
010972B
Delta 1
Installation & Maintenance Guidelines



Kingspan Environmental Service Contact Numbers:

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Enclosed Document

DS0938B	Delta 1 Sales Drawing
010086B	SCP Wiring Nomenclature
500228	Timer Wiring & Setting Detail

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HEALTH & SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can become acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following the guidelines supplied with the equipment.

We recommend the use of a dust mask and gloves when cutting GRP components.

A qualified electrician should carry out electrical work.

Sewage and sewage effluent can carry micro-organisms harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Covers must be kept locked. Do not leave access or maintenance covers open for any longer than is necessary. Temporary barriers and warning signs should be erected around any open covers or man-ways as appropriate.

Observe all hazard labels and take appropriate action to avoid exposure to the risks indicated.

The correct ongoing maintenance is essential for the proper operation of the equipment. Service contracts are available and recommended. Please contact our Sales department for details of your local service provider.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses.

Ensure that the working area is adequately lit.


The power supply to the equipment should be isolated at the main RCD before lifting the blower cover.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

Desludging should be carried out by a licensed waste disposal contractor holding the relevant permits to transport and dispose of sewage sludge. The contractor must refer to the desludge instructions contained in these guidelines.

The user's attention is drawn to the following: -

- 1 All appropriate sections within this manual must be read before working on the equipment.
- 2 Installation must only be carried out by suitably trained/qualified personnel.
- 3 Normal safety precautions must be taken and appropriate procedures observed to avoid accidents.

	
Kingspan, Klargester Ireland 3A Carnbane Industrial Estate Newry County Down Northern Ireland BT35 6QJ	
10	
EN 12566-3: Small wastewater treatment plant for up to 50 PT:	
Delta	
6 PE with 200 litres/ day/ person	
Hydraulic daily load	1.2m³/ day
Organic daily load	0.37kg/ d
Material	GRP Glass Reinforced Plastic
Watertightness (water test)	Passed
Structural Testing (calculation)	Passed
Treatment Efficiency	COD: 90.1%
	BOD: 95.5%
	SS: 93.4%
	NH₄: 78.7%
	P Total: 46.3%
	N Total: 52.0%
Sludge production	0.5 litres/ day/ person
Power consumption	1.8K wh/day

During the nominal flow sequences of the performance test carried out at an independent laboratory to the requirements of the EN 12566-3 standard, the Delta treatment unit produced better than the above treatment efficiencies. The effluent qualities measured were better than the concentrations given below.

COD: 100 mg/l
BOD₅: 20 mg/l
SS: 30 mg/l
NH₄: 20 mg/l

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2 PLANT DESCRIPTION

2.1 INTRODUCTION

2.1.1 The unit is a packaged sewage treatment plant developed to treat domestic sewage from 6 people. It is a 'uni-tank' design comprising of a primary settlement stage, biological treatment stages and humus final settlement stage within a single tank shell.

2.1.2 The plant will provide long and trouble free operation provided the simple maintenance procedures are adhered to.

2.1.3 Your attention is drawn to the Health & Safety section in this manual. It is imperative that you read these instructions carefully before attempting to carry out work on the system.

The unit has been performance tested and meets the requirements of BS EN 12566- 3 and IS EN 12566-3

2.1.4 The plant has been designed to treat the waste from a residential domestic property, or a volume and strength of sewage specified in the original quotation. To ensure that the plant continues to operate efficiently, your attention is drawn to the following points:

- **DO NOT EXCEED THE MAXIMUM DESIGN LOADING OF THE PLANT (The unit loads make no allowance for the use of waste disposal/in sink macerators)**
- **DO NOT ALLOW SURFACE WATER TO ENTER THE SYSTEM**
- **DO NOT ALLOW HIGH VOLUME DISCHARGES SUCH AS FROM SWIMMING POOLS OR JACUZZIS TO ENTER THE SYSTEM**
- **DO NOT ALLOW LARGE QUANTITIES OF CHEMICALS SUCH AS WATER SOFTENER REGENERANT, DISINFECTANTS, STRONG ACIDS OR ALKALIS, OIL OR GREASE, PESTICIDES OR PHOTOGRAPHIC CHEMICALS TO ENTER THE SYSTEM**

2.1.5 If you have doubts about a particular substance, please contact us for further advice.

2.2 SCOPE OF SUPPLY

	Delta 1
Typical Dwelling	3 bedrooms
Population Load	Up to 6 persons
Total BOD Load	0.36kg/day
Maximum Flow	1.2m ³ /day
Peak Flow Rate (For ½ hour in any 2 hour period)	0.15 m ³ /hr

2.2.1 This treatment unit is a single tank which includes the following:

Primary Settlement

Two Reactors, stages of biological treatment containing moving submerged media

Humus Settlement

Air Diffuser Arrangement

Compressor

Timer controlled recycle

Self cleansing orifice flow control

Isolator including an alarm to indicate compressor failure

- 2.2.2 The tank is manufactured in glass reinforced plastic (GRP). It is impervious to water and sewage and designed to ensure robust construction and a long service life. The tank is provided with an access cover.
- 2.2.3 The covers are removed by unscrewing the locking devices.
- 2.2.4 The biological treatment stage is split into two reactors each with moving beds containing many pieces of plastic filter media, providing a very large surface area on which the bacteria required for the purification process can grow.
- 2.2.5 The system uses air diffusers installed in the base of each biological stage.
- 2.2.6 The final settlement zone settles the biomass carried forward from the last reactor.
- 2.2.7 Periodically, a recycle operates to return settled humus sludge and liquor to the primary chamber. This is set to operate every 30 minutes and provide 100% volume recycle.
- 2.2.8 A lit beacon indicates compressor operation. Should power fail, the beacon will be extinguished.

3 INSTALLATION GUIDELINES

- 3.1.1 Please read the Health & Safety section of this manual before attempting to work on the system.
- 3.1.2 These guidelines represent Best Practice for the installation of these units. Many years of specialist experience has led to the successful installation of thousands of units. It must be noted, however, that these guidelines are necessarily of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, any information or advice given by employees or agents of the company regarding the design of an installation must be verified by a qualified specialist (e.g. civil engineering consultant). Once installed the unit should have Pre-Service Agreement Inspection by an approved engineer.
- 3.1.3 NOTE: Please refer to the product drawing, specified at the front of this manual.
The following instructions are offered for guidance only.

3.2 HANDLING & STORAGE

- 3.2.1 The contractor is responsible for off-loading all items of equipment with due regard to the following:
- 3.2.2 Care must be taken to ensure that the unit is not damaged during delivery and handling on site.
- 3.2.3 Units must be off loaded and lowered into the excavation using certified webbing straps and the designated lifting points. Do not use chains. Alternatively, a forklift truck can be used for off loading purposes).
- 3.2.4 Do not lift the tank if it contains water. (If there is water in the tank, this should be removed using a small drainage pump and flexible hose)
- 3.2.5 The design requirements of our units will frequently mean that the centre of gravity of the unit is "offset". Care must therefore be taken to ensure that the unit is stable when lifting.
- 3.2.6 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site. We accept no responsibility for the selection of lifting equipment.
- 3.2.7 Whenever Delta units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects which might damage the unit. The unit must be placed on ground which is flat and level to evenly support the base of the unit. Do not subject the tank to sharp impacts.
- 3.2.8 Note: When stored on site, the unit access covers should be locked in place to prevent the ingress of rainwater.
- 3.2.9 On delivery, do check that all items delivered correspond with the delivery note.

3.3 SITING THE UNIT

- 3.3.1 The following points should be considered before installation of the equipment:
- 3.3.2 The discharge must have the consent of the relevant Environmental Regulator.

- 3.3.3 The installation should have Planning and Building Control approval.
- 3.3.4 Sewage treatment works should be as far away from habitable buildings as is economically practicable. Consult the building regulations for acceptable distances. Many Local Authorities will insist on a minimum distance of 15 metres. The EPA Manual for Southern Ireland states the recommended minimum distance from a single house treatment plant (<10PE) to a dwelling is 7m. The direction of the prevailing wind should also be considered in relation to properties.
- 3.3.5 Ground conditions and water table level should be assessed. If the water table will be above the base of the unit at any time of the year, we recommend adequate concrete back-fill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the back-fill. It should be borne in mind that the inlet drain trench will act as a land drain, directing surface water to the back-fill around the unit.
- 3.3.6 If the discharge is to a drainage field, a porosity test should be carried out in accordance with BS: 6297(2007) or to the European Technical report TR 12566/2. In Ireland, the site survey and test should be carried out considering the EPA code of practise for single house systems. This is required to assess sub-soil drainage and to aid the design of the sub-surface irrigation system.
- 3.3.7 There must be at least 1 metre of clear, level ground all around the unit to allow for routine servicing. Measures must be taken to ensure that it cannot be flooded by surface water run-off.
- 3.3.8 Consideration of the following additional points should be made when choosing the site of the treatment plant, Ease of access for electrical and other services, connection to foul drains, audio and visual impact, location of the beacon and its visibility, public access and environmental impact.
- 3.3.9 Care should be taken not to place the unit in close proximity to any openings within the building.
- 3.3.10 Adequate access must be provided for routine de-sludging and maintenance. Usually the unit should be sited within 30 metres of a hard standing area suitable for a vacuum tanker. The sludge-emptying vehicle must have access to the plant and be located within the suction lift capability of the vehicle. (Maximum reach of 40-metres and depth from vehicle to the bottom of the treatment tank 5-metres maximum. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.
- 3.3.11 Units must be installed at a level which will allow connection to the incoming drain and a free discharge at the system outlet. Surface water connections should be removed from the foul sewer. Effluent pumping stations are available to lift the discharge to a higher level and/or pump to remote discharge points.
- 3.3.12 Where necessary the unit should be fenced off or otherwise protected. Maintenance access must be maintained as above.
- 3.3.13 The drainage system connecting to the Delta must be adequately vented in accordance with the Building Regulations.
- 3.3.14 An adequate electrical supply must be provided, complying with current electrical regulations. The use of a separate Residual Current Device (RCD) protection is strongly recommended. Independent pump stations or any other associated equipment should have a separate power supply and RCD.
- 3.3.15 Proximity to a mains water hose pipe connection point is recommended, for maintenance purposes. Such a supply should be connected in accordance with water bylaws and regulations.
Never leave a hose connected and immersed in sewage.

3.4 INSTALLATION

- 3.4.1 **A Dry Site** is defined as one where groundwater lies below the base of the excavation at all times and the subsoil is free-draining. If in any doubt, assume “Wet Site” conditions.
- 3.4.2 Installation should only be carried out by suitably qualified and experienced contractors in accordance with the Health and Safety at Work Act. Electrical work should be carried out by a qualified electrician, working to the latest edition of IEE.

- 3.4.3 The installation should be carried out in accordance with the requirements of the Construction and Building Regulations. It is good practice to install inspection chambers at pipework direction changes and upstream of the unit. For sampling purposes, a sampling chamber should be installed downstream. (Optional extra)
- 3.4.4 During the course of the installation, the following equipment will be required:
- 3.4.4.1 Normal construction equipment and plant
 - 3.4.4.2 Concrete (Specification below).
 - 3.4.4.3 Pea-shingle 3mm-8mm rounded offering low point of loading characteristics.
 - 3.4.4.4 An adequate clean water supply to fill the unit, (all compartments) at the same rate as backfilling
 - 3.4.4.5 De-watering equipment as necessary
 - 3.4.4.6 Set of lifting straps
- 3.4.5 **Concrete back fill is recommended for backfilling the unit, but peashingle or sand may be used with relevant holding down strapping into the concrete base. See installation drawing.**
- 3.4.6 When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipework should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.
- 3.4.7 In situations where the excavation will not maintain a vertical wall, it will be necessary to support side walls of the excavation (e.g. with suitable trench sheets and bracing systems) to maintain a vertical wall from the bottom to the top of the excavation. DO NOT completely remove the shoring system until after the back-filling is complete, but before the concrete fully hardens (if backfilling with concrete).
- 3.4.8 In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be de-watered, using suitable pumping equipment, until the installation is complete. In such conditions it may be advisable to line the excavation with polythene sheeting, to prevent cement being washed out of the concrete surround/base.
- 3.4.9 During installation care must be taken to ensure that the body of any unit is uniformly supported so that point loads through the unit are avoided.
- 3.4.10 A water supply must be available on site to enable the unit to be ballasted during back-filling.
- 3.4.11 The Concrete Specification is a *general* specification, not a site specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)	
TYPE OF MIX	(DC) DESIGN
PERMITTED TYPE OF CEMENT	BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)	BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE	20 mm
GRADES:	REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C25 /30 C25 /30 C16 /20 270 - 280 Kg/M ³ 220 - 230 Kg/M ³
SLUMP CLASS	S1 (25mm)
RATE OF SAMPLING	READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER	

- 3.4.13 Excavate to the units dimensions allowing a minimum clearance of 200mm between the tank wall and the excavation sides. Excavate to the appropriate depth for the installation, i.e. invert level of incoming drain plus depth of tank to invert of inlet pipe connection, plus 200mm minimum backfill thickness (actual thickness to suit ground conditions).
- 3.4.14 When working in deep excavations, make sure that all necessary safety precautions are taken to ensure the stability of the excavation and provide safe working conditions for site personnel. (The only time anyone is required to be working at the bottom of the excavation is when leveling the base and ensuring that the first concrete back fill is correctly placed).
- 3.4.15 It is the responsibility of the installer to determine the thickness and strength of concrete required to hold the tank in the ground. Ground conditions should be ascertained and taken into account when calculating for the effects of buoyancy on an empty tank, external forces exerted by ground water pressure, backfill and traffic loadings etc.
- 3.4.16 Lay and level a concrete base for the tank to a minimum of 200mm thickness depending upon ground conditions. In wet or unstable ground conditions it may be necessary to lay an additional hard-core sub-base).
- 3.4.17 Lift and install the tank into position using certified webbing straps, taking care not to damage external flanges or pipework. Check that the inlet and outlet orientation is correct and that the unit is level. It is essential that the unit is installed level. If backfilling with peashingle or sand, secure the two holding down strap in the concrete base.
- 3.4.18 Start backfilling with concrete, peashingle or sand in 300mm lifts and at the same time fill all tank compartments with water ensuring that the progressive backfill and water levels are equal. Backfill must be evenly spread around the tank; ensuring spigot connections are not covered at this stage.
- Never wholly fill the tank with water before surrounding it with backfill
 - Never wholly surround the tank with backfill before filling it with water
 - *Note:* do not use vibrating rammers to compact the concrete
- 3.4.19 Make all interconnecting pipework connections, ensuring a minimum pipe gradient of 1:70.

3.5 VENTING

- 3.5.1 A vent socket has been provided in the tank body so as to provide air for blower operation. A high level vent should be provided at the property, connected to the drain line. The head of the drainage system should be connected to a stack pipe, open at high level, so as to draw foul air from the system and be sited with consideration to prevailing wind direction. Tile vents & Air admittance valves should not be used as the sole drainage ventilation facility, but if these cannot be avoided, the unit should be independently ventilated. All inspection points within the drain system should be sealed so as to enable ventilation at high level. If the unit is installed at a great distance from the property, a local vent may be required. The drainage field should be vented. (See BS; 6297 2007)

3.6 DUCTING

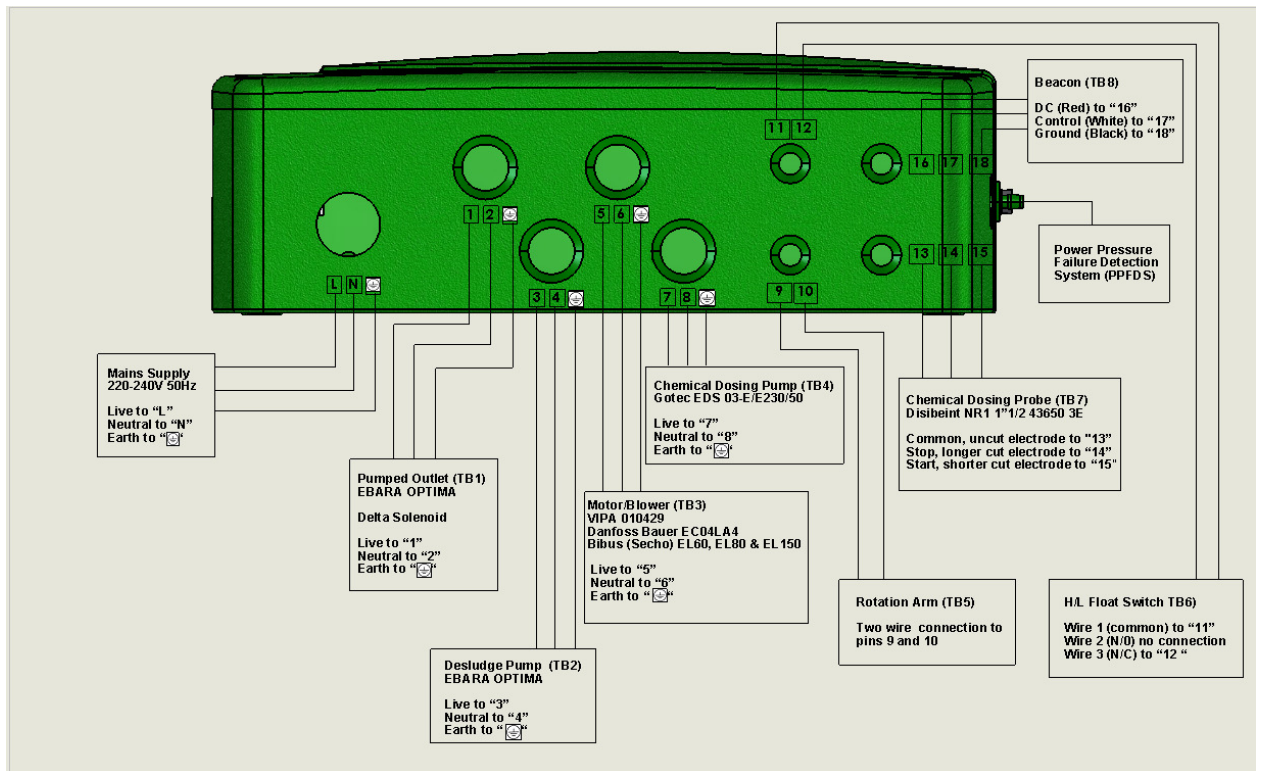
- 3.6.1 Provide and lay a 100mm uPVC duct from the tank to the dedicated electric power supply. The connection is clearly marked on the side of the unit.
- 3.6.2 Continue placing backfill in 300mm lifts, terminating 100mm below the underside of the top flange. If backfilling with concrete, allow an initial set of concrete between lifts and wait at least 24 hours for the concrete to harden. Where a high water table exists continue localised de-watering for 24-hours.

3.7 HIGH WATER TABLE/OR HEAVY WET GROUND

- 3.7.1 Where the water table is high or the ground is heavy clay, increase the thickness of concrete to a minimum of 250mm. Provide de-watering to keep excavations clear of water by providing a 250mm shingle sub-base before laying the concrete base. (Provide a polyethylene 1200 gauge sheet between the shingle and concrete). De-watering can be carried out through a 200mm uPVC pipe placed into the shingle. This pipe can remain in position to continue de-watering until the concrete has set.

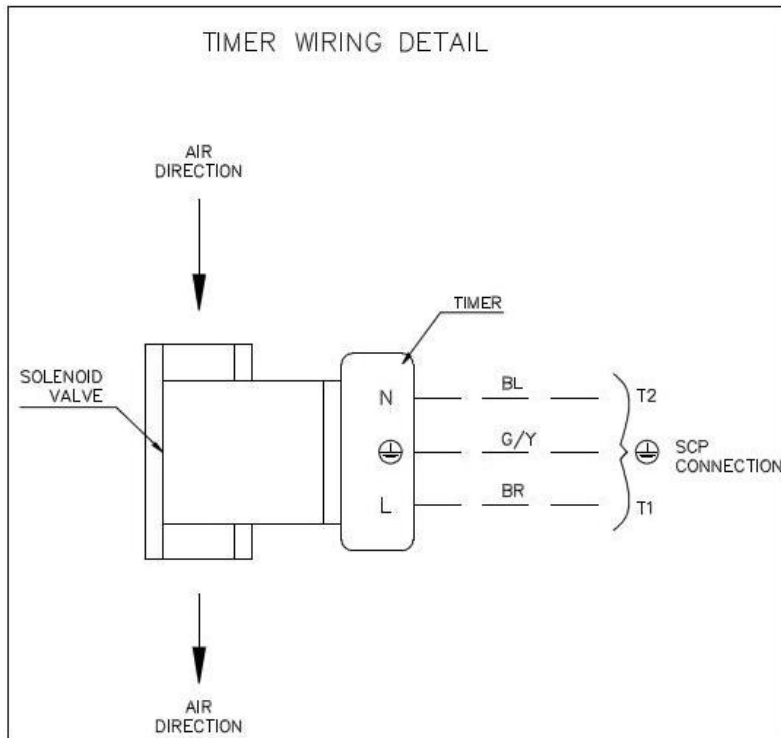
3.8 ELECTRICAL INSTALLATION

- 3.8.1 **It is imperative that the electrical installation of this equipment is entrusted to a competent qualified electrician working to the latest IEE regulations.**
- 3.8.2 It is not possible to state a specific installation configuration that would suit all sites. The selection of current protection devices must remain the responsibility of the installer who should select a suitable cable and current overload protection, taking into account the distance from the power source to the unit and any other relevant factors. (In many cases steel wire armored (SWA) cable, minimum 1.5 sq mm will be suitable)
- 3.8.3 When installing the electrical supply to the unit, the following points should be considered:
- 3.8.3.1 The electric power supply to the tank should be by means of a dedicated circuit with isolation and protection devices consistent with the requirements for fixed equipment and in accordance with the latest regulations of the Institute of Electrical Engineers.
 - 3.8.3.2 This power supply should be independent of all other household protection devices other than the supply authority's main fuse and that provided specifically for the power supply. In particular, earth leakage devices provided for normal domestic protection must not form part of the supply circuit to the tank.
 - 3.8.3.3 An earth leakage circuit breaker should be incorporated in the supply to the unit. A device with 30mA minimum trip current is recommended.
 - 3.8.3.4 Locate the Control Panel (in the unit) and mount externally at a point where it is easily visible from the property.
 - 3.8.3.5 The power supply cable should connect to the IP65 rated control panel mounted externally (see sales drawing), the supply should then pass through a duct in the side of the turret to the blower housed within the turret. Any terminal shrouds removed during the connection of cable cores must be replaced afterwards. A separate duct or conduit should be provided by others.
 - 3.8.3.6 Control Panel Wiring Diagram.

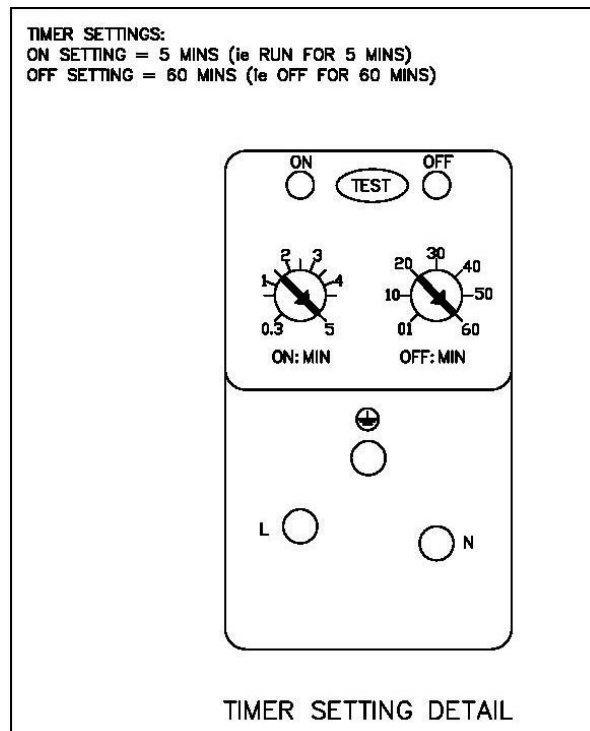


3.8.3.7 A secondary power supply cable should connect to timer fitted to the solenoid valve located in the blower housing. The supply should then pass through a gland in the side of the turret to the mains power. Any terminal shrouds removed during the connection of cable cores must be replaced afterwards.

3.8.3.8 Solenoid Valve Timer Wiring Diagram.



3.8.3.9 The timer should be factory set at the correct settings for this application; please check timer is set correctly to diagram below.



4 OPERATION

4.1 THE PROCESS

- 4.1.1 The unit is a new generation of package sewage treatment plant developed to treat domestic and other biodegradable sewage waste in a simple and compact system comprising four treatment zones within a 'uni-tank' design.
- 4.1.2 The moving aerated media process used is a compact development of the traditional biological process and provides a more effective and complete means of reducing the loads.
- 4.1.3 Raw sewage gravitates to the unit where it is received in the primary settlement zone. Here, gross solids and other social debris settle to the bottom of the tank where they remain until the tank requires desludging. Settled sewage is displaced from primary zone and enters the first of two sequential moving aerated media reactors.
- 4.1.4 Media and liquid circulation in each zone is achieved through the use of a compressor and diffuser, which introduces fresh air into each compartment. The liquor is constantly re-circulated and contacts the moving media and as it does so, it is purified by the microorganisms (biomass) growing on the surface of the media and within the moving liquor. Excess growth of biomass is shed as solid particles into the liquor.
- 4.1.5 When settled sewage enters the primary tank it displaces an equal volume of treated liquor from the second reactor chamber into the humus or final section.
- 4.1.6 The final settlement tank is where humus solids settle to form sludge. At preset intervals, portions of the sludge and liquor are returned to the primary tank for additional treatment. However, sludge does build up and it must be periodically removed. The primary and final settlement zones should be emptied of sludge every 12 months.
- 4.1.7 Final effluent is displaced from the final settlement tank. With regulator approval, it is suitable for discharge to a watercourse or drainage field.

5 PLANT START UP/SHUT DOWN PROCEDURE

5.1 START UP

5.2 Introduction

5.2.1 Every care is taken to ensure that all mechanical components are correctly fitted, adjusted and lubricated prior to leaving the factory. However, subsequent handling during transportation and installation may result in the movement of components and a subsequent need to re-adjust prior to starting the unit. Your installing contractor should have thoroughly checked the unit.

5.2.2 **If, on inspection, you consider that any components require adjustment, please contact us. We do strongly recommend that you purchase a Pre-Service Agreement Inspection from an approved engineer experienced in the operation of sewage systems.** Your warranty may require it.

5.2.3 If you are considering starting up the unit yourselves, the following guidance is provided, however, you should not attempt to carry out to do this if there is any doubt about the installation. Ensure that all Health and Safety precautions are observed. All electrical work should be carried out by a competent qualified electrician.

5.3 Water

5.3.1 During installation the unit should have been left filled with water, check that the unit is full of water to the outlet level.

5.4 Electrical

5.4.1 Check that the power supply is connected. Check that all electrical components and conductors are earthed.

5.4.2 Check the operation of the RCD (supplied by others) in accordance with the manufacturer's instructions.

5.4.3 Check the running current of the compressor against the full load current rating.

5.5 Unit

5.5.1 Check that the unit is in order, with no obvious damage or misalignment of parts. If any problems are discovered, contact us.

5.5.2 Check that the recycle operates returning liquid from the final settlement zone to the primary settlement zone.

5.5.3 Check that the reactor compartments “bubble” and that the media moves.

5.5.4 Check that water flows freely into and out of the plant.

5.5.5 Fit the manhole cover and lock in position.

5.5.6 If any equipment appears not to be operating correctly, refer to Fault Finding section of this manual.

5.5.7 The unit is now operational; however, the treatment process is dependant on the growth of naturally occurring microorganisms on the filter media. The time taken for these to fully establish is dependent on temperature and may take from six to eight weeks in winter (less in summer): Please note that the treatment process will be incomplete until the biomass is fully developed. During this time, do not allow any strong cleaning agents or bleaches to enter the system. Some ammonia treating bacteria will not develop in the colder months when the temperature is low (below 12 C).

5.6 SHUT DOWN / NO INCOMING FLOW

5.6.1 Temporary absence of flow to the plant will not be detrimental, however, if the flow of sewage to the plant is interrupted for long periods, (several months), the following procedure should be completed.

- 5.6.1.1 Desludge all tank compartments in accordance with the instruction in the maintenance section of the manual.
- 5.6.1.2 Refill the plant with clean water.
- 5.6.1.3 Re-Fit all tank covers, checking that the lid fixings are secure and in place.
- 5.6.1.4 Isolate the compressor.

6 OPERATION

6.1 Introduction

- 6.1.1 The biological treatment process of your Delta is self regulating and it requires no specialised operational knowledge, but it is important that you are aware of the following:
- 6.1.2 Your system uses colonies of live natural micro-organisms (biomass), to break down the pollutants in the sewage. Many chemicals used in households and commercial establishments can inhibit or kill these micro-organisms; particularly if used in excessive amounts.
- 6.1.3 Bear in mind that treatment plants serving small populations do not have the benefit of dilution that occurs at a large sewage works. A bottle of bleach tipped down a toilet in Birmingham would be virtually lost amongst the millions of gallons of sewage arriving at the city's treatment works; a bottle of bleach in a plant serving just one house can be a lethal dose for the biomass.
- 6.1.4 If the biomass is damaged, it will usually recover in time, but one of the more obvious symptoms of damage can be an unpleasant smell, so it is in the operator's interest to avoid this.
- 6.1.5 Generally speaking all common household cleaning fluids are acceptable, **provided they are used in accordance with the maker's instructions and stipulated concentrations.** The following "Do's and Don'ts" includes the most common household chemicals, but it is not an exhaustive list and the golden rule is "If in doubt - leave it out."
- 6.1.6 Bear in mind too that it isn't only the toilet that is connected to the treatment plant; anything that goes down the sink, bath etc. also ends up there.

6.2 Do's and Don't's

- 6.2.1 **Washing machine and dishwasher detergents, washing up liquids:** These are generally all right to use in the normal concentrations and usage found in domestic housing applications. But problems can occur if, for instance, you are washing the jerseys of the local rugby club's five teams! If you have to do unusual amounts of clothes washing it would be a good idea to spread it over a few days.

Excessive use of Biological washing powders can cause degradation of the biomass. Non-biological detergents, without enzymes, may be substituted. The use of liquid detergents can be more economical as well as being less detrimental. Avoid excess.

- 6.2.2 **Floor cleaners, disinfectants and bleaches:** These are safe to use in accordance with the makers recommendations and in the minimum necessary concentration. Do not pour neat disinfectant or bleach down sinks or outside gullies. (If these are smelly it usually indicates a build up of decaying material or a plumbing problem and should be dealt with accordingly.)
- 6.2.3 **Nappy disinfectants and bottle sterilising fluids: e.g. Milton.** When disposing of the used fluid, ensure that it is well diluted with water, for example by flushing it away down the toilet.
- 6.2.4 **Waste disposal units:** These do not inhibit the biomass, but, depending on use, they can present the treatment plant with considerable extra load both in terms of organic load and liquid as the grinded product is flushed into the unit. The use of a macerator is will probably result in the treatment process becoming unbalanced, leading to problems. We have not allowed for their use in the system design.
- 6.2.5 **Home beer and wine making:** These present a similar problem to waste disposal units. The unit has to work as hard to treat one pint of beer tipped down the drain as it does to treat all the normal waste produced by one person in 24 hours. The chemicals used to cleanse and sterilise can affect biomass, See also the notes above regarding sterilising fluids.

6.3 THE FOLLOWING MUST NOT BE DISCHARGED INTO THE DRAINS

- Motor oil, grease, anti-freeze, brake fluid etc.
- Cooking oil and fat.
- Weed-killers, insecticides, fungicides and other gardening chemicals.
- Paint, thinners, white spirit, turpentine, creosote etc.
- Chemical drain cleaners/ Commercial cleaning products.
- Acid based brick/stone floor cleaners.
- Medicines (Return unused medicines to a pharmacist for safe disposal)
- Photographic developing fluids.
- Nappies, sanitary towels, rags, soft toys, tennis balls etc. Although such items are not directly damaging to the biomass they can cause problems, not the least of which is simple blockage of the drains. Disposable nappies and sanitary towels and toilet wipes although termed biodegradable, they do not degrade fully within the treatment plant and they can lead to malfunction.

7 MAINTENANCE

7.1.1 **Every sewage treatment plant needs regular maintenance as does the upkeep of drainage fields and drains.** This is the responsibility of the owner/user.

7.1.2 We recommend that plants are maintained by qualified service personnel, however some self help and an awareness of normal is helpful in assistance identification of a larger problem.

7.1.3 If the plant appears not to be operating correctly, refer to the Fault Finding section of this manual.

7.2 MAINTENANCE SCHEDULE

DAILY

- Check the operation of the compressor. It should be possible to hear it running by standing close to the unit.

MONTHLY

- Check the operation of the compressors (bubbles should be rising in the reactors and media should be seen slowly rotating).
- Visually check that the inlet and outlet zones are clear of debris.
- Visually check the biomass growth on the filter media. The biomass colours should vary from light brown colour, (not white or grey.) to rich brown. Odour from the plant should be 'earthy' and hydrogen sulphide odours ('rotten eggs') should not be present.
- Visually check the final effluent. If cloudy or containing many suspended particles, then the humus and or primary tank is likely to require desludging.

THREE MONTHLY

- Assess the depth of the thickness of the floating sludge in the primary and final zones.
- Check the blower filter, and replace if necessary. Note. The filter will collect dirt particles from the air and the location of blower/inlet will influence the frequency of filter change.

ANNUALLY

- The unit is designed to be emptied of sludge every 12 months

7.3 DESLUDGING THE UNIT

- 7.3.1 Desludge the primary and final settlement zones using a suction tanker. Please consult your local yellow pages, internet or similar for licensed contractors offering this service.
- 7.3.2 Remove the cover. Carefully lower the suction hose into the primary compartment, then empty the final compartment. Remove all floating and settled solids from these compartments taking care not to knock or disturb the internal pipework.

Note. **DO NOT EMPTY** the reactor compartments, this is unnecessary and if done will affect the process abilities of the system. When the primary and final compartments are emptied, the level in these compartments will drop a little.

(If it is necessary to desludge the reactor compartments, **following specialist advice only**, ensure that the correct size suction hose is used. Remove the grid, recycle pipework, pressure wash the media to release any solids which are blinding/clumping the media, then carefully insert the suction hose. Take care not to remove any of the media when emptying. When complete, ensure all components are correctly replaced and refill the reactor with clean water.)

- 7.3.3 After desludging each compartment, the primary zone should be refilled with clean water either by using a hosepipe or by running several taps in the household(s). Refill final settlement/humus tank with a hose, whilst running in tap water into the primary
- 7.3.4 See unit start-up guidance.

7.4 SPARE PARTS

Due to the inherent reliability of the unit, very few components will require replacement during the lifetime of the unit provided the unit has been properly installed/sited and correctly/regularly serviced. When requesting spare parts, please contact us with the details of the model name, size and serial number.

FAULT FINDING

1 COMPRESSOR NOT RUNNING

Cause	Remedy
Power cut	Do nothing. When power is restored the system will restart automatically Check Mini Circuit Breaker on electrical supply board
Power supply RCD (Residual current Device) tripped	Isolate the power supply and reset the RCD Switch on the blower, which should start automatically If not, switch off the power and call an electrician

2 NO EVIDENCE OF AIR BUBBLES RISING THROUGH THE MEDIA

Cause	Remedy
Blower not running	Refer to fault condition 1 Contact our Service company (Details on front cover)

3 MEDIA NOT MOVING

Cause	Remedy
Blower not running	Refer to fault condition 1 Contact Service company

4 NO BIOMASS GROWTH ON MEDIA OR WHITE GROWTH THROUGHOUT BOTH BIOLOGICAL REACTORS

Cause	Remedy
Blower not running	Refer to fault condition 1 Contact service company
Toxic input	Consider each chemical and the amount used within the properties E.g. washing powders bleaches. Switch to alternative products, consider switch from biological powders to non biological washing liquids and use less per wash

5 SMELL

Cause	Remedy
Blower not running	Refer to fault condition 1 Contact service company
Time for a Desludge	Remove sludge from primary and final compartments

8 SERVICE

Please contact our service department for Pre-Service Agreement Inspection and regular planned maintenance visits. Contact details are provided on the front page of the guidelines.

9 TECHNICAL DATA

Delta		
Population equivalent	Model	6
Daily flow Q	M ³ /d	1.2
Daily load	kg BOD ₅ /d	0.36
Daily flow Q ₁₀	M ³ /h	0.12
Measurements		
A- Outlet invert	Mm	1137
D- Diameter	Mm	1508
L- Length	Mm	2725-
G- Installation depth	Mm	1737
Z- Inlet invert	Mm	1237
H- Cover height	Mm	50
Inlet pipe work*	Mm	110
Outlet pipe work*	Mm	110
Unit Weight	Kg	250
Primary Tank		
Tank volume	M ³	2.2
Final settlement Tank		
Tank volume	M ³	0.63
Electrical Items. Power rating		
Blower	kW	0.064 (64 watts)
	230-240 V single phase 50 Hz	60 lpm

*Inlet and outlet dimensions to suit Country requirements, UK=110mm