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GL0015P
INSTALLATION GUIDELINES
FOR BIODISC® UNITS
BD, BE, ND & NE



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Enclosed Documents

510101	BD & BE Single Phase Wiring Diagram
DS0468P	BioDisc General Dimensions
The following wiring diagrams are provided with in the control panel housing. If additional copies are required contact Kingspan.	
510009	BD & BE Single Phase Control Panel (Option L/M)
510030	BD & BE 3 Phase Control Panel Wiring Diagram
510003	BD & BE 3 Phase Alarm Control Panel Wiring Diagram
510012	ND & NE Single Phase Panel Wiring Diagram
510013	ND & NE Single Phase Panel (Option L /W)
510006	ND & NE Three Phase Panel Wiring Diagram
510007	ND & NE Three phase Alarm
510018	Independent Loss of Rotation Alarm

Issue	Description	Date
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HEALTH AND 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 be acquainted with the functioning of the equipment and the relevant warnings.

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

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

Electrical work should be carried out by a qualified electrician.

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.

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. Kingspan offer a range of maintenance contracts, details on request.

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

BioDisc units contain rotating machinery and associated drive chains or belts.

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 must be isolated at the control panel(s) before lifting the covers. Where a specific maintenance procedure requires the equipment to be running with the covers off, all care must be taken to avoid contact with moving parts and electrical components or conductors. Drive guards must be replaced and secured if removed during maintenance.

Once power has been isolated, the control panel must be kept locked shut to avoid accidental re-connection whilst work or inspection is being carried out.

Use only the designated access walkways. Do not walk on the cover or deep well safety mesh(es). Desludge port covers, where fitted, must be replaced if removed.

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 contractor holding the relevant permits to transport and dispose of sewage sludge. The contractor must refer to the desludge instructions in the Operating Manual, a copy of which is fastened under the covers.

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1.0 Introduction

These Guidelines represent Best Practice for the installation of these Kingspan BioDisc Units. Many years of specialist experience has led to the successful installation of thousands of BioDisc 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 Kingspan regarding the design of an installation must be verified by a qualified specialist (e.g. civil engineering consultant). The unit should be commissioned by an approved engineer.

2.0 Handling & Storage

- 2.1. Care must be taken to ensure that the unit is not damaged during delivery and handling on site.
- 2.2. The design requirements of Kingspan products 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. Rainwater may collect also inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.
- 2.3. When lifting the unit, use webbing slings of a suitable specification, which must be attached to the designated lifting points.
- 2.4. Do not use chains.
- 2.5. Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 2.6. Kingspan Environmental accept no responsibility for the selection of lifting equipment.
- 2.7. Whenever Kingspan BioDisc units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects which may damage the unit. The BioDisc must be placed on ground which is flat and level to evenly support the base of the unit.

3.0 Site Planning

The following points should be considered before installation of the equipment:

- 3.1. The discharge must have the consent of the relevant Environmental Regulator.
- 3.2. The installation should have Planning and Building Control approval.
- 3.3. 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, adequate concrete backfill 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 backfill. It should be borne in mind that the inlet drain trench will act as a land drain, directing surface water to the backfill around the unit.
- 3.4. If discharge is to a soakaway, a porosity test should be carried out in accordance with BS 6297 to assist in assessing sub-soil drainage and designing the sub-surface irrigation system.
- 3.5. The BioDisc system must be installed at a level which will allow connection to the incoming drain and a free discharge at the system outlet.

- 3.6. The unit should be installed so that the bottom lip of the cover is 65mm above local ground level. If the unit has to be recessed, measures must be taken to ensure that it cannot be flooded by surface water run-off.
- 3.7. There must be at least 1 metre of clear, level ground all around the unit to allow for routine servicing.
- 3.8. The unit should be installed as far as possible from any habitable building. Many Local Authorities will insist on a minimum distance of 15 metres. Care should be taken not to place the unit in close proximity to any openings within habitable buildings
- 3.9. The drainage system connecting to the BioDisc must be adequately vented in accordance with the Building Regulations. 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 sited with consideration to prevailing wind direction. Tile vents & Air admittance valves should not be used as the sole drainage ventilation facility, but if this cannot be avoided, the BioDisc should be independently ventilated. All inspection points within the drain system should be sealed so as to enable ventilation at high level.
- 3.10. Adequate access must be provided for routine de-sludging and maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.
- 3.11. BioDisc covers are not suitable for walking on. Where necessary the BioDisc should be fenced off or otherwise protected. Maintenance access must be maintained as above.
- 3.12. An adequate electrical supply must be provided, complying with current electrical regulations. The electrical details in Section 6.2.6 will enable selection of suitable cable and current overload protection, taking into account the distance from the power source to the control panel and any other relevant factors. In most cases steel wire armoured (S.W.A.) cable, minimum 1.5sq mm will be suitable, but this is a minimum recommendation and selection is the responsibility of the installing electrician. Although not obligatory for an installation of this type, RCD protection is suggested as an extra precaution.
- 3.13. Pump stations or any other associated equipment should have a separate power supply.
- 3.14. Proximity to a mains water hosepipe 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.**
- 3.15. 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.

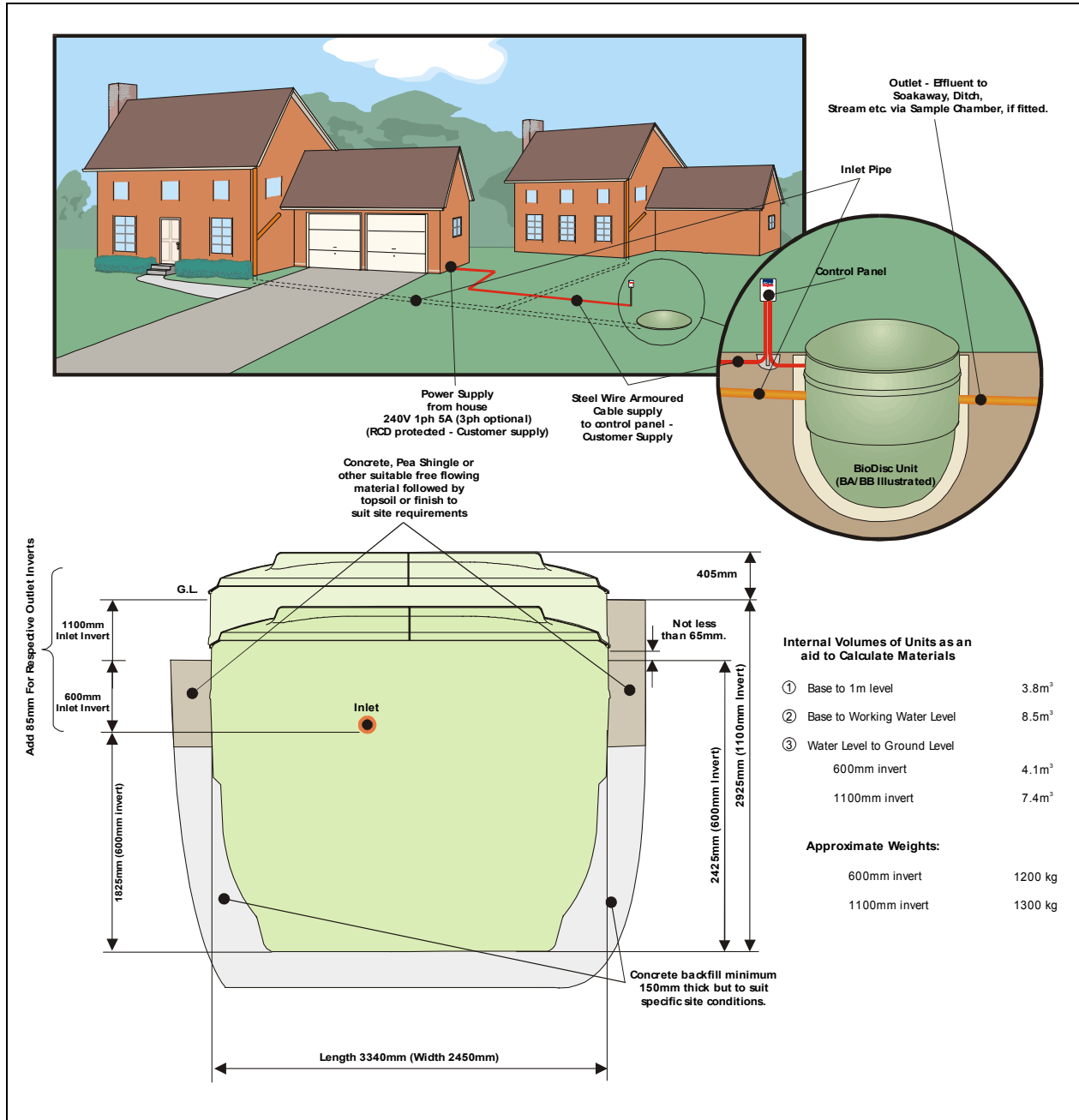
4.0 Installation - General

- 4.1. 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.
- 4.2. In situations where the excavation will not maintain a vertical wall, it will be necessary to support side walls of the excavation (eg. 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 backfilling is complete, but before the concrete fully hardens.
- 4.3. 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.
- 4.4. During installation, care must be taken to ensure that the body of the unit is uniformly supported so that point loads through the unit are avoided.
- 4.5. A water supply must be available on site to enable the unit to be ballasted during backfilling.
- 4.6. The Concrete Specification is a *general* specification. It is 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	

5.0 BioDisc Installation

- 5.1. The package tied to the outside of the unit, contains this Installation Guideline and a cover key.
- 5.2. Excavate a hole of sufficient length and width to accommodate the unit and a minimum of 150mm concrete surround and to a depth which allows for the burial depth of the unit plus a minimum 150mm thick concrete base.
- 5.3. Construct a suitable concrete base slab, a minimum of 150mm thick, appropriate to site conditions. In wet or unstable ground conditions it may be necessary to lay a hard-core sub-base (see notes 3.3 & 4.3). Ensure that the slab is flat and level. Allow the slab to set sufficiently to support the installed load, but not so much as to prevent subsequent backfill bonding fully to the base.
- 5.4. Ensure that the slab is free of any stones or other material which could damage the unit. Lower the unit onto the slab using suitable webbing slings and lifting equipment.
- 5.5. Remove the covers by undoing the locks and folding the covers before lifting them off.
- 5.6. Remove the Control Panel and Owners Pack from the inside the unit.
- 5.7. Check that the inlet and outlet orientation is correct and that the unit is level. It is essential that the unit is installed in a level plane to avoid undue stress on the bearings.
The rotor shaft must be level end to end, to within $\pm 3\text{mm}$, measured at the bearing caps or directly on the shaft.
The unit must also be level to within $\pm 5\text{mm}$ from side to side, measured at the GRP walkway on either side of the rotor.
If necessary, lift the unit off the base and apply further concrete as needed to level up.
Note : The top flange of the BioDisc should not be used for levelling as manufacturing tolerances may result in it not being parallel with the rotor shaft.
- 5.8. It is essential that levels given above are checked regularly throughout the installation process. Should the unit become out of level, immediate remedial action is advised, to maintain the unit within the levels stated in section 5.7.
- 5.9. Pour no more than 1 metre depth of water into the primary (inlet) chamber and the final (outlet) chamber, ensuring there is never more than 250mm difference in water level between any of the sections.
- 5.10. Place concrete backfill to approximately 500mm above the unit base, ensuring good compaction to avoid voids. **Do not use vibrating pokers.**
- 5.11. Continue backfilling with concrete up to the level of the outlet. Keep the concrete at an even level all round the unit, compacting in layers. As backfilling proceeds keep the ballast water level inside the unit 200-250mm above the backfill level, but do not attempt to fill the unit with water above the outlet level.



- 5.12. Connect the inlet and outlet pipework when safe access can be gained. Short lengths of "rocker" pipe with flexible joints should be used adjacent to the unit to allow for any minor differential movement.
- 5.13. Check the cables attached to the Control Panel and drill the corresponding number of 40mm holes in the BioDisc case, 100mm below ground level and adjacent to one end of the baffle supporting the Motor/gearbox. If an Independent Remote Alarm is to be fitted this will also require a 40mm hole.
- 5.14. Erect the Control Panel as described in Section 6.0.
- 5.15. Continue to backfill, with concrete or free flowing granular material, up to ground level. The finished surface should be 65mm minimum lower than the lip of the cover.
- 5.16. **Important : Read section 8.2 regarding delayed electrical installation.**

6.0 Control Panel Installation

6.1 General Installation

- 6.1.1. The control panel should be positioned adjacent to the unit, so that:
 - a) It does not interfere with cover removal.
 - b) It is convenient for the incoming power supply.
 - c) It cannot be reached by someone standing in or on the BioDisc unit.

d) It is close enough to enable the electrical connections to be made in the BioDisc.

This usually indicates a panel position about 1.5 metres distance from the BioDisc.

- 6.1.2. Set the panel leg(s) in a concrete base, minimum 250mm thick and prop the panel to prevent movement until the concrete has set. Allow 350mm minimum clearance from ground level to the bottom of the panel.
- 6.1.3. Control panels are supplied with pre-fitted steel wire armoured (s.w.a.) cable(s), complete with grommets and glands. Lay the cable(s) in a 500mm deep trench and bed them on a layer of sand or similar soft material.
- 6.1.4. Insert the cables through the hole(s) in the casing of their respective unit(s), using the grommets supplied. Leave the cable(s) temporarily secured above water level pending electrical installation.
- 6.1.5. Cover the cable(s) with a layer of sand or similar soft material and warning tape. Backfill the cable trench with graded spoil, free of large stones or any other material which might damage the cable(s).
- 6.1.6. The Control Panel key is in the protective bag at the end of the motor/gearbox cable.

6.2 Electrical Installation

- 6.2.1. Depending on type, the control panel is supplied with between one and three pre-fitted armoured cables.
 - a) Every Control Panel has a motor/gearbox cable.
 - b) Control Panels for ND and NE units have an additional Sludge Return Pump cable.
 - c) Alarm Control Panels have an extra cable for the Loss of Rotation sensor.

Each cable is fitted with a gland for connection to the terminal box or junction box and a grommet for entry into the BioDisc case.

- 6.2.2. Refer to the wiring diagram attached and connect the cable(s) to the appropriate electrical junction(s) in the BioDisc, fitting the glands supplied. The cables can be identified by their numbered end connectors which correspond to connection points in the BioDisc. The end numbers on the motor/gearbox cable correspond with the numbered terminals in the motor/gearbox terminal box.
- 6.2.3. Units with an Alarm Control Panel or optional Independent Remote Alarm (used in conjunction with a standard Control Panel) will be supplied with a fixing kit. Install the kit in accordance with the installation instructions provided. Please note that the Remote Alarm Unit should not be installed more than 100 metres from the BioDisc and that the interconnecting cable (customer supply) should be laid in a separate trench to prevent electrical interference.

	Connection Point	Connector Type	End Numbers
Motor/Gearbox	Motor/Gearbox Terminal Box	Pin	Three Phase : L1, L2, L3, Earth
			Single Phase : 1, 3, Earth
Sludge Return Pump	Junction Box fixed inside BioDisc Case	Pin	L1, N1, Earth
Loss of Rotation Alarm	Junction Box fixed to Motor Support Beam	Pin	6, 7, Earth

- 6.2.4. Ensure that cables inside the BioDisc are securely tied to the structure, clear of the drive arrangement and do not present a trip hazard.
- 6.2.5. Connect the incoming power supply to the control panel, using suitable cable and current overload protection (See section 3.11.) Ensure that the panel is securely closed.

		Full Load Current (Amps)			
		BD	BE	ND	NE
Motor	240 volt single phase	0.92	1.15	0.92	1.15
	415 volt three phase	0.33	0.37	0.33	0.37
Sludge return pump	240 volt single phase only	N/A	N/A	2.4	2.4

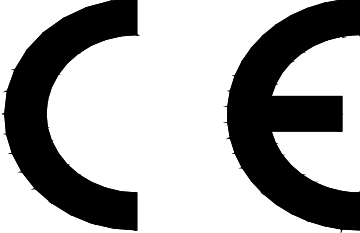
7.0 Ancillary Equipment

Ancillary items should be installed in accordance with the Installation Guide supplied e.g.

Crude Sewage Pump Station, Effluent Pump Station, Effluent Sample Chamber, Grease trap.

8.0 Start Up

- 8.1. Refer to the Owners Handbook for details of the Start Up Procedure. We recommend that the unit is commissioned using an approved engineer.
- 8.2. Once the unit has been installed it should be left filled with water. Please switch on the motor, following the procedure in the Owners Handbook and leave the unit running, even if there is no sewage being fed into the plant. If the unit has been installed with no operational power supply, then remove the motor/gearbox unit and drive belt/chain and store in a dry or heated environment until such time as the unit is ready for permanent operation.

	
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<p>07</p>	
<p>EN 12566-3</p>	
<p>BA - BF BioDisc</p>	
Hydraulic daily load:	1.2m³/day - 10m³/day
Material:	GRP Glass Reinforced Plastic
Watertightness (water test):	Pass
Structural Calculation:	Pass
Treatment efficiency:	COD: 89%
	BOD₅: 96%
	SS: 95%
	Total P: 48%
	NH₄: 89%
	Total N: 46%
Electrical consumption:	1.3 kWh/d - 3.1 kWh/d
Sludge production:	0.21 litres per person per day