



A WCS Group Company

3FBO MICROSCREEN INSTALLATION, OPERATION & MAINTENANCE MANUAL

SITE NAME:

REFERENCE NUMBER:

TABLE OF CONTENTS

| | | |
|-----------|--|-----------|
| 1. | SAFETY..... | 4 |
| 1.1 | Health and safety at work act 1974: | 4 |
| 1.2 | Leptospirosis: | 4 |
| 1.3 | Sensible precautions:..... | 5 |
| 1.4 | Vaccinations: | 5 |
| 1.5 | Warranty period: | 5 |
| 1.6 | Warranty limitations and exemptions: | 5 |
| 1.7 | Chargeable non-warranty work: | 6 |
| 2 | PRINCIPLE OF FILTRATION..... | 7 |
| 2.1.1 | SS (mg/l), mesh (microns)..... | 8 |
| 2.1.2 | Secondary filter layer..... | 8 |
| 3 | FILTER DESCRIPTION..... | 9 |
| 4 | FILTER TYPE DESIGNATION | 10 |
| 4.1 | Filter size | 11 |
| 4.2 | Filtration and usable surface area of the drum | 11 |
| 5 | OPERATION..... | 12 |
| 6 | TECHNICAL PARAMETERS..... | 13 |
| 7 | INSTALLATION INSTRUCTIONS | 15 |
| 8 | ASSEMBLY AND COMMISSIONING..... | 16 |
| 8.1 | Shutdown of the unit (for longer than 2 days) | 18 |
| 9 | OPERATING INSTRUCTIONS | 19 |
| 10 | ROUTINE MAINTENANCE..... | 20 |

| | | |
|-------------|--|-----------|
| 10.1 | Pressure Sensors: | 20 |
| 10.1.1 | Safe removal of the sensor cap for cleaning | 21 |
| 10.1.2 | Care of the probe | 21 |
| 10.2 | Spray Bar Nozzles: | 21 |
| 10.2.1 | Spray jet operation image and valve for rinsing the jets | 22 |
| 10.2.2 | Correct and incorrect operation of the spray bar nozzles | 22 |
| 10.3 | Backwash Pump and filter mesh: | 22 |
| 10.3.1 | Clean and dirty basket images | 23 |
| 10.4 | Drum drive belts and drive shaft: | 23 |
| 10.4.1 | Drum drive belt rotation | 24 |
| 10.4.2 | Shaft mounting | 24 |
| 10.5 | FILTER CLOTH REPLACEMENT | 24 |
| 11 | TROUBLESHOOTING | 28 |
| 12 | KEY COMPONENT PHOTOS | 30 |
| 12.1.1 | Inlet probe – removed from pot. Probe controls backwash and drum drive operation. | 30 |
| 12.1.2 | Backwash pump – removal requires undoing the connector and hose and lifting out the pump using handle (later models). | 30 |
| 12.1.3 | Backwash pump strainer/filter – requires checking and cleaning regularly to ensure it is free from debris, preventing the mesh blocking & the pump dry running –the potential for blockages will vary from site to site. | 30 |
| 12.1.4 | Backwash drain valve – allows complete backwash drain down and removal of debris. | 31 |
| 12.1.5 | Spray bar drain and washdown point- can be fitted with a hose and the backwash run manually to clean down the unit if required. | 31 |
| 12.1.6 | Door microswitch/deadlock – unit will not operate with the door open and the switch not depressed. | 32 |
| 12.1.7 | Spray bar jet– several jets are placed along each spray bar. N.B.: Blockages can be cleared with a piece of stiff wire and then running the backwash pump in manual with the door closed. | 32 |
| 12.1.8 | Sludge pump – controlled via a pressure probe in the sludge compartment | 33 |
| 13 | TECHNICAL INFORMATION | 34 |
| 13.1 | OPERATING FLUID LEVELS – (from screen level in mm) | 34 |
| 13.2 | INLET AND OUTLET SIZES | 34 |
| 13.3 | WEIGHTS OF MICROSCREEN DRUM FILTERS (SKID MOUNTED) | 34 |
| 13.4 | MICROSCREEN DRUM FILTERS DIMENSIONS (SKID MOUNTED) | 34 |
| 13.5 | MATERIALS AND GENERAL INFORMATION | 34 |
| 13.6 | BACKWASHING RATES | 35 |
| 13.7 | MESH SIZE AND MAXIMAL FLOW RATES 3FBO | 35 |

| | | |
|-------------|--|-----------|
| 13.8 | CONTROL PANEL | 35 |
| 14 | APPENDIX ARTICLE..... | 36 |
| 14.1 | Appendix article 2: FB/O, 3 spare parts..... | 38 |
| 14.2 | Appendix article 3: Sludge pump Technical Data 1..... | 39 |
| 14.3 | Appendix article 4: Sludge pump Technical Data 2..... | 40 |
| 14.4 | Appendix article 5: Backwash pump Technical Data 1..... | 41 |
| 14.5 | Appendix article 6: Backwash pump Technical Data 2..... | 42 |
| 14.6 | Appendix article 7: P&ID Schematic Diagram | 43 |
| 14.7 | Appendix article 8: Siemens LOGO – Data Sheet | 44 |

Revision table:

| REVISION | CHANGES TO VERSION | DATE | BY |
|-----------------|---------------------------|-------------|-----------|
| A | FIRST ISSUE | 18/10/2022 | TC |
| B | REVISED LAYOUT | 29/11/2022 | TC |
| | | | |
| | | | |
| | | | |

1. SAFETY

When using and performing maintenance on the filters in this document, it is extremely important that maintenance procedures in this document are followed. Any deviation from this could cause serious injury or have a detrimental effect on the filter and its operation.

1.1 Health and safety at work act 1974:

Section 6a of this act requires manufacturers to advise their customers on safety and handling precautions to be observed when operating, maintaining and servicing their products.

The user's attention should be drawn to the following:

- All sections of this manual should be read before undertaking work on the equipment.
- Suitably trained personnel must carry out the installation.
- Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.
- Refer to WCSEE Ltd for further technical advice or product information.

1.2 Leptospirosis:

The following is extracted from a health warning card issued to WCSEE Ltd's staff. It is the client's responsibility to ensure that the relevant Personal Protective Equipment (PPE) is available and used.

There are two types of Leptospirosis that effect people in the UK and they are as follows:

1. Weil's disease, which is a serious infection transmitted to humans by contact with soil, water or sewage that has become contaminated with urine from infected rats.
2. Hardjo-type Leptospirosis, which is transmitted from cattle to humans.

The typical symptoms for both diseases start with a flu like illness, with a persistent and severe headache, muscle pains and vomiting. Jaundice generally appears on the fourth day of the illness.

The bacteria can enter your body through cuts and scratches or through the lining of the mouth, throat and eyes.

1.3 Sensible precautions:

After working with contaminated fluid or materials it is important that hands and forearms are washed thoroughly with soap and water. If your clothing or boots become contaminated then they should also be washed after use.

Immediate action should be taken, so that any cuts scratches or abrasions are washed thoroughly with clean water, prior to applying any protective covering (plaster or bandage).

Do not handle food, drink or smoking material without first washing your hands. If you display any of the symptoms described after coming in to contact with sewage; report to your doctor immediately advising them of the circumstances.

1.4 Vaccinations:

To avoid the possibility of illness it is recommended that all site personnel have the following vaccinations. WCSEE Ltd also recommends that you that you consult your doctor for any additional vaccinations that you may require. The general vaccinations WCSEE use for all personnel are as follows:

- Hepatitis A
- Hepatitis B
- Polio
- Tetanus
- Typhoid/cholera – probably carried out as a child.

1.5 Warranty period:

There is a 24-month guarantee with this product. WCSEE Ltd takes no responsibility for improper storage, or bad installation/maintenance performed by unqualified personnel. This also covers the overloading of the filter, above that of normal conditions, and any other accidental cause or disregard for the information in this document.

1.6 Warranty limitations and exemptions:

WCSEE Ltd shall not be liable for any labour involved for the removal or replacement of its equipment or the subsequent transportation, handling or packaging of any part or parts thereof. In no case will WCSEE Ltd be liable for loss incurred because of interruption of service or for consequential damages, labour or expense required to repair defective units, nor shall this constitute a cause for the cancellation of the contract of purchase and sale. Specifically exempt from this warranty are limited life of consumable components subject to normal wear and tear, such as air pump vanes, diaphragms and filters.

1.7 Chargeable non-warranty work:

Service charges will be incurred (including parts and labour), due to the following:

- Unauthorised alteration.
- Accidental damage.
- Improper use.
- Abuse.
- Tampering.
- Failure to follow installation instructions or failure to follow operating and maintenance procedures.

The above will not be covered by this warranty and are not assumed by WCSEE Ltd. All service visits for non-warranty work are chargeable. This warranty gives specific additional benefits. Statutory rights are unaffected.

Note: WCSEE Ltd will not uphold the guarantee on the purchased filter if the routine maintenance has not been performed and documented.

WCSEE Ltd strongly recommends that the installation of the purchased product is carried out by a qualified and experienced installer. Dependent on the site a qualified civil engineer may need to be consulted for the construction of suitable base materials.

2 PRINCIPLE OF FILTRATION

Water containing solid particles flows through the filter cloth/sieve of the given structure which has openings of a certain size. The filter cloth traps impurities which are bigger than openings in the filter cloth while smaller particles, including water, flow through the filter. As the filter cloth slowly becomes clogged by the increasing amount of filtered impurities, the filter cloth must be backwashed so it can function again.

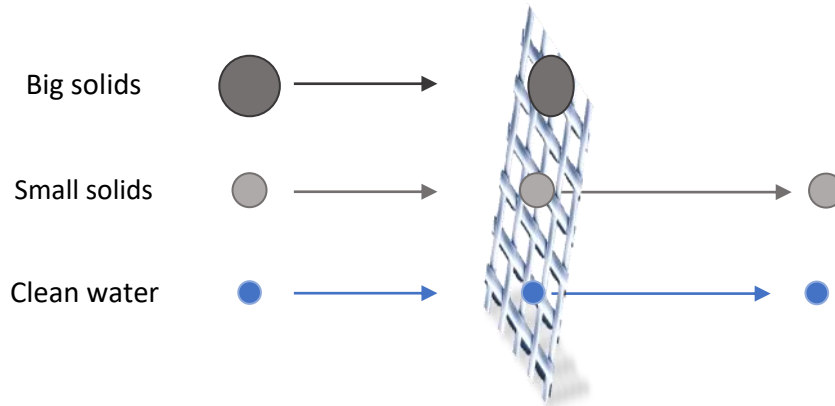


Fig. 1 Filtration principle

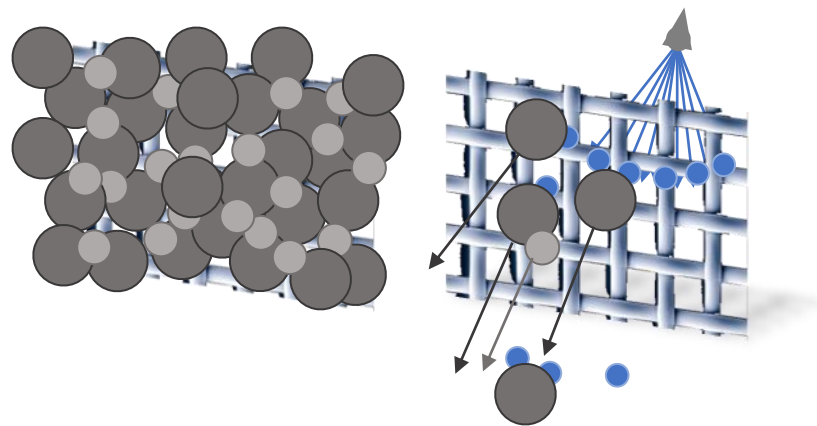


Fig. 2 Filter cloth cleaning

2.1.1 SS (mg/l), mesh (microns)

Suspended solids (SS) are in mg/l and show how many SS (e.g. flocs and other debris) are in one litre of water. It is just a reference parameter. It is also important to know what solids look like and select the mesh accordingly.

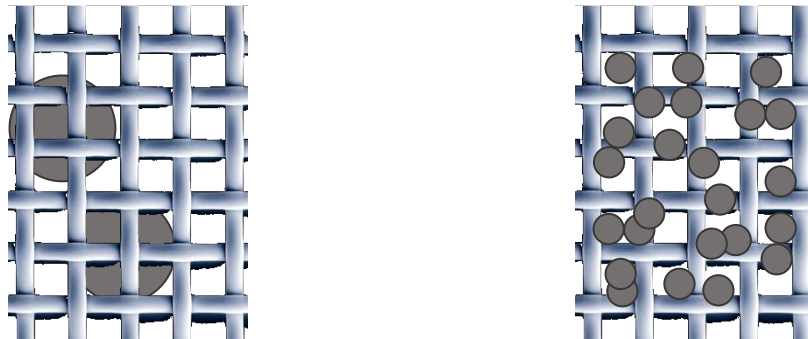


Fig. 3 The same value of SS (mg/l), but solids are of different sizes

2.1.2 Secondary filter layer

Filter capacity is greatly influenced not only by the volume but also by **the nature of filtered SS**. What matters is their size (flat particles tend to clog openings more easily than round ones), mechanical strength (compact particle can be filtered better than non-compact slimy ones) and the proportion of small and big particles in the total volume of influent. If a certain number of compact solids, bigger than the mesh openings, occur, it can result in a thin layer of sludge - **secondary filter layer**, which is capable of catching solids which are considerably smaller than the size of mesh openings, see figure 4. It is therefore advisable to choose a filter with a greater filter area so the filter idle time is as long as possible and an efficient secondary filter layer can form on the inner side of the mesh. This layer is flushed down to the sludge channel during backwash.

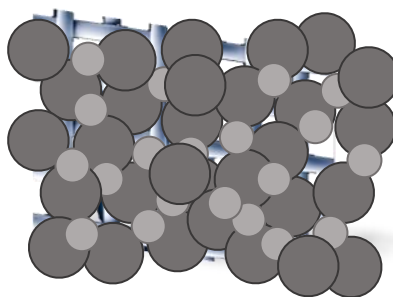


Fig. 4 Secondary filter layer

3 FILTER DESCRIPTION

The microscreen drum filter is a filtration unit. The filter is made up of a drum with filter cartridges. Above the filter is a backwash unit and inside the filter is a sludge channel. The cover which protects the filter cartridges from sunlight and other weather influences is supported by struts. Probes and other necessary filter parts are placed on the frame of the unit.

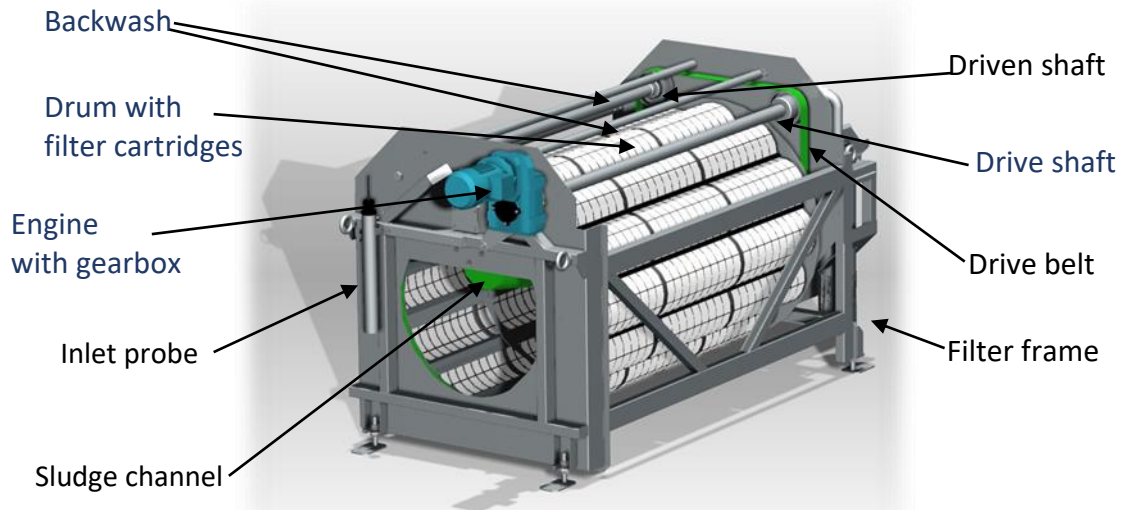


Fig. 5 Parts of the unit – viewed from the inlet side (FBB)

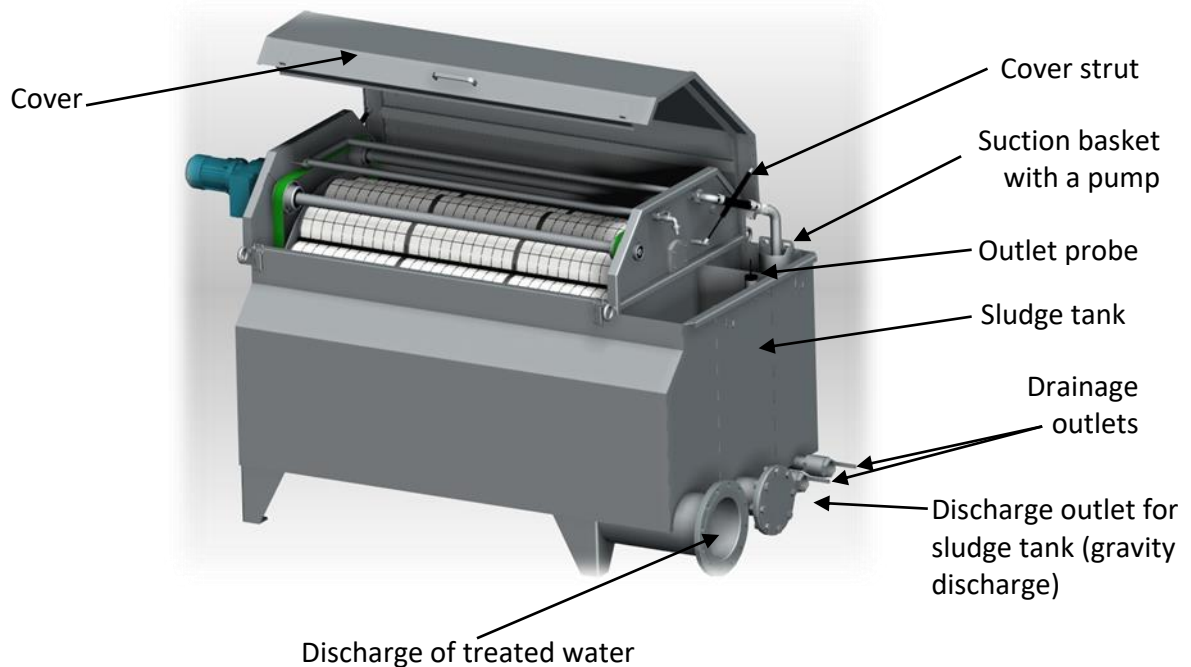
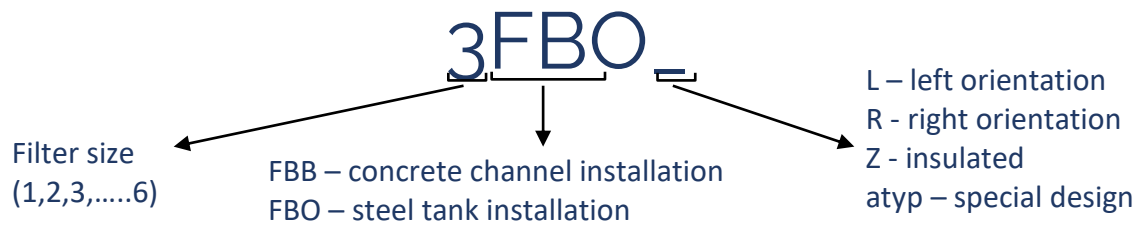


Fig. 6 Parts of the filter unit – viewed from the outlet side (FBO)

4 FILTER TYPE DESIGNATION



Note: the filter orientation is defined by the filter cover opening side. When water flows through the filter from left to right, it is right-hand orientation and vice versa (see Fig. below)

Note: This guide is for 3FBO micro screen drum filters.



Fig. 7 Right-hand orientation of the filter

4.1 Filter size

Filter size is given by the number of filter cartridges in a row along the circumference of the filter drum (see Table 1).

| FILTER TYPE | NO. OF CARTRIDGES IN A ROW | NO. OF ROWS ON THE DRUM CIRCUMFERENCE | TOTAL NO. OF CARTRIDGES |
|--------------------|----------------------------|---------------------------------------|-------------------------|
| 1FBO | 1 | 7 | 7 |
| 2FBO | 2 | 9 | 18 |
| <u>3FBO</u> | <u>3</u> | <u>12</u> | <u>36</u> |
| 4FBO | 4 | 15 | 60 |
| 5FBO | 5 | 18 | 90 |
| 6FBO | 6 | 23 | 138 |

Table 1 Filter size

4.2 Filtration and usable surface area of the drum

| FILTER TYPE | FILTRATION AREA IN THE DRUM IN m ² | USABLE FILTER AREA IN m ² |
|--------------------|---|--------------------------------------|
| 1FBO | 0,728 | 0,416 |
| 2FBO | 1,872 | 1,109 |
| <u>3FBO</u> | <u>3,744</u> | <u>2,392</u> |
| 4FBO | 6,240 | 4,16 |
| 5FBO | 9,360 | 6,24 |
| 6FBO | 13,104 | 8,736 |

Table 2 Filtration surface area

5 OPERATION

Water, containing suspended solids, flows through the inlet pipe and into the interior of the filter drum. The suspended solids remain on the inside of the filter cloth as the filtered fluid flows through to the chamber beneath and over the effluent weir. The entire filter remains off, i.e. not rotating during this process.

As the filter cloth slowly becomes blinded by the increasing amount of filtered solids, the resistance to the flow increases, thus causing the water level inside the filter drum to rise. When the pre-set level is reached in the pipe at the influent side of the filter, it activates the drum drive unit and the backwash pump simultaneously. The backwash pump then sends filtered water to the jet rinse system.

The direct stream of water from the jet rinse system removes the solids accumulated on the inside of the filter cloth. The solids then flow out from the inside of the drum through the waste collection trough located inside the drum, directly below the jet rinse system. The solids then wash into the silt sump, where they are pumped away by the silt pump (if fitted). The Microscreen drum filter may be provided with a gravitational discharge pipe from the silt sump.

The silt pump is fully automatic and will only activate when the water level inside the silt collection reservoir/sump reaches the pre-set level. The pump will automatically shut off when the fluid level is pumped down below the low-level set point.

A clean portion of filter cloth is presented at the bottom of the filter as the drum revolves. The water level then drops as a result of the reduced resistance to the flow through the unit. The low level in the pipe simultaneously stops the drum drive motor and the backwash pump. The rotating drum and pump remain off until reactivated, at which point the entire cycle is repeated as described above.

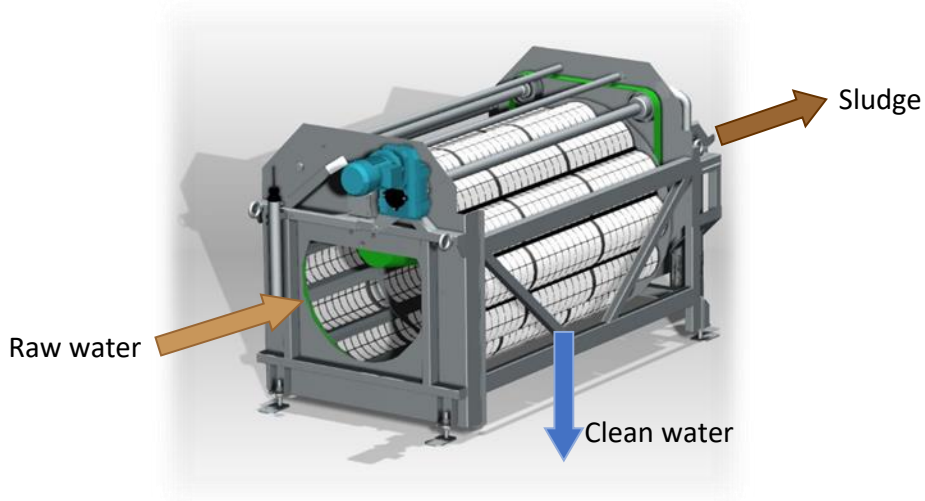


Fig. 8 Flow of water through the filter

Note: The average operating and rest cycles of the filter should be dependent on the level of suspended solids entering the filter, the flow into the filter, and the properties of the suspended solids contained in the influent stream.

The condition of the filter cloth can also have an impact on the number of cycles the filter performs.

The influent flow remains uninterrupted throughout the whole filtration process, with the rinse water taken directly from the filter, alleviating the requirement for an external water source.

6 TECHNICAL PARAMETERS

The filtration capacity is determined primarily by the effective working surface area of the filter cloth. The second and third parameters are the size of the apertures in the filter cloth and the area of the freely functioning surface.

The composition of the solid particles also has a significant effect on the capacity of the filter, dependent on the shape (i.e. flat particles block the openings more efficiently than round particles), the density (solid particles are filtered better than non-solid mucus), and the amount of small and large particles in the entire volume of influent.

When a certain amount of dense particles, larger than the filter cloth openings, are reached, a thin silt layer is formed on the filter cloth. This silt

layer acts as additional filtration that enables the cloth to catch particles that are much smaller than the actual openings.

When the backwash cycle is activated, the silt layer will be removed by the jet rinse system and sent to the silt sump.

The filtration process, during any given period, is affected by all of the aforementioned characteristics; it is advisable to conduct field trials to ascertain the optimum type of screen and micron rating for the screen cloth for any given site.

On average, the amounts of water that may pass through the filter using **20 micron cloth**, under optimum conditions are as follows:

3FBO - Max flow with 20 micron cloth – 13.7 L/s

NOTE: - During the backwash cycle and due to the screen backing up with flow, there will be an inrush of flow on top of the inlet flow which needs to be considered when determining the outlet pipework size and flowrate.

When using the Microscreen drum filter as a tertiary filtration process for industrial wastewaters, experience has shown that a filter cloth with a 40micron (0.04 mm) opening is most suitable

Note:

1. Treated water must not contain any grease (oil, fats). The filter will become clogged by grease which cannot be rinsed off.
2. Sand (not even diatomaceous powder) cannot be allowed to enter the filter unit. Damage can be caused to the filter (e.g. Bearings). it will be necessary to use a sand trap and sand separator to remove sand in the pre-treatment phase.

7 INSTALLATION INSTRUCTIONS

When deciding where to locate the Microscreen drum filter, for optimum performance, the flow into the screen should be a gradual gravitational flow, thus preventing the break-up of solid particles.

Rough solid particles larger than 3cm and sharply pointed materials should be 'pre-screened' from the influent before entering the filter.

The filter **MUST NOT** be installed following a chlorine contact tank. The chlorine residual will shorten the life span of the filter cloth to 3 months or less.

The filter must be set in a horizontal position with a maximum allowable level divergence not to exceed 3mm.

The effluent pipe must be kept clean of obstructions at all times. The water level following the filter must **NOT** be allowed to rise to such an extent that the inability of the effluent to flow out causes a backflow into the filter. The unchecked flow of water back into the filter will cause the water level inside the filter to rise and possibly overflow and the filter will stop functioning.

For minimum and maximum water level differences between the influent and effluent lines refer to Microscreen drawings and level table in section 14.1.

If either the filter capacity is exceeded or the filter stops functioning, water will pass unfiltered through the unit. Construction of a bypass line is not necessary; however, it may be advantageous to install a bypass in order to halt the influent flow so that routine maintenance (i.e. changing the cloth) can be performed. Filters installed in a concrete channel can be lifted out of the channel to perform routine maintenance without interrupting the water flow. Therefore, a bypass channel may not be required.

NOTE: DRAIN DOWN THE SCREEN IF IDLE IN FREEZING CONDITIONS AS THE FLUID EXPANSION DURING THE FREEZING PROCESS CAN CAUSE CLOTHS TO TEAR OR DISTORTION IN THE TANK'S CONSTRUCTION.

8 ASSEMBLY AND COMMISSIONING

The filter must be levelled on a stable area with maximum allowance of 3 mm (length of the unit) using wedges (FBO).



Fig. 11 Checking the horizontal position of the unit (on the shaft, from the side)

If the filter does not have a gravity discharge and sludge is pumped out by a sludge pump, it is necessary to connect sludge discharge pipe. Standard delivery includes a 3m-long sludge hose. Ø of the hose changes depending on the filter type.

The influent water should be free of solid coarse particles bigger than 3 mm big, sand and sticky substances including oils and fats.

Outlet of the filtered water must be kept free

The water level behind the filter must not be allowed to rise to such a level that the level in the outside part of the filter drum would rise excessively due to the inability of the effluent to flow out. The filter would stop functioning.

When connecting the filter to the switchboard, it is **necessary to check the correct rotation of the drives** – rotation of the drum (see the arrow on the inner side), the correct rotation of the sludge and backwash pump see Fig.14. If at the start up the pump “kicks” against the direction of the arrow, it must be slightly lifted.

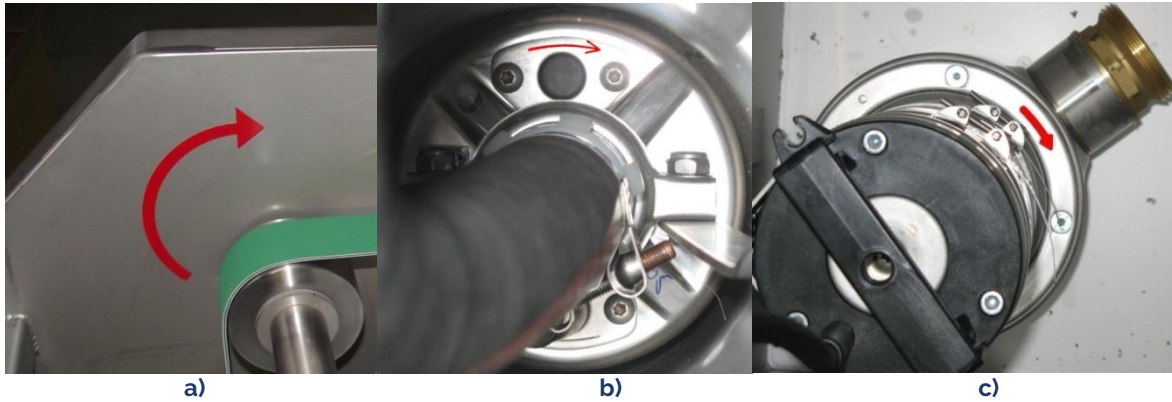


Fig. 14 Direction of rotation
a) drum sense of rotation
b) backwash pump sense of rotation c) sludge pump sense of rotation

When the filter is first put into operation or after a long idle time, it is necessary to fill the inside of the filter with clean water up to the overflow level in order to avoid having very different water levels which would cause the drum or the backwash pumps to start rotating. The pumps would not have enough water and could be damaged. The flow to the filter should be gradual.

Before commissioning the unit, it is necessary to remove all protective packaging including the probe packaging.



Fig. 15 Probe

8.1 Shutdown of the unit (for longer than 2 days)

If you need to shut down the unit for any reason, follow these instructions:
Stop the inflow of raw water into the unit.
Switch the switchboard to manual mode (MAN). Start backwash and check that it is working correctly. Next, rinse all the filter cassettes thoroughly.
Switch off the unit (main circuit breaker). Drain/discharge water and clean all the available parts of the unit, including filters of backwash, probes, belts, etc.

NOTE:

BEFORE STARTING THE FILTER, THE TANK MUST BE FILLED UP TO THE OVERFLOW WEIR WITH CLEAN WATER.

FAILURE TO PERFORM THIS TASK CAN RESULT IN THE CLOTH FILTER TEARING.

THIS MUST BE PERFORMED WHENEVER THE UNIT IS FIRST PUT INTO SERVICE AND WHENEVER THE TANK IS DRAINED!

ONCE THE FILTER HAS BEEN PRIMED WITH FRESH WATER AND THE CONTROL PANEL SWITCHED TO AUTO, AND ALL ROTATIONS HAVE BEEN CHECKED, NO FURTHER COMMISSIONING IS REQUIRED.

9 OPERATING INSTRUCTIONS

The automatic operation of the Microscreen Drum Filter is achieved through the use of pressure sensors/probes, which energise and de-energise the relevant drives.

- There is a probe on the influent side of the filter which is connected to PLC (Siemens) where the levels (switch-off, delayed switch-off¹ for increased level, switch-on, emergency level) are set. The probe monitors the water level in front of the filter and sends signal to the PLC. If the switch-on level is reached, the drum and backwash pump are activated. When the level is dropped under the preset switch-off level, the filter stops running. The cycle repeats all the time. When the emergency level is reached, the filter is in operation for the time set by the timer, and if the level does not drop, the filter stops and a red light of the emergency level switches on on the switchboard.
- There is also one probe in the sludge tank with only two levels (switch-on and switch-off level). The principle is the same as described above on the inlet to the filter.



Fig. 19 Pressure probe (inlet and sludge tank)

The Microscreen Drum Filter can operate in one of three modes:

- A) Continuous operation (M or Manual)
- B) Automatic operation (A or Automatic)
- C) Idle phase (Automatic)

- A) If the switches on the control panel are turned to the M or Manual position, the drum will rotate continuously, the backwash will be continuous, and the silt pump will run continuously (if equipped). This mode of operation is only recommended for extensive cleaning of the cloth or for flushing out the jet rinse system. It is **not** recommended for normal filter operation. It is also important to note that the drum drive and all pumps will operate in the M or Manual position. Opening the lid will deactivate the interlock and the machine will **stop**.
- B) Placing the switch in the A or Automatic position ensures the filter works as it is intended in fully automatic mode. As described previously, the drum drive, backwash pump, and silt pump will only activate when necessary. Please note that the filter will not operate in the A or Automatic modes if the lid is open. By closing the lid, the "Dead Man" switch is activated and the system will operate.
- C) This is a 'soak cycle' in which the drum will rotate in the effluent without backwash pumping, in order to keep the cloth wet or lubricated. This process involves the drum rotating every hour for one minute. If the cycle is not initiated then the cloth is likely to dry out, become brittle and be more prone to tears or cracking

10 ROUTINE MAINTENANCE

The following tasks must be performed at least once a month. (For optimum performance we recommended that the tasks are performed once a week.) Refer to key component photos for further information.

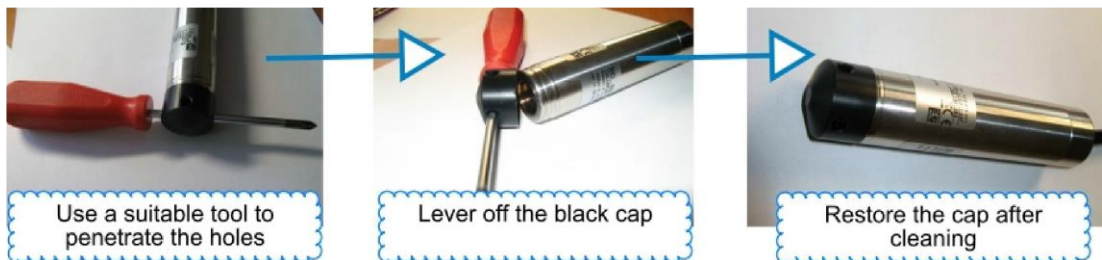
Always ensure the power to the unit is turned off!

10.1 Pressure Sensors:

Inspection frequency: Once a week

Models fitted with pressure sensors require no specific maintenance, however, it is deemed good practice to check for potential blocking of the orifices on the sensor cap and to ensure the tube in which the sensor resides is clear of debris and matter - perform this task weekly. Please refer to sections 11.1.1 and 11.1.2 for safe cleaning instructions:

10.1.1 Safe removal of the sensor cap for cleaning



10.1.2 Care of the probe



Great care should be taken, when cleaning the tip of the probe so that metallic objects do not come into contact with the sensor. This can cause irreparable damage to the sensor!

10.2 Spray Bar Nozzles:

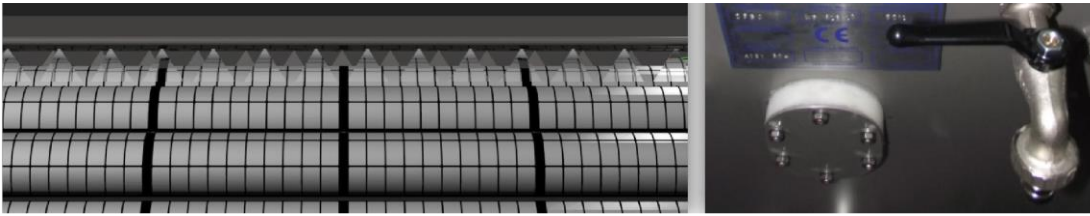
Inspection frequency: Once a week

Visually inspect the nozzles for blockages; should any blockage be apparent then flush out the jet rinse system as follows: (perform this task as required)

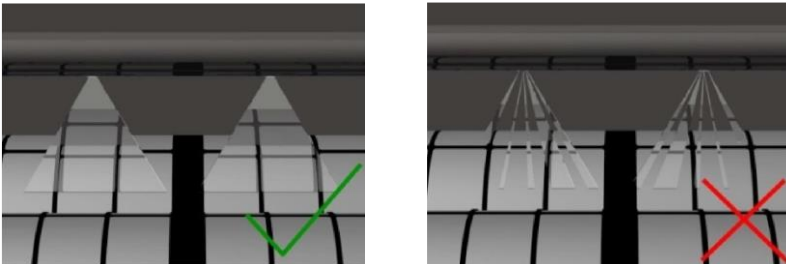
Perform this task as follows:

- Turn the drum drive and backwash pump switch to 'M' or 'Manual'
- Open the drain valve at the end of the jet rinse pipe. This will empty water into the silt pump.
- Run for approximately 2-3 minutes.
- Any obstructions/foreign matter will be removed.
- In the event that a foreign object becomes lodged in the jet rinse system, a 1mm diameter wire can be used to clean the nozzle.
- Remove the pump from the filter; rinse the basket with pressure washer.

10.2.1 Spray jet operation image and valve for rinsing the jets



10.2.2 Correct and incorrect operation of the spray bar nozzles



10.3 Backwash Pump and filter mesh:

Inspection frequency: Once a week

The backwash pump should be checked to ensure the pump filter mesh is not blocked and the backwash chamber is clear of debris. The recommended minimum interval for checking is once a week, however this is site dependant, subject to the type and volume of suspended solids etc within the effluent.

Perform this task as follows:

- Isolate the machine to the 'off' position
- Locate the backwash pump and remove the delivery hose by releasing the lug connection (located at the top of the pump) counter clockwise.
- Withdraw the backwash pump from its housing with the assistance of the lifting handle.
- Open the backwash drain valve to allow any dirty fluid to drain from the backwash chamber.
- Using a hose and suitable hand brush carefully wash the strainer mesh to remove collected debris.
- Refit the pump once clean.

10.3.1 Clean and dirty basket images



10.4 Drum drive belts and drive shaft:

Inspection frequency: Once a month

The belts should be inspected to ensure that they have not incurred any mechanical damage. The recommended frequency of inspections is once a month; however this will be dependent on the site and the intensity of its use.

Perform this task as follows:

- Isolate the machine in to the 'off position'.
- The shaft should be rotated by using the drum start & stop button from the control panel.
- Check the integrity of the shaft and drive belt. This should be done by visual inspection and also running your fingers along its length, ensuring that there are no cracks, abrasions or mechanical damage to the shaft or belt.
- Refer to section 11.4.1 for the definition of the drum drive belt and its intended rotation direction.

10.4.1 Drum drive belt rotation



10.4.2 Shaft mounting

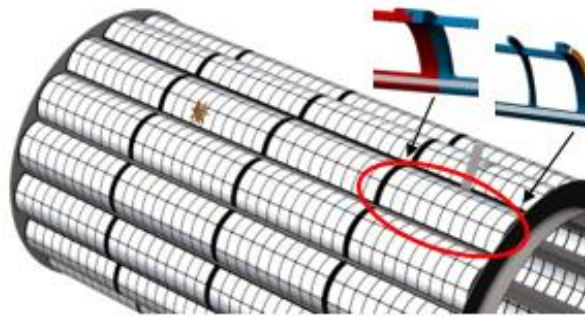


Section 11.4.2 above shows of the location of the drum shaft and its removable, shaft access handles.

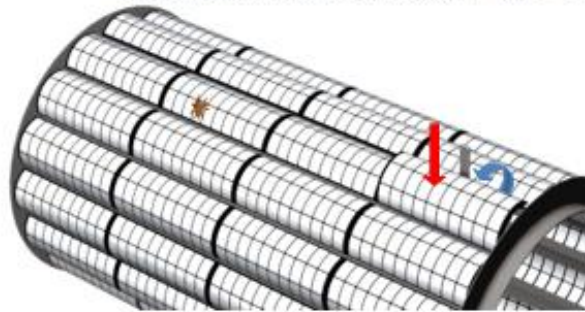
10.5 FILTER CLOTH REPLACEMENT

The filter cloth is attached to a plastic frame and forms a single filter cartridge which is the same for all the filter sizes. Different filter sizes only mean a different number of filter cartridges.

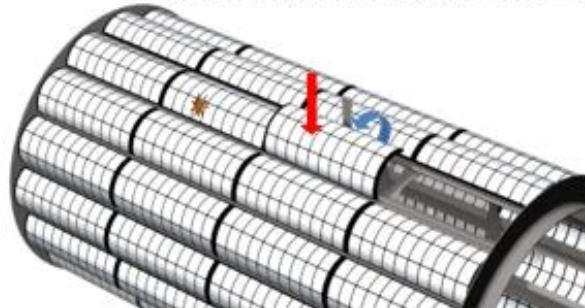
Replacing filter cartridges is very simple, there are no fixing or connecting elements.




1. In order to change the damaged cartridge it is necessary to first dismantle the end cartridge mounted in that row because its lock is laid over the next cartridge.

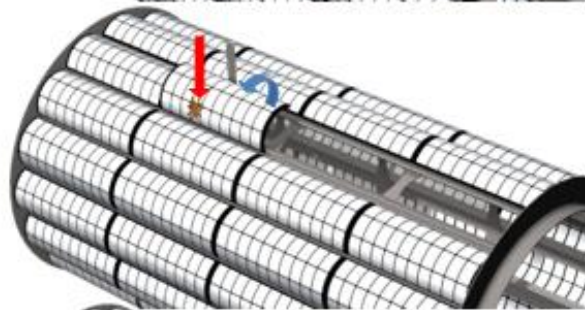


2a. Apply pressure on the cartridge using your **palm** in the direction of the red arrow.



2b. With the help of a **special strap**  loosen the cartridge on one side from the rail in the direction of the blue arrow.

2c. Follow the arrow to remove the cartridge.



3. Use the same method to dismantle other cartridges in a row until you get to the damaged one.



4. Remove the damaged cartridge and replace with a new one.



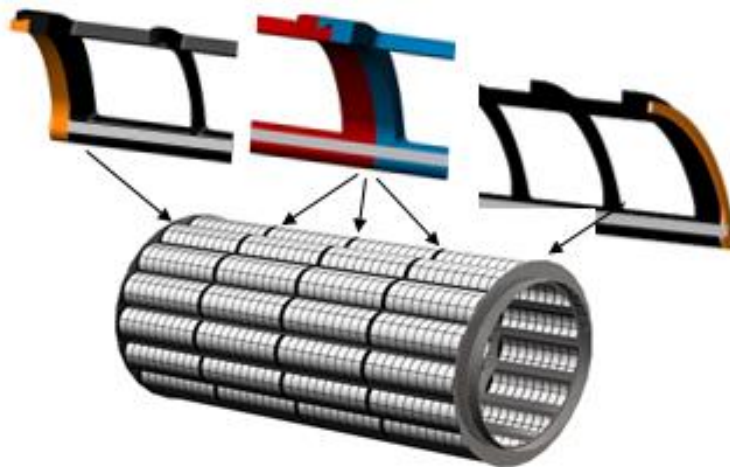
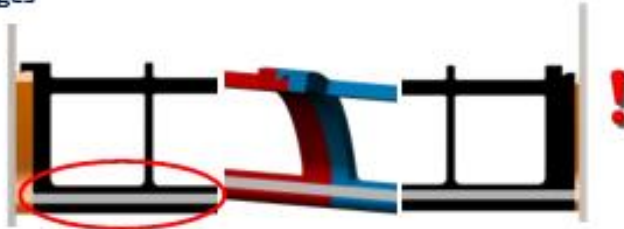


5. Restore the fine cartridges back to their respective places.

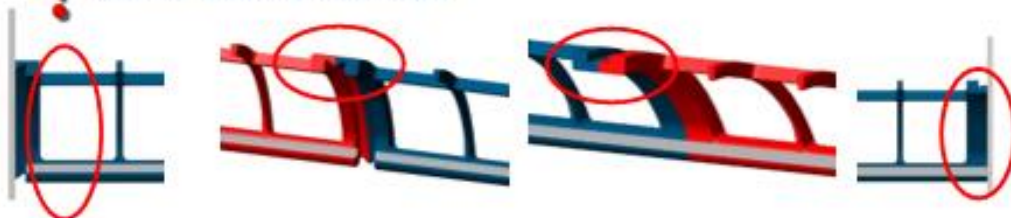


Correct mounting of cartridges

! Always check condition of longitudinal sealing in the ridge on reused cartridges. If damaged or not attached properly, use new cartridge.



! Incorrect mounting of cartridges



Cartridge without side rubber seal Incorrectly rotated cartridge Cartridge without side rubber seal

To replace follow the sequence below:

1. Switch the power to the unit off.
2. Drain the water from the tank.
3. Using the inch control inch, the drum round until it is accessible.
4. Once the damaged section is exposed, you can follow the steps 1 to 5 above
5. Check to ensure cartridges are properly mounted.
6. Close all open drain valves.
7. Turn power to the unit on.
8. Return flow to the filter.

Note: In the event the cartridge cloth is left to dry out following heavy soiling, the cloth may become partially blocked and brittle. In this instance it may not be possible to remove the dried in solids by continual backwashing, therefore a replacement may be required.

11 TROUBLESHOOTING

- a) The most important function of the filter is the backwash cycle and as such will need to be operating correctly at all times. This will require the nozzles to be checked on a regular basis to ensure that they do not become blocked or damaged. If the jets are not operating correctly the following actions should be carried out:
 - The cleaning of the spray heads should be carried out using a 1mm diameter wire to remove debris or blockages.
 - If the pressure of the jets is not high enough to remove the debris when in the backwash cycle, it will be necessary to remove the pump from the filter basket and the filter basket from the sewer. The filter basket should then be cleansed to remove any debris that could be affecting the flow to the pump.
 - If the jet rinse system shows signs of heavy clogging then the spray bars and nozzles should be removed and flushed out with clean water.

- b) The continuous rotation of the drum can be caused by the following issues:
 - The filter may have become overloaded; thus having an excessive amount of detritus in the influent water. When the quantity of the detritus has decreased then normal function can be restored.
 - Improper function of the jet rinse system (See point A for rectifying actions).
 - The filter mesh apertures become clogged with grease as a result of long operation. This can be rectified by switching the filter to run continuously for 30 – 60 minutes. If the problem remains after this cycle then it can be sprayed with a mild detergent to remove the excess grease build up.
 - The level sensor at the front of the filter is clogged. Remove the sensor from its holder and clean the impurities between the electrodes.
 - The filter is switched to continuous operation.
 - The filter capacity is exceeded

- c) The water continuously weirs over from the sides of the silt trough inside of the drum and in to the silt tank. The following are the possible causes:
 - The jet rinse system is not functioning correctly.
 - The filter is overloaded with detritus in the influent.
 - The filter mesh is clogged.
 - The filter capacity is exceeded

- d) The water does not reach the edge of the silt trough inside of the drum, but flows over the edges in to the silt tank.
- The level sensor in the silt tank is clogged.
 - The silt pump is clogged.
- e) When the silt tank is filled to its upper level, via the sensor, the silt pump must be activated automatically. When the silt has been pumped out to a level at which the low level sensor is activated, the pump will be deactivated and the silt tank will re-fill.
- f) If the silt continuously flows over the edge of the tank, there is a risk that the filter basket for the backwash pump could become clogged; thus stopping the operation of the entire filter.

Note: When checking the filter it is necessary to check that the automatic discharge of the silt tank is functioning properly.

IMPORTANT NOTICE! The main circuit breaker will need to be turned off when any maintenance is being performed on the filter.

12 KEY COMPONENT PHOTOS

12.1.1 Inlet probe – removed from pot. Probe controls backwash and drum drive operation.



12.1.2 Backwash pump – removal requires undoing the connector and hose and lifting out the pump using handle (later models).



12.1.3 Backwash pump strainer/filter – requires checking and cleaning regularly to ensure it is free from debris, preventing the mesh

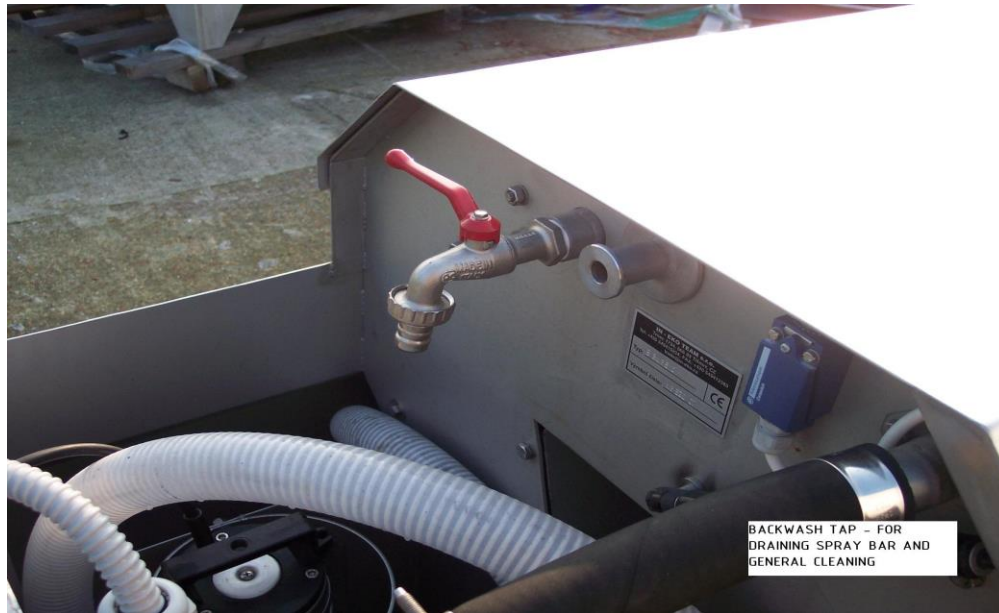
blocking & the pump dry running –the potential for blockages will vary from site to site.



12.1.4 Backwash drain valve – allows complete backwash drain down and removal of debris.



12.1.5 Spray bar drain and washdown point- can be fitted with a hose and the backwash run manually to clean down the unit if required.



12.1.6 Door microswitch/deadlock – unit will not operate with the door open and the switch not depressed.



12.1.7 Spray bar jet– several jets are placed along each spray bar. N.B.: Blockages can be cleared with a piece of stiff wire and then running the backwash pump in manual with the door closed.



12.1.8 Sludge pump – controlled via a pressure probe in the sludge compartment



13 TECHNICAL INFORMATION

| MODEL | kW | MOTOR | GEARBOX | SLUDGE PUMP | BACKWASH PUMP | BACKWASH PUMP 2 |
|-------|------|--|--------------------------------|--|---|-----------------|
| 3FBO | 2.37 | SIEMENS, 1LA7073, 0.37Kw, 50Hz, 3x400V, 1.07A | Bonfiglioli F202, i=76.8 | LOWARA DOMO15VXT, 3 x 400V, 50Hz, 1.49kW, 2.73A | LOWARA SCUBA SC409T, 3 x 400V, 0.9Kw, 2.6A. | N/A |

13.1 OPERATING FLUID LEVELS – (from screen level in mm)

| Filter Type | Min level (mm) | Max Level (mm) | Drawing numbers |
|-------------|----------------|----------------|-----------------|
| 3FBO | 945 | 1180 | 3FBO-SHT01 |

13.2 INLET AND OUTLET SIZES

| Model | | DN inlet - mm | DN outlet - mm | DN sludge outlet |
|-------|---------|---------------|----------------|------------------|
| 3FBO | DEFAULT | DN250 – PN16 | DN250 – PN16 | DN150 – PN16 |

13.3 WEIGHTS OF MICROSCREEN DRUM FILTERS (SKID MOUNTED)

| Type | Weight of the filter | Weight with water |
|------|----------------------|-------------------|
| 3FBO | 570 kg | 2250 kg |

13.4 MICROSCREEN DRUM FILTERS DIMENSIONS (SKID MOUNTED)

| Type | Length (mm) | Width (mm) | Height (mm) |
|------|-------------|------------|-------------|
| 3FBO | 3,880 | 1,620 | 1,850 |

13.5 MATERIALS AND GENERAL INFORMATION

| Model | BODY MATERIAL | FILTRATION CLOTH | DRIVE BELTS | SEALING |
|-------|--|-----------------------|-------------|----------|
| 3FBO | Stainless steel DIN 1.4301 or 1.4571 + plastics (polyamide + ABS) | Polyamide - UHELON | Aramid | Situseal |

13.6 BACKWASHING RATES

| Model | PUMP DETAILS | kW | Amps | FLOW RATE |
|-------|---------------------|-------|------|-----------|
| 3FBO | Lowara SCUBA SC409T | 0.9kW | 2.6A | 2.55L/S |

NOTE: DURING THE BACKWASHING CYCLE, FOR A SHORT TIME THE WATER LEVEL WILL RISE.

13.7 MESH SIZE AND MAXIMAL FLOW RATES 3FBO

| Mesh Size (μm) | mg/L | Flow rate (L/s) |
|-----------------------------|------|-----------------|
| 20 | 40 | 13.7 |

13.8 CONTROL PANEL

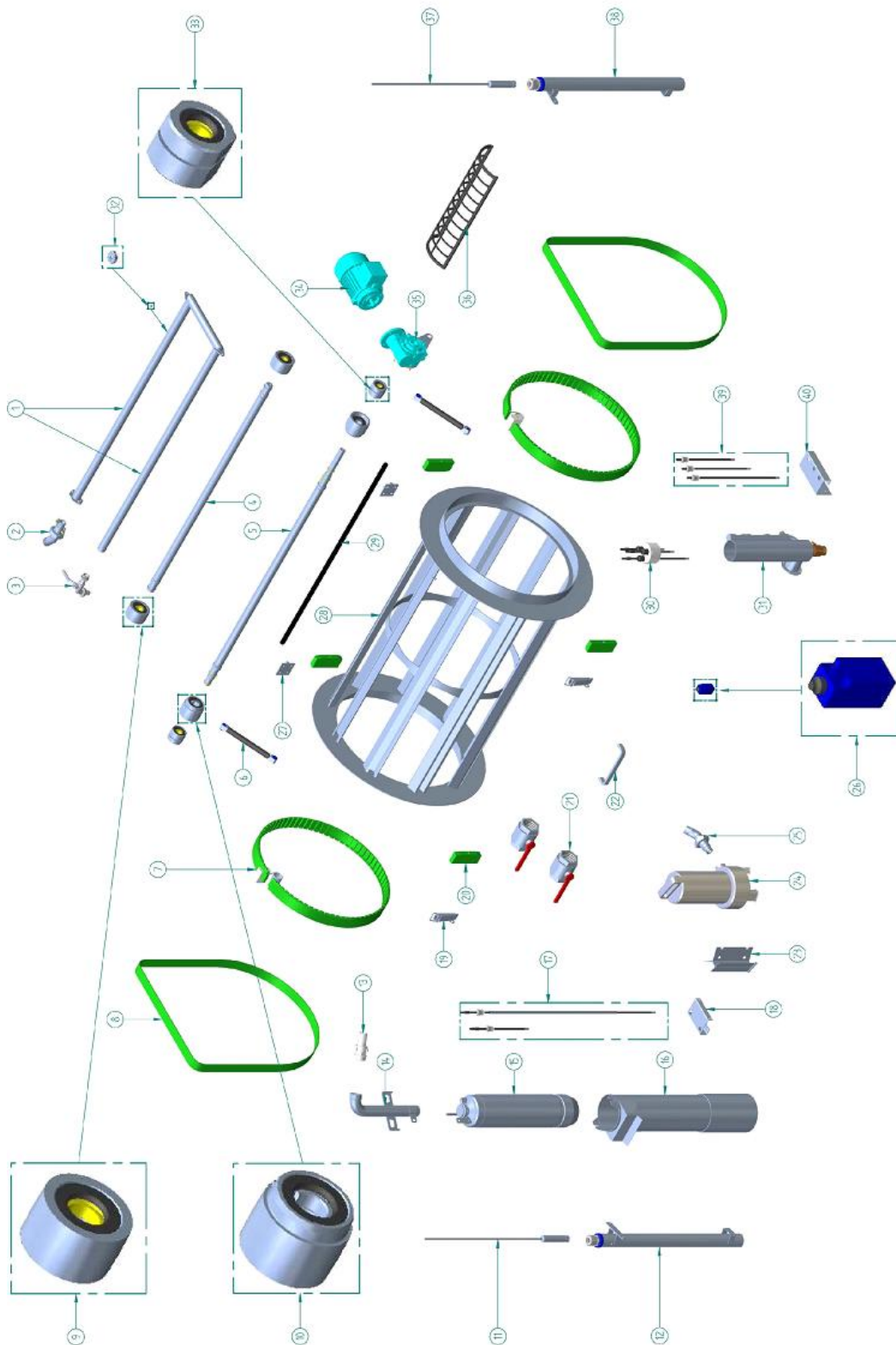
The skid mounted unit comes equipped with a 3ph, control panel. (see control panel drawings for further details and specification).

14 Appendix article.

| List of spare parts for filters | | 1_FBB(O) 2_FBB(O) 3_FBB(O) |
|---------------------------------|---|----------------------------------|
| Part No. | Name | Pcs |
| 1 | Backwashing pipe | 1 |
| 2 | Backwashing pipe connection | 1 |
| 3 | Ball valve - backwashing pipe | 1 |
| 4 | Suspension shaft | 1 |
| 5 | Drive shaft | 1 |
| 6 | Gas strut | 2 |
| 7 | Drum sealing | 2 |
| 8 | Belt | 2 |
| 9 | Suspension pulley | 2 |
| 10 | Drive pulley | 2 |
| 11 | Pressure probe - sludge | 1 |
| 12 | Pressure probe holder - sludge | 1 |
| 13 | Backwash pump hose connection | 1 |
| 14 | Backwash pump holder | 1 |
| 15 | Backwash pump | 1 |
| 16 | Suction basket | 1 |
| 17 | Contact water level sensor - sludge | 1 |
| 18 | Contact water level sensors holder - sludge | 1 |
| 19 | Latch | 2 |
| 20 | Guide | 4 |
| 21 | Ball valve - drainage | 2 |
| 22 | Handgrip | 1 |
| 23 | Sludge pump holder | 1 |
| 24 | Sludge pump | 1 |
| 25 | Sludge pump hose connection | 1 |
| 26 | Cowl switch | 1 |
| 27 | Hinge | 2 |
| 28 | Drum | 1 |
| 29 | Safety sealing rubber | according to filter type |
| 30 | Contact water level sensors - inlet | 1 |
| 31 | Contact water level sensor holder - inlet | 1 |
| 32 | Nozzle | according to filter type |

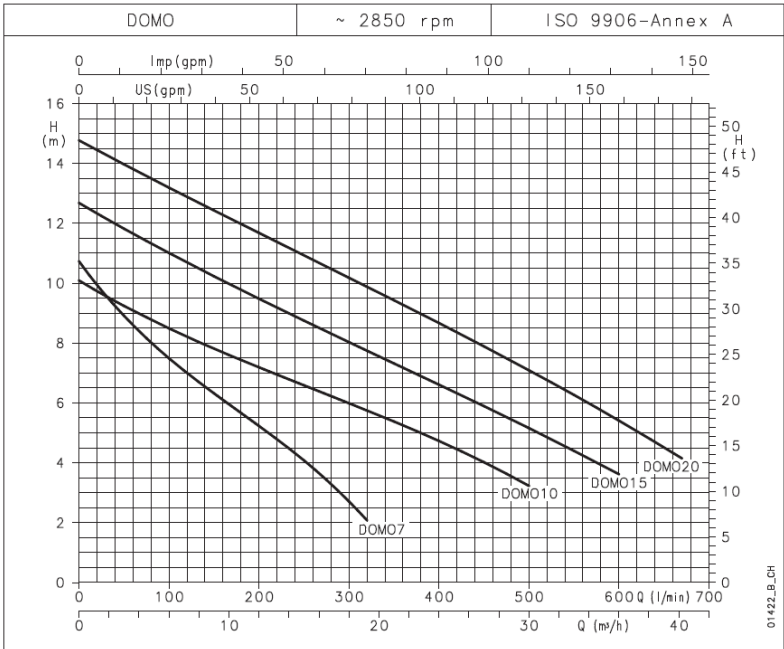
| | | |
|----|--|--------------------------|
| 33 | House | 2 |
| 34 | Drive | 1 |
| 35 | Gear box | 1 |
| 36 | "Clic-Clo" cartridge with filtration cloth | according to filter type |
| 37 | Pressure probe - inlet | 1 |
| 38 | Pressure probe holder - inlet | 1 |
| 39 | Contact water level sensors - inlet - (FBO) | 1 |
| 40 | Contact water level sensors holder - inlet (FBO) | 1 |

14.1 Appendix article 2: FB/O, 3 spare parts

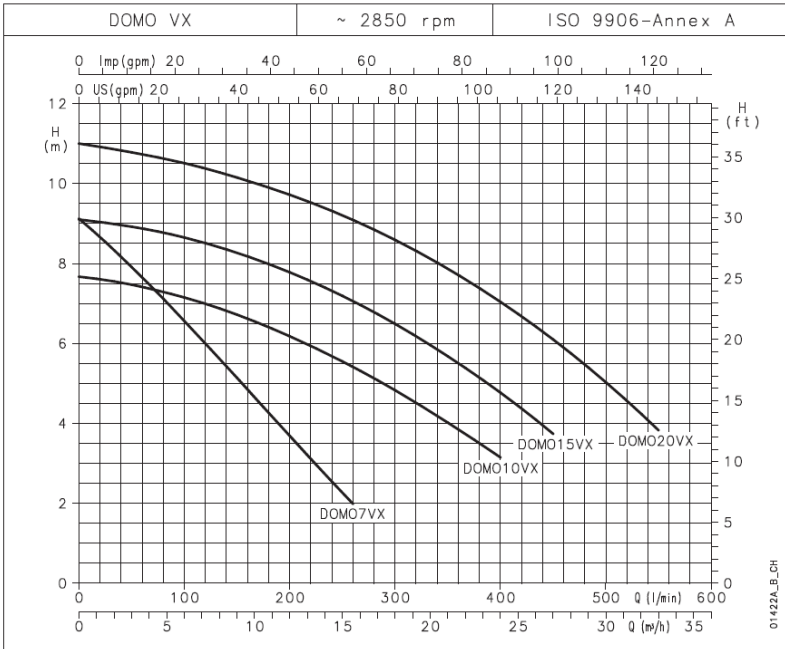


14.2 Appendix article 3: Sludge pump Technical Data 1

Domo series – operating characteristics at 50 Hz



Domo VX Series – operating characteristics at 50 Hz



14.3 Appendix article 4: Sludge pump Technical Data 2

Hydraulic Performance Table

| PUMP TYPE | RATED POWER | | Q = DELIVERY | | | | | | | | | | | |
|------------|--|------|--------------|------|------|------|------|------|-----|-----|-----|------|-----|-----|
| | | | l/min | 0 | 100 | 150 | 200 | 250 | 300 | 320 | 400 | 500 | 600 | 670 |
| | m³/h | 0 | 6 | 9 | 12 | 15 | 18 | 19,2 | 24 | 30 | 36 | 40,2 | | |
| | H = TOTAL HEAD IN COLUMN OF WATER (METRES) | | | | | | | | | | | | | |
| | kW | HP | | | | | | | | | | | | |
| DOMO 7(T) | 0,55 | 0,75 | 10,7 | 7,5 | 6,3 | 5,2 | 4,1 | 2,7 | 2,1 | | | | | |
| DOMO 10(T) | 0,75 | 1 | 10,1 | 8,5 | 7,8 | 7,2 | 6,6 | 6,0 | 5,8 | 4,7 | 3,2 | | | |
| DOMO 15(T) | 1,1 | 1,5 | 12,7 | 11,0 | 10,2 | 9,5 | 8,8 | 8,0 | 7,8 | 6,6 | 5,2 | 3,6 | | |
| DOMO 20T | 1,5 | 2 | 14,8 | 13,2 | 12,4 | 11,7 | 10,9 | 10,2 | 9,9 | 8,7 | 7,1 | 5,4 | 4,2 | |

These performances are valid for liquids with density $\rho = 1.0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

domo-2p50_a_th

Electrical Data

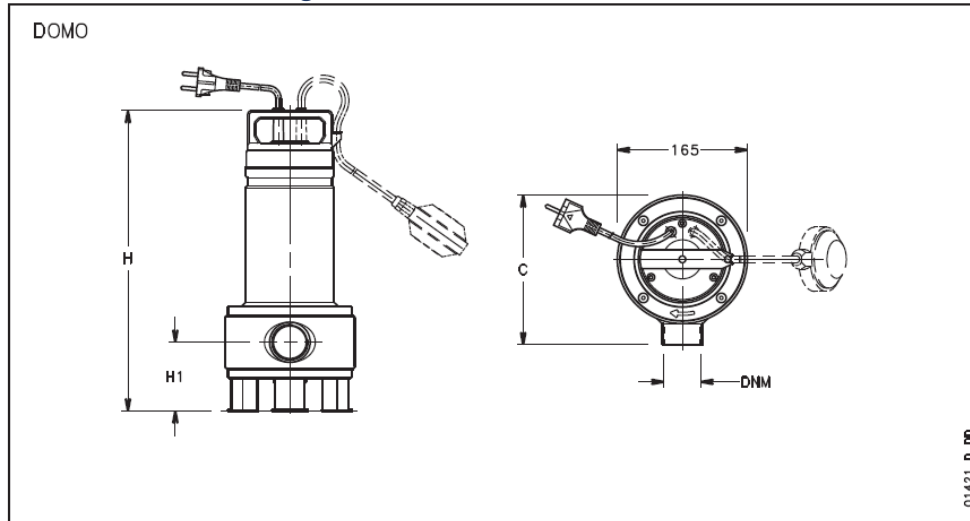
| PUMP TYPE | INPUT POWER* | INPUT CURRENT* | CAPACITOR |
|--------------|--------------|----------------|-------------------------------|
| SINGLE-PHASE | kW | 220-240 V A | $\mu\text{F} / 450 \text{ V}$ |
| DOMO 7 | 0,80 | 3,94 | 16 |
| DOMO 10 | 1,14 | 5,84 | 22 |
| DOMO 15 | 1,58 | 7,02 | 30 |
| - | - | - | - |

*Maximum value in specified range

| PUMP TYPE | INPUT POWER* | INPUT CURRENT* | INPUT CURRENT* |
|-------------|--------------|----------------|----------------|
| THREE-PHASE | kW | 220-240 V A | 380-415 V A |
| DOMO 7T | 0,73 | 2,58 | 1,49 |
| DOMO 10T | 1,09 | 4,09 | 2,36 |
| DOMO 15T | 1,49 | 4,73 | 2,73 |
| DOMO 20T | 1,96 | 6,6 | 3,81 |

domo-2p50_a_te

Dimensions and weights



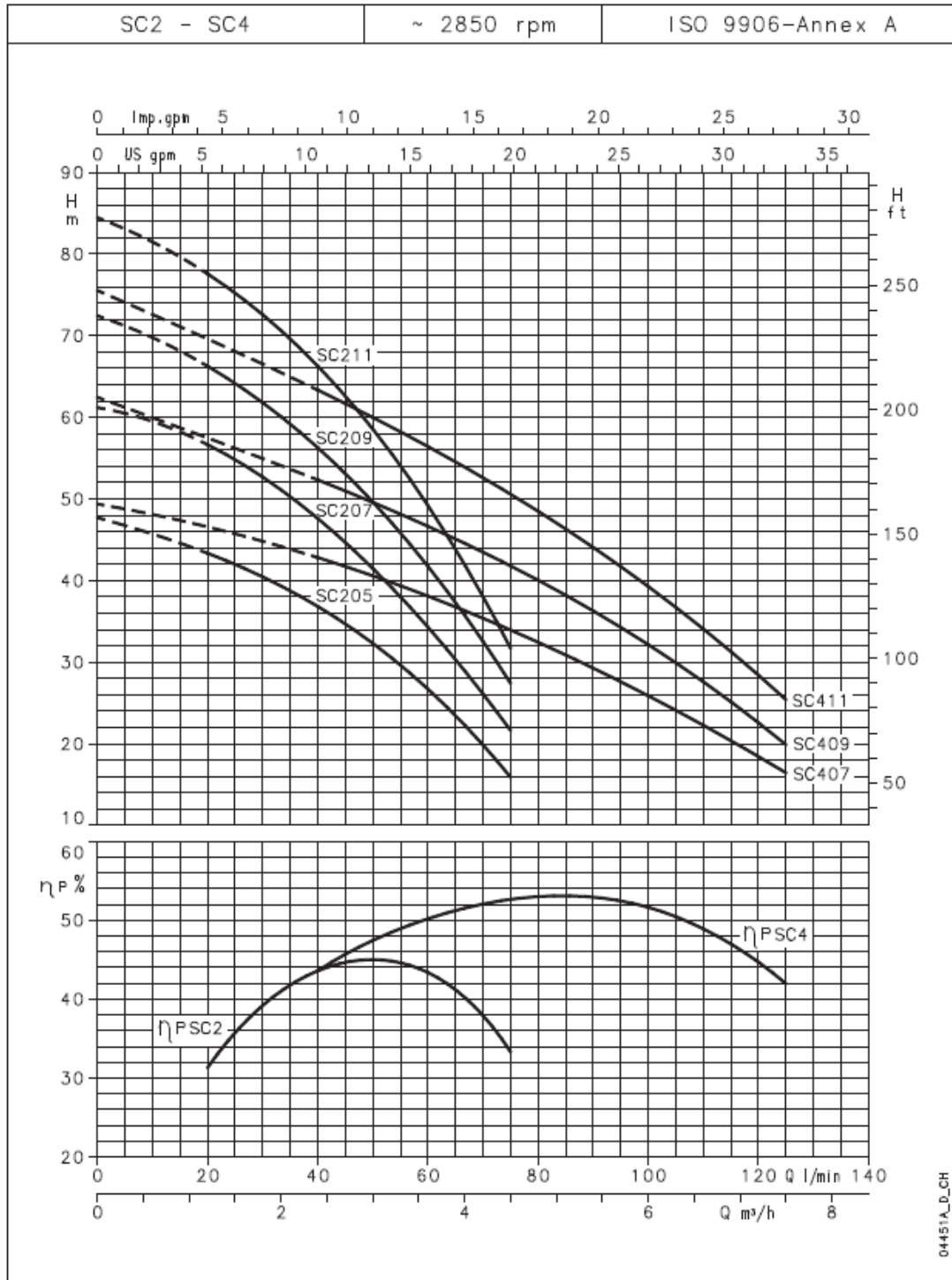
| PUMP TYPE | | DIMENSIONS (mm) | | | DNM | WEIGHT |
|--------------|------------|-----------------|-------|-----|---------|--------|
| SINGLE-PHASE | | H | H1 | C | | kg |
| DOMO 7 | DOMO 7 GT | 391 | 88 | 193 | Rp1 1/2 | 10,2 |
| DOMO 10 | DOMO 10 GT | 468 | 111,5 | 198 | Rp2 | 13,6 |
| DOMO 15 | DOMO 15 GT | 468 | 111,5 | 198 | Rp2 | 15,3 |
| - | - | - | - | - | - | - |

| PUMP TYPE | | DIMENSIONS (mm) | | | DNM | WEIGHT |
|-------------|------------|-----------------|-------|-----|---------|--------|
| THREE-PHASE | | H | H1 | C | | kg |
| DOMO 7T | DOMO 7VXT | 391 | 88 | 193 | Rp1 1/2 | 8,9 |
| DOMO 10T | DOMO 10VXT | 438 | 111,5 | 198 | Rp2 | 11,6 |
| DOMO 15T | DOMO 15VXT | 468 | 111,5 | 198 | Rp2 | 13,6 |
| DOMO 20T | DOMO 20VXT | 468 | 111,5 | 198 | Rp2 | 14,6 |

domo-2p50_c_td

14.4 Appendix article 5: Backwash pump Technical Data 1

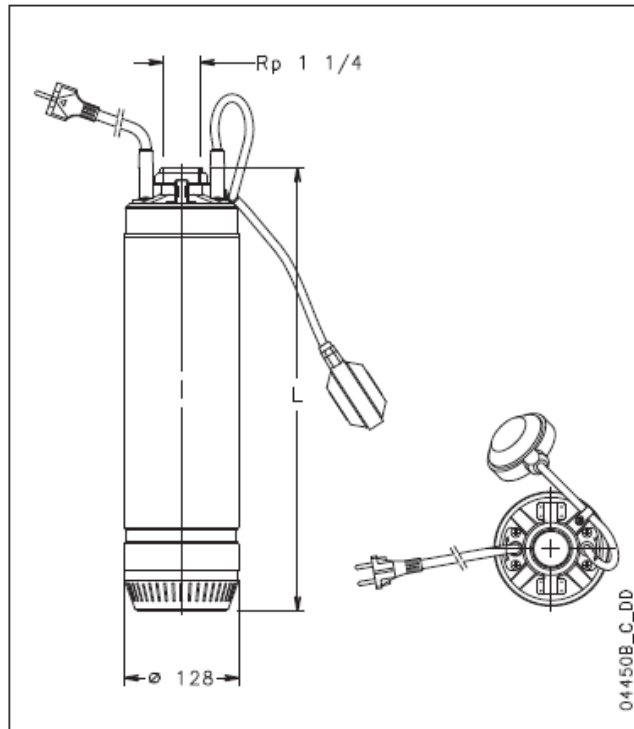
Operating characteristics at 50Hz



These performances are valid for liquids with density $\rho = 1.0 \text{ kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{s}$.

14.5 Appendix article 6: Backwash pump Technical Data 2

Dimensions and weights



| PUMP TYPE | | NUMBER OF STAGES | DIMENSIONS | |
|--------------|-------------|------------------|------------|------|
| SINGLE-PHASE | THREE-PHASE | | L mm | kg |
| SC205C | SC205T | 4 | 526 | 13,5 |
| SC207C | SC207T | 5 | 566 | 15 |
| SC209C | SC209T | 6 | 591 | 16 |
| SC211C | SC211T | 7 | 636 | 18 |
| SC407C | SC407T | 4 | 541 | 14,5 |
| SC409C | SC409T | 5 | 566 | 15,5 |
| SC411C | SC411T | 6 | 611 | 17,5 |

Hydraulic performance table at ~2850 rpm 50 Hz

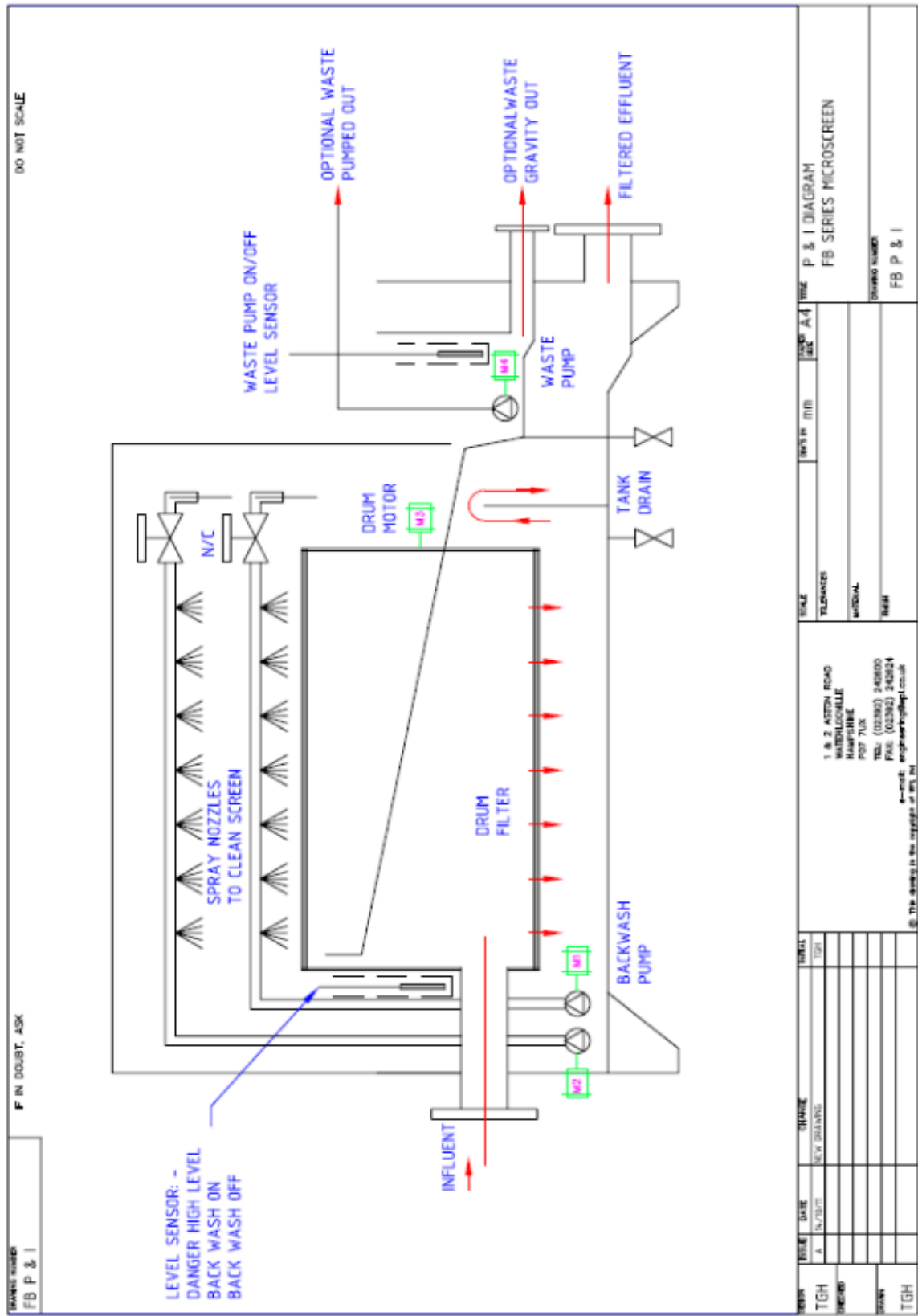
| PUMP TYPE | RATED POWER | | Q = DELIVERY | | | | | | | | | | |
|-----------------|----------------|------|--|------|------|------|------|------|------|------|------|------|-----|
| | | | l/min | 0 | 20 | 30 | 40 | 50 | 60 | 75 | 80 | 100 | 125 |
| | m³/h | 0 | 1,2 | 1,8 | 2,4 | 3 | 3,6 | 4,5 | 4,8 | 6 | 7,5 | | |
| | kW | HP | H = TOTAL HEAD IN COLUMN OF WATER (METRES) | | | | | | | | | | |
| SC205C - SC205T | 0,55 | 0,75 | 47,7 | 43,4 | 40,5 | 36,8 | 32,3 | 26,7 | | | | | |
| SC207C - SC207T | 0,75 | 1 | 61,2 | 56,7 | 52,7 | 47,6 | 41,5 | 34,3 | 21,7 | | | | |
| SC209C - SC209T | 0,9 | 1,2 | 72,4 | 66,3 | 61,8 | 56,3 | 49,6 | 41,8 | 27,4 | | | | |
| SC211C - SC211T | 1,1 | 1,5 | 84,5 | 77,6 | 72,6 | 66,3 | 58,6 | 49,2 | 31,7 | | | | |
| SC407C - SC407T | 0,75 | 1 | 49,4 | | | 42,8 | 40,6 | 38,1 | 34,0 | 32,5 | 25,9 | 16,5 | |
| SC409C - SC409T | 0,9 | 1,2 | 62,5 | | | 52,3 | 49,6 | 46,7 | 41,8 | 40,1 | 32,2 | 19,9 | |
| SC411C - SC411T | 1,1 | 1,5 | 75,5 | | | 63,4 | 60,0 | 56,4 | 50,6 | 48,5 | 39,3 | 25,4 | |

Electrical Data

| PUMP TYPE | INPUT POWER* | INPUT CURRENT* | CAPACITOR |
|--------------|--------------|----------------|------------|
| SINGLE-PHASE | kW | 220-240 V A | μF / 450 V |
| SC205C | 0,93 | 4,37 | 16 |
| SC207C | 1,15 | 5,19 | 25 |
| SC209C | 1,32 | 5,88 | 25 |
| SC211C | 1,63 | 7,25 | 30 |
| SC407C | 1,18 | 5,28 | 25 |
| SC409C | 1,38 | 6,17 | 25 |
| SC411C | 1,76 | 7,85 | 30 |

| PUMP TYPE | INPUT POWER* | INPUT CURRENT* | INPUT CURRENT* |
|-------------|--------------|----------------|----------------|
| THREE-PHASE | kW | 220-240 V A | 380-415 V A |
| SC205T | 0,86 | 2,81 | 1,62 |
| SC207T | 1,09 | 4,12 | 2,38 |
| SC209T | 1,27 | 4,40 | 2,54 |
| SC211T | 1,45 | 4,68 | 2,70 |
| SC407T | 1,12 | 4,16 | 2,40 |
| SC409T | 1,33 | 4,50 | 2,60 |
| SC411T | 1,59 | 4,94 | 2,85 |

14.6 Appendix article 7: P&ID Schematic Diagram



14.7 Appendix article 8: Siemens LOGO – Data Sheet

SIEMENS

Data sheet

6ED1055-4MH00-0BA1

LOGO! TD TEXTDISPLAY, 6 LINES, 3 BACKGROUND COLORS 2
ETHERNET PORTS ACCESSORIES, FOR LOGO! 8



| General information | |
|--------------------------------------|-------------------------------------|
| Suitability for use | Can be used with LOGO! 8 and higher |
| Display | |
| Design of display | FSTN |
| graphics-enabled | No |
| Line display | |
| • Number of lines | 6 |
| • Number of characters per line | 20 |
| Backlighting | |
| • Type of backlighting | LED |
| Control elements | |
| Keyboard fonts | |
| • Keys with LED | No |
| • System keys | Yes |
| — Number of configurable system keys | 0 |
| • Numeric/alphabetical input | |
| — Numeric keyboard | No |
| — alphanumeric keyboard | No |

Industrial wastewater treatment

+44 (0) 15 3083 0020

Sewage treatment

+44 (0) 23 9224 2600

info@wcs-group.co.uk

wcs-group.co.uk/environmental-engineering

Disclaimer

WCS Environmental Engineering (WCSEE) has a policy of continual product development and the above information may be subject to change without notice. WCSEE reserve the right to to change the specification in line with company policy of improvement through research and development. Errors and omissions excepted. Models shown in this manual may include additional cost options that are not part of the standard specification