RF100ANQ INSTRUCTIONS
1. Safety Precautions

It is strongly advised that gloves, face protection and steel toe capped boots or shoes are worn when installing or servicing the Rotorflush self-cleaning filter unit for analysers.

The relevant safety precautions must be taken with respect to the fluid that the Filter is being installed into. Factors that should be taken account of are: corrosive or poisonous liquids, poisonous or explosive gases, and bio –hazards for example bacteria, fungal spores and viruses.

Care should be taken when handling the filter so that there is no possibility of injury from it falling and causing injury to persons. Ensure that there is no possibility of injury from moving the filter owing to its weight.

When starting the pump keep well away from all pipe work and the sample tank so that if there are any leaks there is no possibility of coming into contact with the fluid

2. Description

The Rotorflush Analyser Self Cleaning Filter system has been designed for supplying analysers with a continuous filtered sample.

It consists of a self cleaning 60 micron filter, (115 and 250 micron available), head positioned in the sample tank. This is driven by the MAG drive centrifugal pump. The pump recycles the fluid to be filtered back to a backwashing mechanism within the filter. A small amount of the fluid (maximum 15 litres/minute) is drawn off via the outlet valve and supplied to the analyser. The flow to the analyser is adjustable from 0-15 litres/minute. The lower the flow rates to the analyser the more suspended solids in the fluid to be filtered that the filter will cope with.

There must be a minimum of 15 Litres per minute flowing out of the outlet at the top right of the tank. This is to ensure that particles in the water are carried away from the filter system and to ensure that a representative sample is supplied to the analyser. Over a period there may be settlement of heavy solids in the bottom of the tank. These should be drained from time to time by the drain valve at the bottom of the tank. The flow into the bottom of the tank should be greater than 15 litres/minute + the flow to the analyser. For example if 5 litres per minute is going to the analyser then at least 20 litres/minute must be entering the bottom of the tank.

The float switch in the tank is to protect the pump from dry running in the event that the supply of water to the tank is interrupted. This controls a 230/110v (depending on model) relay that controls the motor.

The valve at the bottom is to periodically drain any detritus that may over time build up in the bottom of the tank.

Materials in Contact with liquid are PVC, Acetal, Polypropylene, stainless steel, nylon.
3. Environmental Conditions

The Filter system should not be used in environments where:
- The maximum ambient temperature is above 40°C
- The minimum ambient temperature is below 2°C (unless anti-frost protection is in place)
- Corrosive atmospheres
- Explosive and/or fire danger zones
- Where it is liable to flood
- If the filter system is sited in an enclosure, make sure that there is adequate ventilation for motor cooling
- Where there is excessive vibration

4. Liquid to be pumped

For use with water containing suspended solids with a specific gravity of 1

Should not be used with
- Flammable liquids
- Toxic liquids
- Corrosive liquids
5. Installation and wiring

Flow to analyser.
Adjust between 0 and 15 l/min with valve as required.

OUTLET - Continuous flow of water out to drain. Flow rate through tank 15 litres/min minimum.

TO CHANGE FILTER CAGE:
1. Release Clip
2. Remove Filter Body unit (with cage)
3. Unscrew Retaining Nut
4. Remove Filter Cage and replace with new.
   (available from Rotorflush Filters Ltd)
5. Refit Retaining Nut (hand tight)
6. Replace Filter Head and re-clip.

Water INLET (to be filtered)
Flow rate = 15 L/min minimum + flow to analyser

Outlet to periodically drain solids that may settle in the tank. (Auto purge optional)

1. Main power ON/OFF
2. Fault warning Light
3. Reset Button
4. Pressure sensor unit
5. Continuous bleed (self prime feature)
6. Filter tank
7. Anti-splash lid
8. 1 1/2" BSP (NPT) Outlet
9. Filter Cage
10. Retaining Nut
11. Filter Head Body
12. 1" BSP (NPT) INPUT
13. 1" BSP (NPT) Purge
14. MAG drive pump (To supply drive to backwash rotor and provide filtered supply to analyser)
15. 3/8" BSP (NPT) Ball valve (controls flow to analyser)
16. Float switch
17. Quick Release Clip
   *NPT on US spec units*
Installation (Continued)

Wiring Diagram Rotorflush RF100AN
Float + Vacuum switch

[Diagram of the wiring system with labels for Mains Switch, Supply, Relay, Fault LED, Vacuum Switch, Float Switch, and Pump Motor]
Installation (Continued)

The Filter system is designed to be wall mounted. The PVC backboard can be drilled to accept suitable mounting fasteners.

A suitably qualified electrician must connect a supply either 240v or 110v 50Hz AC to the enclosure above the pump. Make sure that the Filter system is **earthed** and there is a suitable fuse in the supply circuit. *see plate on pump for voltage and frequency and for value for fuse*

Install a suitable isolator to disconnect the electricity supply to the filter system. This should be close to the filter system to enable the electricity supply to be isolated from the filter system during normal operation and in an emergency

*Remove the elastic band holding the float switch up*

Connect the supply of the liquid to be filtered to the 1” BSP branch of the TEE connection at the bottom of the sample tank. A non-return valve may be required in the pipe supplying the sample tank so that it does not drain when the fluid supply is stopped. It is important that once commissioned the sample tank remains full of fluid to prevent air locks on re-starting the system.

Install a valve on the sample supply to adjust the flow rate into the tank. If the flow is higher than the speed at which the water can drain by gravity from the top right connection of the tank the tank may overflow.

Connect the outflow to the 1 ½” BSP male at the top of the tank. The liquid is returned to source by gravity, so there must be sufficient fall back to source. It is recommended that at least a 1 ½” pipe is used to make sure that the liquid is able to return to drain by gravity.

Connect a pipe from the “outlet to the analyser” to the analyser.
6. Commissioning.

Fill the sample tank with clean water.

Slowly introduce the sample supply, adjusting the flow rate so that there is at least 15 Litres per minute flowing out of the connection at the top right of the sample tank. Note: It does not matter if the flow rate is greater than 15 litres/minute, however if the flow rate is too great, then the water may not drain quickly enough from the tank outlet and the tank may overflow. If this is the case a larger outlet pipe may be required. A drop from the output fitting to return location is always required. (Remember the output flow is gravity powered so the greater the fall the better. Avoid long sections of parallel pipework especially straight out of tank)

Once commissioned adjust the flow rate to your analyser system using the valve provided on the outlet to the analyser. Check again that at least 15 L/min is flowing out of the top right outlet of the tank.

Now that the system is commissioned it can be switched on and off without problem as long as there remains enough liquid in tank to activate the float switch.

7. Maintenance (Ensure that unit is disconnected from electricity supply before maintaining)

Over a period of time the filter head may become blocked with detritus that cannot be removed by the backwash mechanism. The Filter cage should be replaced every 6 months, available from Rotorflush Filters. 60 micron Part no. RF-096. 115 micron Part no. RF-097 and 260 micron Part no. RF-098. In most conditions the filter will only need maintenance every 6 months. However if there is a lot of detritus in the water to be filtered, particularly if it contains fatty, oil, or sticky substances or biological growth the filter cage may need to be cleaned more frequently.

8. To remove the Filter head.

- Drain the sample tank
- Release retaining Clip.
- Withdraw the filter head/body assembly from the sample tank.
- Unscrew the Retaining Nut holding the filter cage to the body and replace with a new filter cage. (replacement cages available from Rotorflush Filters)
- Re-assemble
- Follow the steps for commissioning as above
## 9. Problem Solving

<table>
<thead>
<tr>
<th>Fault</th>
<th>Check</th>
<th>Resolution/Action To Be Taken</th>
</tr>
</thead>
</table>
| Pump will not run | - Power supply  
- Fault warning light  
- Float switch activated | - Turn on at power supply and main switch. Check the unit has been wired correctly.  
- This may mean the Pressure switch has activated. This could mean the filter is blocked. Clear filter and press Reset button.  
- Ensure the water level is adequate to activate the float switch.  
  If problem continues contact Rotorflush Filters. |
| Fault light is on (Meaning the pressure sensor is activated) | - Solids level in tank  
- Filter blocked  
  - Condition of filter head (Is it blocked or damaged? If there are splits in the nylon mesh a new head is required as this will allow larger solids through which will cause blockages in the pipework and could result in damage to the pump) | - Purge tank (With the nature of our self cleaning filter this may be enough to clear the filter head without further action. Once purged press Reset button)  
- Clean or replace filter head (spares available from Rotorflush filters)  
  If problem continues contact Rotorflush Filters. |
| The tank is overflowing | - The pipework from the 1 ½” Outlet is large enough. (Consult installation instructions. This pipe must be 1 ½” or larger otherwise the gravity fed flow will be restricted.  
- There is a downward run from the tank outlet with minimal parallel run from tank level.  
- The Input flow into the tank from the 1” Tee | - Increase pipe size  
- Check output is greater than 15 litres a minute.  
- Increase drop from tank (Please remember the output is directly related to the input flow and ability of the water to flow away from the filter tank. The steeper and larger the pipe on the output, the better water will flow through the system)  
- The Input flow may need to be reduced although there must be a minimum of 15 litres per minute to achieve good flow through tank taking suspended solids with it.  
  If problem continues contact Rotorflush Filters. |
| Solid levels in the tank are causing the filter head to block to often | - Pre-filtration of feed to RF100AN wall mounted unit.  
- Flow through the filter tank (as above)  
  - The flow to the analyser | - We recommend the use of a Rotorflush self cleaning filter to feed the RF100AN. In most cases this is from our Self cleaning submersible range. Please consult Rotorflush filters.  
- If the flow to the analyser is throttled back (using ball valve above tee) This increases the backwash pressure though the cleaning rotor.  
  If problem continues contact Rotorflush Filters. |
EC Declaration of Conformity

In accordance with BS EN ISO/IEC 17050-1:2010

We: Rotorflush Filters
Of: Langmoor Manor, Charmouth, Dorset, U.K. DT6 6BU

declare that:

Equipment: Rotorflush Analyser Filter System
Model name/number: RF100AN

The following CE Marking Directives are applicable:

2006/42/EC Conforms with the essential health and safety requirements of the Machinery Directive and its amending Directives

and has been designed and manufactured to the relevant parts of the following standards:


I hereby declare that the equipment named above has been tested and found to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Signed by: [Signature]

Name: Jim Hosford
Position: Director

Done at: Rotorflush Filters

On: 16th September 2012

Rotorflush Filters Ltd, Langmoor Manor, Charmouth, Dorset, DT6 6BU
Tel 01297 560229, Fax 01297 560110, email:sales@rotorflush.com
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Applicable to Small Single Stage and Multi Stage Centrifugal and Turbine Pumps with Magnetic Drive

WARNING

March May Ltd advises that it is imperative to read these instructions prior to installing any March May products.

Provided that the following recommendations and guidelines are adhered to, March May cannot foresee any circumstances where products will present a safety or health hazard.

For further advice please contact March May Ltd.

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10 Troubleshooting

10.1 Common Problems

Here are some common problems which customers may come across along with some potential causes and solutions to the problems. This information should help in prevention of the problems if read before installation as well as solving the problem if it is encountered after installation.

No discharge
- Pump is not sufficiently primed.
- Discharge head is too high.
- Insufficient net positive suction head available (NPSHa).
- Closed valve either before or after the pump. This will impede flow completely.
- Fluid viscosity too high. This will cause the magnets to decouple.
- Specific gravity of fluid is too high causing the magnets to decouple.

Insufficient Flow
- Air leaks in suction pipeline.
- Discharge head higher than predicted.
- Suction lift too high or insufficient NPSH.
- Restricted inlet piping.
- Blocked suction line or foot valve.
- Fluid viscosity higher than expected.

Intermittent pumping
For centrifugal pumps:
- More flow than the motor is designed to handle. This will cause the motor to overheat and the thermal trip to cut power to the motor.
- The specific gravity of the fluid is too high for the motor to handle. This will also cause the motor to overheat and trip the power.
For Turbine pumps:
- The specific gravity of the fluid is too high for the motor to handle. This will cause the motor to overheat and trip the power.

Insufficient Pressure
- Too high percentage of gas/vapour in the fluid.
- Impeller diameter is too small for the duty.
- Discharge head is higher than expected.
- Motor is wired incorrectly and is running in the wrong direction.

Loss of Prime
- Leak in the suction line.
- Suction lift too high or insufficient NPSH.
- Too high percentage of gas/vapour in the fluid.
- Foreign bodies present in the impeller.

Excessive power consumption
- Head is lower than rating.
- Suction pressure higher than expected.
- Specific gravity or viscosity of fluid is too high or higher than defined in the application.

Excessive vibration
The specific gravity of the fluid is too high for the motor to handle. This will also cause the motor to overheat and trip the power.
- Excessive wear on the bearings.
- Drive and impeller magnets have decoupled.
- Magnets are loose or not aligned correctly.

If any issues are encountered which are not listed below, or the information below is not sufficient, then please contact March Mfg directly for more help and advice.
8 Disassembly

8.1 Disassembly Instruction
The following steps must be followed during the disassembly process:
- Suction and discharge valves must be closed and pump drained of fluid before disassembly begins.
- Ensure pipework is well supported and out of the way before removing pipework from suction and discharge branches.
- Remove the motor and the motor bracket connected. Note that doing this will require a considerable force as the impeller pump must be disconnected from the drive motor.
- This removed 'wet end' assembly should be taken to a clean area for further inspection.
- To inspect the 'wet-end' the rear housing must be placed vertically down on a flat bench. Then hold the rear housing firmly and remove the screws which fix the front housing onto the rear housing. Care must be taken to avoid damaging the blade ceramic spindle and thrust washer which are enclosed in the housing.
- The impeller assembly can now be withdrawn from the rear casing and placed on a non-magnetic surface.
- The rear casing can be examined, there will be a thrust washer present which can be inspected and if worn replaced.
- All components should be examined for signs of damage. If either is present then parts should be replaced.
- In some cases it may be necessary to remove the drive motor from the shaft and inspect it. If this is the case, the locking screws should be removed using an Allen key, there is an access hole in the motor bracket to do this.
- The impeller can then be slid off the shaft, if this does not come away easily then it will be necessary to remove the motor bracket and use a puller.

8.2 Handling Precautions for Magnetic Components
The pumps contain components which are highly magnetic. The following precautions should be taken when working with these parts:
- Disassembly or repair should be carried out in a clean, this will prevent the risk of the magnetic components picking up foreign bodies such as ferrous metal, nuts, bolts, wires and nails etc.
- Care should be taken when disassembling the pump so there is a risk of entanglement of fingers or long hair between magnetic components if they are not handled or stored correctly.
- Installation sensitive to magnetic field should be kept away from magnetic components to avoid damage.

9 Assembly
The assembly of March May pump is a straightforward reversal of the disassembly process listed above. The same precautions should be taken when handling magnetic components.

When assembling a pump, the drive motor must be set at the correct height in the motor bracket before the pump will perform correctly. The setting heights for the pumps are as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC5</td>
<td>1.5</td>
<td>TEA</td>
</tr>
<tr>
<td>TE5-A</td>
<td>2.5</td>
<td>TEA</td>
</tr>
<tr>
<td>TE5-B</td>
<td>3.0</td>
<td>TEA</td>
</tr>
<tr>
<td>TE5-C</td>
<td>3.5</td>
<td>MAB</td>
</tr>
<tr>
<td>TE5-D</td>
<td>4.0</td>
<td>MAB</td>
</tr>
<tr>
<td>TE6</td>
<td>5.0</td>
<td>HTP</td>
</tr>
<tr>
<td>TE7</td>
<td>6.0</td>
<td>MAB</td>
</tr>
</tbody>
</table>

1 General Information

These instructions are addressed to the customer of the product who must ensure that all information included in this document has been read and understood. The information should also be read by anyone operating, maintaining or disassembling the product in future.

These instructions must be retained and kept in a safe and designated point for future reference when necessary.

March May do not accept liability for damage to pumps, equipment or systems incurred by improper use, non-compliance or incomplete observance of the safety precautions indicated in this document or by modifications to the system or use of improper spare parts.

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1.1 Applicable Ranges
These instructions are only applicable with specific ranges supplied by March May Ltd. The ranges are generally small single or multi stage centrifugal pumps which are magnetically driven.

Here is the list of the ranges covered by these instructions:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Centrifugal, magnetic drive, split case</td>
</tr>
<tr>
<td>BVS</td>
<td>Single stage, magnetic drive, single stage, unbalanced</td>
</tr>
<tr>
<td>BMS</td>
<td>Single stage, magnetic drive, balanced</td>
</tr>
<tr>
<td>BSS</td>
<td>Single stage, magnetic drive, single stage, unbalanced</td>
</tr>
<tr>
<td>HRP</td>
<td>Horizontal, magnetic</td>
</tr>
<tr>
<td>LCP</td>
<td>Centrifugal, drive, liquid coupled</td>
</tr>
<tr>
<td>M50</td>
<td>Small centrifugal, magnetic drive, single stage</td>
</tr>
<tr>
<td>M55</td>
<td>Small centrifugal, magnetic drive, single stage</td>
</tr>
<tr>
<td>K55</td>
<td>Small centrifugal, magnetic drive, single stage</td>
</tr>
<tr>
<td>WH7</td>
<td>Small centrifugal, magnetic drive, single stage</td>
</tr>
</tbody>
</table>

If a pump is running, care should be taken to protect fingers or long hair from becoming tangled in the fan of the motor or motor shaft. Hair should be tied back and fingers should never be placed near the motor fan or shaft while running. Do not insert any objects through the fan cover while the motor is running. To test the motorstartup, set a stop switch or other object which will prevent damage, however this should only be done when motor is turned off and disconnected from electrical source.

1.2 General Safety Information
Some of the larger pumps may be heavy when assembled so must be moved with caution to avoid injury to employees or damage to the pump itself or other equipment.

Ensure the correct safety precautions and procedures are followed before testing or running the pumps. Avoid any operation which may put employees or third parties at risk of injury.

If pump becomes damaged or seems damaged upon commissioning, do not attempt to run the pump until it has been inspected and repaired as this may cause further damage to the pump or endanger personnel.

1.3 Magnetic Component Safety
There are several safety factors which must be observed when transporting and handling magnetic components which are supplied by March May products.

Care must be taken during assembly to avoid electrically charged bodies coming into contact with the magnetic components. This is due to the strong mechanical forces between two magnetic components when they are put together. It is advisable never to place any bulk part between two magnetic components, and for long hair to be tied back or other components removed during assembly.

Assembling, be aware that equipment or tools which are magnetized will not be subject to damage to the magnetic components. To avoid injury, sharp or heavy magnetic tools should be removed from the assembly area.

If loose magnetic particles get into eyes, medical advice should be sought immediately.

Magnetic components can interfere with safety mechanisms and other devices such as wristwatches, computers and credit cards. This equipment should be removed from assembly area.
2 General Description

2.1 General Principles

March May magnetic drive pumps use the principle of magnetic attraction to create a pump which provides complete isolation of the pumping media. They are designed with a front cover and mechanical connection between motor and pump head. The risk of leakage means these pumps have advantages over mechanical seal pumps and are good for pumping aggressive media.

There are two main sections of March May pumps: the pump head and motor.

The pump head is the 'front' of the pump. It includes the pump housings and internal components along with the drive magnet and motor bracket. This pump head is fixed to the motor by March May to create the full pump assembly.

2.2 Exploded View (Pump Head)

Here is an exploded view of an MSP 2 stage pump head. The general format can be transferred to most of the ranges covered by this manual. However, individual configuration will vary between ranges, as will size, number of parts and design.

![Exploded View (Pump Head)](image)

Figure 1 - MSP 2 stage pump head exploded view

2.3 General Parts List and Descriptions

This is a generalised parts list and corresponding descriptions for March May pumps. The numbers correspond to figure 1 above, as please refer to that.

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front Housing</td>
<td>Part of the housing. Typically includes inter-pump.</td>
</tr>
<tr>
<td>2</td>
<td>Impeller</td>
<td>Impeller - Multiple impellers present in multi-stage pumps.</td>
</tr>
<tr>
<td>3</td>
<td>Shaft</td>
<td>Frame and between impellers.</td>
</tr>
<tr>
<td>4</td>
<td>Stage Housing</td>
<td>Part of the housing. Only used in multi-stage pumps.</td>
</tr>
<tr>
<td>5</td>
<td>Thrust Bearing</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spares</td>
<td>A range of internal components.</td>
</tr>
<tr>
<td>7</td>
<td>Bearing Housing</td>
<td>Only present in multi-stage pumps.</td>
</tr>
<tr>
<td>8</td>
<td>Impeller Housing</td>
<td>Part of the impeller assembly, fixtures with the drive magnet.</td>
</tr>
<tr>
<td>9</td>
<td>Pump Housing</td>
<td>Part of the pump housing. Typical includes inter-pump.</td>
</tr>
<tr>
<td>10</td>
<td>Drive Housing</td>
<td>Part of the pump housing. Not housed in pump housing.</td>
</tr>
<tr>
<td>11</td>
<td>Motor Bracket</td>
<td>Connects the pump head to motor. Also protects drive magnet.</td>
</tr>
</tbody>
</table>

This set up and parts list will not be correct for all ranges however it can be used as a general guide if spares are required or if technical advice is needed and a part description is unknown.

7 Maintenance

7.1 Maintenance

Never attempt to perform maintenance work on a pump whilst it is in operation, or has recently been shut down. Rotating and hot components and connections to electrical supply all pose health and safety risks to personnel if work is attempted.

Pumps should be shut down and left to cool, then isolated by disconnecting the suction and discharge valves. Then the Chambers should be fully drained. After this the electrical supply should be disconnected. It is then safe for maintenance and servicing to be carried out.

7.2 Monitoring and Servicing

The levels of monitoring and servicing required for a pump is dependent on the operational strain placed on it. Pumps running frequently should be monitored and serviced regularly. Pumps running infrequently should be checked before operation if long periods of shut down have occurred.

At regular intervals the following should be checked against specification:

- Drive power consumption
- Noise levels when in operation
- General operating conditions and pump performance

To ensure trouble free operation the following should be checked for:

- No dry running
- No cavitation
- No loose fillings or fittings
- No unusual running noises or vibrations
- No impermissible leaks
- Warm or damaged components

If any problems are found with the pump and you wish for March May to perform tests and repairs to the pump then that can be arranged, please contact March May if you have any queries about maintenance or servicing.

7.3 Component Life

The life of components will depend on the liquid being pumped, the operating strain imposed on the pump and the component material. The liquid lubricated drive bearing should be initially examined every 4000 hours of operation and replaced if it appears necessary. This time period may be subsequently increased depending on the cleanliness of the system.

March May recommend that the impeller or bearings, where fitted, are replaced before the maximum wear exceeds 0.5mm.

7.4 Spare Parts

March May can supply spare parts for all pumps and many of the parts are kept in stock. Please contact March May for information regarding the purchasing of spares or repair of pumps.
6 Operation

6.1 Commissioning

6.1.1 Commissioning Preparation

Before commissioning the pump there are some necessary preparations.

- The pump and pipework should be primed before switching on. This is done by opening the bleed valve, which should then be closed as soon as all liquid escapes in a steady, air free stream. Priming may be performed with water if it is acceptable to the process/pump system.
- Ensure that all parts and connections are tight.

Safety Precautions:
- Extreme caution should be taken if the liquid is corrosive, flammable, toxic or an irritant. All personnel involved should wear appropriate safety clothing (eg. face masks, goggles, gloves) and all necessary safety equipment should be installed.

6.1.2 Switch On & Operation

Once the pump and system are primed the pump can be switched on and run. The following information should be consulted when switching on:

- The suction valve should be fully opened and the discharge valve 90% closed. Then switch on and allow the pump to run up to speed.
- After approximately 20 seconds the discharge valve should be opened slowly. Failure to observe this precaution can result in loss of suction head due to the magnetic components decoupling. If this happens, the discharge valve should be closed. Personnel should check for correct priming and then fully open the suction valve. The discharge valve should then be re-opened more slowly then before.
- When operating correctly the discharge capacity can be regulated by adjusting the discharge valve. Under NO circumstances should flow be regulated through throttling the suction valve. This can result in the pump being starved of fluid and lead to over heating which could cause cavitation, and will lead to damage to the pump.
- Pumps should never be run at shut valve flow (i.e. completely closed by closing the discharge valve) for prolonged periods of time. If this occurs, liquid in the pump chamber will become extremely hot and possibly cause distortion to components and eventual failure of the pump.

6.1.3 Switch off

- Turn off motor.
- Completely close the discharge valve. Failure to do this could result in flow reversal and hydraulic alarm.
- Completely close the suction valve.

6.2 Decommissioning

When taking a pump out of operation please consult the following measures to ensure that this process is performed safely and correctly:

- If a pump remains shut down for 14 days or more then the rotor shaft should be turned weekly in order to break up any film which may have built up in the pump chamber.
- If the pump is to be shut down for a considerable time but remain ready for operation, it should be run for short bursts of around 5 minutes at intervals of between 1 and 3 months. This should only be done if there is sufficient liquid to lubricate the components.
- If the pump is to be left shut down during a long period of time, the rotor should be drained in order to prevent rusting or the components.
- In freezing conditions, the pump and pipework should be insulated to prevent freezing or the formation of ice. The pump should be drained of the fluid and the valves closed.

3 Pump Information

3.1 Pump Suitability

When selecting a pump for a duty you must refer to the performance curves and material properties of the component parts. These are two factors which govern whether a pump is suitable.

This should be done before purchasing the pump of course but also before running to ensure that the pump is not near outside of its physical capabilities which will reduce the risk of damage to the pump or system.

March May’s technical performance data is purely indicative and actual performance may vary slightly. The data was gathered from tests carried out on water with an SS 1.0 unless otherwise stated on documentation.

If the medium you are pumping is not water then the characteristics of that medium must be analysed and checked. You must verify that the system can pump that medium before running the pump.

Properties which will affect the pumps performance are specific gravity (SG) and fluid viscosity. Media with higher SG values will need more power to pump at the same duty, and vice versa with lower SG. Media with high viscosities will experience a reduction in flow and head along with a increase in power consumption. This increase and decrease will be proportional to how much more or less viscous the medium is then water.

As well as the pumps performance, the construction material must be considered when evaluating a pumps suitability.

Chemical compatibility charts should always be consulted before running a pump with media other than water. If a material is used in construction where it is incompatible with the pumping media then damage to the pump will result.

March May will give material recommendations if asked and these recommendations are given in good faith and are based on previous experience and technical data available at the time. Customers should also check compatibility. Test materials can be provided if no data can be found.

Operating temperature and pressure must be considered as the construction materials thermal resistance and pressure capabilities will vary.

3.2 General Material Limitations

Below is a table which gives some general limitations of the main materials used in March May pump construction. Consult this table when assessing pump suitability.

<table>
<thead>
<tr>
<th>Material</th>
<th>Acetal</th>
<th>PP</th>
<th>PPE (Polyester)</th>
<th>POOF (Polyurethane)</th>
<th>Steel SS/SS</th>
<th>Stainless Steel SS/SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Temperature Limit</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>120</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Lower Temperature Limit</td>
<td>-20</td>
<td>-20</td>
<td>-20</td>
<td>-20</td>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>Upper Pressure Max (at 25°C)</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>13.0</td>
<td></td>
</tr>
<tr>
<td>Lower Pressure Max (at 85°C)</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>13.0</td>
<td></td>
</tr>
</tbody>
</table>

These values are based on water as the test medium with internal operating pressures of less than 2 bar. Various forms of some of these materials are available. Please check with March May directly if the material properties required are not listed above.

3.3 Media Suitability

Certain media are not suitable for use with March May magnetic drive pumps. Media which are unsuitable are:

- Media containing hard or abrasive particles. These will cause damage to the internal components of the pump.
- Media containing any particles over approx. 5mm in diameter. These can build up in the pump chamber and cause the internal components to seize up.
- Media containing ferrous particles. These particles will become attracted to the magnetic internal components and cause them to seize up and result in damage to the pump.
- Media with very high viscosities (typically over 500 SSSU).
4 Packaging

Marsh May carefully package all their products before delivery. Packaging will consist of the outer packing, generally a carton, and some internal packing to act as protection against damage during the delivery of the goods. If pallets are required for delivery grants will be fixed securely and freely to the pallet to avoid damage during delivery.

Packaging should be removed upon receipt of goods but not disposed of until goods have been checked against the delivery note. Please note that the larger TE pumps (TE-9 and TE-10 series) will have impeller wing assemblies shipped separately in order to avoid damage to parts during transit.

Check carefully that no parts or technical information are left in packaging before disposal. If goods are all present and removed from packaging then packaging should be recycled where appropriate or disposed of sensitively and legally.

5 Installation

5.1 Pipework and Valve Installation

There are numerous considerations which must be noted when setting up pipework for Marsh May pumps.

- System and connecting pipework must be entirely self-supporting and under no circumstances should the pump provide support.
- Existing pipework must be flushed out to remove any foreign bodies before the pump is installed. This is to avoid any foreign bodies entering the pump chamber. If this were to happen the pump would be damaged due to the very fine running clearances of the impeller.
- Ensure that all suction joints are tight to avoid loss of vacuum when the pump is running.
- Choice of pipework size and/ or pipe support (or means of holding) should be discussed with Marsh May.
- Marsh May recommends the fitting of sluice valves on suction and delivery branches of the system. This is to make future removal of the pump for maintenance easier.
- Marsh May recommend that when long delivery lines are used that a non return valve should be fitted. This is in order to prevent flow reversal. Freeway types valves are preferred to reduce vibration and minimize tendency of jamming. If any more information on non return valves is needed please consult Marsh May directly.

5.2 Pump Installation

This information must be taken into account upon installation so that the pump works properly and to avoid damage to the pump.

- Before running, ensure that all centrifugal pumps are primed as they have limited suction capabilities.
- Pumps should NEVER be dry. If they are dry then the components will overload and become either distorted, damaged or fail together under heat and pressure. The medium is necessary to lubricate the parts.
- Pumps should be on a flat, stable surface or support which is suitable to prevent movement of the pump and motor when in operation. It is advisable to mount the motor on a non-rotating/insulating surface to reduce noise and vibration caused by vibrating components whilst in operation.
- Always ensure that the suction lift is higher than the inlet port. This allows for gas to escape through. If the outlet is not higher than the inlet gas can build up and may cause problems within the system. See Figure 2 below for examples of incorrect and correct set up. Marsh May offer a wide range of port configurations, which will comply with this recommendation.

5.2 Pump Installation continued

- The pump should never be mounted vertically with the pump head at the lowest point. This would create an air pocket within the pump chamber and could cause problems with the pump performance.

Figure 3 - Pump Mounting Schematic

- Ensure that there is sufficient clearance between motor fan and external surfaces when installing the pump. This will allow sufficient heat dissipation and cooling of the motor. It is recommended that around 30 mm minimum clearance is allowed for both the motor and the pump.
- Ensure that the pump, motor and external wiring are protected adequately from spillage or mechanical damage when installing.

5.3 Electrical Information

When connecting to electrical supply please consult this information and comply with relevant safety precautions to avoid injury.

- Any electrical work must be performed by a qualified electrician.
- Ensure that the electrical supply available and the motor are compatible before proceeding with connection.
- Ensure that the motor is connected in accordance with the circuit diagram (if provided). For motors with a junction box the wiring diagram is generally found on the reverse of the junction box lid. For pre-wired single phase motors the following wiring information is applicable:

<table>
<thead>
<tr>
<th>Type</th>
<th>CC</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth</td>
<td>Yellow/Green</td>
<td>Green</td>
</tr>
<tr>
<td>Insulated</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>Live</td>
<td>Brown</td>
<td>Black</td>
</tr>
</tbody>
</table>

- All pumps must be earthed.
- The direction of rotation for the pump must be checked. If a pump runs in the wrong rotation it will not perform correctly. Marsh May pumps must always start and run in a clockwise direction viewed from the pump head end. It is often easier to check the rotation by looking at the motor end, then the motor fan and the rotation should appear clockwise.
- When checking rotation direction it is safe to perform a quick running test of no longer than 3 seconds, while the pump is dry. Do not perform any running tests in quick succession and under no circumstances should the test last more than 3 seconds as this can cause damage to the pump.

Safety Precautions:

- Remember that when working with any electrical supply there is danger of electrical shock. Extreme caution should always be taken when working with electrical equipment and live supplies.
- If pump or motor appears to not meet the electrical requirements or damage is apparent then it should not be connected and Marsh May should be contacted.
- When a pump is running there is danger from rotating components. Ensure that all guards and covers are fitted before running equipment to avoid risk of injury from rotating components.
**Isolate electricity supply**

Turn off the supply of water to sample tank and then open drain valve to drain the tank.
Filter cage replacement (continued)

1) Remove Anti-splash Lid.

*View of Retaining Clip
Check that the 2.5mm Bleed Nozzle is clear. ( Unblock with wire or similar if required)

2) Release Clip retaining Filter Head Body. (Avoiding dropping the body into the bottom of the tank).
Filter cage replacement (continued)

3) Removing Filter head assembly from sample tank
   (Making sure that the ‘O’ Rings remain seated in their grooves)

4) Unscrew the Retaining Nut that attaches the Filter Cage to the Body.
   Then remove the old Filter Cage.
   (press out from filter side as shown)
NOTE: Instructions 5-7 are only required occasionally or if the Cage mesh has split in use.

5) To clean the Jets, the filter cleaning rotor must be split. Insert plain screw driver into slot to lever the Jet Rotor mouldings apart gently.

6) Clean the insides of the cleaning rotor paying particular attention to the jet slots

7) Re-assemble cleaning rotor by pressing together. (If required gently use pliers, but usually hand pressing is sufficient.)
8) Using a new Filter cage or one that has been thoroughly cleaned, insert it into the Retaining Nut (ensuring its fully pushed in).

9) Screw the Retaining Nut fully back onto the Body (hand tight only is required!)

10) Re-install Filter Body assembly in the sample tank. **ensure mating faces are clear of debris and ‘O’ rings are in place.**

11) Push Retaining Clip back in its closed position.
Once Filter maintenance is completed introduce water into system and switch on system. If safe to do so by placing your fingers on the Filter Cage it is possible to feel a pulsing as the Backwash Rotor rotates.

**IT IS ESSENTIAL TO CHECK THAT FILTERED WATER IS BEING DELIVERED TO ANALYSER.**

Sometimes an air lock can prevent the filter system working and will result in serious damage to the pump due to dry running. If this occurs uncouple outlet pipe to analyser and re-start until water is being pumped. Then re-attach pipe work to analyser and re-start checking that there is a supply to the analyser.