



**Operation and  
Maintenance Guide for  
the Modulus Package  
Treatment Plant**

## Your Modulus Treatment Plant

The Modulus Package treatment plant is a traditional 3-chamber based system, clearly identified in 3 distinct modular chambers that interconnect and operate as a single unit.



Figure 1 – OM6LP shallow excavation plant illustrated

There is a degree of simple assembly required as per the following instructions. All loose components required to assemble the Modulus should be found in Tank 1.

Identify and align the three modules upon the 250 mm concrete base prepared to uniformly support the base of each tank within your excavation (for further details on the excavation and installation please refer to the General Installation guide supplied or drawing reference

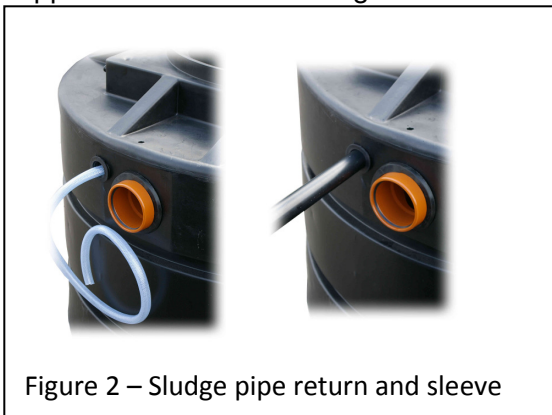


Figure 2 – Sludge pipe return and sleeve

SA2029/09). Feed the clear sludge return pipe that protrudes from tank 2 through the Ø40 mm black waste pipe to act as a protective sleeve as illustrated in Figure 2.

The hose protruding from the black sleeve can now be inserted through the grommet into tank 1 alongside the tank outlet. Trim

the clear pipe inside Tank 1 so that it will terminate just above the water line when full. **The water line will be level with the bottom of the outlet pipe.**

Connect the outlet of tank 1 to the inlet of tank 2 and the outlet of tank 2 to the inlet of tank 3 using the 2 lengths of terracotta pipes supplied. Figure 3 shows the connected pipework from tanks 1 to 2 alongside the 'sleeved' sludge return pipe.

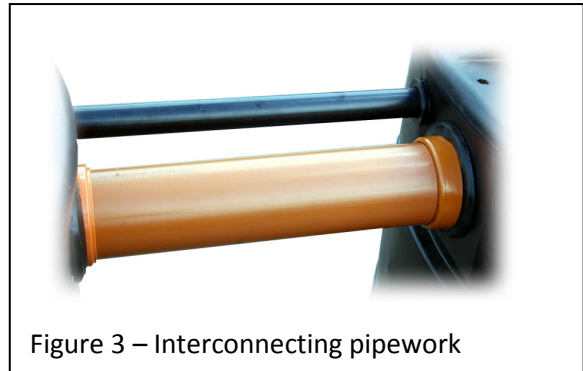


Figure 3 – Interconnecting pipework

Using the clear length of air hose supplied, connect one end to the exposed hometail on tank 2, marked air inlet. Secure to the hometail using the jubilee clip supplied.

The opposite end of the air hose should be fed through an appropriate duct to

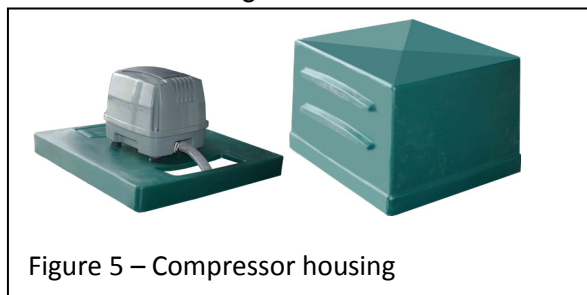


Figure 4 – Air inlet connection

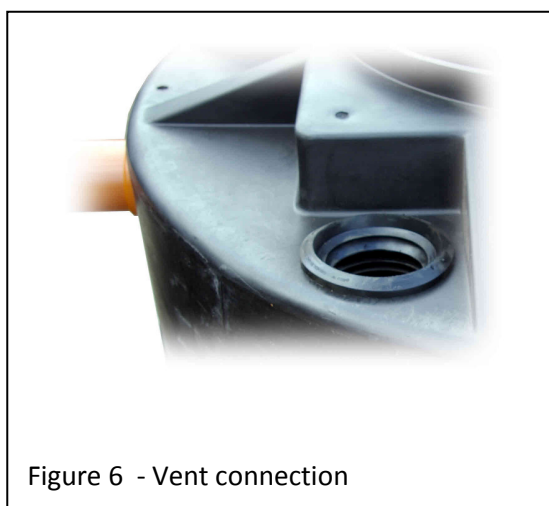
terminate at the designated location for the compressor within its housing. Attach hose to the compressor supplied, sliding over the compressor's spigot and secure with a jubilee clip.

For further details on the installation of the compressor refer to the Linear Diaphragm Pump/Blower unit section later in this manual or the manufacturers instruction supplied.

The compressor housing should be completed by placing the cover over the base completely enclosing the compressor as illustrated in Figure 5.



Ventilation to a suitable above ground external soil stack or high level ventilation pipe should be made to the treatment plant. Provision to make such a connection is provided on tank 2 as



illustrated in Figure 6.

## Linear Diaphragm Pump/Blower unit

These units are precision instruments which will give many years of service provided that the instructions on installation and operation are followed.

On receiving the blower unit, check that the unit has not been damaged in transit. Remove any protective covers where fitted. Ensure that the voltage at which the air pump operates is the same as the rating on the label.

The blower unit must be horizontal. **Use only to pump air.**

Using the large bore air hose supplied and avoiding sharp bends and kinks to the pipe will improve the performance of the blower and the treatment plant. As such the standard brass hometail (where supplied from the original equipment manufacturer) is surplus to requirements and should be disregarded. Complicated and detailed pipe layouts from the blower to the treatment plant with multiple bends and connections will all reduce capacity and make the air pump work harder.

Ensure the blower unit can discharge sufficient air at all times, never close off the blower outlet, otherwise the pump will heat up and may be damaged.

Never immerse the blower unit in water. To avoid any backflow of water into the air pump, install the pump above water level in the housing provided. If this is not possible, a non-return or check valve must be used in the outlet pipe.

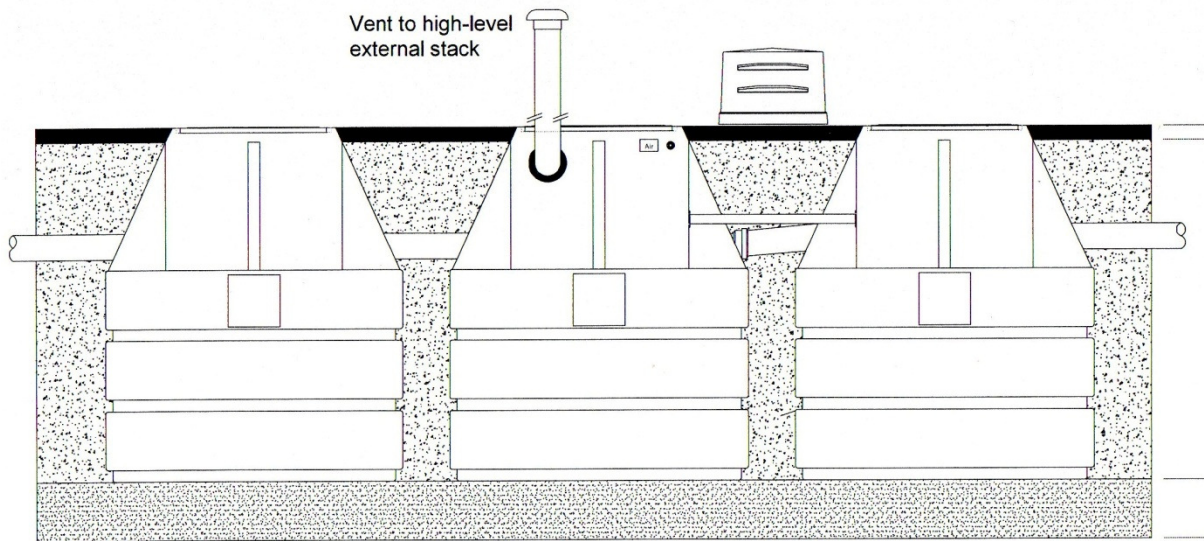
To guarantee a long service life, install the air pump in dry conditions, free of condensation and dust. Dust and moisture can seriously shorten the service life.

**Please note** that ambient temperatures above 40°C can cause the diaphragms to dry and crack. The electricity supply must be grounded to protect the operator from electric shock. Never carry the pump by the power supply cord. Switch off or disconnect the plug from the power when not in use, and before installing or removing parts or cleaning.

Do not place the air pump where it might come into contact with liquids, or near flammable or other dangerous materials or objects. If the normal pump sound is interrupted, or indicators illuminate or other abnormal conditions occur, immediately disconnect the power and

contact the pump supplier or service provider.

## Treatment Process



**Module One** is the primary 'Settlement Chamber'. In this tank the heavier lumps in wastewater sink to the bottom and the process of degradation begins as bacteria start to eat the waste.

**Module Two** is known as the 'Aeration Chamber'/Biozone. Here air is pumped into the tank so there is plenty of oxygen available for the bacteria to quickly break down the waste. If there is insufficient oxygen it may result in the bacteria working slowly or not at all and the pollutants are not removed from the water.

**Module Three** is the 'Settlement Chamber'/humus tank. Smaller particles in the water appear in this tank. Such particles are not waste but the clumps of bacteria which have been busy eating the pollutants in Module Two. These are less harmful than what entered the plant in the wastewater but nevertheless are not permitted in the discharge. They settle to the bottom of the tank and form a super-rich 'sludge' of helpful bacteria.

## Dos and Don'ts

### Do

- Think before putting any wastes down the sink, toilet or drain.
- Tell visitors or have appropriate signage stating what is or isn't acceptable to the Modulus system.
- **Regularly desludge the system** (see below for further details)
- Spread clothes washing throughout the week, rather than having a 'washing day'
- Use the same brand of cleaning and washing product consistently this will help the system work more efficiently (the bacterial communities adapt to deal with one type of chemical, if you change the chemical type/composition it will take them a while to develop the ability to process the new one)
- Use liquid cleaners for clothes washing and especially dishwashers

- Fit a grease trap if you are likely to produce significant amounts of fats during cooking (eg if you are a restaurant)
- Position the air stack which vents from (Module Two) to an external high level soil stack in a position which will allow any potential smells to be quickly dispersed by the breeze.
- Compost waste vegetables rather than using a waste disposal unit
- Regularly check your plant for faults by following our 12 Point Service Plan
- Install an alarm so you will be alerted if there is failure on the air compressor. These work by monitoring a drop in air pressure which indicates the compressor has stopped working.
- Consider taking out a Maintenance Contract which will ensure the system is regularly serviced.

### Don't

- Use excessive amounts of household cleaners including bleach (for example bleach toilets on a weekly not daily basis) Bleach kills the bacteria which remove the pollutants from the wastewater.
- Have a 'washing day', spread the washing throughout the week.
- Dispose of products such as **tampons, sanitary towels, disposable nappies, cotton wool, condoms, baby wipes, face wipes, incontinent pads** down the toilet
- Pour fat or grease down the drain (eg from a grill tray or chip pan)
- Dispose of **medicines, garden chemicals (eg fertilizers, preservatives, or weed killers), motor oils or anti-freeze, DIY products such as white spirit,**

**paint thinners, solvents or glue or dairy waste** down the drain, sink or toilets.

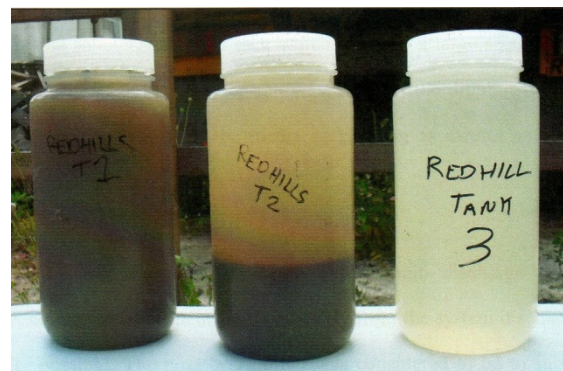
- Situate your air stack (which vents from module two) in an area too sheltered from breezes. If the air is stagnant the potential odour will not disperse and you may have problems with smells (ie avoid anywhere too close to a fence or hedge or putting it at head height)
- Indiscriminately use waste disposal units unless specifically sized for - consider composting options instead.
- Ignore your plant completely and imagine it is going to run itself without any intervention from you.
- Disconnect the power supply to the air compressor, it needs to be running 24 hours a day.

### Start up period

It can take up to 3 months for the system to grow enough bacteria to treat the waste completely, any problems encountered during these first few months should be disregarded and the system given a chance to stabilise.

### What to expect

A correctly installed and operating system effectively treats the influent throughout each stage of the process, typically like those shown in the following photograph.



In **Module One** it may have a crust of solids on the top, this is normal. If you wish to improve the system efficiency further you can stir it with a stick every few months to break it up and allow it to settle to the bottom of the tank where no oxygen is present and greater decomposition will occur. (This area is also known as the anoxic zone)

In **Module Two** you will be able to hear the air compressor humming and see bubbles rising to the surface. A bag of 'media' will be visible and bacteria will grow on them and around the fibres of the bag.

In **Module Three** the water will appear quite dirty still, however if a sample is collected with a jar, downstream of the unit where the flow can be sampled it will be seen that it is relatively clear, (see aforementioned photo) and there may be tiny black specks visible in the discharge water. Increased discolouration does not necessarily indicate a malfunction, this may be as a result of the type of water received by the system.

## Desludging

### What is it?

Sludge is the solid matter produced in and by all sewage treatment plants. It comes from the solids that are flushed into the system from the toilet, kitchen or laundry and accumulates mainly in Module One, the 'Settlement Chamber'. It is a combination of existing solids in the wastewater when it entered the system and what is produced as a consequence of bacterial growth in this chamber.

Desludging is the process of removing the accumulation of this 'sludge' from the Module One

### Why is it removed?

Treatment plants only have a finite amount of space. Sludge reduces the length of time wastewater is in the system, which in turn affects and influences how well the wastewater is treated. The fuller Module One is with sludge, the smaller the total volume of the system. Consequently the retention time is reduced and wastewater can be untreated. Another factor affecting the length of time wastewater stays in the system is the rate (speed) at which it is entering. Too much too soon and the wastewater leaves without having had chance to be treated properly. For this reason it is important to choose the correct size of tank.

If sludge is not regularly removed the Modulus may not work efficiently and the quality of effluent will worsen until it does not comply with the regulatory requirements. If the discharged effluent does not comply with Standard prEN 12566-3 this is a civil offence and a fine may be incurred.

### How do I know when to de-sludge my system?

We recommend inspection after a 6-month period and desludging where appropriate with a minimum desludging on **at least** an annual basis. There are often **no obvious signs** a plant needs desludging except an increase in the concentration of pollutants in the wastewater which may not be visible to the householder or owner/user. The following are definite signs that treatment plant requires desludging:

- A thick crust on the surface
- A poor quality liquid effluent discharge usually containing solids
- Persistent bad (i.e. worse than normal) smell
- A dip sample which suggests Module One is more than two-thirds full of sludge

## Who desludges the plant and how is it done?

De-sludging is usually carried out by recognised operator. It is advisable to check the qualifications of the operator. You both have a Duty of Care to ensure the waste is disposed of properly and safely. A tanker will come to your property and pump out the waste which they will then remove from the site for safe disposal elsewhere.

The optimal distance for desludging is generally 30m linear distance from the closest hard standing for the tanker.

It is recommended than 75mm of sludge is left in the bottom of the tank to encourage the growth of a new 'biozone'. It is

## Trouble Shooting Guide

recommended that the tank be refilled immediately after emptying especially in wet conditions.

A summary of Duty of Care requirements and responsibilities is available at:

<http://www.defra.gov.uk/environment/waste/legislation/pdf/dutyofcare-summary.pdf>

If a Service Contract Agreement is entered into by the householder or owner/user of the tanks it is recommended that it is with a company with suitably qualified staff. A list of Accredited Service Engineers is available at:

[http://www.britishwater.co.uk/ptp\\_engineers/Accredited\\_Service\\_Engineers.aspx](http://www.britishwater.co.uk/ptp_engineers/Accredited_Service_Engineers.aspx)

Symptom	Possible faults	Solution
<ul style="list-style-type: none"> <li>Strong smells* are persistently present around the tank</li> </ul> <p><b>* Some smell is normal and is not a sign of system faults or failures. Smells occur as a result of the products flushed into the system</b></p>	<ul style="list-style-type: none"> <li>Air stack is incorrectly positioned, e.g. too close to the ground or too close to a fence so there is limited air circulation</li> <li>First tank is full</li> <li>An excess of bleach or cleaning products is being used</li> <li>Blower/air pump failure</li> </ul>	<ul style="list-style-type: none"> <li>Move/change the height of the air stack</li> <li>Arrange for desludging to be carried out (for further information see page 5)</li> <li>Clean toilets etc less frequently, it is not recommended that bleach is put down the toilets more than once a week. It is also best to stick to the same brand of cleaning product</li> <li>Lift lid on second tank and look for bubbles rising to the surface of the water. If none are present arrange for the air pump to be serviced/replaced</li> </ul>
<ul style="list-style-type: none"> <li>Water leaving the third chamber is very dark coloured and/or has a large number of bits in</li> </ul>	<ul style="list-style-type: none"> <li>First tank is full</li> <li>Blower/air pump failure</li> </ul>	<ul style="list-style-type: none"> <li>Arrange for desludge to be carried out (for further information see page 5)</li> <li>Lift lid on second tank and look for bubbles rising to the surface of the water. If none are present arrange for the air pump to be serviced/replaced</li> </ul>

	<ul style="list-style-type: none"> <li>• Ground or rain water is entering the system and causing 'wash out' meaning waste is washed out of the system before it has been treated properly</li> <li>• Consider whether the tank is correctly sized, if you are a business which has expanded you may find you no longer have sufficient treatment capacity to treat the waste you are producing. (See British Waters <i>Flows and Loads 3</i> for guidelines on appropriate sizing of tanks. )</li> </ul>	<ul style="list-style-type: none"> <li>• Check the fitting of the covers to each module tanks. Replace/refit as appropriate</li> </ul>
<ul style="list-style-type: none"> <li>• Yellow (and smelly) solid lumps are visible on the surface of tanks one and/or two</li> </ul>	<ul style="list-style-type: none"> <li>• There is an excess of fats/grease in the system</li> </ul>	<ul style="list-style-type: none"> <li>• Install a grease trap or check that the one in use is not blocked and that there is sufficient time for wastewater to cool before passing through the grease trap and entering the system</li> </ul>
<ul style="list-style-type: none"> <li>• Foaming (Light coloured bubbles/foam coming up from the air vent on Tank 2)</li> </ul>	<ul style="list-style-type: none"> <li>• Insufficient volume/strength of wastewater received by the system</li> </ul>	<ul style="list-style-type: none"> <li>• Consider whether the tank is receiving sufficient use. If there is practically no movement of water through the system and/or insufficient solids are being received that can cause problems with foaming. Try not to waste solids and to keep a more continuous flow of wastewater into the tanks.</li> </ul>
<ul style="list-style-type: none"> <li>• Abnormal noise from the blower unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Dust or foreign matter may have entered the air inlet resulting in failure of the pump.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean or replace the air pump's inlet filter sponge regularly, frequency will depend upon the environment (refer to pump manufacturer's instructions for cleaning/replacing).</li> </ul>
<ul style="list-style-type: none"> <li>• Blower unit/air pump has stopped</li> </ul>	<ul style="list-style-type: none"> <li>• Disruption to the power supply</li> <li>• Diaphragm ruptured/seized</li> </ul>	<ul style="list-style-type: none"> <li>• Check main power supply and associated fuses.</li> <li>• Fit replacement diaphragm to blower unit (refer to pump manufacturer's instructions for details of servicing/replacing diaphragms)</li> </ul>
<ul style="list-style-type: none"> <li>• Treatment plant backing up with rising water levels</li> </ul>	<ul style="list-style-type: none"> <li>• Interconnecting pipework between modules blocked</li> </ul>	<ul style="list-style-type: none"> <li>• Modules 1 to 2 - Rod overflow and dip pipe to clear blockage into chamber 2</li> <li>• Modules 2 to 3 – Dislodge/reposition media bags beneath and around dip pipe freeing flow to chamber 3</li> </ul>



	<ul style="list-style-type: none"> <li>• First tank full</li> <li>• Drainage field/soakaway blocked or saturated</li> <li>• Discharge pump (where installed in non-gravity systems) failed/seized in Module 3</li> </ul>	<ul style="list-style-type: none"> <li>• Arrange for desludge to be carried out (for further information see page 5)</li> <li>• Refer to installer – this could be due to seasonal weather conditions or poorly draining ground. Drainage field may have to be excavated and re-laid.</li> <li>• Check float switch – free from any snagging and reset</li> <li>• Check main power supply and associated fuses</li> <li>• Replace pump if necessary</li> </ul>
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Customer Notes

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Model reference .....

Date of supply .....

Blower size and serial no .....

Discharge pump serial no .....  
(where supplied – non-gravity systems only)

Quality checked .....

# Modulus Treatment Plant 12 Point Service Plan

Customer:

Site Address:

Contact telephone number:

<b>Modulus Treatment Plant</b>	
Model Ref:	Installation date:
Compressor Make:	
Compressor Model/Serial no:	

Yes / No

Covers present and secure	<input type="checkbox"/>	<input type="checkbox"/>
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<b>Module 1</b>	Ensure Filter/overflow unrestricted	<input type="checkbox"/>	<input type="checkbox"/>
	Desludge required <small>Please note Module 1 should be recharged with clean water following desludging</small>	<input type="checkbox"/>	<input type="checkbox"/>
	Tank inlet clear of any restriction	<input type="checkbox"/>	<input type="checkbox"/>
	Sludge return operational	<input type="checkbox"/>	<input type="checkbox"/>

<b>Module 2</b>	Aeration from diffuser visible	<input type="checkbox"/>	<input type="checkbox"/>
	Overflow/filter clear	<input type="checkbox"/>	<input type="checkbox"/>
	Media/Biomass established	<input type="checkbox"/>	<input type="checkbox"/>
	Airlines connected and secure	<input type="checkbox"/>	<input type="checkbox"/>
	Vent clear	<input type="checkbox"/>	<input type="checkbox"/>
	Check presence of any solids <small>Please note excessive solids indicates tank 1 should be deslugged</small>	<input type="checkbox"/>	<input type="checkbox"/>

Module 3	Access clarity and surface build up	<input type="checkbox"/>	<input type="checkbox"/>
	<u>Comments</u>		

<u>Overall Comments and Recommendations</u>
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Recommended service interval:

Date of next service:

\_\_\_\_\_

Signed for and on behalf of client

\_\_\_\_\_

Print and date

\_\_\_\_\_

Signed for and on behalf of contractor

\_\_\_\_\_

Print and date

*This form should be reproduced for every subsequent service visit.*



## Plumbing & Drainage

### **Brett Martin Plumbing & Drainage**

Speedwell Ind. Estate

Staveley, Derbyshire

England, S43 3JP

**Tel:** 01246 280 000

**Fax:** 01246 280001

**Email:** [building@brettmartin.com](mailto:building@brettmartin.com)

Blairlinn Road

Cumbernauld, Glasgow

Scotland, G67 2TF

**Tel:** 01236 725 536

**Fax:** 01236 725 871

**Email:** [scotland@brettmartin.com](mailto:scotland@brettmartin.com)

100 Camford Way

Sundon Park

Luton, Bedfordshire

England, LU3 3AN

**Tel:** 01246 280 000

**Fax:** 01246 280 001