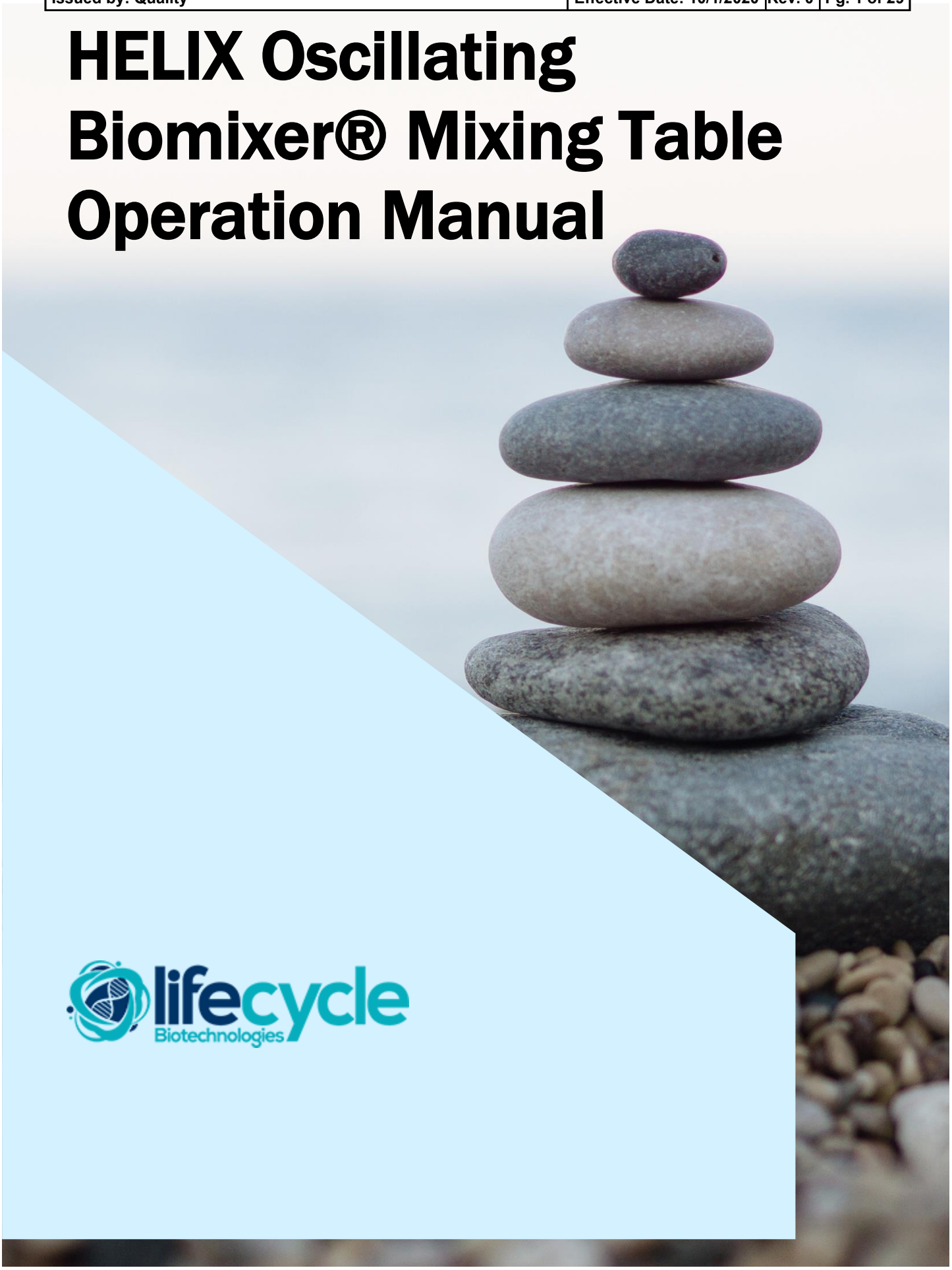
HELIX Oscillating Biomixer® Mixing Table Operation Manual



lifecycle Biotechnologies

Table of Contents

Table of Figures

Quick-Start Operation

Preparing Table

The table requires a single standard 110V wall socket to power both the motor and the control module. As an option, the control module can also be plugged into the local network. This will support remote monitoring of the table operation.

The container should be placed on the rotating table to sit directly within the red bumpers to hold the bottle in place. Filling of the container can occur prior to placing the container on the table, or while it is on the table.

Mixing Table.

The basic table operation provides two types of operating modes, with a limitless degree of configurations.

This section will provide a brief overview of the two modes and how to quickly begin running the table in either mode.

The two modes are alternating mode, which turns the table a specified number of revolutions in both directions. And the pulse mode, which turns the table a specified number of revolutions in either direction.

Safety

SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS PRIOR TO USE

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual. Always read and follow all safety messages

This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or injure you and others. All safety messages will follow the safety alert symbol and either the word WARNING or CAUTION.

Before switching on the equipment, make sure that all connectors are plugged in. Any interruption of the protective conductor inside or outside the apparatus or the protective conductor terminal will make the table dangerous.

Capacitors inside the apparatus may still be charged, even if the table has been disconnected from a voltage source. Any adjustments, maintenance, and repair of the opened apparatus under voltage must be avoided, and if inevitable, must only be carried out by qualified personnel.

The table assemble weighs more than 18kilos without a container. Lifting support should be used for this devise, do not attempt to lift with a single person.

Loading of 50L Bio-mixers onto the table should be performed by 2 people, when containing solutions.

The table should be plugged into a 120-VAC 60Hz grounded 3-prong outlet.

WARNING

- Do not use if power cord is worn or damaged. Replace or repair immediately. Failure to do so may result in death, fire, electric shock, or malfunction.

- Do not modify the power cord and plug provided with the mixing table. Take care not to damage it when setting up the table, or moving the table. Failure to do so may result in death, fire, electric shock, or malfunction.
- Make sure the mixing table is properly grounded through the 3-prong outlet.
- Connect the mixing table to a grounded outlet conforming to the rating prior to use. Failure to do so may result in fire, electric shock, or malfunction.
- Do not damage or cut off the ground prong of the power cord. Doing so may cause death, fire, electric shock, or product malfunction.
- Improper connection of the equipment-grounding conductor can result in risk of electric shock. Check with a qualified technician if you are in doubt as to whether the table is properly grounded. If it does not fit the outlet, have a proper outlet installed by a qualified electrician.
- The mixing table and the outlet must be positioned so that the plug is easily accessible.
- Do not use adapters or extension cords. Doing so may result in serious injury, fire, electric shock, or death.
- For best performance, plug the mixing table into its own individual outlet. This helps prevent overloading wiring circuits which could cause a fire hazard from overheated wires.
- Do not touch or attempt to touch the container or rotating table area when the mixing table is in operation (moving). Doing so may result in serious injury, or damage to the table.
- Operate the mixing table only on a level surface, and the two locking wheels are in the locked position. Doing so may cause the table to move during operation which may result in serious injury, or damage to the table or property.
- The mixing table should only be operated with a container properly placed within the red bumpers on the rotating table area. Failure to do so may result in serious injury, damage to the equipment, or loss of product.
- Lifting of full 50L containers should only be performed by two people. Failure to do so may result in serious injury, damage to equipment, or loss of product.
- Opening and servicing of any part of the mixing table must only be performed by a qualified technician. Opening and servicing equipment by unauthorized persons may result in serious injury or damage to equipment.

- Prior to any service, the power cable must be disconnected from the outlet and the electronics enclosure. Failure to do so may result in serious injury or damage to equipment

Equipment List

The following identifies the equipment that is a part of this mixing table.

A. Electronics Control Module
    a. HMI – touch display
    b. PLC
    c. Network Switch
    d. Power Supply
    e. E-Stop
    f. Main Power Switch
    g. Motor Controller
B. Electronics Mounting Post
C. Table Assembly
    a. Electronic Motor
    b. 20:1 Gear Box
    c. Table Platform
    d. Table framework
    e. Proximity Sensor

In addition, the electronics control module is connected via cable to the motor and the proximity sensor. There is one 110VAC power cable extending from the electronics control module. There is also a ethernet cable extending from the electronics control module for optional network connection.

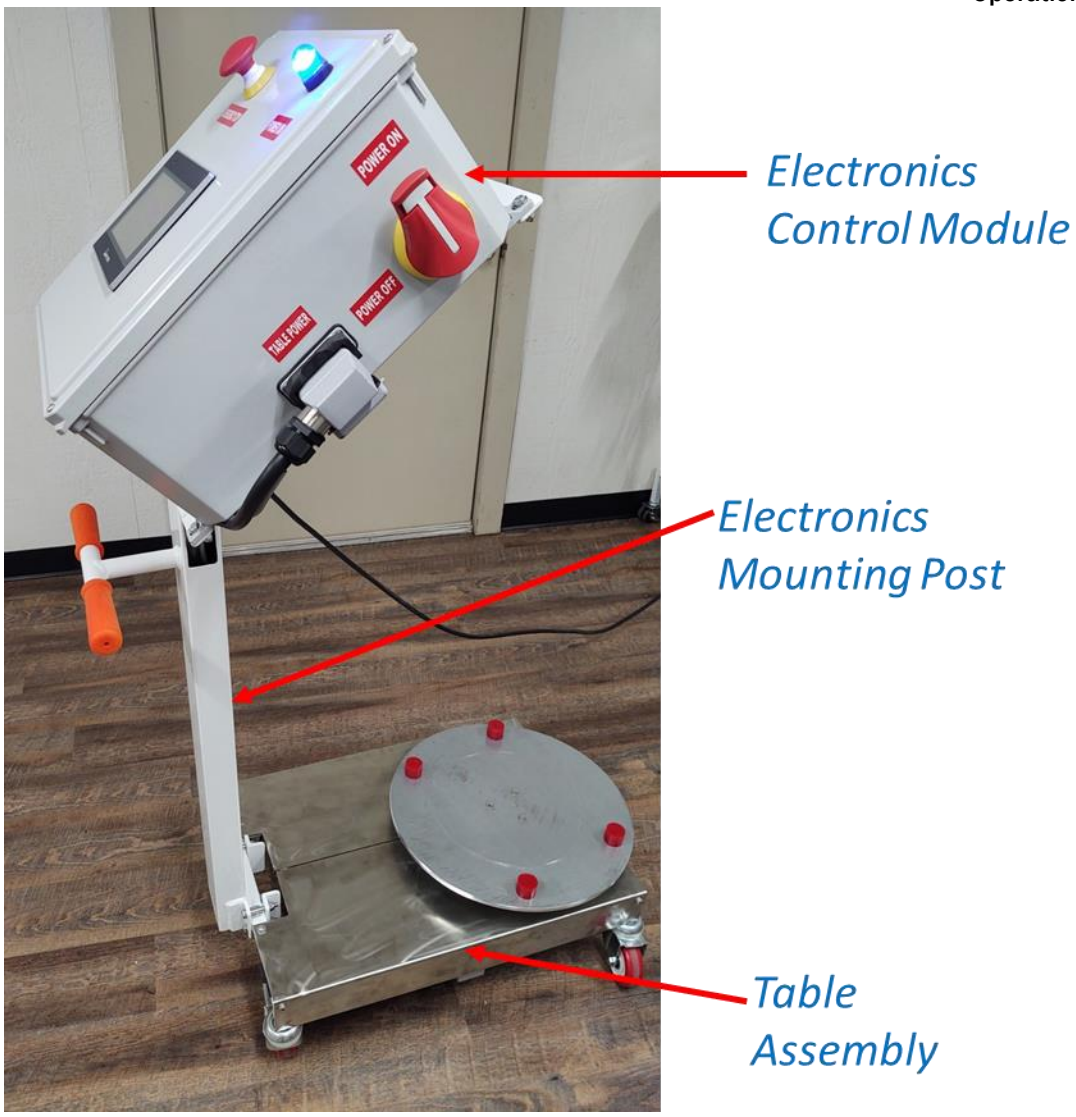


Figure 1. Mixing Table Major Equipment Items

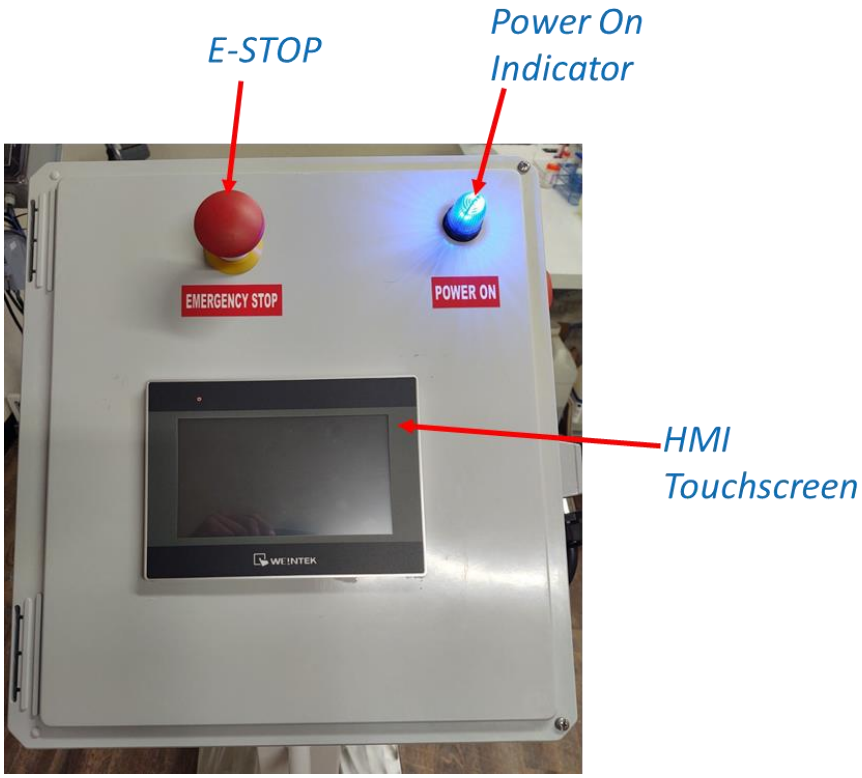


Figure 2 Electronics Control Module

Figure 3 Power and E-STOP buttons

Figure 4 Power and Network Interfaces

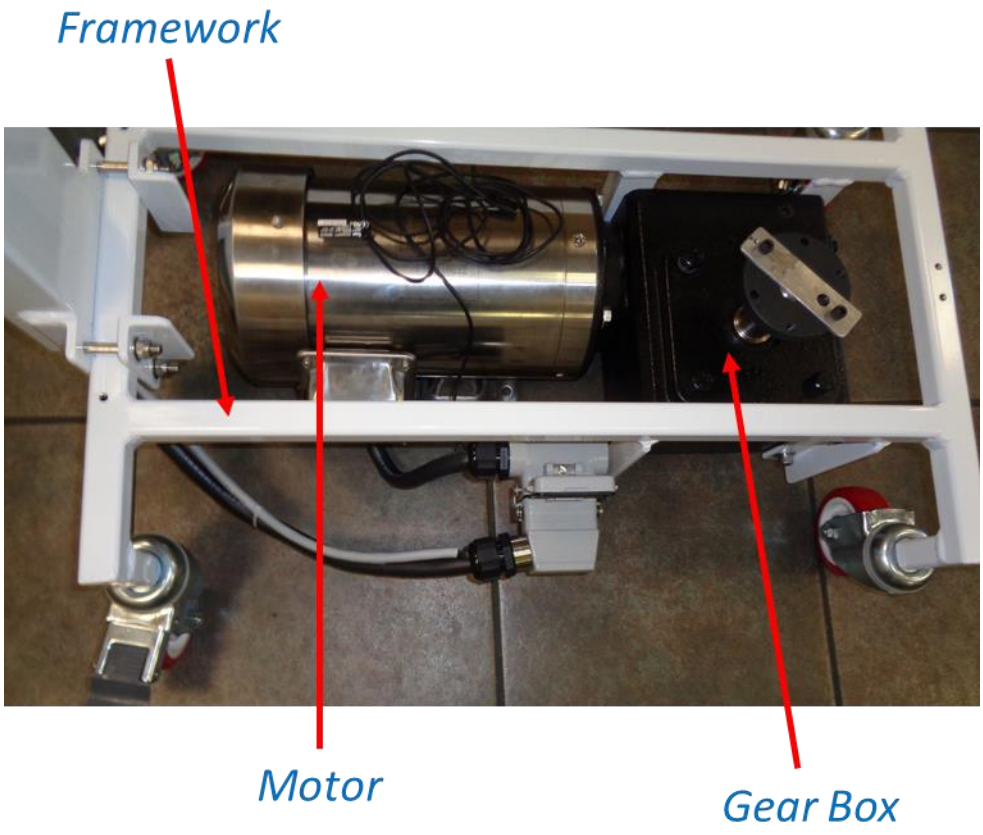


Figure 5 Table Assembly Componenets

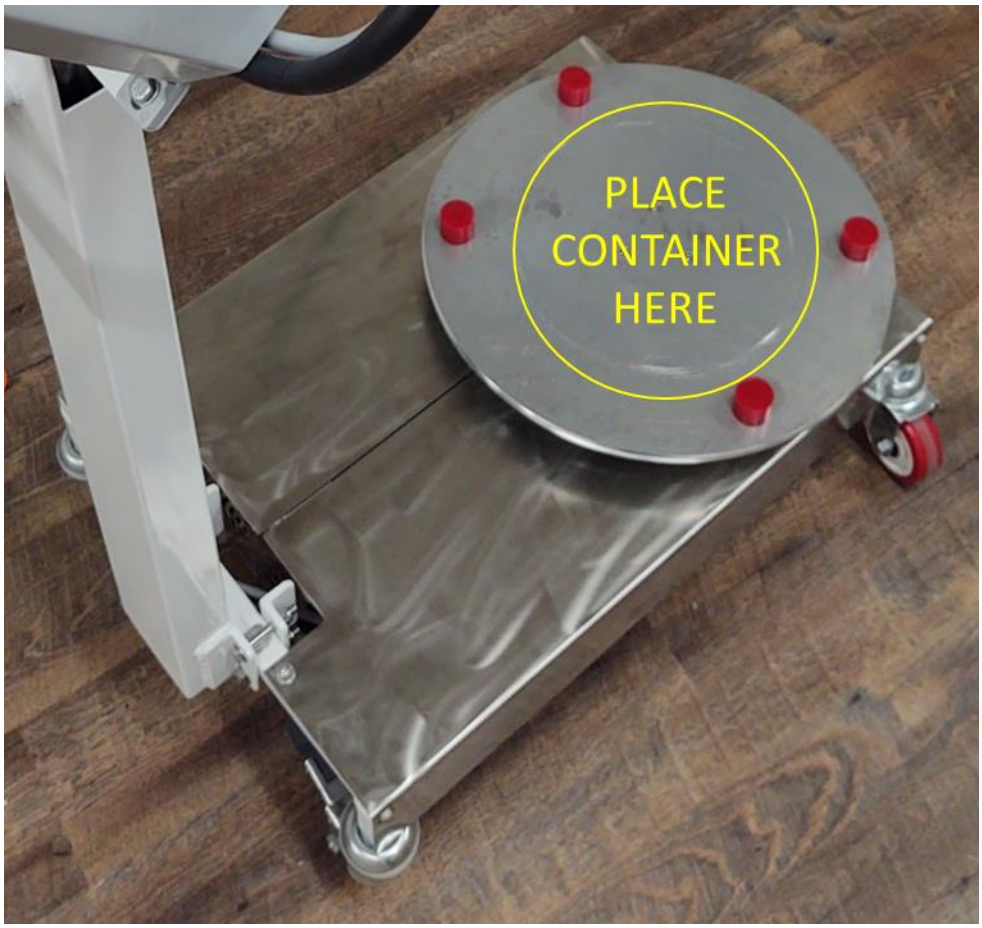


Figure 6 Container placement on Table

The power button controls all power to the table. The E-Stop button will stop the motor, but the controller will remain powered on. If the E-Stop button is engaged the screen will indicate this.

Figure 7 On Screen E-STOP indicator

When the table is powered on, the following Figure illustrates the appearance of the main screen. The table can be quickly operated from the main screen, and with the use of the two setup screens.

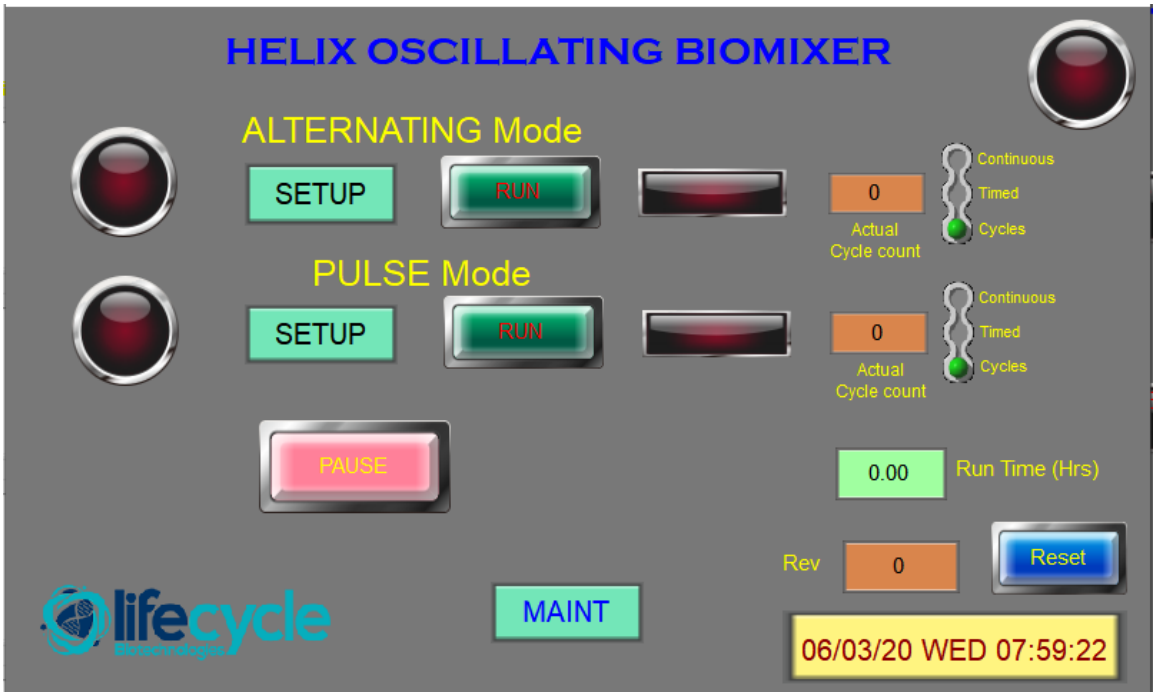


Figure 8 Main Screen

The following figure identifies and describes the functions of each of the buttons on the screen.

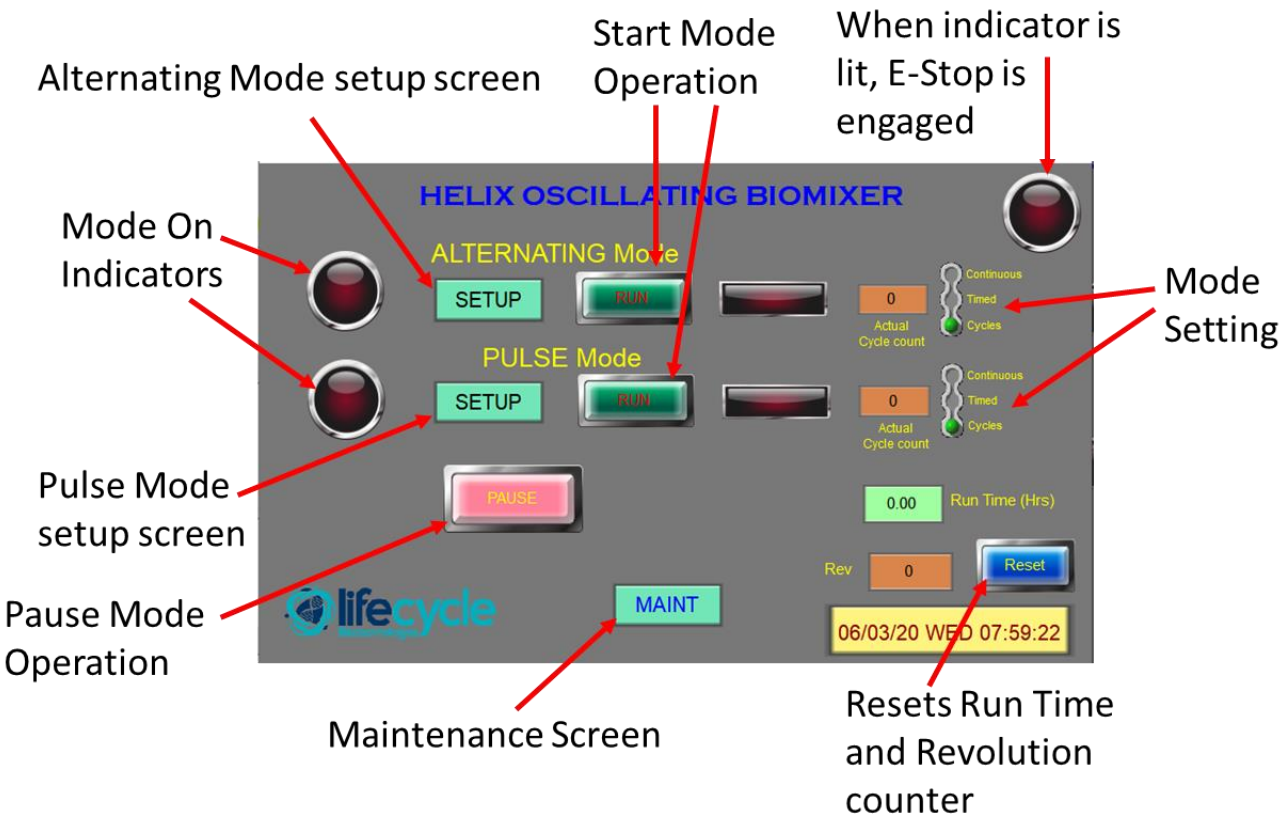


Figure 9 Main screen function descriptions

Alternating Mode

The first of the two modes is the alternating mode. In this mode the table will rotate the programed number of revolutions in each direction (clockwise and counterclockwise). To operate in this mode the first step is to touch the SETUP button directly below the ALTERNATING Mode text on the main screen.

Figure 10 Alternating Mode Buttons

This will bring you to the Alternating mode setup screen.

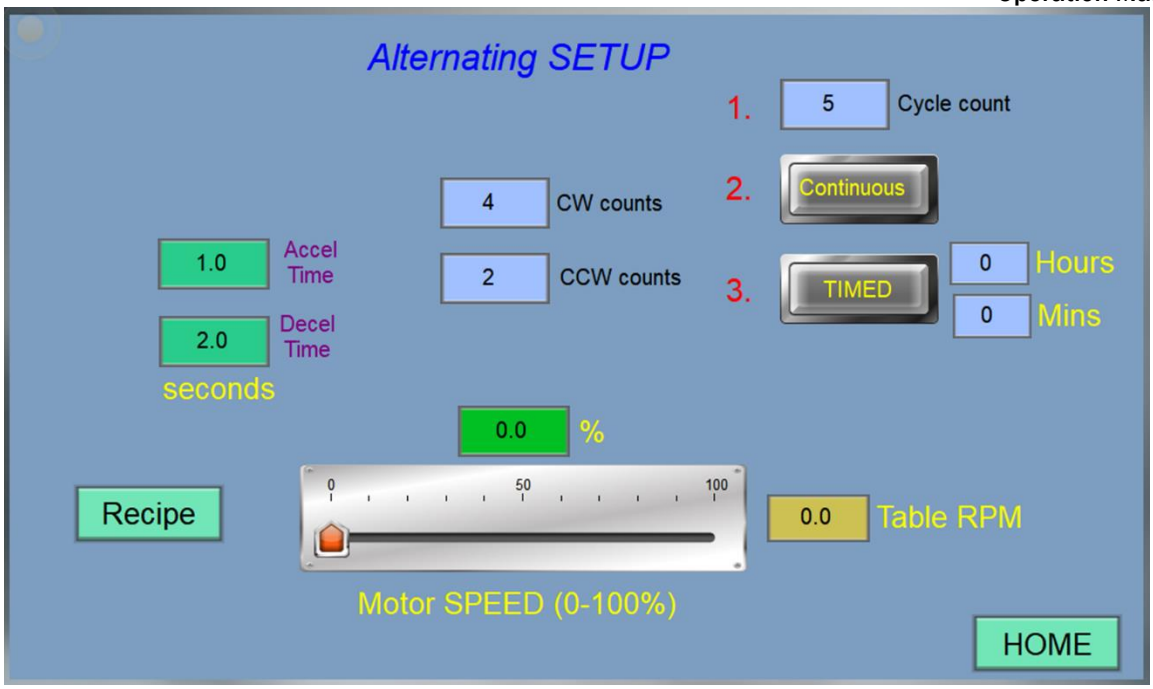


Figure 11 Alternating Mode Setup Screen

This screen provides the complete operational description of how you would like to run this mode. The following items must be programmed:

1. CW counts – This is the number of revolutions the table will rotate continuously in the clockwise direction. The minimum number that can be entered is 1. This number can be set to be greater than 1000.
2. CCW counts – This is the number of revolutions the table will rotate continuously in the counterclockwise direction. The minimum number that can be entered is 1. This number can be set to be greater than 1000.
3. Motor Speed – The motor speed can be set by moving the slider, or by entering a number in the green box above the slider. The number is a percentage of the full motor speed. The percentage of the motor speed is displayed to show the actual table RPM. The range is 4.5 to 87.5 RPM. A speed must be set for the motor to operate. IF the slider is left at 0% the motor will run at the minimum speed of 4.5 RPM (table speed).
4. Accel Time – This is the acceleration ramp of the motor. It determines how quickly the motor will go from stopped to the programmed speed. This is programed in seconds. The minimum is 0.5 and the maximum is 100 seconds.
5. Decel Time – This is the deceleration ramp of the motor. It determines how quickly the motor will go from the programmed rotation speed to a stop. This is programmed in seconds. The minimum is 0.5 and the maximum is 100 seconds.

Once the above values are set, the operator must set how the mode is to run. There are three options.

1. Run for a set number of cycles

2. Run continuously, until manually stopped
3. Run for a programmed amount of time

The Cycle Count value must be a minimum of 1, regardless of the running mode. If the Continuous and TIMED buttons are not selected, the table will run the number of cycles in the cycle count box. One cycle is defined as running the programmed number of revolutions in both the CW and the CCW directions.

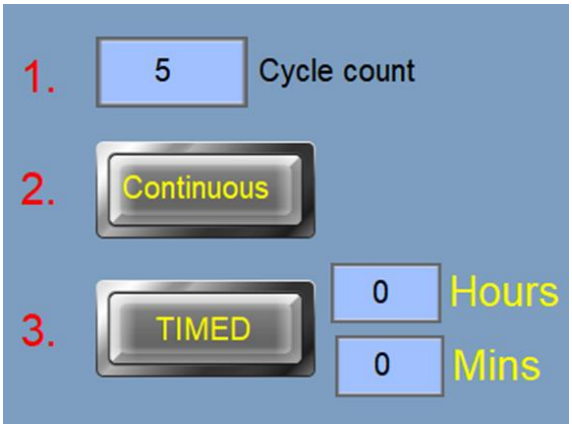


Figure 12 Mode Running Options (To run programmed cycle count)

If the Continuous button is selected, the table will run (once started) until it is manually stopped. There is no time limit to this.

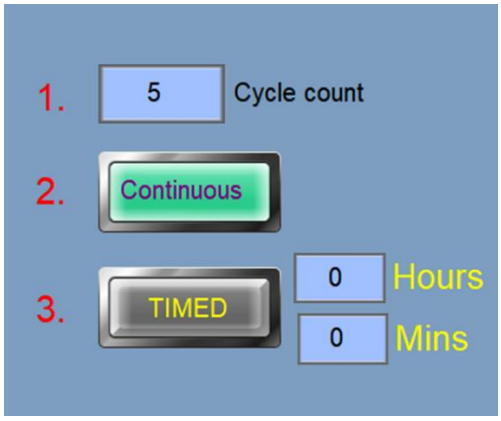


Figure 13 Mode Running Options (Continuous Selected)

If the TIMED button is selected, the table will run the number of hours and minutes in set in the entry boxes next to the button.

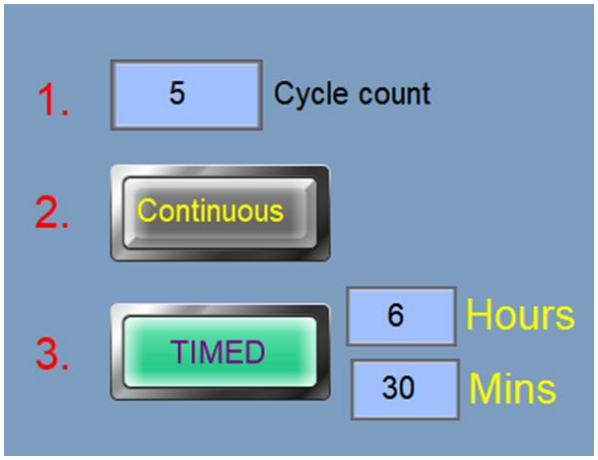


Figure 14 Mode Running Options (Timed Selected)

Once all settings are programmed as the operator desires, return to the HOME screen. The selected mode operation is also indicated on the main screen. The operation cannot be changed by these indicators. To begin the mode operation, press the RUN button (next to the SETUP button).

Main Screen Selected Mode Operation

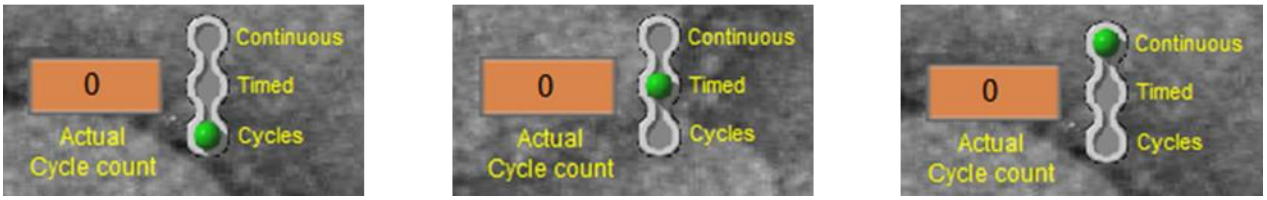


Figure 15 Main screen mode operation indicator

Figure 16 SETUP and RUN buttons

The main screen will then indicate that the Alternating (ALT) mode is ON (running).

Figure 17 Screen status when mode is running

As the mode runs, the Actual Cycle count value will indicate how many cycles have been completely run.

The mode can be paused (stopped) at any time by pressing the button next to the SETUP button. It will indicate the word STOP on it while the mode is running.

If the mode is being run in cycle count or timed mode, the complete indicator will illuminate once the programmed number of cycles are complete, or the run time has complete.

Figure 18 Screen status when mode is complete

Pressing the green STOP button will reset the mode and must be done prior to running another complete cycle.

PULSE Mode

To run in the pulse mode, operation is identical. Press the SETUP button under the PULSE Mode text to setup the mode operation parameters.

Figure 19 Pulse Mode SETUP and RUN button

The PULSE Mode setup screen is almost identical to the alternating mode, with just a few differences.

Instead of programming the CW and CCW counts, the mode simply has a Counts number, and a direction selection button. The Counts is the number of revolutions the table will rotate before it stops. The Direction button is the direction the table will rotate. The mode operates by rotating in selected direction for the number of counts programmed, and then stops.

This is one cycle. Starting, rotating the number of counts, and then coming to a full stop.

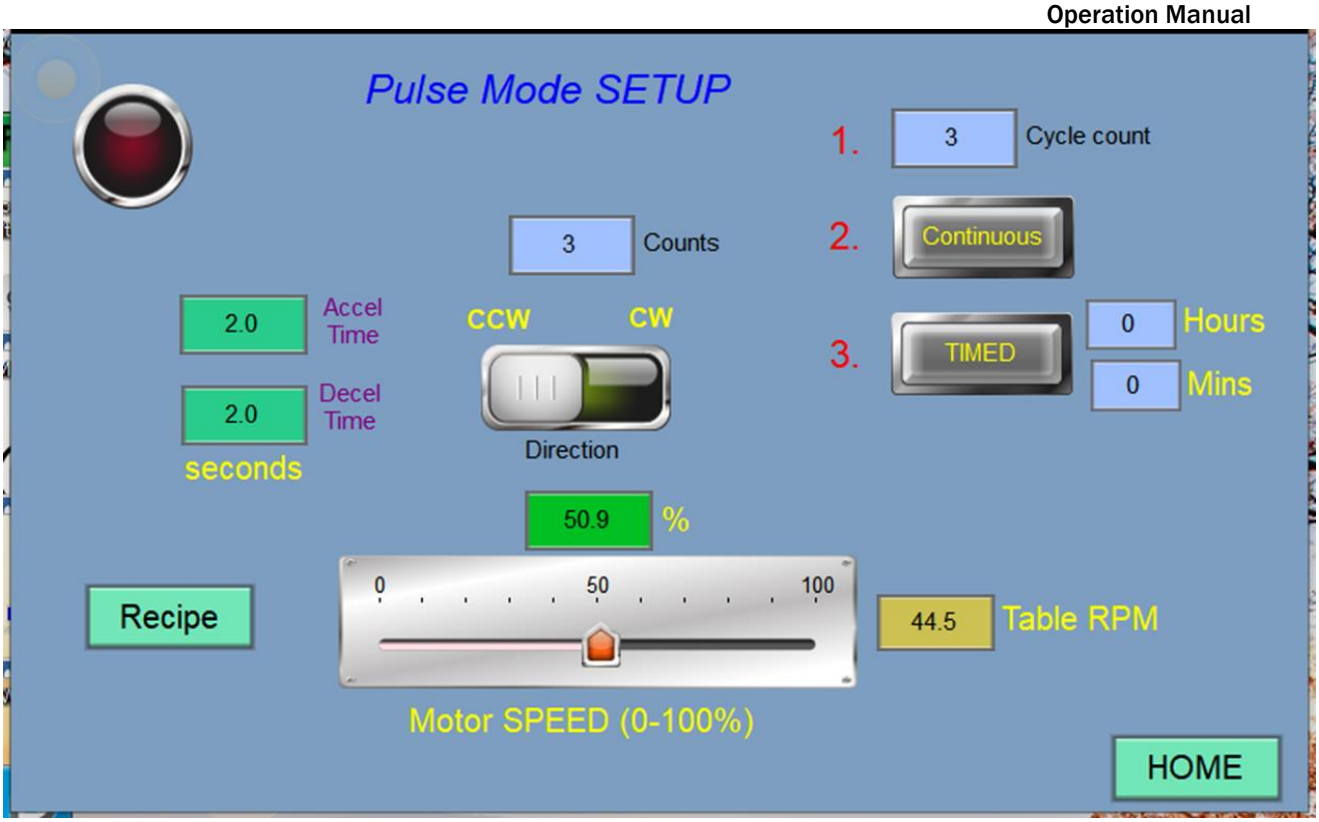


Figure 20 Pulse Mode Setup Screen

This screen provides the complete operational description of how you would like to run this mode. The following items must be programmed:

1. Counts – This is the number of revolutions the table will rotate continuously. The minimum number that can be entered is 1. This number can be set to be greater than 1000.
2. Direction – This is the desired direction of rotation. It can be either CW (clockwise) or CCW (counterclockwise).

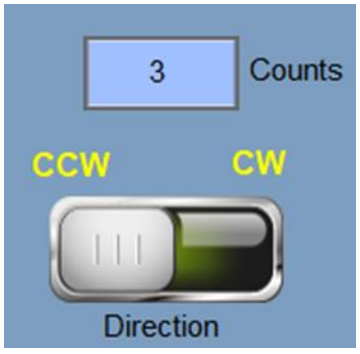


Figure 21 Pulse Mode Unique Setup parameters

3. Motor Speed – The motor speed can be set by moving the slider, or by entering a number in the green box above the slider. The number is a percentage of the full motor speed. The percentage of the motor speed is displayed to show the actual table RPM. The range is 4.5 to 87.5 RPM. A

speed must be set for the motor to operate. IF the slider is left at 0% the motor will run at the minimum speed of 4.5 RPM (table speed).

4. Accel Time – This is the acceleration ramp of the motor. It determines how quickly the motor will go from stopped to the programmed speed. This is programed in seconds. The minimum is 0.5 and the maximum is 100 seconds.
5. Decel Time – This is the deceleration ramp of the motor. It determines how quickly the motor will go from the programmed rotation speed to a stop. This is programmed in seconds. The minimum is 0.5 and the maximum is 100 seconds.

Once the above values are set, the operator must set how the mode is to run. There are three options.

1. Run for a set number of cycles
2. Run continuously, until manually stopped
3. Run for a programmed amount of time

The Cycle Count value must be a minimum of 1, regardless of the running mode. If the Continuous and TIMED buttons are not selected, the table will run the number of cycles in the cycle count box. One cycle is defined as running the programmed number of revolutions in the selected direction.

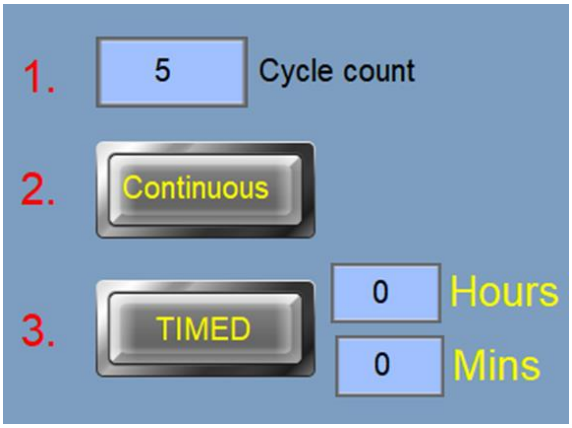


Figure 22 Mode Run Options, Cycle Count Selected

If the Continuous button is selected, the table will run (once started) until it is manually stopped. There is no time limit to this.

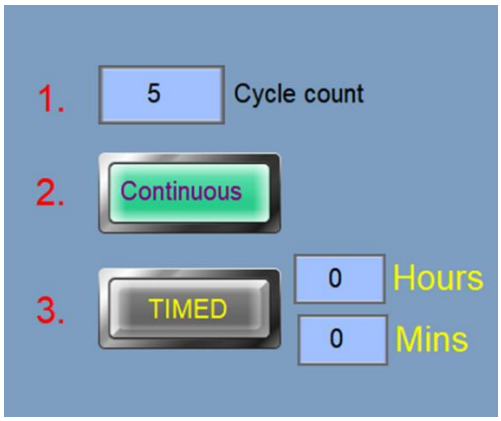


Figure 23 Mode Run Options, Continuous Selected

If the TIMED button is selected, the table will run the number of hours and minutes in set in the entry boxes next to the button.

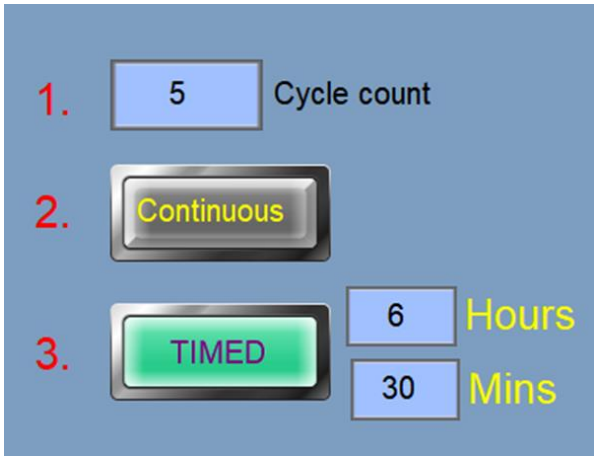


Figure 24 Mode Run Options, Timed Selected

Once all settings are programmed as the operator desires, return to the HOME screen. The HOME screen contains a three position indicator to inform the operator of the current mode operation. To begin the mode operation, press the RUN button (next to the SETUP button).

Main Screen Selected Mode Operation

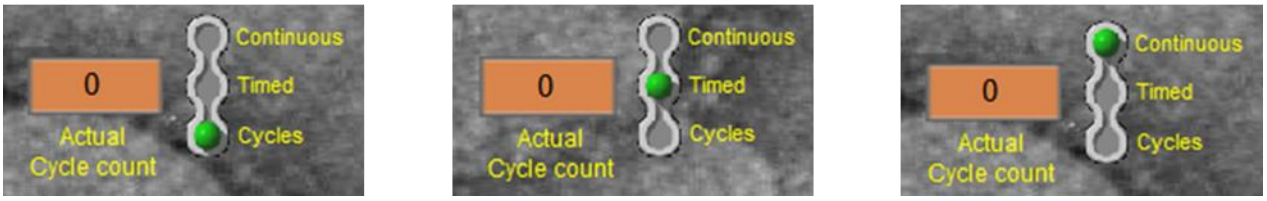


Figure 25 Mode operation indicator

Figure 26 SETUP and RUN buttons for Pulse Mode

The main screen will then indicate that the PULSE mode is ON (running).

Figure 27 Screen Status when Pulse Mode is running

The mode can be paused (stopped) at any time by pressing the button next to the SETUP button. It will indicate the word STOP on it while the mode is running.

If the mode is being run in cycle count or timed mode, the complete indicator will illuminate once the programmed number of cycles are complete, or the run time has complete.

Figure 28 Screen Status when Pulse Mode is complete

Pressing the green STOP button will reset the mode and must be done prior to running another complete cycle.

When running either mode, the red PAUSE button can also be used to stop or pause the mode operation. It is only a software pause button, and can be engaged and released at any time.

Figure 29 ALL Mode Software Stop/Pause Button

When any mode is running, there is a revolution counter, and a run time indicator. This will continuously count every revolution in both directions. This will also indicate how long the motor has been running since the last RESET.

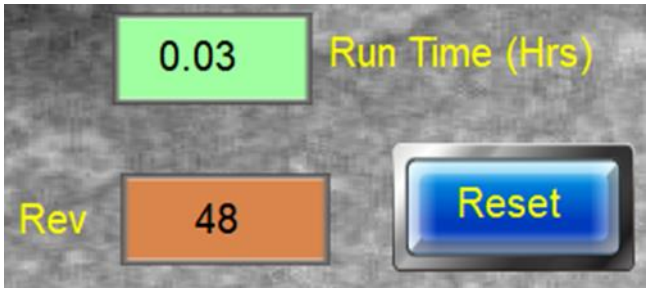


Figure 30 Run Time Indicator, Revolution Counter, RESET Button

The RESET button will reset both indicators to zero any time it is pressed.

Advanced Operation

Each of the two operating modes has an advanced operational function. This is a recipe database capability. This is the ability to capture, store, and recall specific recipes for specific products. All operational parameters are included in this capability.

The previous sections of this manual have discussed the basic operation of the mixing table. Each of the two modes was detailed in the configuration and operation of the mode. This section will highlight the usage of the recipe system to enhance the overall ease of use of the mixing table. The generic operational flow is designed to support the following steps:

1. Selection and configuration of a mode for a specific product formulation. This includes setting of all the operational parameters on the SETUP screen for the selected operational mode. When a specific configuration has been validated, the operator can perform the next step.
2. Now the operational parameters can be captured in the recipe database. They should be given a meaningful name and stored in the database. Each mode has a separate database that can store up to 36 recipes.
3. Subsequent production of that same product can now be simplified with the recall of the saved recipe. If the recipe needs to be adjusted, modifications to the specific recipe can made at any time, even during the running of the mode.

Alternating Mode Recipe Screen

To access the recipe database function for the Alternating Mode, this can be done from the SETUP screen. From the SETUP screen, press the RECIPE button.

Figure 31 RECIPE screen button

This will bring up the recipe database screen. The following operations can be performed with the recipe database:

A. Capture and store the current operational parameters.
B. Recall a stored recipe and set to current operational parameters.
C. Modify, and delete existing recipes.

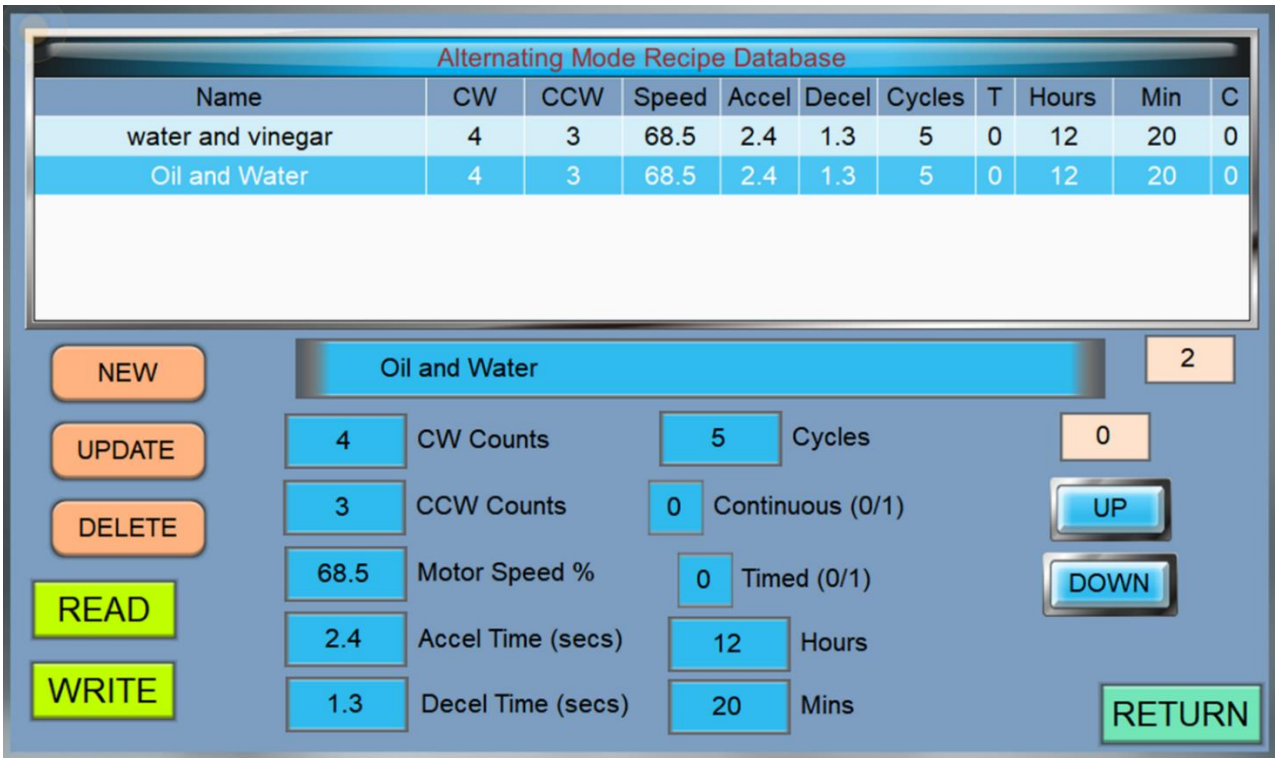


Figure 32 Alternating Mode Recipe Screen

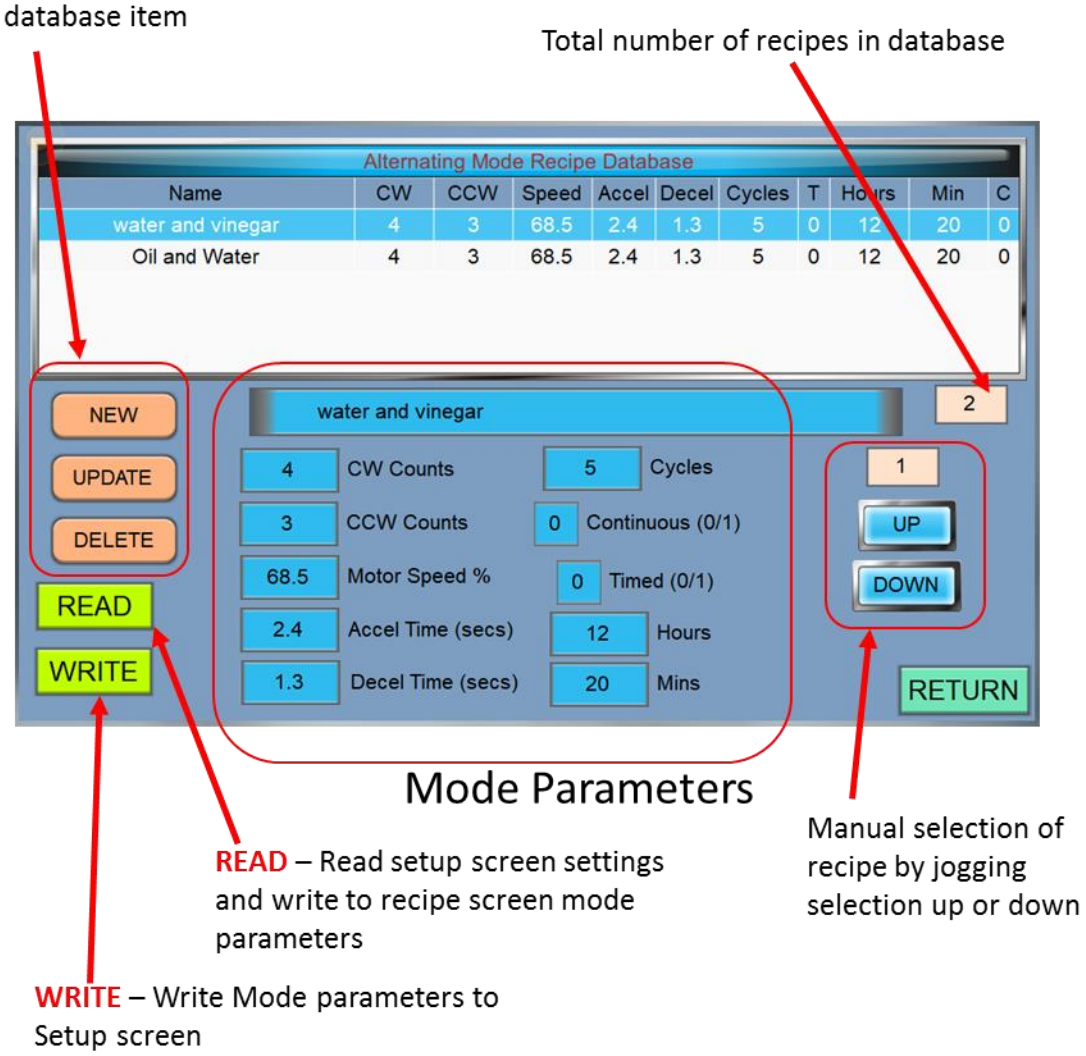


Figure 33 Alternating Mode Recipe Screen Button Functions

To utilize the recipe database during normal operation, the following steps should be followed for capturing and storing a recipe configuration:

1. First, the current operational parameters on the SETUP screen need to be capture to the RECIPE screen. This is accomplished by pressing the READ button. All parameters are then loaded into the mode parameter locations on the RECIPE screen
2. Now, the recipe should be given a meaningful name in the long entry bar.
3. Finally, the NEW button should be pressed. This stores the parameters loaded into the recipe screen with the given name into the recipe database.

The next important function of the RECIPE screen is to recall and load a stored recipe into the current SETUP screen.

1. Scroll through the recipe database and select the desired recipe. This can be done by swiping with your finger to scroll, and then touching the desired recipe to select it. OR, use the UP and DOWN buttons to manually scroll through the recipe database. Once selected those parameters are automatically loaded into the mode parameters on the RECIPE screen.
2. Press the WRITE button to transfer those parameters to the SETUP screen. The table is now ready to run that mode in the normal way from the HOME screen.

Finally, the RECIPE screen also provides the ability to modify existing recipes, and also delete recipes from the database.

A. To modify an existing recipe: Select the recipe, and then edit the individual mode parameters. Then press the UPDATE button to save the existing recipe with modifications
B. To delete an existing recipe: Select the recipe. Press the DELETE button.

Pulse Mode Recipe Screen

The usage and manipulation of the PULSE Mode Recipe Database is identical. The only difference is the 2 mode parameters that are different. Saving, Recalling, Modifying are all the same. Accessing the Pulse Mode Recipe screen is achieved by pressing the RECIPE button on the Pulse Mode SETUP screen.

Both recipe databases store up to 36 recipes.

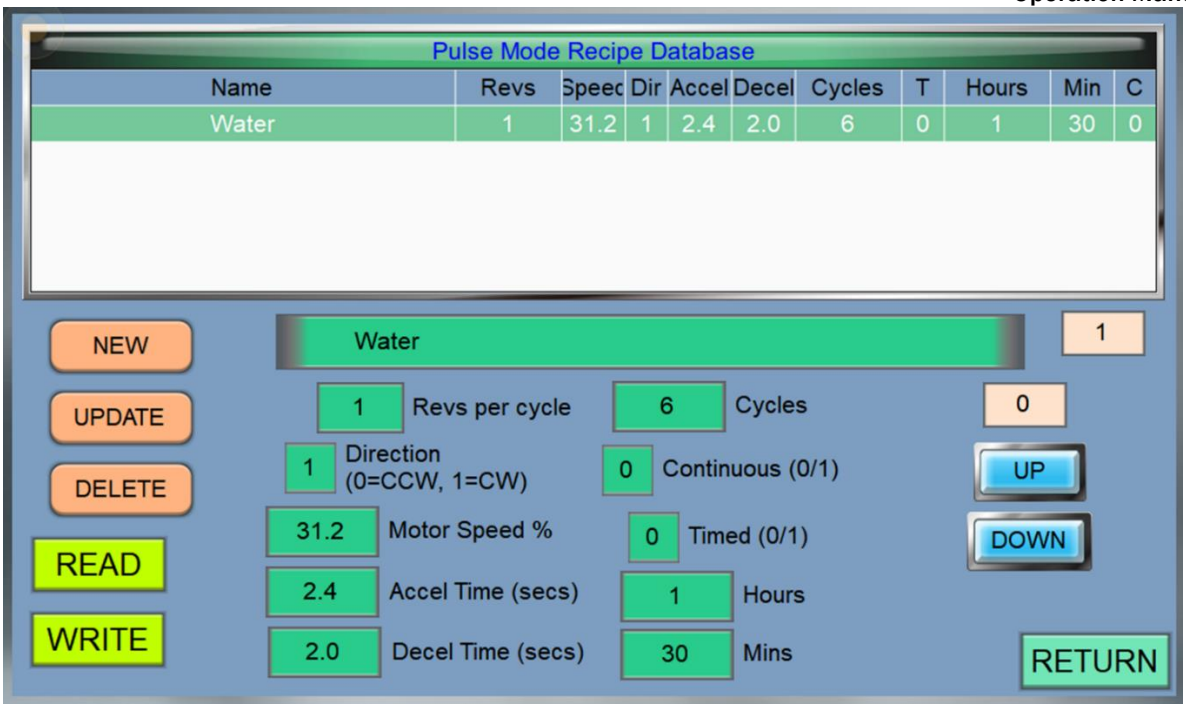


Figure 34 Pulse Mode Recipe Screen

Recipe database actions

NEW – write mode parameters to a new database entry with selected name

UPDATE – write mode parameters to current selected database item

DELETE – delete currently selected database item

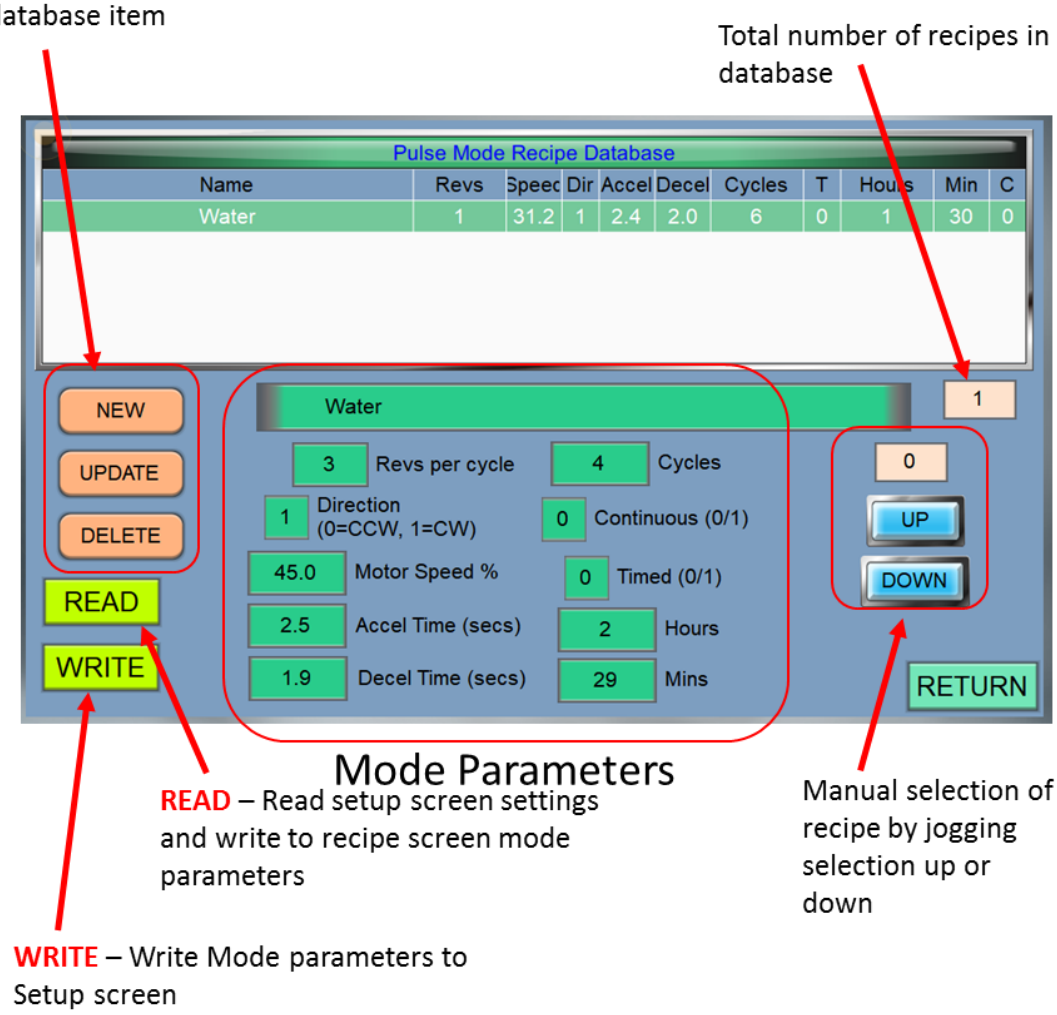


Figure 35 Pulse Mode Recipe Screen Button Functions

Maintenance Screen

From the HOME screen the maintenance screen can be accessed. This is to be used only by qualified personnel to check/monitor motor operation. To access the maintenance screen, press the MAINT button.

Figure 36 Maintenance Screen Button

The HMI will ask for verification that you really want to access this screen.

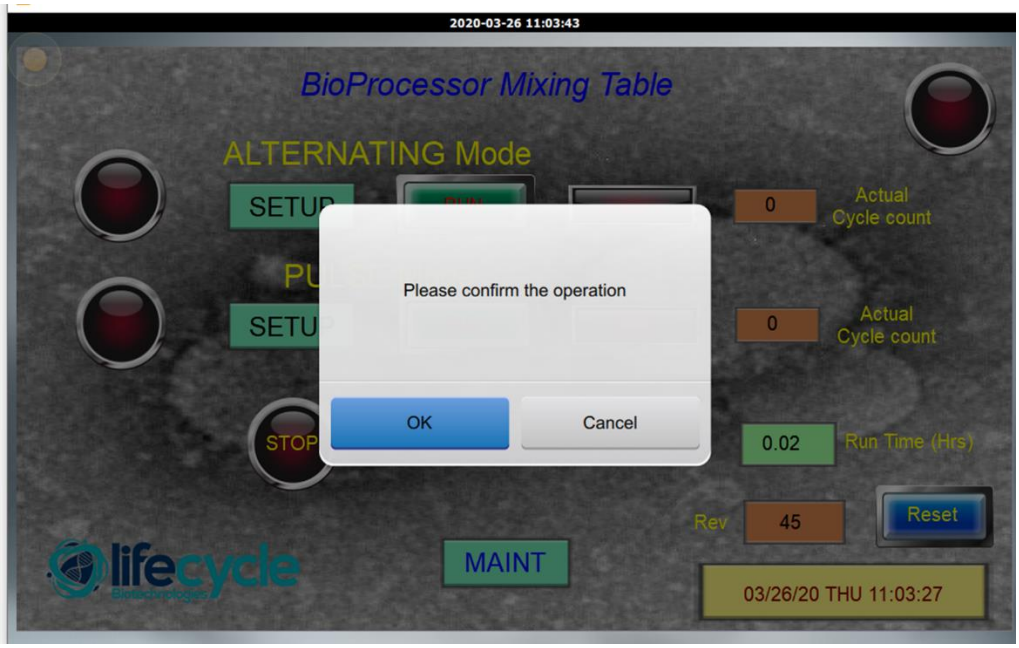


Figure 37 Confirmation Screen for Maintenance screen access

From the Maintenance screen the motor can be manually controlled. This also includes the ability to low speed JOG the motor in either direction. It also provides real time status of the motor status indicators and also specific motor operational parameters.

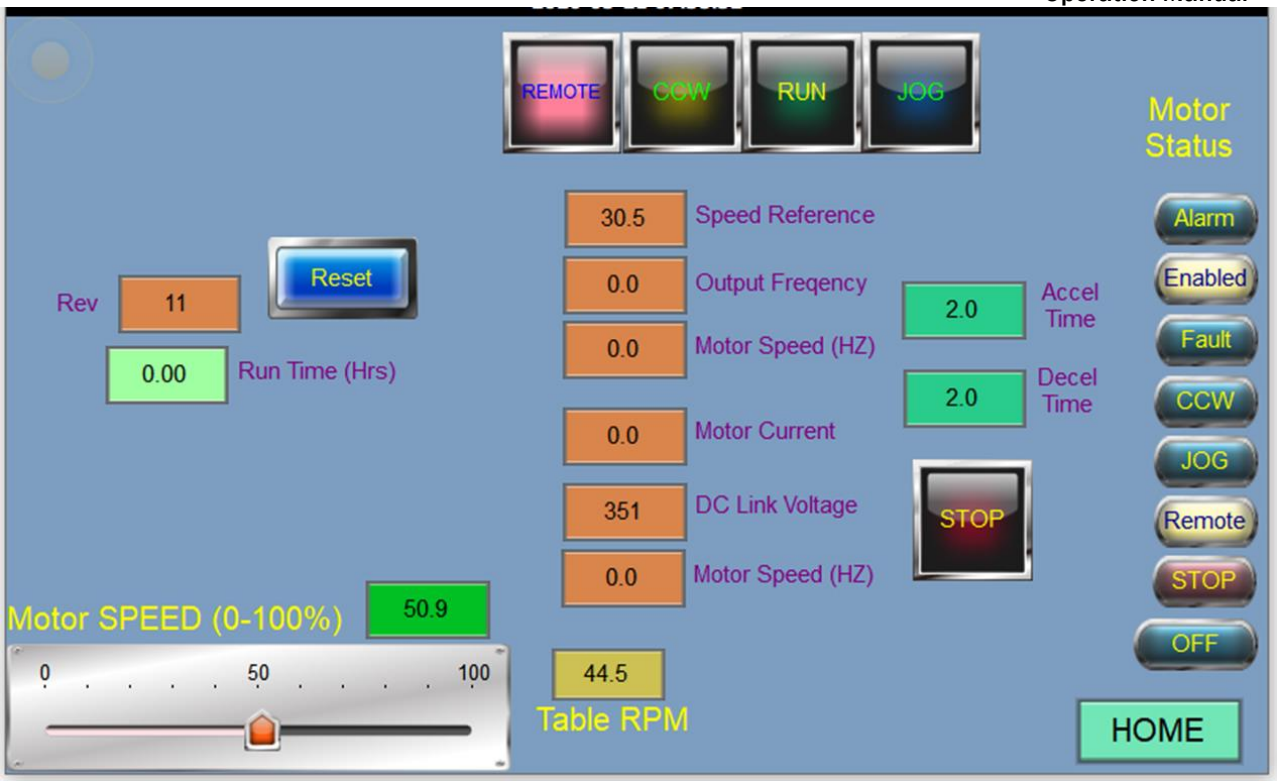


Figure 38 Maintenance Screen

Setting HMI Time and Date

To Adjust the HMI system time, the following steps should be taken:

1. Press the system menu button
2. Select the lock symbol
3. Enter the password: “111111”
4. Adjust the time
5. Save the changes

Maintenance

The following are the maintenance items associated with this table

1. Periodically test the manual power switch and E-Stop switch.
2. Periodically inspect all cables for any nicks, cuts, or excessive wear.
3. Periodically check the gear box oil level. The site glass is located on the side opposite of the motor attachment side. If oil is low, add Mobile 1 synthetic 75W-90 oil by removing the vent plug on the top of the gear box.