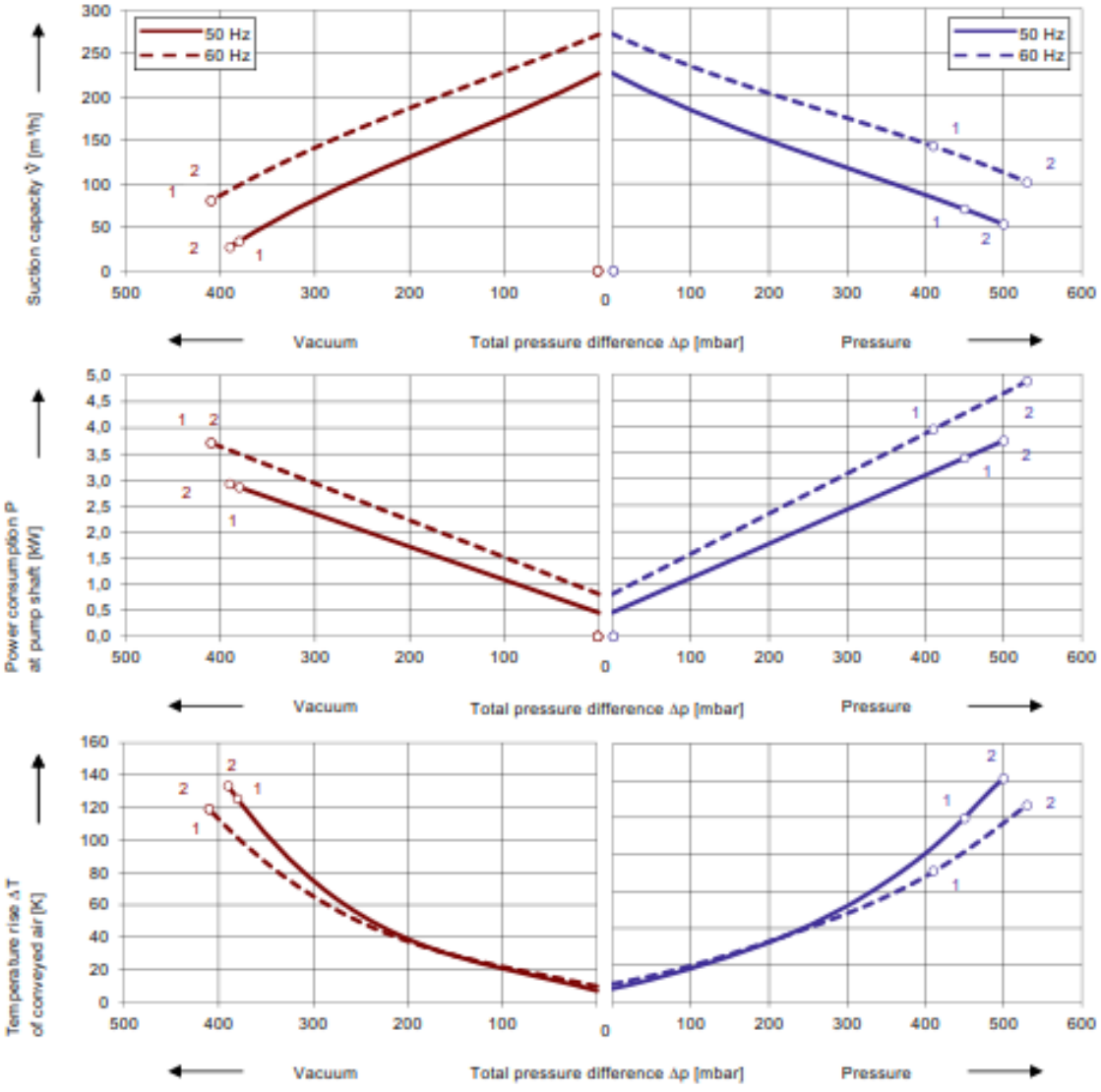
**Data sheet 2BH1 510**

**Side channel blower with IE3-motors**

IE3

**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 ± 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

| No. | Frequency | Rated | | | Max. differential pressure [2] | | Sound press. level [3] | Efficiency class [4] | Weight approx. | Order No. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Voltage [1] | Current | Power | Vacuum | Pressure | | | | |
| | Hz | V | A | kW | mbar | | dB(A) | | kg | |
| **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 | 13,3 Δ | 3,45 | -380 | 450 | 72 | IE3 | 53 | **2BH1510-1HK41** |
| | 60 | 190-210 YY / 380-420 Y | 15,0 YY / 7,5 Y | 4,0 | -410 | 410 | 74 | IE3 | | |
| | 60 | 200 YY | 15,0 YY | 4,0 | -410 | 410 | 74 | NP | | |
| 2 | 50 | 190-210 Δ | 17,1 Δ | 4,6 | -390 | 550 | 72 | IE3 | 63 | **2BH1510-1HK61** |
| | 60 | 190-210 YY / 380-420 Y | 19,4 YY / 9,7 Y | 5,3 | -420 | 530 | 74 | IE3 | | |
| | 60 | 200 YY | 19,4 YY | 5,3 | -420 | 530 | 74 | 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 | 11,6 Δ / 6,7 Y | 3,45 | -380 | 450 | 72 | IE3 | 53 | **2BH1510-1HK46** |
| | 60 | 220-240 YY / 440-480 Y | 13,0 YY / 6,5 Y | 4,0 | -410 | 410 | 74 | IE3 | | |
| | 60 | 230 YY / 460 Y | 13,0 YY / 6,5 Y | 4,0 | -410 | 410 | 74 | NP | | |
| 2 | 50 | 220-240 Δ / 380-420 Y | 14,9 Δ / 8,6 Y | 4,6 | -390 | 550 | 72 | IE3 | 63 | **2BH1510-1HK66** |
| | 60 | 220-240 YY / 440-480 Y | 16,8 YY / 8,4 Y | 5,3 | -420 | 530 | 74 | IE3 | | |
| | 60 | 230 YY / 460 Y | 16,8 YY / 8,4 Y | 5,3 | -420 | 530 | 74 | 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 Y | 5,4 Y | 3,45 | -380 | 450 | 72 | IE3 | 53 | **2BH1510-1HQ43** |
| | 60 | 575 Y | 5,2 Y | 4,00 | -410 | 410 | 74 | NP | | |
| 2 | 50 | 500 Y | 6,8 Y | 4,6 | -390 | 550 | 72 | IE3 | 63 | **2BH1510-1HQ63** |
| | 60 | 575 Y | 6,7 Y | 5,3 | -420 | 530 | 74 | 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 | 380-420 Δ / 660-725 Y | 6,7 Δ / 3,85 Y | 3,45 | -380 | 450 | 72 | IE3 | 53 | **2BH1510-1HQ47** |
| | 60 | 440-480 Δ | 6,5 Δ | 4,0 | -410 | 410 | 74 | IE3 | | |
| | 60 | 460 Δ | 6,5 Δ | 4,0 | -410 | 410 | 74 | NP | | |
| 2 | 50 | 380-420 Δ / 660-725 Y | 8,6 Δ / 5,0 Y | 4,6 | -390 | 550 | 72 | IE3 | 63 | **2BH1510-1HQ67** |
| | 60 | 440-480 Δ | 8,4 Δ | 5,3 | -420 | 530 | 74 | IE3 | | |
| | 60 | 460 Δ | 8,4 Δ | 5,3 | -420 | 530 | 74 | NP | | |

1) In case of frequency converter operation the standard motor insulation system is suitable for converter input voltages up to 500 V.

2) Relief valves available for limiting differential pressure.

3) 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).

4) The motors according to NEMA MG1-12. NP=NEMA Premium; NEMA Premium includes IE3.

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 | | Efficiency [4] | cULus | | |
|---|---|---|---|---|---|
| 50 Hz | 60Hz | | 60 Hz | 2BH1...-1. □ - □ | |
| 3~ | | | | | |
| 200 VΔ | 200 V YY / 230 VΔ / 400 VY | NEMA Premium | • | K | 1 |
| 190-210 VΔ | 190-210 VYY / 220-240 VΔ / 380-420VY | IE3 | | | |
| 200 VΔ / 230 VΔ / 400 VY | 230 V YY / 460 VY | NEMA Premium | • | K | 6 |
| 190-210 VYY / 220-240 VΔ / 380-420VY | 220-240 VYY / 440-480VY | IE3 | | | |
| 475-525 V Y | 550-600 V Y | NEMA Premium | • | Q | 3 |
| 475-525 VΔ | 550-600 VΔ | NEMA Premium | • | Q | 5 |
| 400 VΔ / 690 V Y | 460 VΔ | NEMA Premium | • | Q | 7 |

c. Sludge Pump Specification

Specification Sheet – Part Number – 2404550333EUM

Waterco Hydrostar MKIV Datasheet

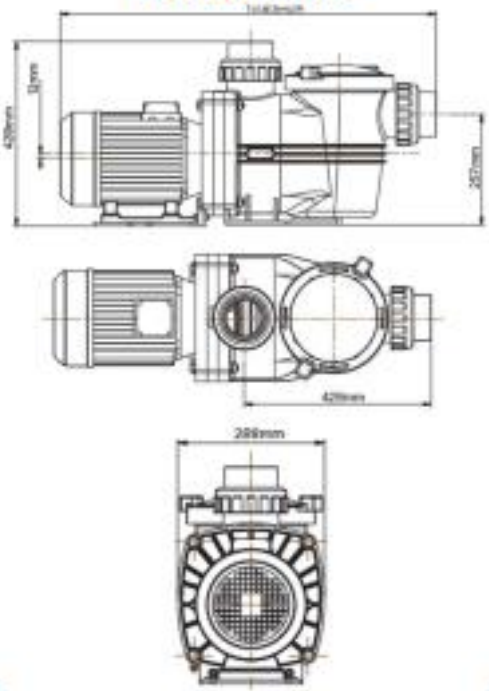
WATERCO
Water, the liquid of life

# WATERCO 5.5HP Hydrostar MKIV Pump

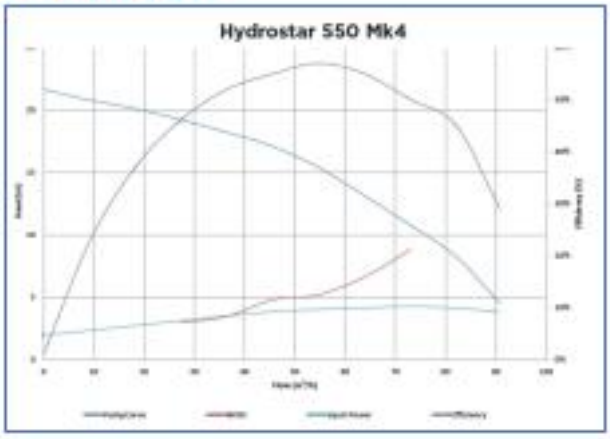
The Hydrostar Plus range is purpose built for aquatic facilities, water parks and large commercial swimming pools. Hydrostar Plus pumps are high performance corrosion resistant thermoplastic pumps.

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

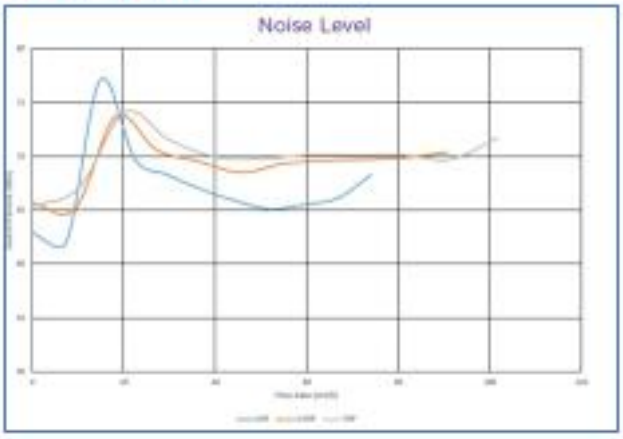
## Dimensions




## 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)

BN thermic

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.

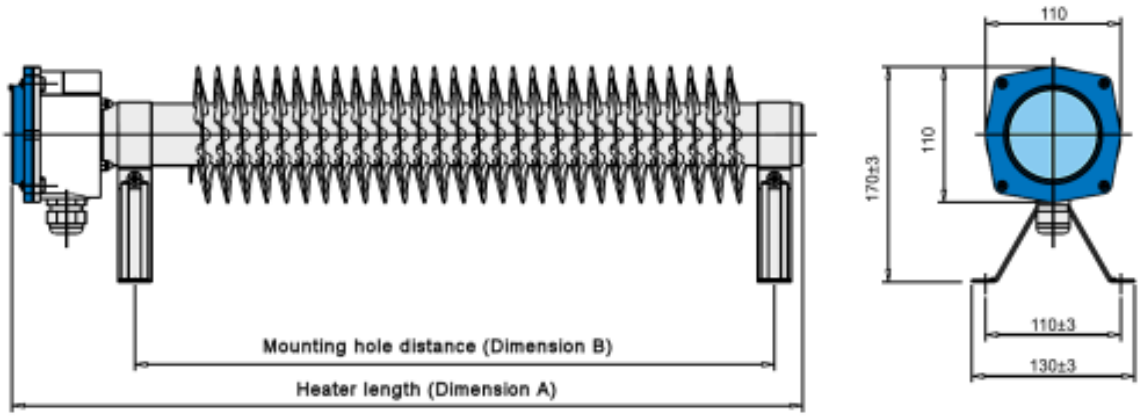
- The Health & Safety at Work Act 1974 makes owners of electrical appliances responsible for the safe condition of those appliances and the safety of the appliance operators. If in any doubt about electrical safety, contact a qualified electrician.
- Installation should always be carried out by a qualified 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.

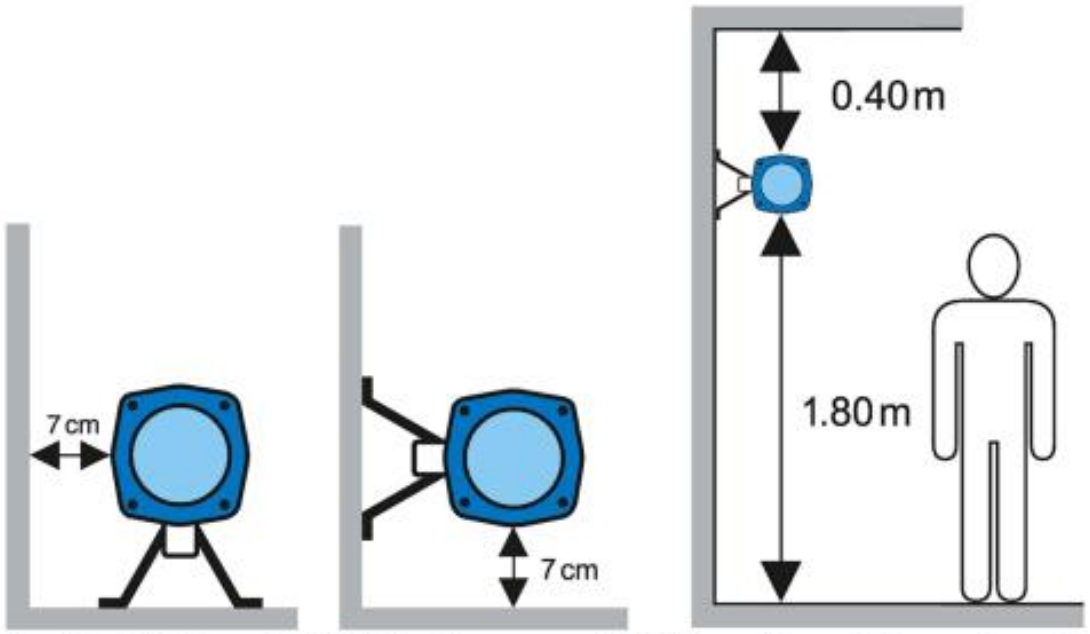
When the heater is installed in an area to which personnel have access the SWG protective guard must be used.

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 place 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.

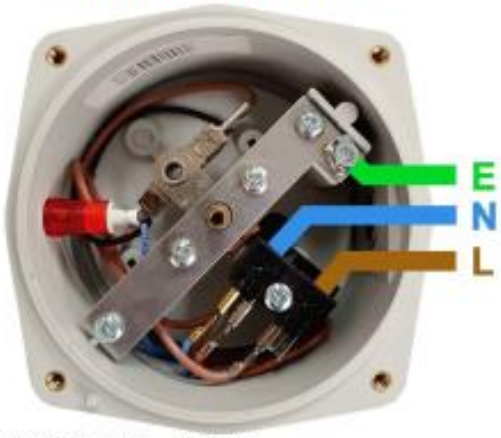
## 4. ELECTRICAL CONNECTIONS

### 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.

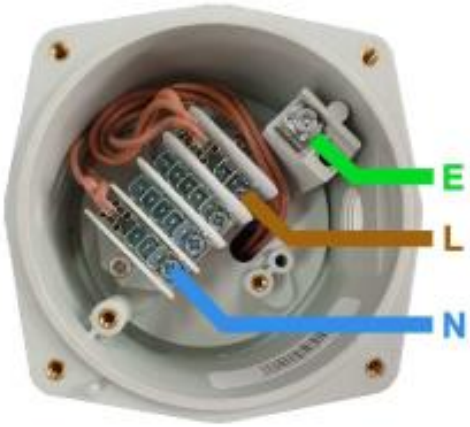
**500W Model No. SWD-U-500**


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.

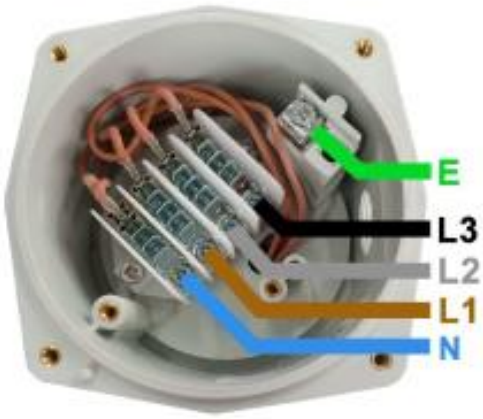
Please Note:- Specified cable sizes are for typical installations, correction factors may need to be used when determining actual cable sizes.

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

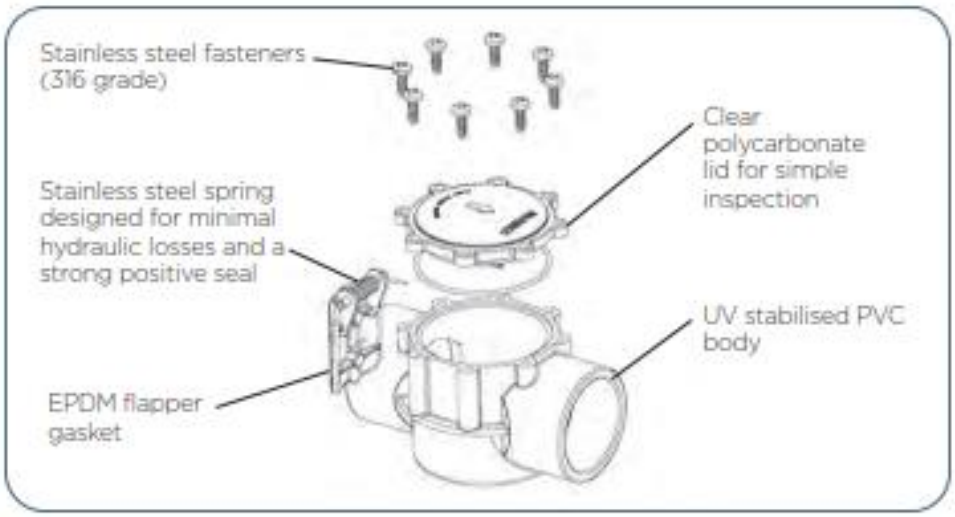
Flow Check Valve 180°

**FLOW CHECK NON RETURN VALVE**

| Part No. | Product Description | Nom. Size |
|---|---|---|
| 14653 | Flow Check Valve 180° | 63/75mm |
| 14651 | Flow Check Valve 180° | 2"/2½" |
| 146539 | Flow Check Valve 90° | 63/75mm |
| 146519 | Flow Check Valve 90° | 2"/2½" |

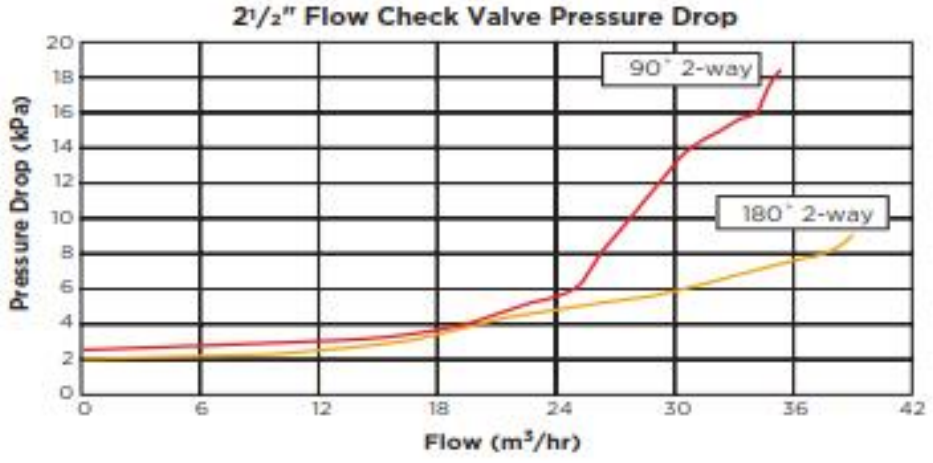
The Flow Check Valve has been designed to be simple to install, inspect and service. With a stainless steel spring designed for minimal hydraulic losses and a stronger positive seal, it is ideal for both inlet and return lines.

Flow Check Valve 90°




- 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.

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.



## 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 PG11 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

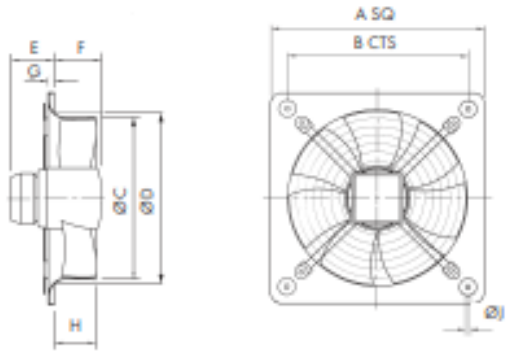
Fan sound levels are measured in a reverberant chamber in accordance with BS848 Part 2 1985. Published dB(A) figures are free field sound pressure levels at 3m with spherical propagation at a reference level of $2 \times 10^{-5}$ Pa (20 micro-Pascal). The sound power level spectra figures are dB with 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:

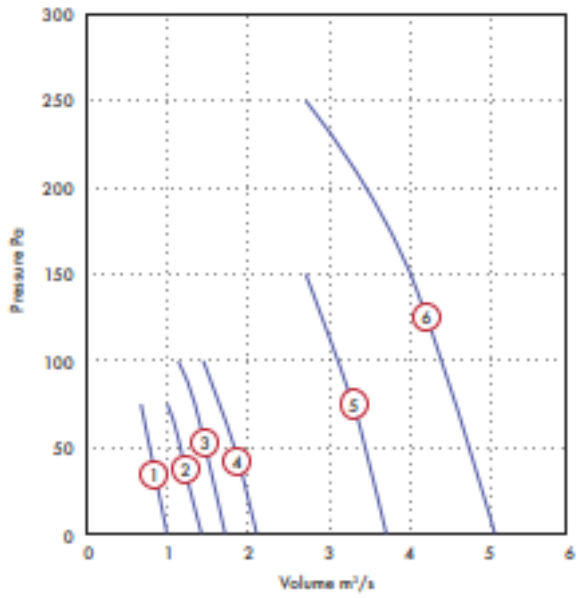
- Electronic Speed Controllers
- Auto Transformer Speed Controllers
- D.O.L Starters & Overloads
- Discharge Guards
- Louvre Shutters

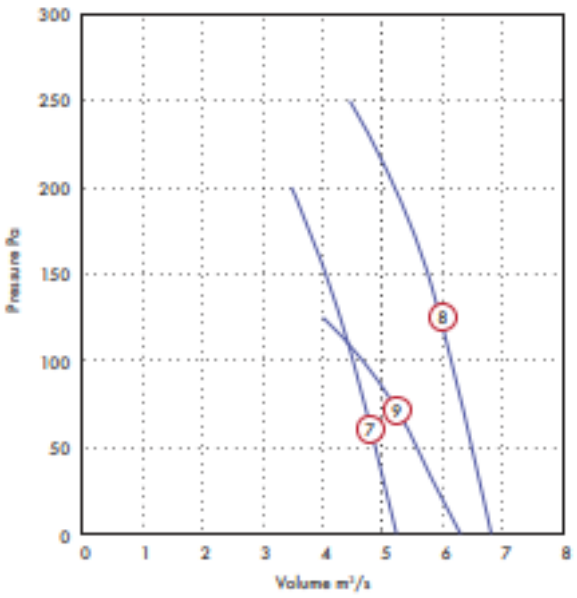
## Dimensions (mm)




| 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. | m³/s @ Pa 0 | 50 | 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 |