VetUS, LLC

Eco-Safe Digester User Manual

2012 Manual

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1. INTRODUCTION

This User guide is intended to provide you with information to help you learn how to operate and troubleshoot your new Eco-Safe Digester high volume organic waste decomposition system for optimal performance.

BASICS

The Eco-Safe Digester uses a highly refined formula of micro-organisms to decompose carbon based food waste into a non-toxic liquid that is safely disposed into standard waste water disposal systems.

The capacity of the machine refers to the average weight of food waste digested in a 24 hour period. It is important to note that while each Eco-Safe Digester model has a standardized maximum capacity specification, capacity can vary based on usage trends.

Each system is controlled by a state of the art CPU (Central Processing Unit) that controls the chamber's parameters to create the ideal environment for micro-organism performance. A touch panel provides Graphic User Interface to allow easy and convenient operation.

NOTE: Please be sure to read all sections of the User Guide prior to operating your new Eco-Safe Digester.

1.1 Site Preparation

1. **Space**

   The optimal space for the machine has at least 3 ft of clearance on both sides in addition to the machine's width. This additional room is necessary to help facilitate maintenance of the machine. Due to the weight and size of the machine, we strongly recommend that these criteria be met. In the event this space is not available, a custom application may be necessary. Variation in space will occur depending on which Eco-Safe Digester model is installed.

1.1 Site Preparation (continued)

2. Power source

The required power for the machine is AC 220V +/- 10V, 3 phase, 1 ground at 30A. The power source with a circuit breaker must be within 5 ft of the desired installation location and on the left side of the machine. A minimum voltage of 220 must be dedicated solely to the operation of the machine and must be maintained at the installation location.

3. Water and Drain

A dedicated warm water source (104° F) with a ¾ male pipe fitting is also required within 5 ft of the left side of the machine. The water source should be dedicated to machine operation only. Sharing the water source with other usage is not recommended.

The drain must be an open floor drain and should be connected to the machine with a 3 inch drain pipe (PVC or Copper). Please minimize any changes in flow direction from the machine to drain hole. An elbow fitting should not be used more than 2 times. A pitch must be maintained at least 1/4 inch declination for every 2 ft length.

Please see the table 1.1 and prepare the list before machine installation.

Table 1.1 Check Lists for Site Preparation

List	Requirement	Note
Space	Left: 5 ft, Right: 5 ft space Not including machine size	Ready Not ready
Power source	220 volt (+/- 10%), 3 phases at 30A (T, R, S, and Ground)	Ready Not ready
Water supply	Warm water (40C) ¾ inch male pipe fitting Easy access to the machine	Ready Not ready
Drain	4 inch open floor drain Must be within 5ft of machine site	Ready Not ready

1.2 Transporting and Leveling Your Machine

1. In the event your machine must be moved with a forklift, be sure to lift it at the base frame between the left and right casters at the bottom of the machine. Extreme caution is necessary to avoid damaging the external cover.

2. In the event your machine must be lifted with a crane or winch, be sure to use the left and right eye bolts attached on the top of the machine and lift it carefully.

3. In the event your machine is going to be transported in or on a vehicle, be sure to turn the screw handles of all four casters located under the machine to allow the fixing pads to contact the floor. Do not skip this step or your machine may be damaged in transport.

4. In the event a bar or belt is used to secure the machine during transport, be sure to avoid contact with the top cover of the machine. Use a base frame or caster parts on the lower part of the machine without any excessive force to secure the machine.

5. In short distance moves, a forklift is strongly advised to move the machine after the machine is unloaded. Movement of the machine using the casters may cause excessive vibration that can damage certain electrical components. Movement of the machine using the casters should be avoided at all times except for adjustments to the machine at the final installation location.

6. The final location of the machine should be a level surface. The positioning legs will be installed at each corner of the machine and may be used as a level adjuster.

CAUTION

Excessive vibration or rough handling may cause loosening of machine elements and/or electrical devices which may impair installation and performance. A qualified service technician should be used for all service and installation requirements.

1.3 Installation process

1. When the machine is placed in its final location, turn the screw handles of all fixing pads so contact with the floor is made. Be sure to level the fixing pads so that the machine is grounded. If the machine rocks or shakes, this may be an indication that the fixing pads have not made contact with the floor, and that the machine may not be level.
2. Connect the water supply hose to the water supply valve exposed at the front-left part of the machine so that it is secure.
3. Open the cover on the right side of the machine and connect the drain pipe or hose to allow for proper drainage of the effluent to the designated floor drain.
4. Before connecting the power lines, be sure to check if it is suitable for 220V, 3 phases.
5. Open the front cover and the door of the electrical panel and connect the power lines to the main breaker.
6. Before turning the main switch to the ON position, be sure to tighten any loose connections on each terminal within the electrical panel.
7. Check to see if there are any loose fitting bolts or nuts on the pipes of the machine.
8. BioHitech calibrates all mechanical parameters.
9. Turn all switches, including the main power switch, to the ON position. The machine is now ready to use in the factory setting mode.

2. OPERATION

2.1 Preparation of Food Waste

1. The digestion process of the Eco-Safe Digester machine is similar to the human digestion process. The machine will accept organic foods that are acceptable for human consumption. Table 2.1 is an example of acceptable and unacceptable items for the machine. It is important to note that all chemicals, metals, and foreign objects are not suitable for the machine and may cause permanent damage and/or void your warranty.

2.1 Acceptable and Unacceptable Food Waste Items

DO	**Food type**	**Acceptable Items:** - **Meat** - **Poultry** - **Fish** - **Fruit** - **Vegetables** - **Rice** - **Pasta** - **Bread & Baked Goods** - **Grains** - **Eggshells** - **Dairy products**
	Feeding	**1/4 of the machine capacity every 4 hours is optimal.** **(In the event of time constraints, more frequent feedings are acceptable)**
	Size	**Small pieces of waste are optimal and will increase digestion rate however, large items may be added**
DO NOT	**Food type**	**Unacceptable Items:** - **Excessive baked items added at one time** - **Beef bones** - **Pineapple tops, cores and skins** - **Fruit seeds over 1/2 inch diameter (such as mango, avocado, peach)** - **Corn Husks and Cobs** - **Raw dough and Pure flour** - **Oil, Grease, and Fats**
	Feeding	**Maximum feeding capacity should not exceed the agitator shaft** **Do not overload the machine (<u>NOTE</u>: Oxygen is essential to microorganism performance, overloading the machine will cause the microorganisms to perform inefficiently)** **Input scheduling is highly recommended**
	Temperature	**Temperature of food waste should be room temperature for optimal performance**

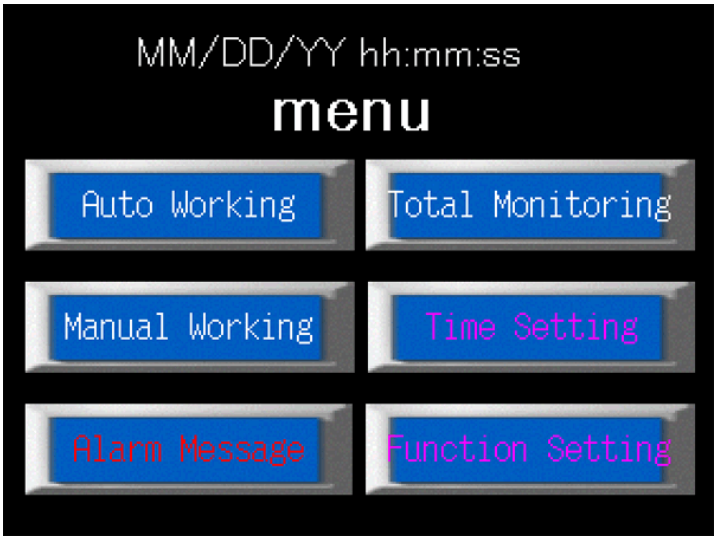
2.2 Operating in Auto Mode

1. Turn on the machine. Use Operational Key to turn power on. Be sure to check that the Emergency Shut Off button is not depressed.

2. Opening screen

BHxxxU-xxxxxx-xx: Machine serial number
Press Arrow key on the top, right of the screen.

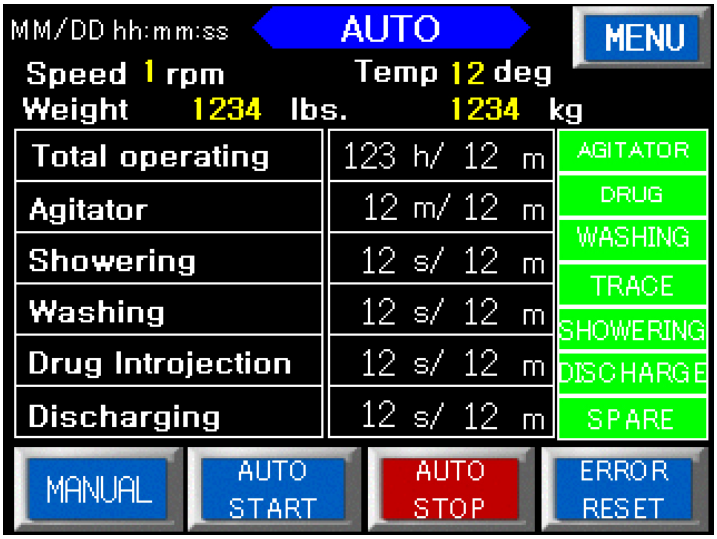
3. Menu screen



Press Auto Working

2.2 Operating in Auto Mode (continued)

4. Auto working screen (in Ready mode)

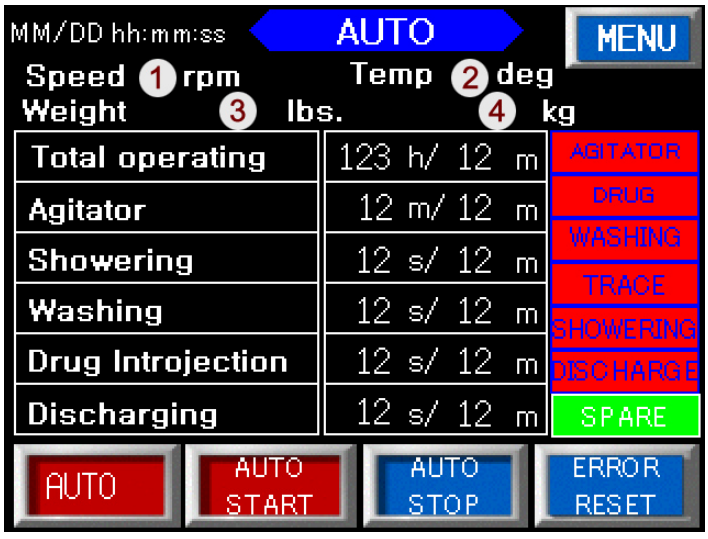


+ Parameters shown above do not represent actual values.

Press MANUAL: Button changes to AUTO

Press AUTO START

5. Auto working screen (in Operation mode)



+ Parameters shown above do not represent actual values.

Machine is now running in Auto Mode.

2.2 Operating in Auto Mode (continued)

6. There are 4 important parameters displayed in Auto mode. Below is a brief explanation of each parameter.

    - **Speed** (1): The rate of speed at which the paddles rotate inside the Eco-Safe Digester. The default RPM (Revolutions per Minute) setting is 6 rpm.

    - **Temp** (2): The temperature range for optimal performance is 30 degrees Celsius to 39 degrees Celsius.

    - **Weight** (3 and 4): These displays depict the weight of the food waste in real time. The User can monitor or schedule feedings using these values as guidelines. The recommended input at one time is a quarter of the machine capacity every 4 hours (i.e., Eco-Safe 800 lb machine can accept 200 lbs every 4 hrs)

    - Input scheduling is crucial to achieve the machine's optimal capacity.

    - Upon initial startup, the machine needs to cycle through a warming-up period. During this period, the machine will not start until the shell temperature reaches 15 degrees Celsius.

    - When the hatch is open in Auto Mode, the machine will temporarily stop running as a safety precaution. When the hatch recloses operation will resume automatically.

    - Periodically inspect and clean any debris which may inhibit proper door sensor functioning. The sensors are located on the left and right side of the hatch opening.

2.3 Optimal Input Schedules

Feeding the machine every 4 hours is the optimal feeding interval for all Eco-Safe models. A quarter of the machines maximum capacity is the optimal input at each 4 hour interval.

A smaller input at more frequent intervals is acceptable. However, the above feeding schedule is what is recommended for optimum performance.

The following procedure explains how to introduce food waste in to the machine.

Step 1

Observe the position of the Light Tower on the top-left side of the machine. If the light is green, go directly to Step 2. If the light is yellow, monitor the current weight to ensure overfeeding does not occur. Overfeeding will cause the machine to temporarily shut down. If the light is red, the machine is in Stop mode. Stop mode indicates that the machine has been overloaded. This safety function not only protects the drive modules of the system, but also lets the User maintain optimal conditions. To correct a system overload, food must be removed from the machine until the light turns back to yellow. Then click the Error Reset button on the main work screen. The machine will then restart automatically.

Step 2

A green light means the machine is ready for its next feeding. Please refer to 2.3 for recommended feeding intervals

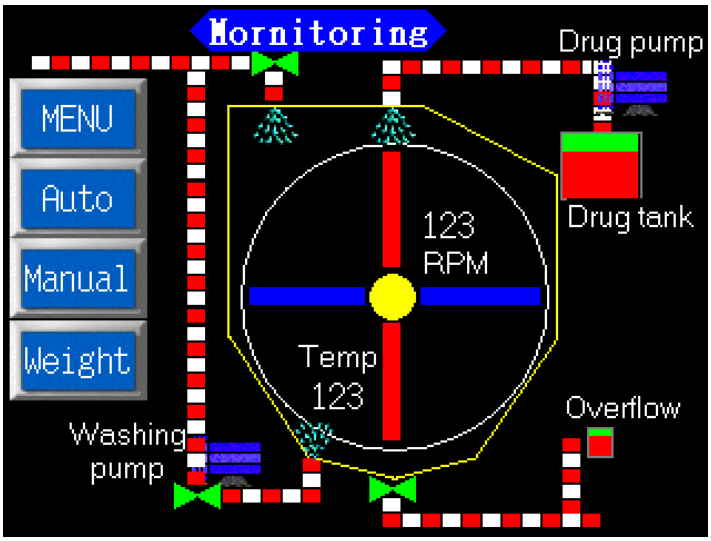
Step 3

Keep the top of the machine clear of all debris. It will add to the total weight of the system, causing a reduction of input capacity and less consumption of the waste.

2.4 Total Monitoring

1. Total Monitoring mode provides the current status of all devices such as water level, valve functionality, temperature, and agitator speed in real time.

2. The PLC (Programmable Logic Controller) controls a highly efficient inverter for the motor. This system saves electrical energy and is equipped with a complete measure against any overload to the agitator motor.

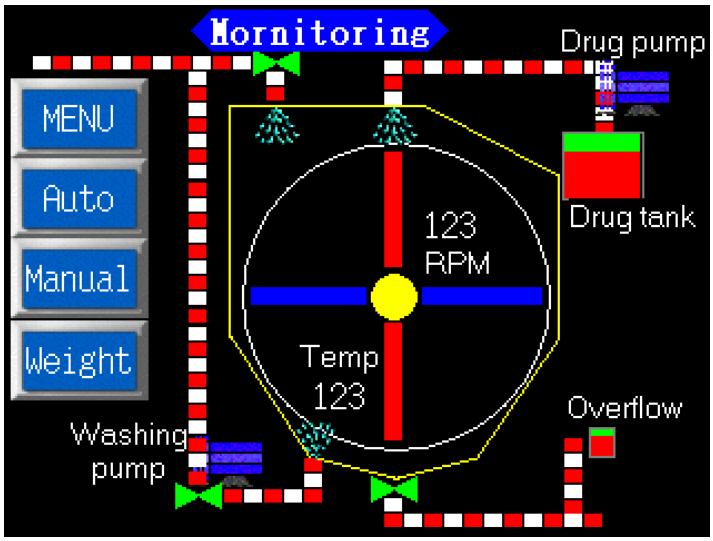


+ Numbers shown above do not represent actual values.

Eco-Safe Digester users can monitor the amount of food waste input daily, weekly, and monthly by selecting the Weight Monitoring screen. The main computer takes two readings at each feeding interval, once when the Hatch is opened, and then when the Hatch closes after feeding. The difference between these two values is automatically added up at the end of every day. There will be 1 value to represent each feeding occurrence throughout the day. The summation of these totals creates the Total Daily Weight digested by the machine.

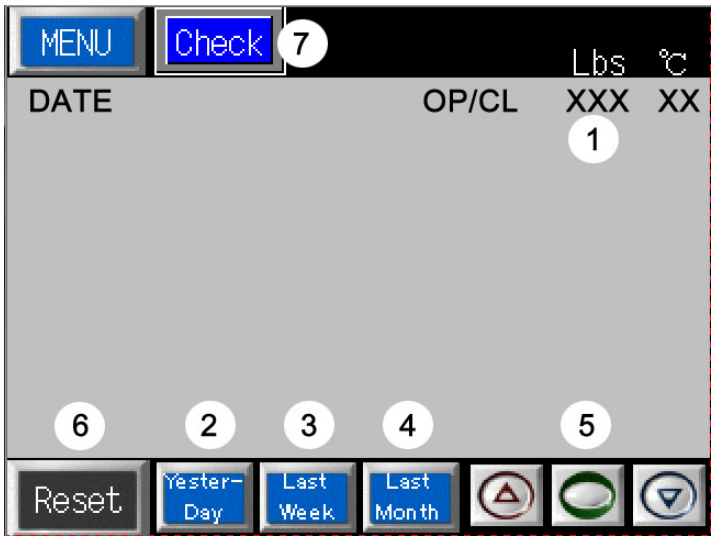
2.5 Weight Monitoring (continued)

1. Weight Monitoring menu



Click Weight

2. Weight monitoring screen



2.5 Weight Monitoring (continued)

- The current weight is recorded when a user opens or closes the hatch. Date, door status (OP: open, CL: close), current total weight, and current temperature in Celsius are displayed on the screen.

- When the Yesterday Button is pressed, the user can see the total amount of weight that was consumed by the machine on the previous day. A daily record is calculated from 12:00 a.m. to 11:59 p.m.

- When the Last Week button is pressed, weekly amounts can be checked. A weekly record is based on the previous week starting from Sunday 12:00 a.m. to Saturday 11:59 p.m. regardless of what the current day is.

- When the Last Month button is pressed, monthly data from the 1st day to last day of the month is displayed. For example, if today is the 15th of September, last month's data will show August's total weight.

- Arrow buttons can be used to see more data lines.

- When pressed twice, displayed records are erased from the screen. Even if the data is deleted on the screen, real data is still in the memory to be used for weekly and monthly calculations.

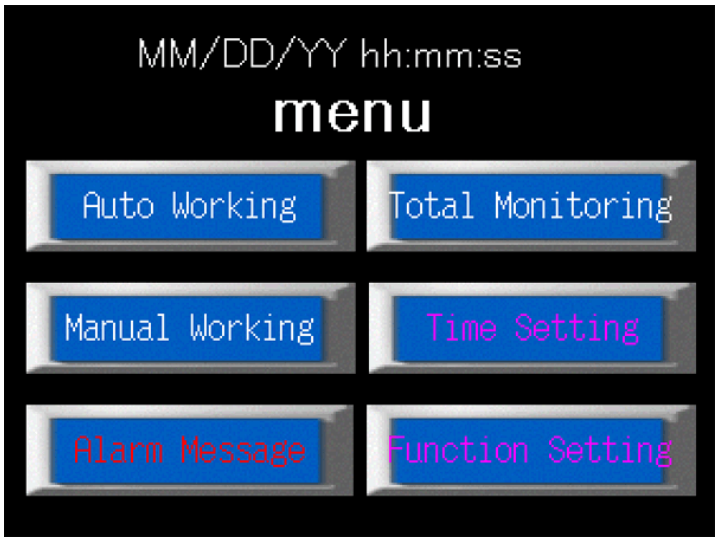
- The Check button is used to check the monitoring system. A user can see the current weight even if the door status has not changed.

2.6 Error Diagnostics

If there is a beeping sound from the machine, you can easily check the machine status using the touch panel.

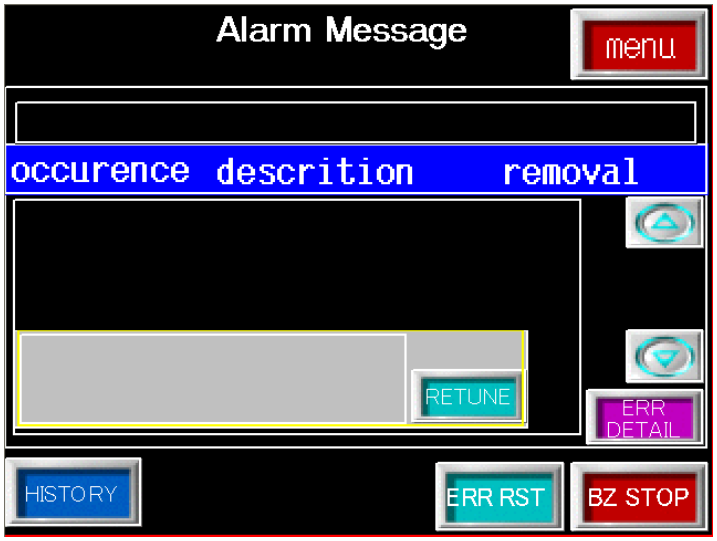
Steps for error check.

1. Menu screen



Press Alarm Message

2. Error description screen



If there is a message displayed on this screen, refer to procedure in table 2.2 that corresponds to the message displayed on screen

2.6 Error Diagnostics (continued)

Table 2.2 Error messages and follow-up

Message Number	Description	Procedure
0	emergency open (0)	Emergency button pressed **Release button**
1, 2, 8	pump overload trip (1: washing, 2: drug, 8: enzyme)	Pump overload Call customer service

3	agitator over current alert (3)	Agitator current overload Call customer service
4	inverter fault (4)	Motor inverter overload Call customer service
5, 6, 7	heater overload trip (5, 6, 7)	Heater overload Call customer service
9	water supply valve check (9)	Water supply valve error Call customer service
10	overflow sensor error (10)	Shell overflow alert Call customer service
11	drug pump low level (11)	Drug tank low level **Fill drug tank with deodorizer and water (Mix 1 cup of deodorizer with water at a time)**
12	door sensor error (12)	The door is opened during auto working **Close the door**
13	chamber low level error (13)	Reservoir tank empty **Check out water valve**
14, 15	heating rising error (14, 15)	Heater error Call customer service

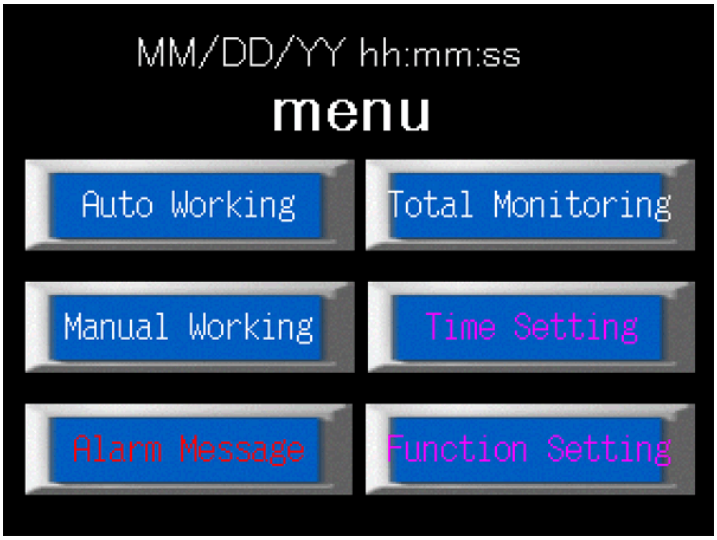
Please press ERR RST button after following the appropriate procedure above. Error message will disappear once the error is corrected.

2.7 Other Functions

BioHitech America does not recommend using these functions for machine operation unless the operator has extensive knowledge of each function. These functions are password protected.

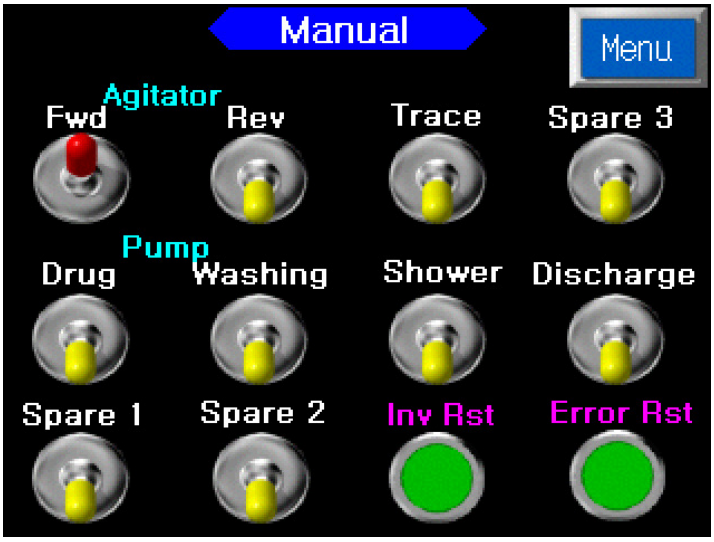
Manual working (For installation and maintenance only

1. Menu screen



Press Manual Working

2. Manual working screen

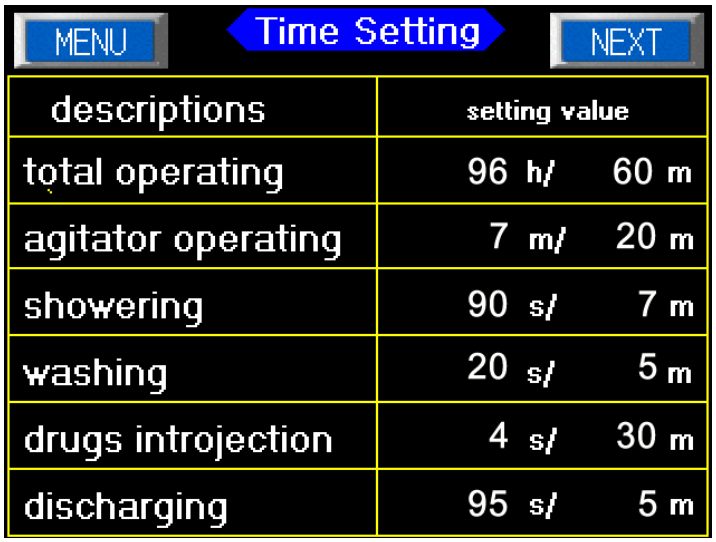


2.7 Other Functions (continued)

- Agitator On/Off toggle switch: Starts and Stops the agitator from rotating.
- Rev On/Off toggle switch: Starts and Stops agitator in reverse rotation.
- Trace On/Off toggle switch: Starts and Stops the heating system.
- Drug On/Off toggle switch: Starts and Stops drug (deodorizer) operation
- Washing On/Off toggle switch: Starts and Stops the washing nozzles located under the mixing chamber
- Shower On/Off toggle switch: Starts and Stops adding water to the mixing chamber.
- Discharge On/Off toggle switch: Starts and Stops water discharging from the mixing chamber
- Spare 1, 2 and 3 On/Off toggle switch: Extra switches for future features.

Time Setting (For installation and maintenance only)

3. Time setting screen

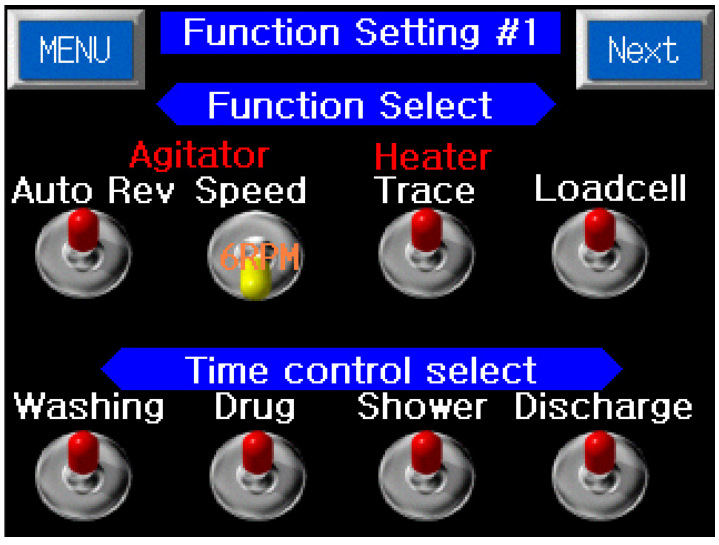


The screen values above represent the factory default settings.
The parameters may be changed by BioHitech America to create optimal setting for digestion of food waste.

2.7 Other Functions (continued)

Function Setting (For installation and maintenance only)

4. Function setting screen



Above screen values represent the factory default settings. The parameters may be changed by BioHitech America to create optimal setting for digestion of food waste.

3. MACHINE CONFIGURATION

1. **AGITATOR**
   The agitator is used to aerate the food mixture inside the mixing chamber so that food digestion is effectively maintained. Aerating the food mixture also provides the microorganisms ample amounts of oxygen for optimum performance.

2. **TRACE HEATER**
   The trace heater controls the temperature of the main chamber. In addition, it heats up the bottom of the machine to prevent oil coagulation.

3. **DRUG PUMP and MIST NOZZLES**
   The drug pump and mist nozzles are used to spray the deodorizer that is stored in the drug tank. A deodorizing mist is activated each time the door is opened or closed. This system is designed to neutralize odor. In addition, it can be set to periodically spray during operation.

4. **HIGH PRESSURE WASHING PUMP**
   There are 12 high pressure washing pump nozzles within the drain discharge area that remove washing oil and fat residues to help prevent blockages in the perforated bottom of the mixing chamber.

5. **ELECTRIC SOLENOID VALVES**
   These valves regulate the flow of water to various functions of the machine.

4. MAINTENANCE CHART

Description	Model	Bio-X (200, 400, 800, 1200 lb)	CYCLE TIME (Year)				
			1	3	5	10	10+
MAIN MOTOR	SEW	1KW*4P,R67DT90S4/40/230(220/380V , 50/60HZ)				▲	
PUMP (JABSCO-FLOJET)	DRUG	2100 SERIES D3735E7011 MAX7.6L/MIN6.9BAR 220V EPDM		▲			
	SHOWER D3732E5011	DUPLEX SERIES D3732E 5011 MAX6.1L/4.1BAR 220V EPDM		▲			
	ENZYME PR4	MAX 4L/HR 10mH 220V ,IPH ,50/60HZ		▲			
V/V(VALCON)	VALVE	VA15-1N				▲	
	HANDLER	AT24-3T			▲		
HEATER	FLANGE	220V*1.5KW (SUS304) USE WATER		2yr			
	THMP. S/W CASE	120℃			▲		
	THMP. S/W	120℃			▲		
NOZZLE (H.IKEUCHI)	USE WATER	1/4 MVVP 9010 PVDF POLYAMIDE			▲		
	DRUG	1/4 MKBN 80125 TPACVM			▲		
	WASHING	1/4 MVVP 9005 PVDF			▲		
SENSOR	USE LEVEL	15A*4*43L		▲			
HOSE	FLUID PRESSURE	15A*1W*1500L			▲		
	250			▲			
	400			▲			
	1500			▲			
SILICON PACKING	USE DOOR	10*15(FOARNING)		▲			
GAS SPRING		KG15-200-I-13-466		▲			
CASTER		KC60F					▲
CHAIN	RS60x42T	Z42*DP254.85				▲	
	RS60x14T(TENSION)	Z14*DP 84.95				▲	
	RS60x14T(MOTOR)	Z14*DP84.95 I.D 40				▲	
	CHAIN RS60			▲			
	UNIT BEARING	UCF208(NSK)			▲		
BEARING	BALL BEARING	#6004(KBC)		▲			
HANDLE	USE DOOR	KA-781-400L, KH-117-1		▲			
COVER HINGE		KH-1037(R,L)					▲
COVER HANDLE		BY183-2CV					▲
DRUG TANK	LEVEL INDICATORS	11351(ELESA)				▲	
	BREATHER CAPS(56281)	SFN 32A+F				▲	
OIL SEAL	D(TC)45-60-9				▲		
O-RING	G90				▲		
KEY	10x8x40(2R) SUS						▲
	10x8x50(1R)-SM45C						▲
PUNCHING CHAMBER				▲			

Appendix. A

Best Practices

1. For optimal machine performance, the machine should be fed every 4 hours with large feedings. If there is a space constraint, smaller more frequent feedings are acceptable.

2. For optimal micro-organisms performance, a mixed diet containing protein, carbohydrates, and some fats should be introduced into the mixing chamber throughout the day.

3. Optimal digestion rate occurs with food items that are small in size.

4. Large pits should be avoided. They will not be digested and will have to be removed from the machine. They may also cause damage.

5. Corn husks, cobs, pineapple tops, bottoms, skins and cores should be avoided. These items do not breakdown efficiently and will need to be removed periodically. Large additions of baked items should not be introduced at one time. This will negatively impact the digestion process.

6. Large meat bones should be avoided. The will not be digested and will have to be removed from the machine. They may also cause damage to the machine.

7. Waste will digest most rapidly at room temperature since it will not bring the temperature inside the machine down.

8. DO NOT add any cleaning agents, chemicals, or boiling water to the machine, they will kill the microorganisms and the machine will need to be sanitized and restarted to resume operation.

9. Water temperature should be 104° Fahrenheit (39° degrees Celsius) for optimal machine performance.

10. Avoid adding straight fat or oil to the machine, they will cause clogs within your drainage and grease trap systems and will greatly reduce digestion rate.

11. Keep the machine clean and free from all debris particularly around the hatch seal area.

12. Wait a minimum of 5 seconds once the hatch is opened before adding waste to the machine, and be sure to shut hatch firmly after feeding. This will ensure accurate weight tabulation by the scale and CPU.

13. Do not leave the hatch door open for extended periods of time, it will cause the internal temperature of the machine to fluctuate and decrease machine efficiency.

14. Be sure to observe the traffic light system. Waste should only be added to the machine when the light is green or yellow. Adding waste to the machine when the light is red will overload the machine and cause it to shut down.

Appendix. B

Trouble Shooting

Problem	Solution
No power	Check that unit is plugged in, breakers are on, and power key is turned on.
No water is entering unit	Check that main water supply is available. Check all three electronic water valves to ensure they are opening and closing properly.
Shell temperature is low	Check water supply; make sure hot water is available. Check heating system, make sure it is on, and set to proper temperature.
Traffic light is not working	Check the bulbs inside the traffic light, change if needed.
Traffic light is red, and the unit won't run	Check the weight, if unit is overfed, remove excess weight and press the error reset button on the auto working screen.
Odors	Check mixing vessel for inorganic material, remove if present. Refill deodorizer tank with BHA deodorizer. Periodically rinse down inside of unit and remove any debris build up.
Sluggish digestion rates	Check shell temperature, it should be between 30° - 39° Celsius. Make sure no harmful items were introduced into the mixing chamber (e.g., chemicals, boiling water, etc.). Make sure mixing chamber is not over filled. Over filling the machine reduces the amount of oxygen available for digestion process.
Unit has power but won't function	Check manual over ride button, if it has been pressed, reset it. Check temperature, it must be at least 15° Celsius to function. Check food hatch, make sure it is completely closed, and door sensors are free of debris. Check alarm message screen for details, if assistance is needed, contact a BHA representative.
Load cells not displaying the proper weight	Make sure nothing is resting or leaning on the unit.
Agitator is not spinning smoothly and quietly	Make sure bearings are tightly fastened, greased, and free of rust.
Noise coming from inside of mixing chamber	Make sure all paddle arms are tightly fastened to shaft. Check mixing chamber and remove any debris (e.g., cutlery, pits, etc.)