Operator's manual
Kodiak (40 ft and 20 ft unit)

Outland Camp
Baker Lake - Nunavut
Projets: NU-P14-1028

BIONEST
Incorporé à l'environnement MD
55, 12e Rue, C.P. 10070
Grand-Mère, QC G9T 5K7
Tél.: 819 538-5662, 1 866 538-5662
Téléc.: 819 538-5707
www.bionest.ca

Contact information

TABLE OF CONTENTS

1 BIONEST KODIAK CONTACTS

Customer Service: 1-866-538-5662

1.1 Bionest

Name	Office phone number	Fax number	E-mail Address
Pierre-Richard Lavallée	819-538-5662	819-538-5707	prlavallee@bionest.ca

KODIAK Technology

TABLE OF CONTENTS

2 DESCRIPTION AND OPERATION PRINCIPLE OF THE KODIAK TREATMENT SYSTEM

KODIAK systems are ready-to-use BIONEST™ advanced secondary wastewater treatment. They are treatment solution units that can easily be moved from one location to another. All treatment components are prepared and assembled at our production plant to ensure optimum quality, quick and simple onsite installation with long durability and low maintenance. KODIAK unit includes two different sections; the BIONEST™ system (conventional septic tank followed by a bioreactor) and a mechanical room. Once units are in place, tanks need to be filled with clean water. Once inlet/outlet pipes are connected, treatment may begin.

Illustration 1 : KODIAK unit

2.1 Primary treatment

The primary treatment consists in the removal of floating material and settling of heavier particles. This is carried out in the septic tank portion of the KODIAK unit. This step also plays a role in the advanced treatment process.

The septic tank is divided into 2/3 and 1/3 sections by a partition wall. This helps to separate the solids from the liquid in the first section, allowing the liquid to flow to the second section, which is equipped with an effluent filter. It is important that routine maintenance is carried out. It is the owners' responsibility to have the septic tank pumped out at frequencies established upon local regulation or on a recommendation from the Kodiak maintenance technician. Please note that the pumping of the septic tank must be performed by a specialised firm and the tank must be filled with clean water after pumping.

2.1.1 EFFLUENT FILTER

The septic tank is equipped with an effluent filter with openings of 1,6mm or less. The effluent filter must be cleaned every time the septic tank is inspected and pumped out. It is recommended that you inform the person emptying the septic tank about the presence of the effluent filter.

Illustration 2 : Effluent filter

2.2 ADVANCED TREATMENT SYSTEM

Primary effluent leaves the septic tank and flows to the second section of the KODIAK unit: The BIONEST[MD] reactor wastewater is put in contact with microbiological cultures naturally fixed on a synthetic material. This synthetic material is our patented non-biodegradable media called «BIONEST[TM] Media».

2.2.1 BIONEST[TM] BIOREACTOR

The BIONEST[TM] bioreactor is a tank similar to the septic tank divided into 2/3 and 1/3 sections. The first section is aerated with fine air bubble diffusers while the 1/3 section is non aerated to create a non turbulent environment where biosolids will be degraded and filtered out.

2.2.2 MÉDIA

The very low volume occupied by the media reduces the risk of unlikely blockage: less than 2% of the BIONEST^{TM} bioreactors' volume is occupied by the media while it still offer a huge surface for bacteria development. The media is distributed evenly in the tank. A surface of 92,5m^2 of the media is used per cubic meter of wastewater. The texture of the BIONEST^{TM} media, as developed after several years of research, provides strong adhesion and allows for faster growth of bacterial mass. The synthetic media is a non-biodegradable polymer and therefore, it does not deteriorate over time and does not need replacement.

Illustration 3 : Media

2.2.3 AERATION

Air is an essential element in any biological treatment system (BIONEST^{TM}, biofilter, sand filter, leaching field, etc.). Temperature and winds vary continuously during the year, thus varying performances of system using passive aeration. The BIONEST^{TM} system provides consistent air quality and temperature year round, regardless of the season, allowing the performances of the system to be constant. Aeration in the first compartment of the bioreactor is made possible with air pumps and fine air bubble diffusers. The air comes from air pumps which are inside the mechanical room.

Illustration 4 : Fine air bubble diffuser

Illustration 5 : Air Pump

2.2.4 RECIRCULATION

Recirculation of treated water back to the reactor inlet ensures several contacts with bacteria enhancing the transformation of nitrogen. The KODIAK system reduces not only ammonia, but also nitrates. Treated wastewater recirculating continuously in the treatment chain is beneficial in the treatment of BOD, the reduction of coliforms and in the reduction of biosolids production. To prevent water cooling, the recirculation pipe is insulated.

2.2.5 SLUDGE REMOVAL APPARATUS

The BIONEST™ Wastewater treatment system has been designed so that only the septic tank section requires periodic pump outs. Even though most biosolids generated in the BIONEST™ reactor are degraded, some will accumulated with time. Biosolids removal in the reactor may be required after ± 2000 days of operation or based on a recommendation from a maintenance technician. A sludge removal apparatus has been integrated into both sections of the bioreactor to ensure easy sludge removal or in the event that toxic and/or prohibited products are released of in the residence's water facilities.

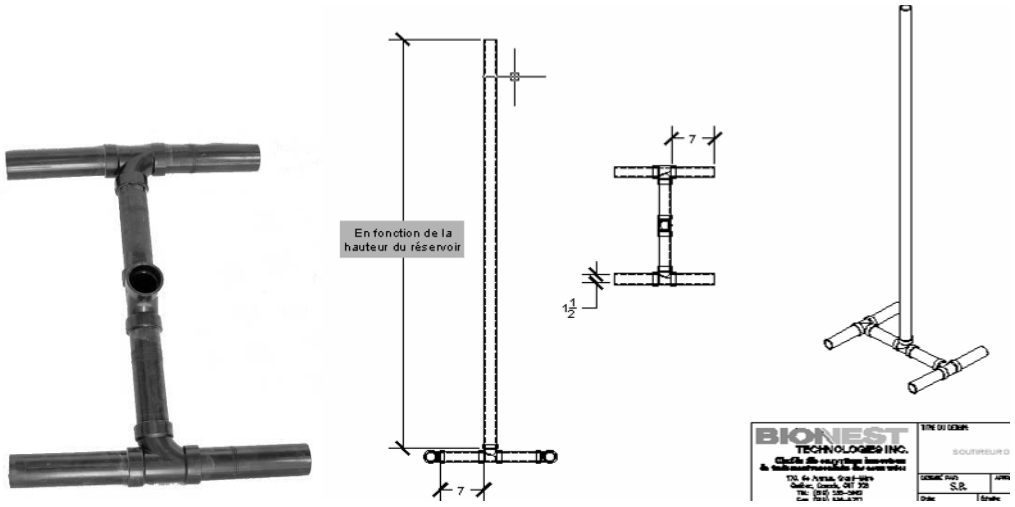


Illustration 6 : Sludge removal apparatus

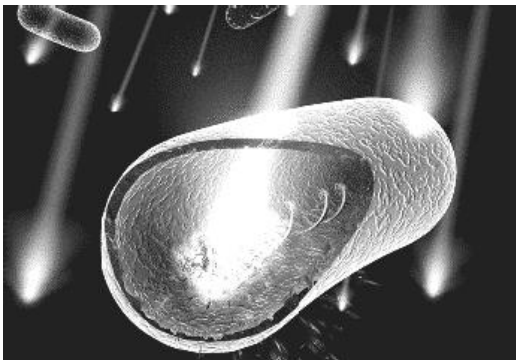
2.3 TERTIARY TREATMENT

The expression «tertiary treatment » can mean different kinds of treatments depending on the local regulations, but always refers to the requirement for a higher treatment level. A tertiary treatment usually refers to the removal of either fecal coliforms, phosphorous or total nitrogen.

2.3.1 ULTRAVIOLET DISINFECTION

The ultraviolet rays can penetrate the cell core of the coliform bacteria and deactivate their reproductive capacity, thus, bringing on their death. This process however requires an environment where light can freely travel, which means as colourless as possible and free of suspended matter. As the BIONEST^{TM} system's effluent is very clear, the UV rays can freely travel within the treated waters and destroy bacteria and parasites as to reach a quality level superior to swimming regulations. The exceptional quality of a BIONEST^{TM} system's effluent also reduces dirt accumulation on the UV lamp, thus preserving the disinfection unit's effectiveness.

Illustration 7 : bacteria DNA damaged by ultraviolet ray



To maintain the effluent quality produced by this treatment unit, the UV lamp has to be inspected and cleaned after 6 months and replaced every year.

To get optimal disinfection results and to prevent an early fouling of the UV lamp, the influent of the UV treatment system should not exceed these concentrations;

- Total suspended solids : 15 mg/l
- Total iron : 0,3 mg/l
- Manganese : 0,05 mg/l
- Total hardess ($CaCO_3$) :120 mg/l

The ultraviolet treatment unit is located in the KODIAK's mechanical room. Its location allows for an easy sampling.

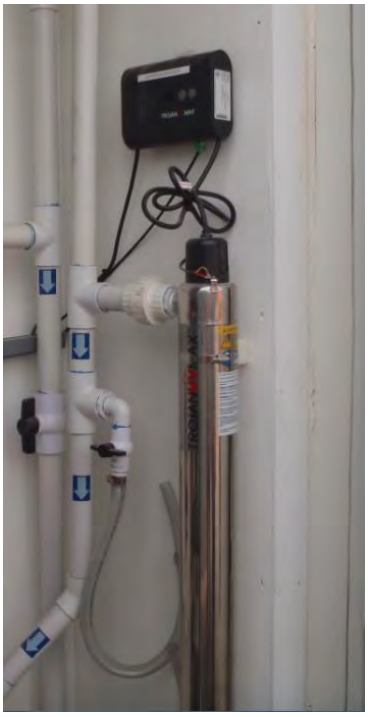


Illustration 8 : Disinfection unit

2.4 Sampling

The KODIAK unit is designed so that a sample of the influent and the treated effluent can be easily taken. In order to do this, different sampling valves are installed in the mechanical room.

2.5 Alarms

To ensure your peace of mind, different alarms are installed in the KODIAK unit monitoring the key components. The Bionest module monitor the following components: recirculation pump, air pumps and effluent filter clogging sensor.

Illustration 9: BIOLARM™

An alarm is also built in the ultraviolet disinfection unit. This one is activated when the uv lamp is burned or when 375 days have elapsed since the replacement of lamp.

The BIOLARM™ , the uv alarm and the different thermostats (mechanical room air temperature, effluent temperature) are located in the mechanical room, which is secured heated and ventilated. The alarm signals are connected to an exterior alarm (tank alert XT), which is connected to an exterior strobe light. A visual and audible signal is also emitted by the tank alert XT when any alarms is activated.

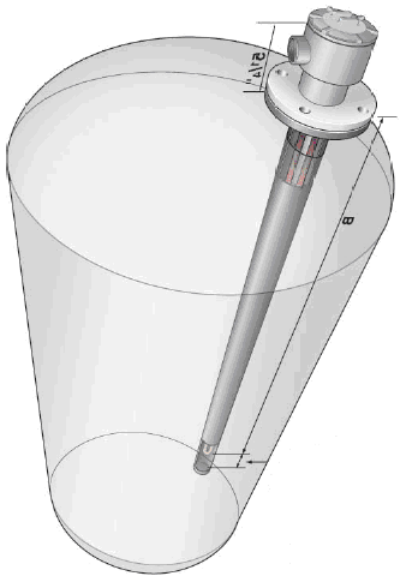
Illustration 10 : Tank alert XT

2.5.1 TEMPERATURE ADJUSMENT DEVICE

In conditions where the influent wastewater may average a temperature less than 10°C, it is required to warm the

water up to keep the bacteria population efficient. This is done by a heating element installed in the septic tank. To ensure a good control, a temperature probe is installed in the bioreactor section. Any temperature detected below 12ºC will activate the heating element.

Illustration 11 : Pipe insert heater



To avoid freezing of stagnant water in the pipe, a ceiling fan heater is installed to maintain a warm temperature in the mechanical room.

Illustration 12 : Ceiling fan heater

To ensure good ventilation within the mechanical room, a 147 CFM ceiling ventilator is installed. The ventilator is connected to a temperature probe, which is installed in the mechanical room. Any temperature detected over 25ºC will activate the ceiling ventilator.

Illustration 13 : Ceiling ventilator

2.6 FINAL DISCHARGE

The treated water is discharged into an outfall sewer designed by the consultant.

2.7 PERFORMANCES

BIONEST[MD] treatment system purifying capacity is exceptional. BIONEST[MD] system active area/ occupied volume rapport is impressive; presently one of the biggest on the market. For each cubic meter relative to the bioreactor, an active area of 92,5 square meter (92,5 m^2 of média/m^3) supply a sustainable habitat to the essential bacteria culture. High concentrations of biomass allow an effective reduction of the amount of toxic organic matter. Beside, water recirculation ensures an effective nitrogen release, preventing water table pollution by nitrates and ammonia.

Illustration 14: Table of official results to the BNQ test

BNQ test bench: Mission accomplished!	Advanced econdary (class III)			Tertiary (class V)
	BOD_5 (mg/L)	TSS (mg/L)	Fecal coliforms (UFC/100mL)	Fecal coliforms (UFC/100mL)
Quebec requirements	15	15	50000	200[a]
Average[1] after 12 months of certification (Annex A and B)[2]	3	3	4000	2[b]

Source : Sommaires analytiques complets et officiels des 52 semaines – BNQ Norme 3680-910/2000-06-16 M_1 (2004-0910)

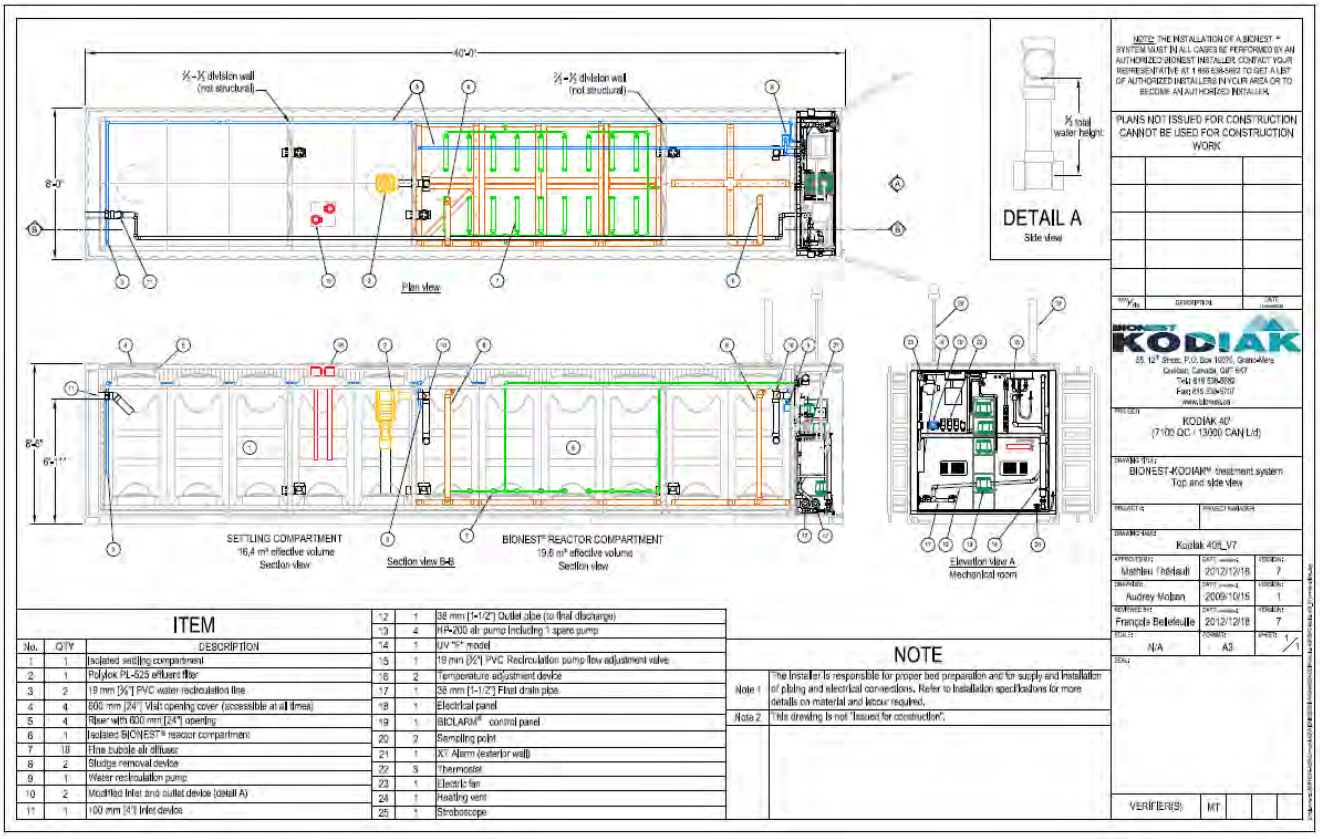
[1] averages are calculated from the official results of Appendices A and B in accordance with the standard 3680-910/2000- 06-16 M_1 (2004-0910)
[2] explanations about data interpretations are found in the BNQ report
[a] after photoreactivation
[b] before photoreactivation

Drawings

TABLE OF CONTENTS

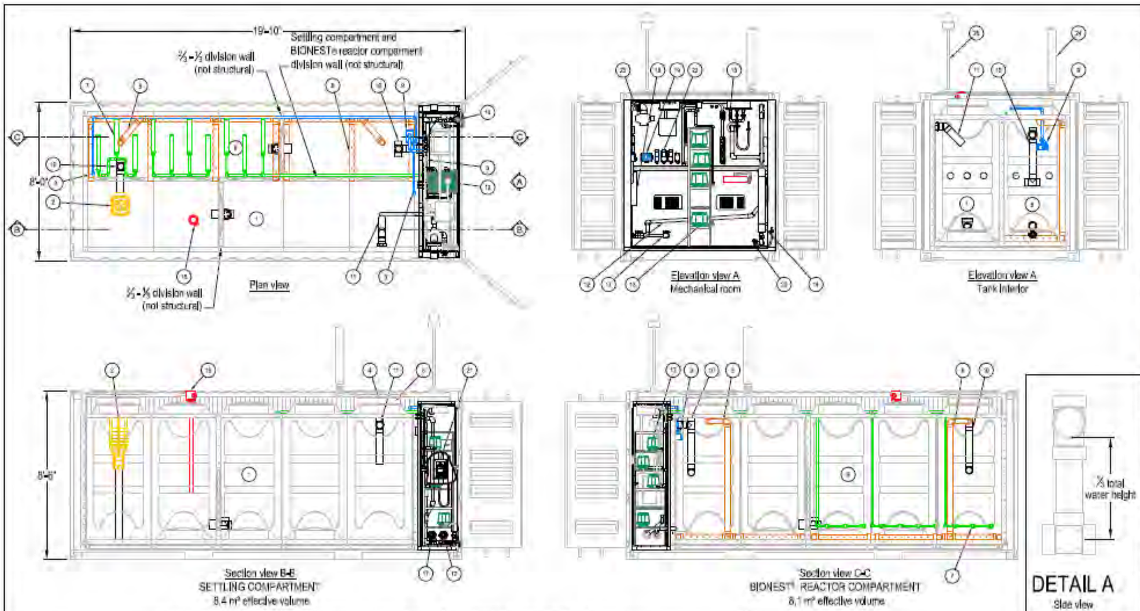
3.0 WORKSHOP DRAWING

Here are the drawings of the 40 feet and 20 feet KODIAK units.



ITEM		
No.	QTY	DESCRIPTION
1	1	Isolated settling compartment
2	1	Polylok PL-525 effluent filter
3	2	19 mm [¾"] PVC water recirculation line
4	4	600 mm [24"] Visit opening cover (accessible at all times)
5	4	Riser with 600 mm [24"] opening
6	1	Isolated BIONEST® reactor compartment
7	18	Fine bubble air diffuser
8	2	Sludge removal device
9	1	Water recirculation pump
10	2	Modified inlet and outlet device (detail A)
11	1	100 mm [4"] Inlet device
12	1	38 mm [1-1/2"] Outlet pipe (to final discharge)
13	4	HP-200 air pump including 1 spare pump
14	1	UV "F" model
15	1	19 mm [¾"] PVC Recirculation pump flow adjustment valve
16	2	Temperature adjustment device
17	1	38 mm [1-1/2"] Float drain pipe
18	1	Electrical panel
19	1	BIOLARM® control panel
20	2	Sampling point
21	1	XT Alarm (exterior wall)
22	3	Thermostat
23	1	Electric fan
24	1	Heating vent
25	1	Stroboscope

NOTE	
Note 1	The installer is responsible for proper bed preparation and for supply and installation of piping and electrical connections. Refer to installation specifications for more details on material and labour required.
Note 2	This drawing is not "Issued for construction".



ITEM

No.	QTY	DESCRIPTION
1	1	Isolated settling compartment
2	1	Polylok PL-525 effluent filter
3	2	19 mm [¾"] PVC water recirculation line
4	4	600 mm [24"] Visit opening cover (accessible at all times)
5	4	Riser with 600 mm [24"] opening
6	1	Isolated BIONEST® reactor compartment
7	10	Fine bubble air diffuser
8	2	Sludge removal device
9	1	Water recirculation pump
10	2	Modified inlet and outlet device (detail A)
11	1	100 mm [4"] Inlet device
12	1	38 mm [1-1/2] Outlet pipe (to final discharge)
13	4	HP-200 air pump including 1 spare pump
14	1	UV "F" model
15	1	19 mm [¾"] PVC Recirculation pump flow adjustment valve
16	1	Temperature adjustment device
17	1	38 mm [1-1/2"] Final drain pipe
18	1	Electrical panel
19	1	BIOLARM® control panel
20	2	Sampling point
21	1	XT Alarm (exterior wall)
22	3	Thermostat
23	1	Electric fan
24	1	Heating vent
25	1	Stroboscope

NOTE

Note 1	The installer is responsible for proper bed preparation and for supply and installation of piping and electrical connections. Refer to installation specifications for more details on material and labour required.
Note 2	This drawing is not "Issued for construction".

NOTE: THE INSTALLATION OF A BIONEST ® SYSTEM MUST IN ALL CASES BE PERFORMED BY AN AUTHORIZED BIONEST INSTALLER. CONTACT YOUR REPRESENTATIVE AT 1 866 538-2662 TO GET A LIST OF AUTHORIZED INSTALLERS IN YOUR AREA OR TO BECOME AN AUTHORIZED INSTALLER.

PLANS NOT ISSUED FOR CONSTRUCTION CANNOT BE USED FOR CONSTRUCTION WORK

55, 12[e] Street, P.O. Box 10070, Grand-Mère
Québec, Canada, G9T 5K7
Tel: 819 538-5662
Fax: 819 538-5707
www.bionest.ca

PROJECT: KODIAK 20' (3600 QC / 5500 CAN L/d)

DRAWING TITLE: BIONEST-KODIAK™ treatment system Top and side view

PROJECT #:	PROJECT MANAGER:	
DRAWING NAME: Kodiak 20ft_V5		
APPROVED BY: Mathieu Thériault	DATE: 2012/12/18	VERSION: 5
DRAWN BY: Audrey Molean	DATE: 2009/12/10	VERSION: 2
REVISED BY: François Bellefeuille	DATE: 2012/12/18	VERSION: 5
SCALE: N/A	FORMAT: A3	SHEET: 1/1
SEAL:		
VERIFIER(S)	MT	

Warranty

Table of Contents

4.0 SUMMARY OF WARRANTY

In order for the warranty to stay valid, the customer must immediately notify Bionest Kodiak of any apparent abnormality, irregularity, or malfunction of the KODIAK unit. Neglecting to inform Bionest Kodiak within a reasonable timeframe can result in the cancellation of the warranty. Bionest Kodiak is committed to responding to and to taking appropriate measures to correct the situation, as long as the system is used properly.

Table1 : Summary of Warranty

Warranty	Warranty period
Binest Kodiak warranties all BIONEST™ KODIAK system parts and components	For TWO (2) years
Bionest Kodiak warranties its media will not deteriorate	For TWENTY (20) years following the purchase date

Warnings

TABLE OF CONTENTS

5.0 SAFETY INFORMATION

To ensure the best performance of your KODIAK wastewater treatment system unit,

DO NOT use or discard any of the following products into the sinks, toilets, or other water facilities in your building:

- Caustic products used to unclog pipes such as: **Liquid Plumr®, Liquid Drano®, etc.**
- Paint, solvent, petroleum based products, etc.
- Pesticides
- Backwash effluents of a water softening system
- Large quantities of household cleaning products
- Oil and grease (engine, cooking, etc.)
- Septic tank treatment products
- All non-biodegradable objects (cigarette butts, sanitary napkins/products, etc.)

Please respect manufacturers' recommended usage for domestic cleaning products and avoid all antibacterial products. Do not use automatic toilet cleaners. Do not use a waste disposal unit in the sink (e.g. In-Sink-Erator).

Do not connect drain pipes or gutters to the septic installation.

Do not modify the configuration of the treatment system installation.

5.1 Warnings

The discharge of any of the aforementioned products into the system may destroy the bacterial culture responsible for treating the wastewater and therefore cause the system to be **non-operational.**

Always disconnect the power supply cord before servicing any unit. Failure to do so may result in electrical shock causing serious bodily injury or death.

If contact with wastewater occurs, please remove any contaminated clothing and thoroughly wash all body areas and clothing exposed to wastewater with soap and water. To minimize any risk of illness, consult a physician.

Please ensure that **the KODIAK unit has been filled with water before starting the system**. **Water filling has to be done on the reactor side. On the opposite, drainage must be done on the septic tank side.** Serious problem can result from the non respect of this procedure.

The use of your system when the air pump is not in function can result in serious consequences (e.g. cancellation of your warranty).

For intermittent use and extended non-use periods please refer to section 4.0 of this manual. Always advise Bionest Kodiak before shutting down your system.

In the event the septic tank has not been serviced for sludge removal within the timelines required by local regulations, or if there is abnormal sludge accumulation noticed in the effluent filter when sludge is being removed, please contact Bionest Kodiak

5.2 Servicing the kodiak unit

KODIAK systems operate automatically and require no individual/specific intervention. When the system is functioning properly, no odours should be present. If odours do occur, make sure the air pump is functioning normally. If not, please call Bionest Kodiak.

WARNING: THE VENTING PIPE MUST BE MOUNTED ON THE UNIT ROOF AT ALL TIME DURING OPERATION AND REMOVED AND STORE IN THE TECHNICAL ROOM BEFORE MOVING THE UNIT

5.3 Intermittent Use And Extended Non-Use Periods

Even if wastewater does not enter the BIONEST™ system for an extended period of time, the system will function properly. The power should be left on during short periods of non-use when there is no water flow to the system (intermittent use) to assure aeration of the stagnant wastewater.

If the property is going to be used seasonally (i.e. summer use only and closed for winter) and if the system is not in use for periods extending over 6 consecutive weeks, please refer to the shut down procedure (Maintenance manual).

5.4 Confined space

Please note that KODIAK's different tanks (septic tank and bioreactor) are considered to be confined space and are hazardous to your health.

➔ **DO NOT** ENTER ANY TANK OR MANHOLE AT ANY TIME.

Please refer to the following document for more information:
http://www.labour.gov.on.ca/english/hs/pdf/confined.pdf.

Components

TABLE OF CONTENTS

6.0 Recirculation Pump

The recirculation pump is a Jebao model WPG-550. All information pertaining to this pump is available in the appendix.

6.1 Effluent Filter

The effluent filter used is a Polylok, model PL-525. All information pertaining to the effluent filter is available in the appendix.

6.2 Pipe Insert Heater

The water heater used is a ASB Heating elements (9 kW).

6.3 Ceiling Fan Heater

The ceiling fan heater used is a Stelpro model SK1002. All information pertaining to the ceiling fan heater is available in the appendix.

6.4 Fan

The ventilator used is an AXC Inline fan, model AXC100A. All information pertaining to the ventilator is available in the appendix.

6.5 Thermostat

The thermostat is a RANCO model ETC-211000-000. All information pertaining to the thermostat is available in the appendix.

6.6 Air Diffuser

The diffusers used are US FILTER linear fine bubble diffusers. All information pertaining to the diffusers is available in the appendix.

6.7 Air Pump

The air pumps are Hiblow model HP-100 (for the 20' unit) and model HP-200 (for the 40' unit). All information pertaining to the air pumps is available in the appendix.

6.8 UV Lamp

The UV lamp is a Trojan UV max model F. All information pertaining to the UV lamp is available in the appendix.

6.9 Alarm

All information pertaining to the alarms are available in the appendix. The alarms used are:

- Bionest BIOLARM™
- Tank alert XT from SJE Rhombus

6.10 Strobe Light

The strobe light chosen is an Federal Signal Corporation model Streamline LP3P. All information pertaining to the strobe light is available in the appendix.

Set Points

TABLE OF CONTENTS

7.1 Air Pump

Permanent aeration of the first compartment of the bioreactor is assured by linear diffusers fed by small diaphragm air pumps. For 40' units, there are 3 air pumps, Hiblow model HP-200, connected to 18 diffusers. For 20' units, there are 3 air pumps, Hiblow model HP-100, connected to 10 diffusers.

7.2 Recirculation Pump

The effluent from the bioreactor is recirculated at a rate of 1,5 to 2,5 times the average daily flow. One recirculation pump will recirculate the effluent.

7.3 Devices to maintain temperature

7.3.1 PIPE INSERT HEATERS

To maintain wastewater temperature above 12°C, pipe insert heaters (9 kW) are installed in the 1/3 section of the septic tank. There are 2 heaters in the 40' units and 1 heater in the 20' units.

7.3.2 TEMPERATURE PROBES

Three probes are installed in the KODIAK unit. Probes are connected to three different thermostats, which are installed in the mechanical room.

Reactor exit (*SORTIE RÉACTEUR*):

A probe is installed in the non-aerated section of the bioreactor. It is connected to this thermostat, which is connected to an alarm. A temperature below 10°C will activate the alarm. The thermostat's parameters are presented in the following table:

Thermostat #1 parameters.

Set point 1	Set point 2
°C	
S1 :10	S2 :---
Dif1.: 2	Dif2.: ---
H1	---

Reactor entrance (*ENTRÉE RÉACTEUR*):

A probe is installed in the non-aerated section of the bioreactor. It is connected to this thermostat, which is also connected to the pipe insert heater control panel. A temperature below 12°C will activate a first pipe insert heater. If a temperature below 10°C is detected, a second pipe insert heater will be activated, in this case, both pipe insert heaters will work in the same time (only for the 40' units). The thermostat's parameters are presented in the following table:

Thermostat #2 parameters.

Set point 1	Set point 2
°C	
S1 :12	S2 :10
Dif1.: 2	Dif2.: 2
H1	H2

Mechanical room:

A probe is installed in the mechanical room. The probe is connected to this thermostat, which is connected to an alarm and a ceiling ventilator. A temperature below 7°C will activate the alarm. At the opposite, a temperature over 25°C will activate the ceiling ventilator. The thermostat's parameters are presented in the following table:

Thermostat #3 parameters.

Set point 1	Set point 2
°C	
S1 :7	S2 :25
Dif1.: 2	Dif2.: 2
H1	C2

7.3.3 CEILING FAN HEATER

To maintain a warm temperature in the mechanical room, a ceiling fan heater is installed. The thermostat has to be set at 10°C.

Ceiling fan heater set point	10°C

7.4 Ultraviolet unit

An ultraviolet disinfection unit is required to disinfect the effluent. One (1) UVmax model F unit disinfecting at a rate of 27 L/min (anywhere except Québec) is installed.

Ultraviolet unit set point	27 L/min

Maintenance

TABLE OF CONTENTS

8.1 Start-up procedure

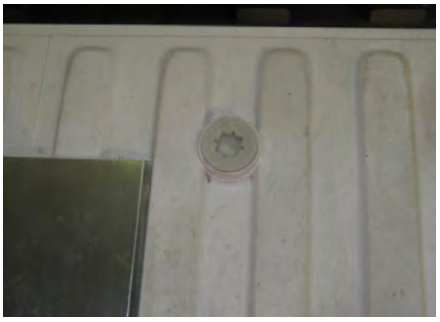
1. Please verify that both the inlet and outlet pipes are properly connected to the KODIAK unit (Figure 1, item #5).

Figure 1: inlet and outlet pipes connection.

2. If needed, insert the UV lamp inside the disinfection unit.

3. Install the heated vent on the top of the KODIAK unit.

Figure 2: installation of the vent

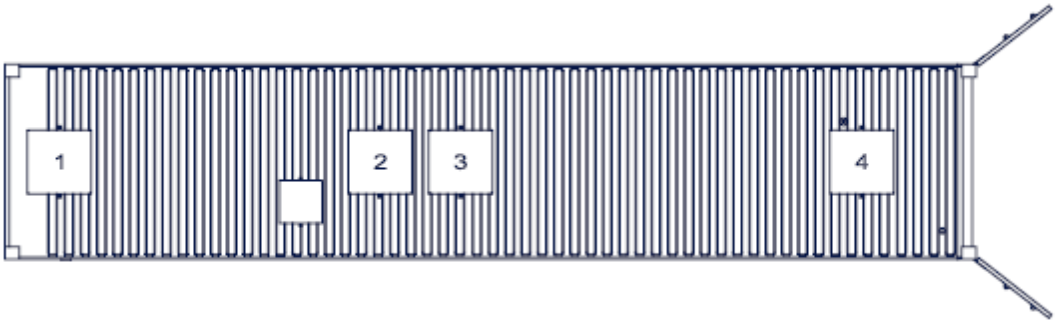


4. Install and plug the strobe light. The strobe light is connected to an exterior alarm (see Figure 3). Any alarm related to the system will activate the strobe light.

Figure 3: Exterior alarm and strobe light

5. **For 40 feet units**:
    a. Completely fill the 40 feet unit with clean water via the last compartment of the bioreactor, (Figure 4A, section 1/3, lid #4)

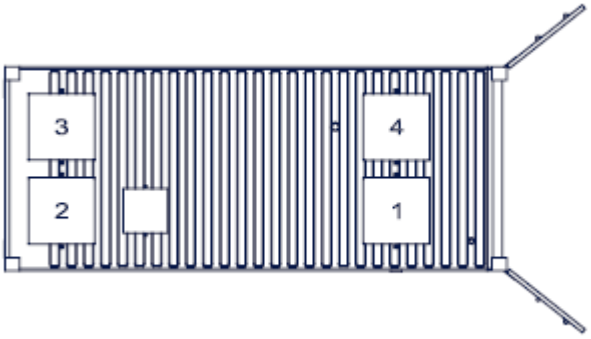
Figure 4A: KODIAK 40 feet unit's configuration.



For 20 feet units:

b. Completely fill the 20 feet unit with clean water via the last compartment of the bioreactor, (Figure 4B, section 1/3, lid #4)

Figure 4B: KODIAK 20 feet unit's configuration.



As the bioreactor is filled, water flows to the septic tank through one-way valves in order to balance the water level in each tank. If the filling is made by any other opening, water from the other tanks could not flow through one-way valves and therefore, too much pressure could cause breakage of partition walls.

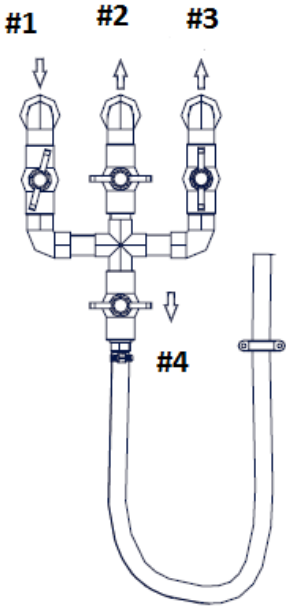
6. Open water supply. (if needed)

7. Bring electricity to the KODIAK unit (Figure 1, item #4) and turn on the electrical supply. **(The KODIAK unit should never be electrically powered if it is not fully filled with water)**

8. Adjust the recirculation flow (see Figure 5)

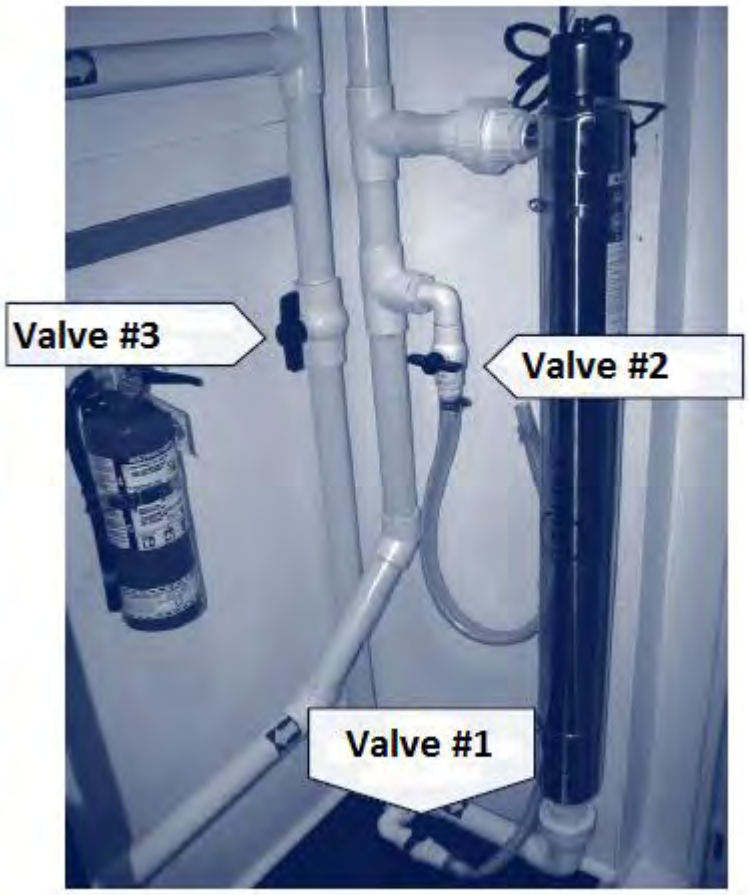
Figure 5: Recirculation adjustment

a. Close the valves to settling section and bioreactor (#2 and #3).
b. Place a bucket under the PVC pipe.
c. Open test valve (#4).
d. Adjust valve #1 in order to have adjust the flow rate.
e. Close test valve (#4).
f. Open valve #2 (everywhere but Quebec) or valve #3 (in Quebec).



9. Adjust the flow rate within the UV disinfection unit (see Figure 6).
    g. Place a bucket under the flexible pipe identified “UV INLET” (*ENTRÉE UV*), i.e. Valve #1.
    h. Open the sampling valve “UV INLET” (*ENTRÉE UV*), i.e. Valve #1.
    i. Adjust the valve identified “UV FLOW RATE” (DÉBIT UV), i.e. Valve #3 to obtain a flow rate of 27 L/min out of the KODIAK unit (anywhere but Québec).
    j. Close the “UV INLET” (*ENTRÉE UV*), i.e. Valve #1.

Figure 6: Disinfection unit adjustment.



10. Test the alarms.
11. Adjust the ceiling fan heater thermostat to 10°C.
12. Adjust the different setpoints (see SETPOINT section)

8.2 Component Maintenance

Every year, an inspection of the following elements must be carried out by the owner. (If the KODIAK unit is used on a seasonal basis, the maintenance shall be done during the start-up and the shut down procedure of the system).

- ⇨ Effluent filter
- ⇨ Air pump
- ⇨ Recirculation pump
- ⇨ Alarm system
- ⇨ UV unit

8.2.1 SECURITY INSTRUCTIONS

- ✓ Do not allow wastewater or treated wastewater to come in contact with your mouth.
- ✓ Please wash your hands thoroughly with antibacterial soap after each inspection.
- ✓ Always turn off the power supply before carrying out the inspection or maintenance of electrical components.

CAUTION: The air pump may be hot. Please take the proper precautions.

8.2.2 COMPONENTS INSPECTION

8.2.2.1 Air pump inspection

A. Verification of the proper operation of the air pump.

1) Verify that the air pump functions properly and make sure that it does not emit any abnormal noise.

B. Cleaning the air pump filter

The filter of the air pump must be cleaned during the maintenance. However, depending on general conditions around the air pump (ex: dusty environment), it may be necessary to carry out additional cleaning during the year.

To clean the air pump filter:

1) Disconnect the power supply of the air pump. (The alarm should go on after a few minutes);
2) To remove the filter cover, remove the screw located at the top of the cover, then remove the filter. See figure 7 and 8.
3) Vacuum any dust.
4) If the filters are heavily soiled, hand wash in soapy water, rinse with clear water and dry the filter before reinstalling;
5) Replace the filter and put the filter cover back. Remember to put back the screw.

6)

Figure 7

Figure 8

Figure 9

7) Connect the power supply. (Reconnect the alarm if it was disconnected).

8.2.2.2 Inspection of the biolarm[tm]

A. Verification of the proper operation of the BIOLARM™ control panel:

1) Disconnect the pressure switch from an air pump and stick the two clamps together.
2) Make sure that the alarm turns on (sound and light)
3) Reconnect the pressure switch
4) Repeat the same operation for each pump.

CAUTION:	If the alarm has not emitted any sound, it may be malfunctioning. Please contact Bionest.

8.2.2.3 Inspection of the UV UNIT

To keep the effluent quality produced by this treatment, the UV lamp has to be expected and cleaned every 6 months. The lamp has to be replaced every year. An alarm is connected to the UV disinfection unit. This one is activated when the UV lamp is burned or when 360 days have elapsed since the change of the lamp. All the information related to the maintenance of the unit is presented in the appendix. **Note that if the KODIAK unit is used on a seasonal basis, the lamp has to be removed during the shut down procedure and put in a warm place.**

8.2.2.4 Inspection of the bioreactor section

1) Remove both lids #3 and 4.
2) Verify that the water level in each compartment of the reactor is normal.
3) The first compartment of the reactor is aerated with fine bubble air diffusers. The appearance of fine bubbles on the surface is an indication that the fine bubble air diffusers are functioning normally.
4) In the event that no bubbles appear this may indicate a problem with the air pump and the BIOLARM™ should have been activated.

CAUTION:	Large bubbles of air at irregular frequency may indicate a problem with the fine bubble air diffusers. In that case, please contact Bionest without delay.

5) Measure the dissolved oxygen (if possible) in the two compartment of the BIONEST™ reactor. The dissolved oxygen should be 4 mg/L or above in the first compartment (lid #3) and 1 mg/L or above in the 2nd compartment (lid #4).
    a. If the dissolved oxygen is lower than 4 mg/L, this indicates that there is not sufficient oxygen in the reactor. Please refer to section 8.3.4.1.
    b. If the dissolved oxygen is higher than 6 mg/L, this indicates too much oxygen is sent to the septic tank. Reduce the recirculation rate (see section 8.1, step #8).
6) Measure the pH (if possible) in the second compartment of the reactor and indicate it on the maintenance report.
7) Make sure that there is no strong smell coming from the second compartment of the reactor.

CAUTION:	A strong ammonia odour may indicate a problem with the treatment system. The malfunction of one of the components of the KODIAK unit or a lack of ventilation may be the cause of this problem. Please refer to section 8.3.1 and 8.3.2.

8) Verify the presence of sludge under the media in both compartments of the reactor. If you find any sludge, please proceed to its removal by pumping it back in the 1st compartment of septic tank.
9) Verify if the water recirculation pump functions properly.
10) Before replacing the lids, clean the surrounding area to make sure that the cover will close properly.
11) You can now replace the two lids of the reactor.

8.2.2.5 Inspection of the septic tank

Sludge needs to be pumped out periodically from the septic tank using a vacuum truck normal pump-out procedure. Bionest recommends that the septic tank be pumped out when the sludge reaches 30 cm (12") deep. Please note that all applicable local regulations supersede these operational instructions.

Please note that the emptying of your septic tank must be carried out by a specialized firm. Do not hesitate to contact your local Health department, or adequate authorities, or Bionest for a list of the specialized firms in your area.

A. Water level verification

1) Remove the lids of the septic tank (lids #1 and 2).
2) Verify that the water level in the septic tank is normal.
3) Verify that the pipe at the inlet and outlet are not blocked by any object.

B. Measurement of the sludge in the septic tank (if needed)

1) Using a sludge measurement apparatus, please measure the height of sludge in the septic tank. If the height of sludge is higher than 30 cm (12") in the first compartment, the septic tank needs to be pumped out.

CAUTION:	The contents of the septic tank can be harmful to your health. Avoid direct contact with the wastewater by using the appropriate equipment.

C. Inspection and cleaning of the effluent filter

1) If water level is high, move effluent filter up and down 2 or 3 times, without removing it to allow water to drop to normal level. Remove effluent filter only when water level is normal.
2) Remove the effluent filter which is located at the outlet of the second compartment of the septic tank (lid #2)
3) Make sure that it is not blocked. Note its condition in the maintenance report.
4) Use a water hose to clean the effluent filter by placing it over the first opening of the septic tank before rinsing it.
5) Replace the effluent filter into its receptacle.

D. Calculate the recirculation rate (see Section 8.1, step #8) and indicate it on the maintenance report.

8.2.2.6 Ventilation

An adequate ventilation of the KODIAK unit is necessary to ensure the proper operation of the system. Make sure the vent is not blocked.

The vent has to be position on the top of the container (see Figure 2). The vent is required at all time when the system is in operation. The vent should be removed and stored in the mechanical room during shipping

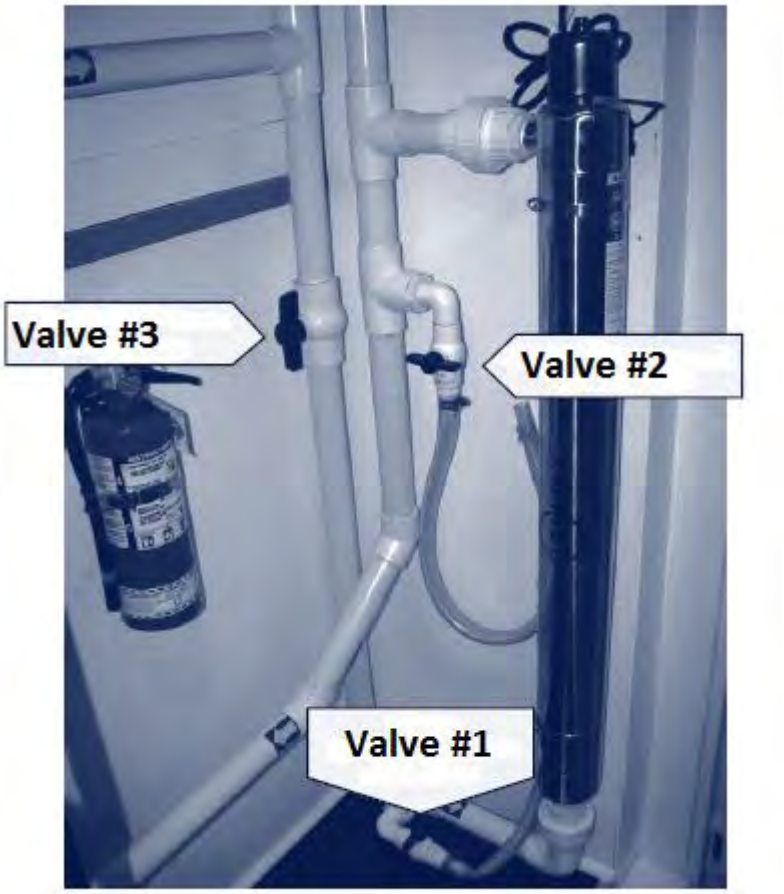
8.2.2.7 Maintenance report

Please send your maintenance reports to Bionest.

8.2.2.8 Sampling procedure

Two different sampling valves are located in the mechanical room. These valves are indicated below. Always purge a sufficient quantity of liquid in a bucket before taking a bottle of sample.

Figure 10: Sampling valves configuration



Valve #1: Effluent of the bioreactor (before disinfection).
Valve #2: Disinfected water.

8.2.2.9 Preliminary evaluation of the collected samples

Although the sample must be analyzed in laboratory using specialized equipment, it is possible to make a qualitative evaluation of them immediately after having collected them.

The effluent samples and the disinfected water must normally be colourless, transparent and no strong smell of ammonia should be detected. The suspended solids are generally not detectable to the naked eye.

If the visual sample quality is not satisfactory, please contact Bionest.

8.3 Troubleshooting section

In the event where a malfunction or failure of the KODIAK unit treatment system component is detected, this section will provide you technical assistance. In such case, you must initially carry out a visual and olfactory inspection of all components of the system.

After having completed the inspection and identified the problem(s), you should use this section to carry out the repair of any non functioning component.

> **CAUTION**: It is strictly forbidden to remove the media from the KODIAK unit no matter what repair has to be carried out. If you judge that it is impossible to carry out the repair of the system without removing the media, please contact us. Please note that this instruction is very important to comply with.

If the content of this section does not help you to solve all problems encountered, please contact us as soon as possible.

8.3.1 ODOURS INSIDE THE BUILDING OR WASTEWATER BACKUP

Generally, the appearance of a backup in the sanitary appliances means that:

- ✓ It's time to empty the septic tank or
- ✓ The effluent filter is blocked.

Please verify what has blocked the effluent filter (grease, paper, etc.), clean the effluent filter and check to see when the septic tank was emptied the last time. Please ensure that the tank was emptied in conformity with the local regulations in force and/or as indicated in this manual.

8.3.2 ODOURS OUTSIDE THE BUILDING

If odours are located outside the building, start by identifying from which part of the treatment train it comes from.

8.3.2.1 Odours coming from the septic tank section

Odours may originate from a properly functioning septic tank but is normally evacuated by the vent. However, in some cases, odours may evacuate by the covers of the septic tank. In those cases, locate and make sure the vent is not blocked. Also, to prevent the smell from exiting from the access covers of the septic tank, they may be sealed appropriately.

It is also appropriate to verify and clean the effluent filter since it may block the circulation of air into the system and may cause odours problems.

8.3.2.2 Odours coming from the reactor section

Generally, an effluent which releases a strong ammonia smell is a sign of a possible failure of the air pump or that the effluent filter is blocked.

1) Verify that the air pump is functioning properly.

2) Measure the dissolved oxygen in the reactor (if possible). If the dissolved oxygen is lower than 4 mg/L in 1st compartment (lid #3) and lower than 1 mg/L in 2nd compartment (lid #4).
3) Inspect and clean the effluent filter.

The other possible cause of strong ammonia smell in the system is the absence of a sufficient biomass fixed to the media. This occurs when the system is subjected to a shock, i.e. under unusual conditions causing the death of the treatment bacteria. Please check the temperature and the pH of water. Relay this information to Bionest in writing.

8.3.3 ABNORMAL WATER LEVEL

8.3.3.1 High water level in the septic tank section

A high level of water in the septic tank section may indicate that the water cannot be properly evacuated. Please inspect and clean the effluent filter since it may be blocked and thus prevent the water from correctly exiting the septic tank.

1) The effluent filter must be removed only to its half to allow the water to exit the septic tank without bringing solids to the BIONEST™ reactor.
2) When the water reaches a normal level, the effluent may be completely removed.
3) Use a water hose to clean the effluent filter by placing it over the first opening of the septic tank (lid # 1) before rinsing it.
4) To avoid contamination of the surrounding area, remove the excess of water before replacing the effluent filter into the second compartment of the septic tank (lid #2).

8.3.3.2 Low water level in the septic tank section

A low water level in the septic tank may be caused by a recent emptying of the septic tank. Please note that the septic tank must always be refilled with water after being emptied.

If the septic tank has not been recently emptied, this may be caused by a leaking septic tank. This may constitute a serious problem and we recommend that you immediately contact us to discuss what measures are to be taken.

8.3.3.3 Low water level in the reactor

First, verify if the septic tank level is normal. If the water level of the septic tank is too low, this may be caused by a leakage from the septic tank. This may constitute a serious problem and we recommend that you contact Bionest without delay.

8.3.4 FAILURE OF SPECIFIC COMPONENTS

8.3.4.1 Dissolved oxygen level

If the dissolved oxygen is lower than 4 mg/L in the first compartment of the bioreactor and lowers than 1 mg/L in the 2nd compartment of the bioreactor, this indicates that the amount of oxygen in the reactor is insufficient.

First, you must verify if there is fine air bubble in the first compartment of the BIONEST™ reactor. If not, verify if the air pump is functioning properly.

If the air pump does not function properly, please refer to section 8.3.4.2. Please note that if the air pump does not function properly, the alarm should go on. If the alarm did not go on, please refer to section 8.3.4.4.
If the air pump is functioning properly, verify that all connections are properly sealed. If so, verify if the air line is blocked by measuring the air flow at its entry to the reactor. To do so:

1) Unscrew the metal hose clamps that hold the air line to the pre-assembled adapter.
2) Remove the pre-assembled adapter from the air line. The air line may be heated with a heat gun to ease its removal.
3) Verify if there is condensation that may have occurred in the air line.
4) Measure the pressure with a pressure gage. It should be around 6-7 psi. If not, the air line is probably blocked. In that case, please contact us.

8.3.4.2 Failure of the air pump

CAUTION:	Before attempting any repair, unplug the electrical cord of the air pump.

A. Air pump does fails to work

1) If the air pump does not function, make sure it is properly connected to a power source.
2) Verify the safety screw. If the air pump over heated, the safety screw may have broken. To replace the safety screw, please refer to section 8.4.2.
3) If the air pump still does not function, the problem is related to the electrical supply.

B. Air pump works but makes loud irregular noise or does not evacuate enough air

1) Verify the air pump filter. If dirty, hand wash in soapy water, rinse with clear water and let dry before replacing it.
2) If the air pump functions but the alarm is on and/or the air pressure at the exit of the air pump is insufficient (lower than 4 psi), it is possible that the air pump is defective.
3) Verify the diaphragms, valves and electromagnet. If one of those is defective, replace the defective parts (see section 4 for replacement procedure). If after the replacement of the defective parts, the air pressure at the exit of the pump is still insufficient, proceed to complete replacement of the air pump (see section 8.4.3 for replacement procedure).

C. Air pump functions, but no air bubble appears in the first compartment of the BIONEST™ reactor.

1) Verify to insure that all connections are properly sealed.
2) Verify if the air pipe is blocked, damaged or pierced.
3) Push down on the media in the BIONEST™ reactor to see bubbles.
4) Open air line in the BIONEST™ reactor to see air pressure.

8.3.4.3 Failure of the fine bubble air diffusers

If inconsistent air bubbles are observed in the first compartment of the reactor, please notify Bionest who will assist in determining the nature of the failure.

8.3.4.4 Malfunction of the Biolarm^{tm}

If the BIOLARM™ has not emitted any sound during the test or if it has not turned on while the air pump if defective, it is probably due to a bad electrical connection. Please contact Bionest.

8.4 Replacement of system components

8.4.1 AIR PUMP DIAPHRAGM AND VALVE REPLACEMENT FOR HP-100 AND HP-200

- Be sure to unplug the pump unit.
- For chamber block replacement, be sure to change both chamber blocks at the same time.
- The rod employs powerful permanent magnets. Therefore, be sure to remove your watch and precision machine before starting the work as it may fail due to their strong magnetic force.
- Do not put the actuating rod close to a magnetic card, a magnetic disk or any other magnetic media as their data may be lost.

A. Remove all the bolts from the four corners.

B. If it is difficult to remove it due to the heavily stuck internal seal packing, pry it open by inserting the tip of a flat-head screwdriver into the clearance between the exhaust nozzle and the upper housing.

C. If the stick is too heavy, raise up the pump body and hit the exhaust nozzle lightly with a hammer (do not use a metal hammer).

D. Remove the sound absorber.
Pull out the L-tube from the casing nozzle. (See figure 11)
Remove the four screws hold the chamber block and the casing block on both side. (See figure 12)

Figure 11

Figure 12

E. Remove one of the U-lock nuts hold the diaphragm mounting block to the rod.
   - Use the box driver to loosen (or tighten) the U-lock nut.

F. Remove one of the diaphragm mounting blocks from the actuating rod and pull out the other diaphragm mounting block with the rod and finally, separate the diaphragm mounting block and rod.

➔ **IMPORTANT** : When pull out the rod; take care not to allow the rod projection to accidentally hit the lever of the SP switch. If the pump stops automatically, the safety screw must be broken to prevent any further damage to the pump. Be sure all debris is removed from unit.

G. Install the new diaphragm mounting block on the actuating rod.
   - Use new U-lock and washer only that come as replacement parts to prevent loosening and causing failure of the pump.

Figure 13

Figure 14

Figure 15

H. Insert the actuating rod in accordance with the gap of the frame.
Secure the diaphragm mounting block on the other side and tighten the U-lock nut with the box driver.
Make sure the gaps between the actuating rod and the electromagnet are even.

I. Connect L-tube to the casing block and secure the casing with the screws.

J. Repeat steps from "E" to "I" for the other chamber block.

K. Install the sound absorber.

L. Place the upper housing back on body.
   - Be extremely careful not to pinch the Sound Absorber in the Upper Housing
     Secure it with the bolts.
     Then place the filter and filter cover on the upper housing.

8.4.2 AIR PUMP SAFETY SCREW REPLACEMENT FOR HP-100 AND HP-200

A. Dispose of broken screw. Be sure all debris is removed from unit as it can result in damage to permanent magnets and or even in a failure of the pump.

B. Draw the new and safety screw through a hole in the different direction of the terminal.
(Threading order: The L-shaped lever-the spring electrode)

C. Fasten screw with nut.
The screw is designed so that the nut will turn freely when it is properly fastened, stop tightening when this happens.

D. Make sure the gaps between L-shaped lever and lug of the actuating rod are even.

- When checking the movement of the switch while the power is connected, touching the terminal will result in an electric shock.
- Unplug the pump immediately after the check.

Figure 16

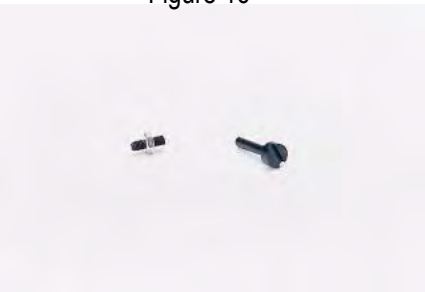


Figure 17

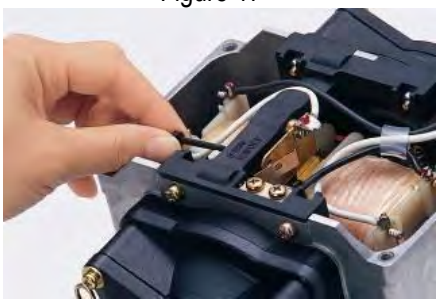


Figure 18

8.4.3 COMPLETE AIR PUMP REPLACEMENT

If the air pump needs to be replaced, please disconnect the electrical wire and the air line and replace it with a new one. You may disconnect the alarm during the operation. Don't forget to reconnect it after the air pump has been replaced and to reconnect it to the BIOLARM™ control panel.

8.4.4 RECIRCULATION PUMP

The recirculation pump is located in the last compartment of the reactor. If it needs to be replaced, please contact Bionest.

8.4.5 BIOLARM™ CONTROL PANEL

If the BIOLARM™ needs to be replaced, please contact Bionest.

8.4.6 AIR DIFFUSER

In the event that the air diffuser needs to be replaced, please contact Bionest. The media should never be removed from the reactor without prior written authorization from Bionest.

8.5 Seasonal or intermittent use

Except for cold temperatures or winter time, in the case where no wastewater is to be available for more than six (6) consecutive weeks, except in the case described by the for the important note below:

1. Turn off the electrical supply.
2. Perform a start-up before wastewater is fed to the unit.

IMPORTANT: The electrical supply cannot be stopped during the winter, or when cold temperatures are expected, because of freeze hazard in the pipes. In those cases, the electrical supply must be available at all times.

8.6 Shut down procedure

1. Turn off the electrical supply.
2. Turn off or close the water supply.
   a. Remove the wastewater supply line and install a plug on the inlet.
   b. If the wastewater supply is pressurized, remove the pumps from the pumping station and store them in a dry place.
3. Drain water from the UV unit in a bucket by opening the "UV INLET" (*ENTRÉE UV*) valve #1 shown on figure 8.
4. Clean the recirculation line with a hose by opening every valve shown on figure 5: valves #1, #2, #3 and #4.
5. Clean the effluent filter with a hose.
6. Drain the KODIAK unit via the septic tank compartment (section 2/3; **lid #1**) (see Figure 4A or 4B). As water from the septic tank is pumped, water from other compartments flows through the one-way valves in order to balance the water level in each tank. If the drain is made by any other opening, water from the other tanks could not flow through one-way valves and therefore too much pressure could cause breakage of partition walls as well as to void the warranty
7. With a shop type vacuum cleaner, remove water from the pipes located in the mechanical chamber by blowing air inside the pipes. An opening identified "PURGE" or "SEPTIC TANK DRAIN" can be used to do so (Figure 1, item #5)
8. Remove and clean the UV lamp before storing it in a warm place. All the information related to the maintenance of the unit is presented in the appendix of the operator's manual.
9. Unplug and uninstall the strobe light and put it in the mechanical room.
10. Uninstall the vent and put it in the mechanical room. It is important to replace the cap on the vent opening (see Figure 2).
11. Dispose of the sludge according to local laws.

Register

TABLE OF CONTENTS

9 MAINTENANCE

This register will allow you to maintain a follow-up on the operations and inspections made on your KODIAK unit. By completing it each time you are making the verifications and the operations asked, you will allow Bionest Kodiak be sure that the operations have been made in conformity with the recommendations.

Table 1: Maintenance activity register

Date	Description of the intervention	Signature

Date	Description of the intervention	Signature

BIONEST KODIAK

NOTES

TANK ALERT® XT Alarm System

Versatile, indoor or outdoor liquid level alarm system.

This alarm system monitors liquid levels in lift pump chambers, sump pump basins, holding tanks, sewage, agricultural, and other non-potable water applications.

The **Tank Alert® XT** indoor/outdoor alarm can serve as a high or low level alarm depending on the float switch model used.

The alarm horn sounds and the red beacon illuminates when a potentially threatening liquid level condition occurs. A "power on" light on the switch indicates power to the alarm panel.

FEATURES

- Enclosure meets Type 3R water-tight standard.
- Automatic alarm reset, horn silence switch, and alarm test switch.
- Alarm horn sounds at 85 decibels at 10 feet (3 meters).
- Alarm system (when installed on separate circuit) operates even if pump circuit fails.
- Complete package includes standard Sensor Float® control switch with 15 feet (4.57 meters) of cable (other lengths available) and mounting clamp.
- UL Listed for indoor or outdoor use.
- CSA Certified.
- Three-year limited warranty.

LR54245 LISTED 288X

Member of Hydraulic Institute

OPTIONS

When ordered with the alarm, the system is available with:

- alternate float switch models for high or low liquid level warning.
- auxiliary dry normally open contacts for easy attachment of remote devices.
- premounted terminal block so enclosure can also be used as a junction box for splicing pump, pump switch, and pump power. Meets NEC standard for junction boxes.
- 6 foot (1.8 meter) power cord and liquid-tight connectors.

SPECIFICATIONS

VOLTAGE: 120 VAC, 50/60 Hz, 8.5 watts max. (alarm condition)

ALARM ENCLOSURE: 6.5 x 4.5 x 3.0 inch (16.51 x 11.43 x 7.62 cm), indoor-outdoor, weatherproof, thermoplastic meets Type 3R water-tight standard

ALARM HORN: 85 decibels at 10 feet (3 meters), meets Type 3R water-tight standard as installed by factory

ALARM BEACON: meets Type 3R water-tight standard as installed by factory

TEST/SILENCE SWITCH: certified to IP66 and IP68 standards

AUXILIARY ALARM CONTACTS (OPTIONAL): 120 VAC, 5 amps max., 50/60 Hz

PRE-MOUNTED TERMINAL BLOCK (OPTIONAL): 20 amps, 120/230 VAC

POWER CORD (OPTIONAL): 6 foot (1.8 meter) cord with 120 VAC plug

FLOAT SWITCH: Sensor Float® control switch with mounting clamp
Cable: 15 feet (4.57 meters), flexible 18 gauge, 2 conductor (UL) SJOW, water-resistant (CPE)
Float: 3.38 inch diameter x 4.55 inch long (8.58 cm x 11.56 cm), high impact, corrosion resistant PVC housing for use in sewage and non-potable water up to 140°F (60°C)
Switch: hermetically sealed steel capsule features mercury-to-mercury contacts. Maximum line impedance for initiating device: 100 ohms

SJE Rhombus® CONTROLS

PO Box 1708, Detroit Lakes, MN 56502
1-888-DIAL-SJE • 1-218-847-1317
1-218-847-4617 Fax
email: sje@sjerhombus.com
www.sjerhombus.com

TANK ALERT® XT Installation Instructions

This alarm system monitors liquid levels in lift pump chambers, sump pump basins, holding tanks, sewage, agricultural, and other non-potable water applications.

The Tank Alert® XT indoor/outdoor alarm can serve as a high or low level alarm depending on the float switch model used. The alarm horn sounds and the red beacon illuminates when a potentially threatening liquid level condition occurs. A "power on" light on the switch indicates power to the alarm panel.

TANK ALERT® XT ALARM

- Voltage: 120 VAC, 50/60 Hz, 8.5 watts maximum (alarm condition) (circuit not supervised)
- Enclosure meets Type 3R water-tight standard.
- Automatic alarm reset, horn silence switch, and alarm test switch.
- Alarm horn sounds at 85 decibels at 10 feet (3 meters).
- Alarm system (when installed on separate circuit) operates even if pump circuit fails.
- Maximum line impedance for initiating device: 100 ohms.
- Complete package includes standard Sensor Float® control switch with 15 feet (4.57 meters) of cable (other lengths available) and mounting clamp.
- Three-year limited warranty.

OPTIONS

When ordered with the alarm, the system is available with:

- alternate float switch models for high or low liquid level warning.
- auxiliary alarm contacts for easy attachment of remote devices: (circuit not supervised) 120 VAC, 5 amps max., 50/60 Hz
- premounted terminal block so enclosure can also be used as a junction box for splicing pump, pump switch, and pump power. Meets NEC standard for junction boxes. 20 amps, 120/230 VAC.
- 6 foot (1.8 meter) power cord with 120 VAC plug and liquid-tight connectors.

PREVENTATIVE MAINTENANCE

- Periodically inspect the product. Check that the cable has not become worn or that the housing has not been damaged so as to impair the protection of the product. Replace the product immediately if any damage is found or suspected.
- Periodically check to see that the float is free to move and operate the switch.
- Use only SJE-Rhombus® replacement parts.

SJE-RHOMBUS® THREE-YEAR LIMITED WARRANTY

SJE-RHOMBUS® warrants to the original consumer that this product shall be free of manufacturing defects for three years after the date of consumer purchase. During that time period and subject to the conditions set forth below, **SJE-RHOMBUS®** will repair or replace, for the original consumer, any component which proves to be defective due to defective materials or workmanship of **SJE-RHOMBUS®**.

THIS EXPRESS WARRANTY DOES NOT APPLY TO THE MOTOR START KIT COMPONENT. SJE-RHOMBUS® MAKES NO WARRANTIES OF ANY TYPE WITH RESPECT TO THE MOTOR START KIT.

ELECTRICAL WIRING AND SERVICING OF THIS PRODUCT MUST BE PERFORMED BY A LICENSED ELECTRICIAN.

THIS WARRANTY DOES NOT APPLY: (A) to damage due to lightning or conditions beyond the control of **SJE-RHOMBUS®**; **(B)** to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions provided; **(C)** to failures resulting from abuse, misuse, accident, or negligence; **(D)** to units which are not installed in accordance with applicable local codes, ordinances, or accepted trade practices, and **(E)** to units repaired and/or modified without prior authorization from **SJE-RHOMBUS®**.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

TO OBTAIN WARRANTY SERVICE: The consumer shall assume all responsibility and expense for removal, reinstallation, and freight. Any item to be repaired or replaced under this warranty must be returned to **SJE-RHOMBUS®**, or such place as designated by **SJE-RHOMBUS®**.

ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. SJE-RHOMBUS® SHALL NOT, IN ANY MANNER, BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES AS A RESULT OF A BREACH OF THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY.

⚠WARNING **ELECTRICAL SHOCK HAZARD**

Disconnect power before installing or servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.

⚠WARNING **EXPLOSION OR FIRE HAZARD**

Do not use this product with flammable liquids. Do not install in hazardous locations as defined by National Electrical Code, ANSI/NFPA 70.

Failure to follow these precautions could result in serious injury or death. Replace product immediately if switch cable becomes damaged or severed. Keep these instructions with warranty after installation. This product must be installed in accordance with National Electric Code, ANSI/NFPA 70 so as to prevent moisture from entering or accumulating within boxes, conduit bodies, fittings, float housing, or cable.

For detailed specifications on this product, or for the complete line of SJE-Rhombus® panel, alarm, and switch products, visit our web-site at www.sjerhombus.com.

INSTALLING THE FLOAT SWITCH

1. Place the cord into the clamp as shown in Figure A.
2. Locate the clamp at the desired activation level and secure the clamp to the discharge pipe as shown in see Figure A. **Note:** Do not install cord under hose clamp.
3. Tighten the hose clamp using a screwdriver. Over tightening may result in damage to the plastic clamp. Make sure the float cable is not allowed to touch the excess hose clamp band during operation.
4. Wire cable leads directly into control device as shown in Figure B.
5. Check installation. Allow system to cycle to insure proper operation. **Note:** All hose clamp components are made of 18-8 stainless steel material. See your SJE-Rhombus® supplier for replacements.

INSTALLING THE ALARM

1. Mount alarm box using existing holes in back of box. To ensure water-tight seal, use screws and sealing washers included with alarm. **Note:** Screws are to be located over wall stud or used with a wall anchor sized for a #8 x 1.25 self tapping screw.
2. Determine "conduit-in" locations on alarm as shown in Figure B. **Note:** When used with a pump application, connect alarm to a circuit separate from the pump circuit. This allows alarm to continue to operate if the pump circuit fails.
3. Drill holes for conduit entry, taking care not to damage bosses inside alarm box.
4. Attach conduit.

   If alarm includes premounted terminal block option, refer now to the Terminal Block Option Wiring Instructions.
5. Bring float switch cable through conduit and wire to terminal block positions 1 and 2 as shown in Figure B.
6. Wire power conductors to terminal block positions 3 and 4 and ground wire to ground termination post as shown in Figure B. **Note:** If terminal block option is used, attach ground wire as shown in Figure A of Terminal Block Option Wiring Instructions.
7. If remote device is used, connect wires as shown in Figure B using supplied wire nuts.
8. Attach alarm box cover using the four pre-installed screws.
9. Turn on power. Light on switch should come on.
10. Check installation by manually tipping the float. The horn and beacon should turn on.
11. Push silence switch to test silence feature.
12. Test unit once per week to insure proper operation.

Figure A

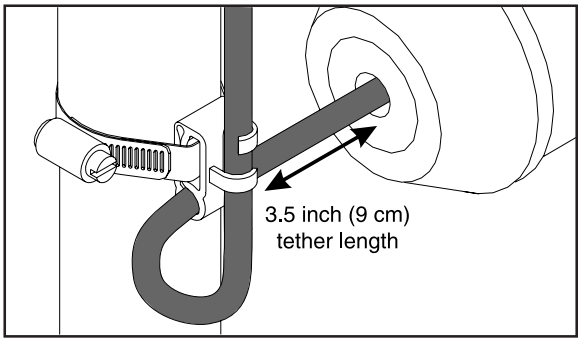
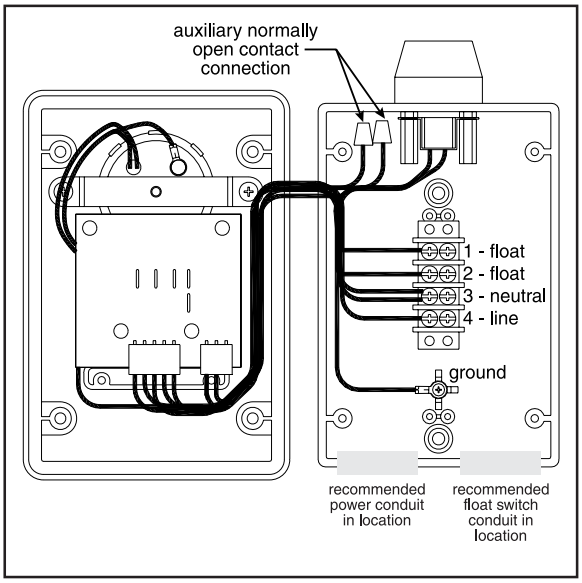


Figure B



SJE-Rhombus CONTROLS®

22650 County Highway 6 ■ P.O. Box 1708 ■ Detroit Lakes, Minnesota 56502 USA
1-888-DIAL-SJE (1-888-342-5753) ■ Phone: 218-847-1317 ■ Fax: 218-847-4617 ■ E-mail: sje@sjerhombus.com

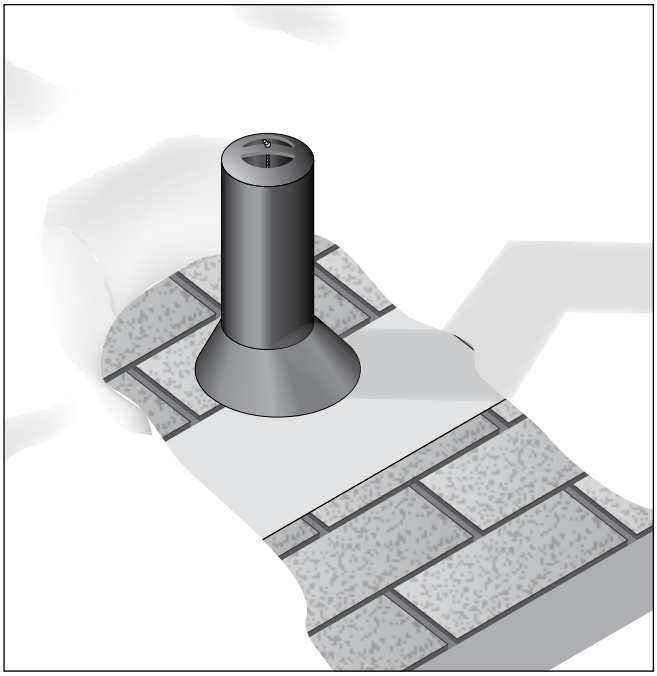
Instl. Instr. PN 1016543C

heat-line®
Freeze Protection Systems

ArcticVent®

Installation Instructions for Electric Units

AV120-03CS **AV120-03GFC**
AV240-03CS **AV240-03GFC**



Approvals

Enclosure Type 3R

Description

ArcticVent is designed for installation by professional licensed tradespersons. ArcticVent must only be used when protected by the Ground Fault Circuit protection (GFC) included in the cord-set of GFC models and with approved Ground Fault Devices when protected at the electrical panel. These products must be installed and wired in accordance with the National Electrical Code (NEC) in the USA and the Canadian Electrical Code (CEC) in Canada.

- Never bypass the Ground Fault Protection.
- Never cut, drill or alter this product in any manner.
- ALWAYS test the system ground fault device before seasonal start-up and monthly while in use.

ArcticVent GFC systems simply plug in. The CS models will require Ground Fault Circuit protection (not included) and field wiring.

Proper completion of this installation will require the expertise of plumbing/mechanical and electrical trades. This is a professional product designed to be installed by licensed tradepersons and must be inspected by the proper electrical and mechanical authorities following completion of the finished installation.

For technical support call Heat-Line a Division of Christopher MacLean Ltd. at (800) 584-4944.

This product must be installed in accordance with governing electrical, plumbing and building authorities.

CAUTION! Failure to properly install and test this product while in use may be hazardous and may result in property damage or loss of life.

Kit Contents

Qty	Description
1	ArcticVent CS or ArcticVent GFC

ArcticVent GFC

ArcticVent CS

⚠ WARNING:

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

- To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of Heat-Line a Division of Christopher MacLean Ltd., agency certifications, the National Electrical Code and Canadian Electrical Code, ground-fault equipment protection must be used. Arcing may not be stopped by conventional circuit breakers.
- Component approvals and performance are based on the use of Heat-Line a Division of Christopher MacLean Ltd. specified parts only. Do not use substitute parts or vinyl electrical tape.
- This is a professional product designed to be installed by licensed tradepersons and must be inspected by the proper electrical and mechanical authorities following completion of the finished installation.