Aceptec™ Ltd.

Technologies for improved animal wellness

The **NOVA® SMART** System

USER MANUAL

JULY 2021

Aceptec™ Ltd.
NOVA® SMART SYSTEM

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1. Overview

The NOVA® SMART control system is capable of mixing both pre-milking and post-milking hygiene products for use on dairy farms. Each product is stored in a reservoir. When a float switch inside one of these reservoirs detects a low level for any of these products, the controller will top up the corresponding reservoir by mixing the respective product following the pre-programmed recipe.

The system mixes the following individual products:

- NOVA® Prep (water, activator, base, foam)
- NOVA® Post (water, activator, base, color, emollient)

When mixing the NOVA® Post product, the Emollient Tank is utilized to pre-mix the NOVA® BLUE Emollient and NOVA® SOFT emollient additives. Both tanks are drained simultaneously into a static mixer to ensure optimal blending of the components.

At the end of each batch, a rinse cycle containing water ensures that any remaining chemicals are flushed out of the system.

2. Hardware

The NOVA® SMART Blending System consists of three mixing vessels.

1. The chlorine dioxide activation chamber
2. The chlorine dioxide / water mixing vessel
3. The emollient mixing vessel

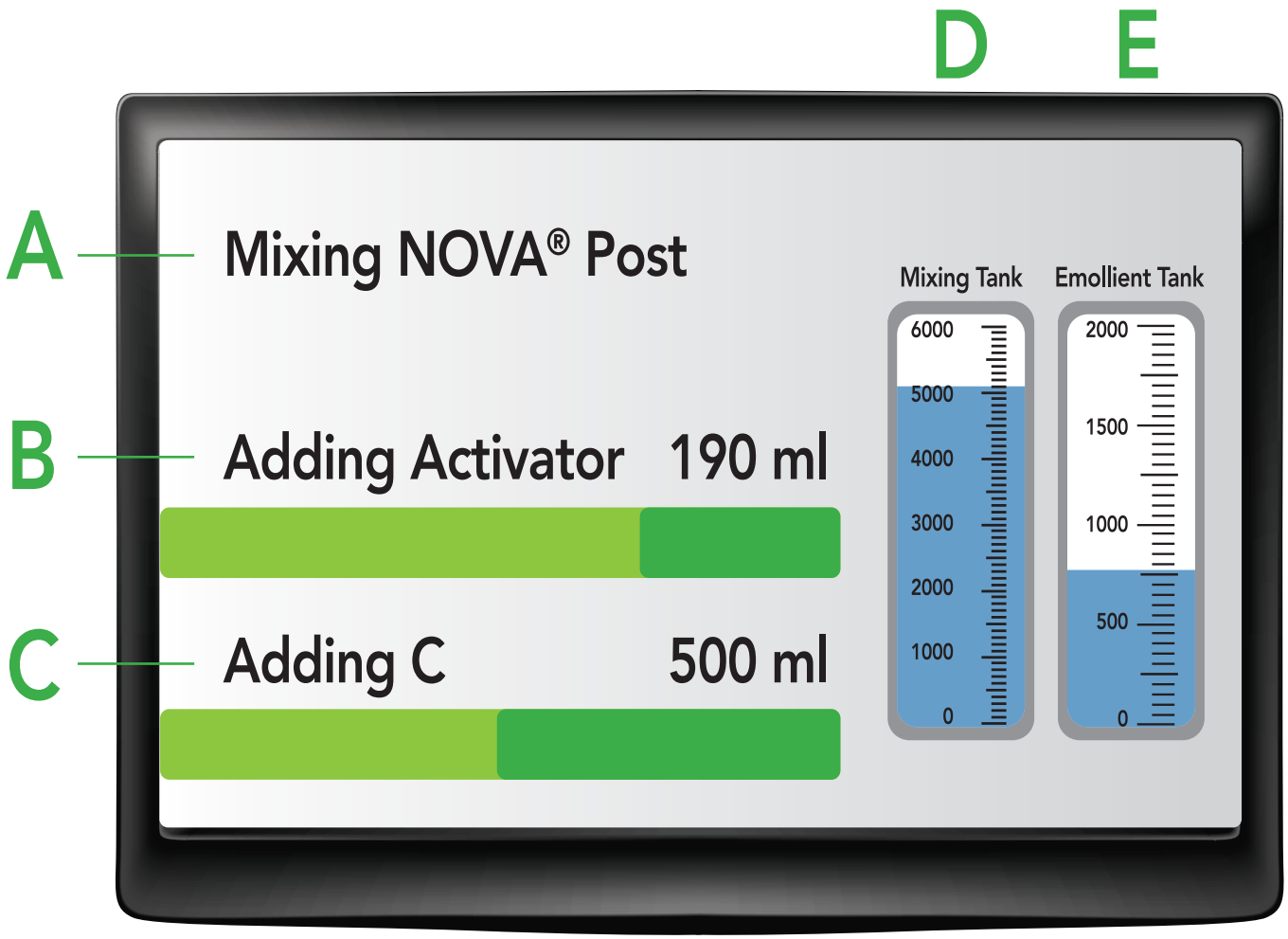
The larger vessel on the left side is used to mix water with the activated chlorine dioxide. The smaller Emollient Tank mixes color and emollient additives used for the NOVA® Post product only. Each mixing tank is equipped with a fill level sensor to accurately measure the fill level.

The control system is capable of operating water fill valves supplying the mixing tanks with water and drain valves to empty the tanks into the storage containers. In addition, the controller is capable of accurately releasing small amounts of additives into the tanks using peristaltic pumps.

3. Software

3.1 Automatic Operation

During normal operation, the main screen is displayed as shown in this example:



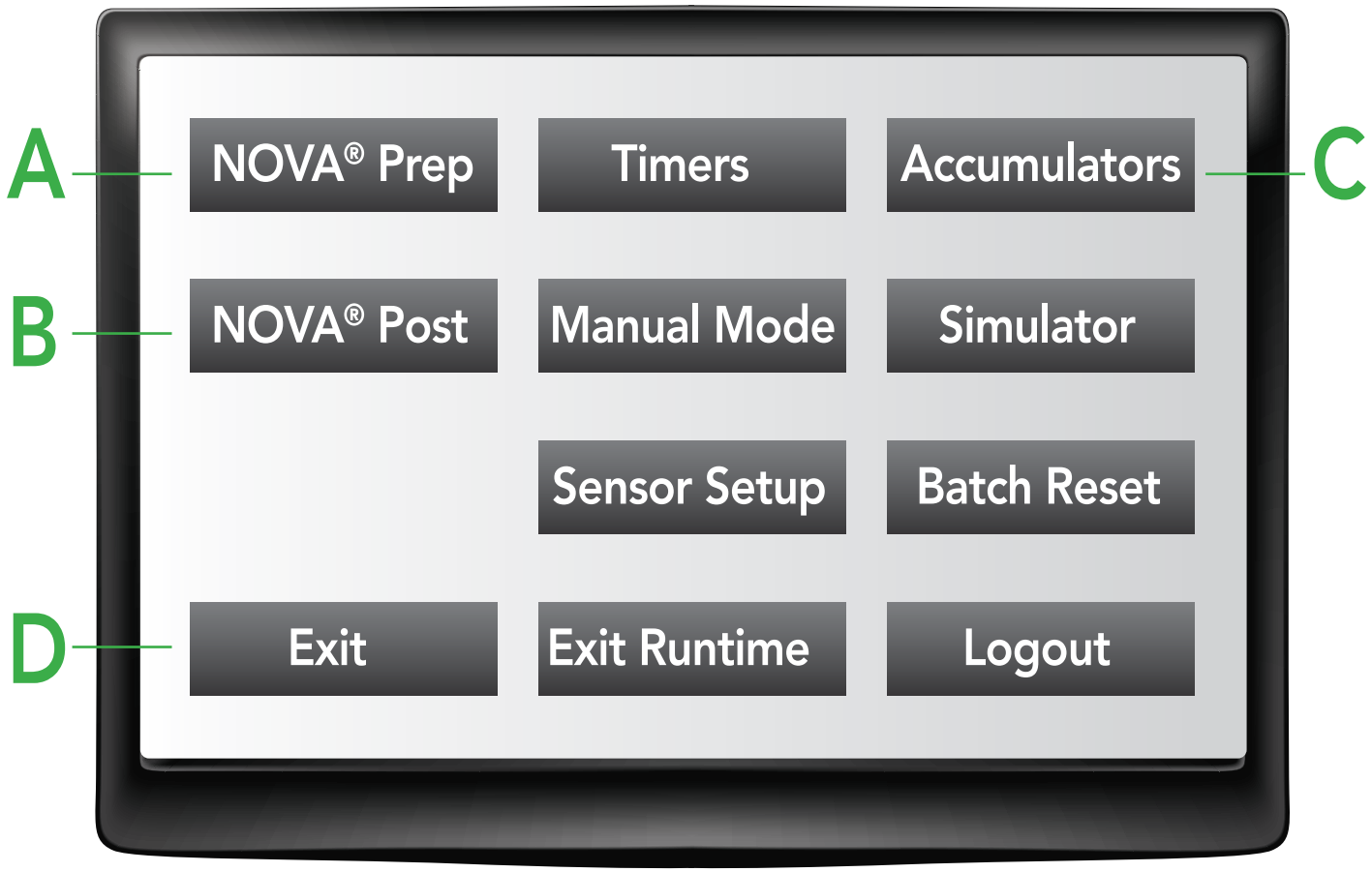
The main screen displays the current mixing process:

A. The name of the product currently being mixed
B. The component being added to the Mixing Tank
C. The component being added to the Emollient Tank
D. The fill level of the Mixing Tank (maximum 6000 ml)
E. The fill level of the Emollient Tank (maximum 2000 ml)

When the system is powered up, it will automatically resume normal operation. If the controller is powered for the very first time or every time the controller has been manually reset, the screen will prompt the operator to press a button in order to resume automatic operation. Press any soft-touch button (F1 - F4) below the touch screen to resume operation.

3.2 System configuration screen

Pressing the touch screen at any time during normal operation will allow access to the system setup screen (password protected).



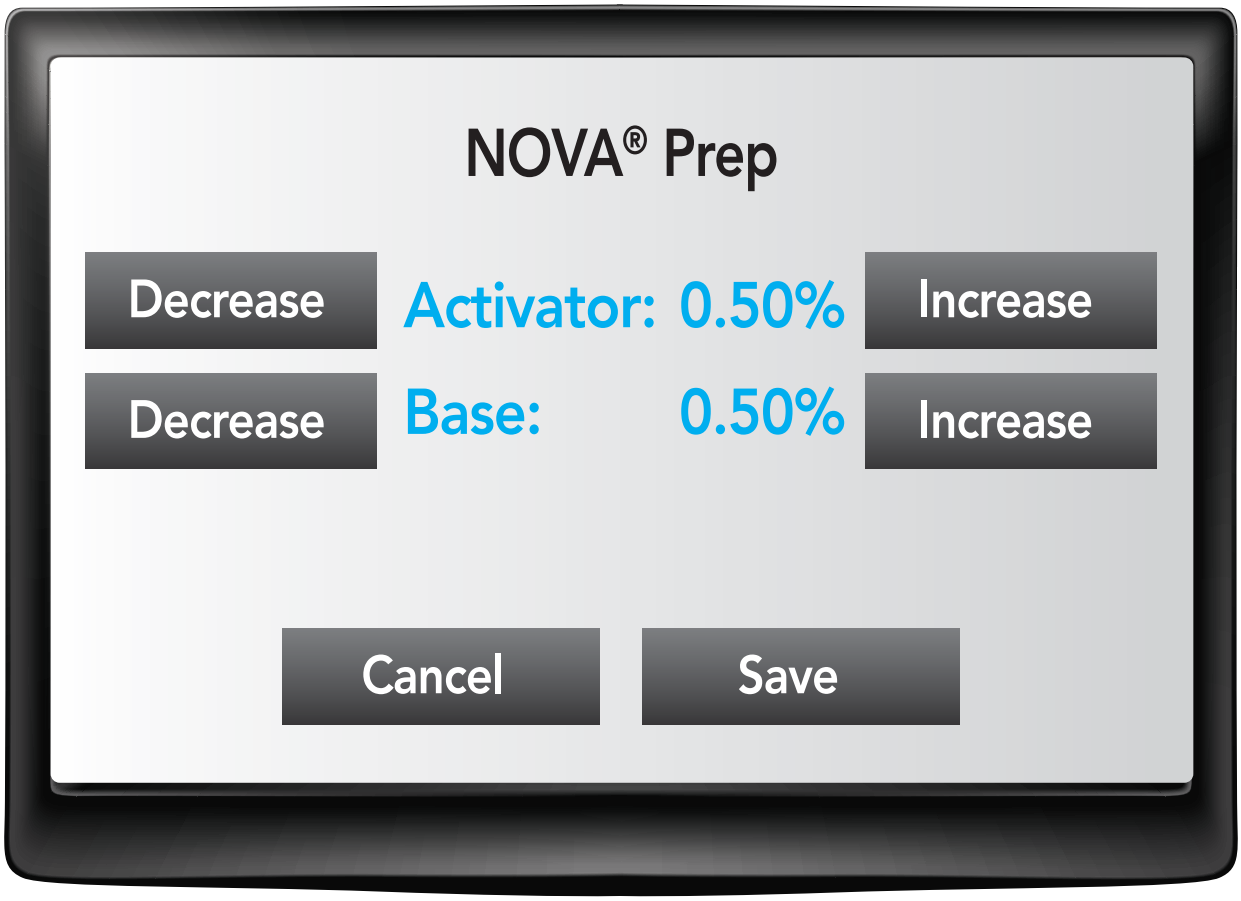
This screen allows access to several menu options listed below:

A. Configure the **NOVA® Prep** recipe
B. Configure the **NOVA® Post** recipe
C. View product statistics **(Accumulators)**
D. Return to main screen **(Exit)**

All other functions are reserved for troubleshooting purposes (see chapter 4).

3.3 NOVA® Prep Setup screen

This screen allows the user to modify the amount of Activator and Base additives used to mix the NOVA Prep product. By default, the concentration of each additive is 0.5%. Each batch of NOVA® Prep measures exactly 10 liters. A concentration of 0.5% amounts to 50 ml of additive in the mixing process.



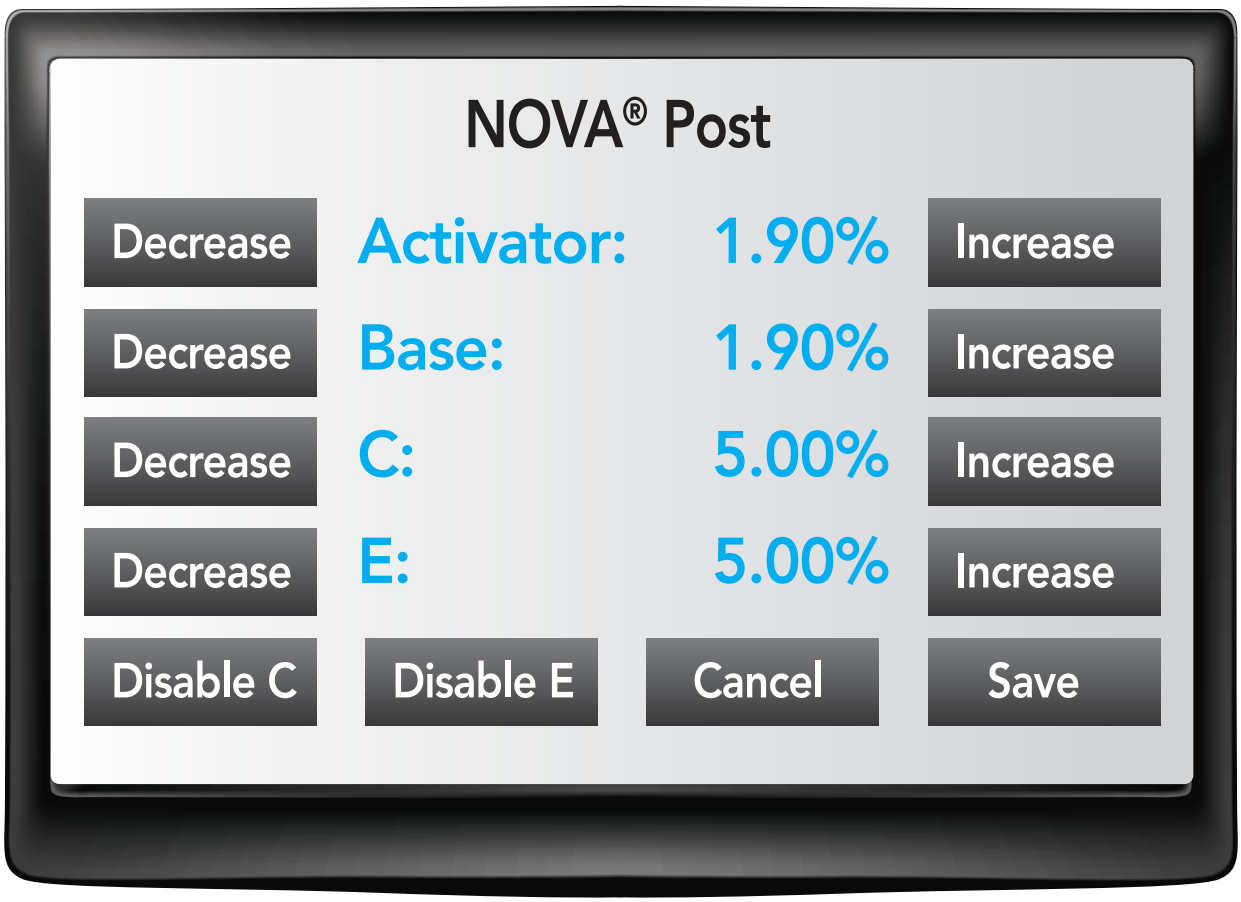
Pressing the Increase or Decrease button will change the amount in steps of 0.05%. The minimum amount is 0%, the maximum is 1%.

Pressing the Save button will apply the changes to the controller. If a batch of NOVA® Prep is already started when the change is applied, the controller will complete the current batch using the old recipe before applying the new recipe to any subsequent batches.

Pressing the Cancel button will return to the previous screen without applying the changes to the recipe.

3.4 NOVA® Post Setup screen

This screen allows the user to modify the amount of Activator, Base, Color and Emollient additives used to mix the NOVA® Post product. By default, the concentration of Activator and Base additives is 1.9%. The default for Color and Emollient additive is 5.0%. Each batch of NOVA® Prep measures exactly 10 liters. A concentration of 1.9% amounts to 190 ml of additive in the mixing process.



For Activator and Base additive, pressing the Increase or Decrease button will change the amount in steps of 0.05%. The minimum amount is 0%, the maximum is 10%.

For Color and Emollient additive, pressing the Increase or Decrease button will change the amount in steps of 0.1%. The minimum amount is 0%, the maximum is 10%.

Pressing the Disable C button will prevent any Color additive from being added to the NOVA® Post product. To re-enable the Color additive, press the Enable C button.

Pressing the Disable E button will prevent any Emollient additive from being added to the NOVA® Post product. To re-enable the Emollient additive, press the Enable E button.

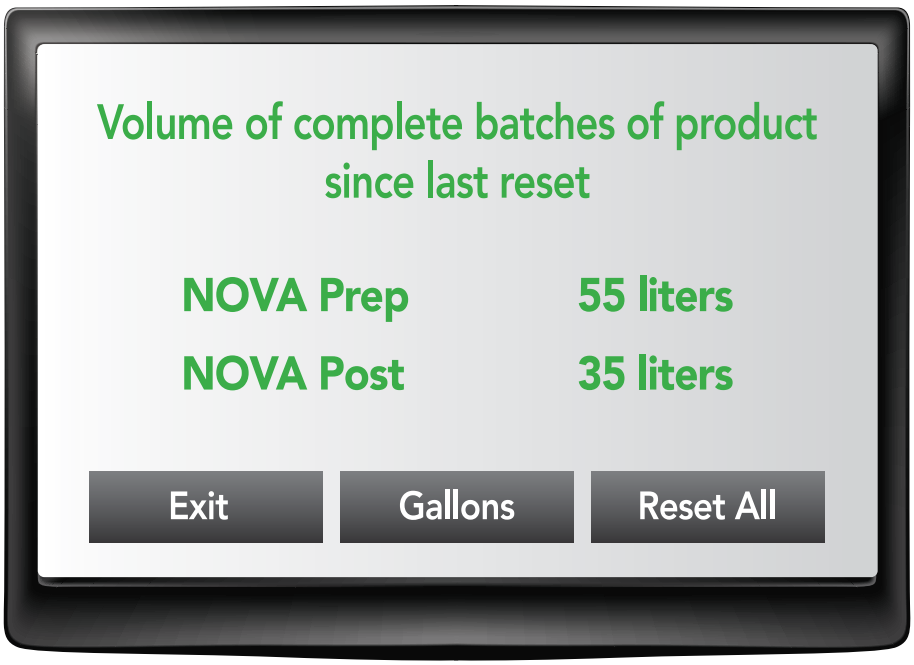
Pressing the Save button will apply the changes to the controller. If a batch of NOVA® Prep is already started when the change is applied, the controller will complete the current batch using the old recipe before applying the new recipe to any subsequent batches.

Pressing the Cancel button will return to the previous screen without applying the changes to the recipe.

3.5 Accumulators screen

This screen displays the total amount of product that has been created using the NOVA® SMART Control system.

Pressing the Gallons button converts the displayed amount from liters to gallons. Pressing the Products button displays the amount broken down into the individual products:



Pressing the Gallons button converts the displayed amounts from liters to gallons.
Pressing the Reset All button resets these amounts to zero. Please note that the total overall volume of complete batches on the previous screen will not be reset.

4. Troubleshooting

4.1 Fault Messages

This section lists all possible fault messages that may occur during operation of the NOVA® SMART control system and suggests common causes for these issues.

Mixing Tank Sensor Fault
This message is displayed whenever the control system does not detect an analog voltage signal from the sensor installed on top of the Mixing Tank. The message will automatically clear and system operation will resume as soon as the analog signal is restored. Check the sensor and its cable for damage. Verify that no object is blocking the sensing surface.

Emollient Tank Sensor Fault
This message is displayed whenever the control system does not detect an analog voltage signal from the sensor installed on top of the Emollient Tank. The message will automatically clear and system operation will resume as soon as the analog signal is restored. Check the sensor and its cable for damage. Verify that no object is blocking the sensing surface.

Mixing Tank Leakage Fault
This message is displayed if the fill level inside the Mixing Tank is not stable after filling it with water. This may be caused by leakage on the water fill valve (level rising), leakage on one of the drain valves (level dropping) or excessive surface ripples due to vibration. To reset the fault and continue system operation, press any soft-touch button below the screen.

Water Fault
This message is displayed if the target water level for the Mixing Tank cannot be achieved within a preset amount of time. This may be caused by a water supply shut-off or blockage. Verify that the water supply valve can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "Water Fault".

NOVA® Prep Activator Fault
This message is displayed if the required amount of NOVA® Prep Activator additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the NOVA® Prep Activator supply has run out. Verify that the NOVA® Prep Activator peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "NOVA® Prep Fault".

NOVA® Post Activator Fault
This message is displayed if the required amount of NOVA® Post Activator additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the NOVA® Post Activator supply has run out. Verify that the NOVA® Post Activator peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "NOVA® Post Fault".

Activator Fault
This message is displayed if the required amount of Activator additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the Activator supply has run out. Verify that the Activator peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "Fault."

Base Fault
This message is displayed if the required amount of Base additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the Base additive supply has run out. Verify that the Base peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "Base Fault".

C Emollient Fault
This message is displayed if the required amount of C Emollient additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the C Emollient supply has run out. Verify that the C Emollient peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "C Fault".

E Emollient Fault
This message is displayed if the required amount of E Emollient additive cannot be added to the Mixing Tank within a preset amount of time. This may occur when the E Emollient supply has run out. Verify that the E Emollient peristaltic pump can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "E Fault."

Mixing Tank Drain Fault
This message is displayed if the draining process on the Mixing Tank did not complete within a preset amount of time. This may be caused by a blockage in the draining system or an incorrect fill level reading. Verify that all drain valves on the Mixing Tank can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "Mixing Drain Fault".

Activation Tank Drain Fault
This message is displayed if the draining process on the Emollient Tank did not complete within a preset amount of time. This may be caused by a blockage in the draining system or an incorrect fill level reading. Verify that the drain valve on the Emollient Tank can be operated by the control system (see section "System Actuator Testing"). To reset the fault and continue system operation, press any soft-touch button below the screen. To change the time-out delay preset for this fault, select "Timers" (see section "System Configuration screen") and modify the value for "Emollient Drain Fault".

4.2 System Actuator testing (Manual Mode)

The controller allows the operator to take over control of the system's actuators for commissioning and troubleshooting purposes. Please note that by placing the controller in manual mode, the operator assumes full responsibility for the blending process and any effect this may have on the finished product in the storage containers.

To access Manual Mode, select "Manual Mode" (see section "System Configuration screen"). Enable Manual Mode, press the Activate Manual Mode button. The button will change color to indicate that Manual Mode is active. To cancel Manual Mode, press the button again.

Once Manual Mode is activated, any button on the screen can be pressed to energize or de-energize the corresponding control system output / actuator. Each controller output button will change color to indicate that the corresponding actuator is energized.

When troubleshooting an actuator that fails to activate, confirm the following:

- Each control output is represented by an LED on the PLC. Ensure that the LED turns on when energizing the button on the touch screen.
- Each control output drives a 24V relay coil. Check that the relay is activated (LED lights up) when the output is energized.
- Each relay module contains an individual output fuse inside the relay socket. When a fuse is blown, an indicator light will signal that the fuse must be replaced (see images below).

The following actuators can be controlled in Manual Mode:

Peristaltic Pumps

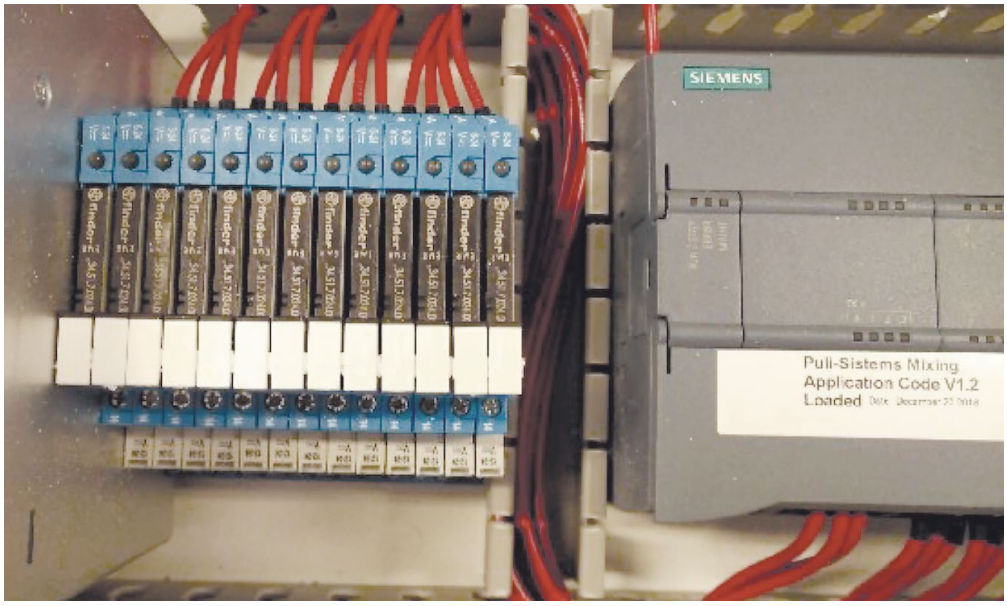
o NOVA Prep Activator Pump	PLC DQa 0.5	Relay # 9
o NOVA Post Activator Pump	PLC DQa 0.6	Relay # 10
o Activator Pump	PLC DQa 0.7	Relay # 11
o Base Additive Pump	PLC DQa 0.4	Relay # 8
o C Emollient Pump	PLC DQb 0.0	Relay # 12
o E Emollient Pump	PLC DQe 0.2	Relay # 3

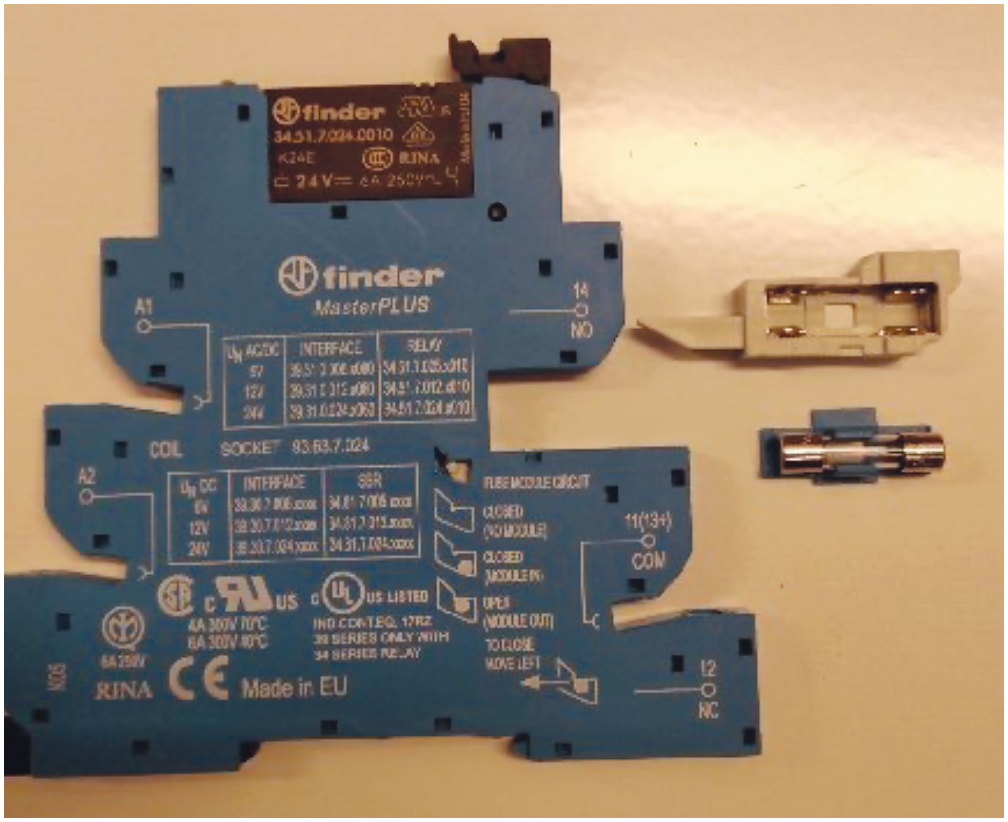
Valves

o Water fill valve (Mixing Tank)	PLC DQa 0.0	Relay # 4
o Water fill valve (Emollient Tank)	PLC DQe 0.1	Relay # 2
o Drain valve (NOVA Prep)	PLC DQa 0.1	Relay # 5
o Drain valve (NOVA Post)	PLC DQa 0.2	Relay # 6
o Drain valve ()	PLC DQa 0.3	Relay # 7
o Drain valve (Emollient)	PLC DQe 0.0	Relay # 1

Alarm

o Alarm output	PLC DQb 0.1	Relay # 13

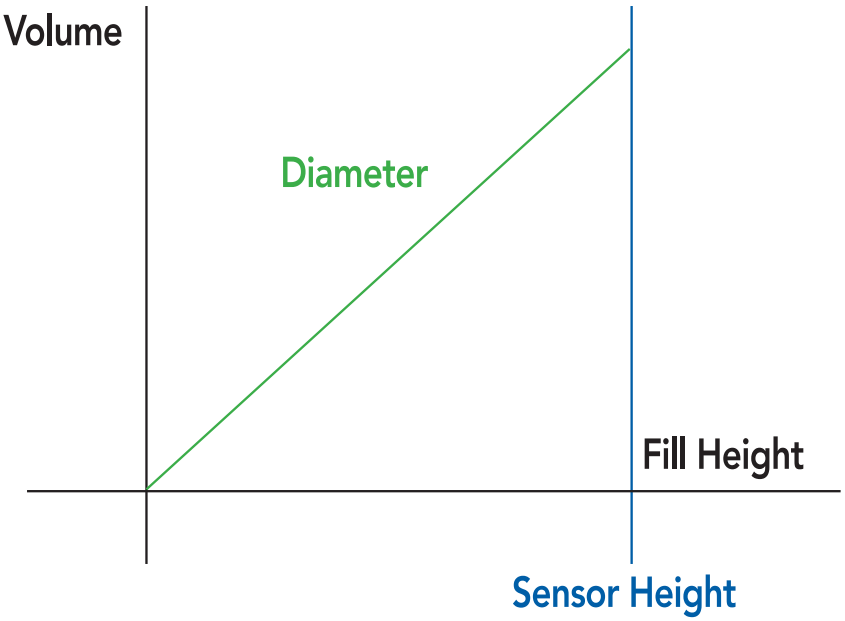


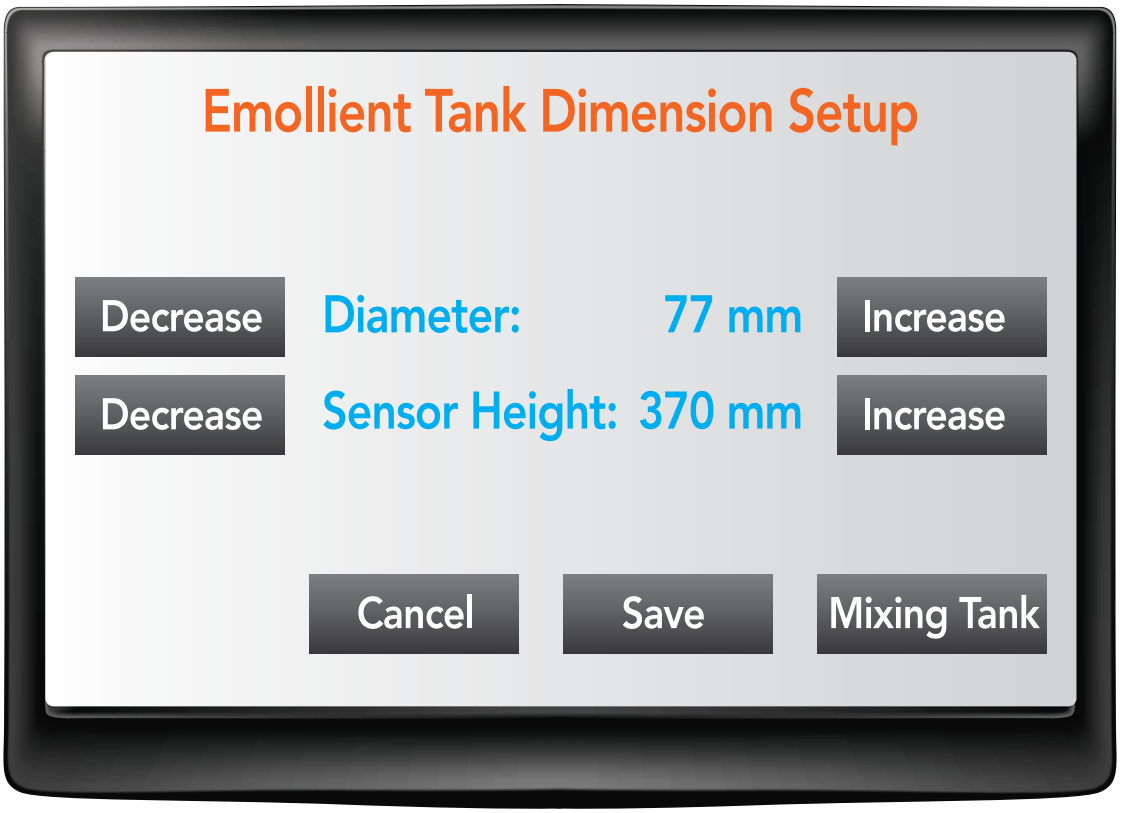


Batch Reset

When using Manual Mode to override normal operation of the system, any batch currently being processed is not canceled automatically. To cancel the current mixing process, press "Batch Reset" on the configuration screen (see section "System Configuration screen") and confirm your decision with "Yes." After each Batch Reset, normal operation is halted until the operator presses any soft-touch button below the screen.

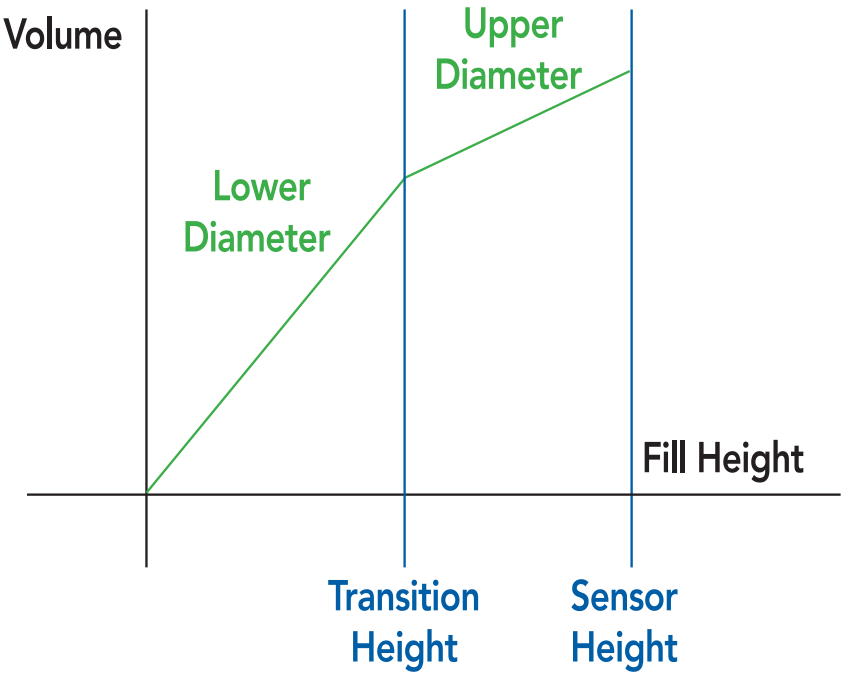
4.3 Sensor setup

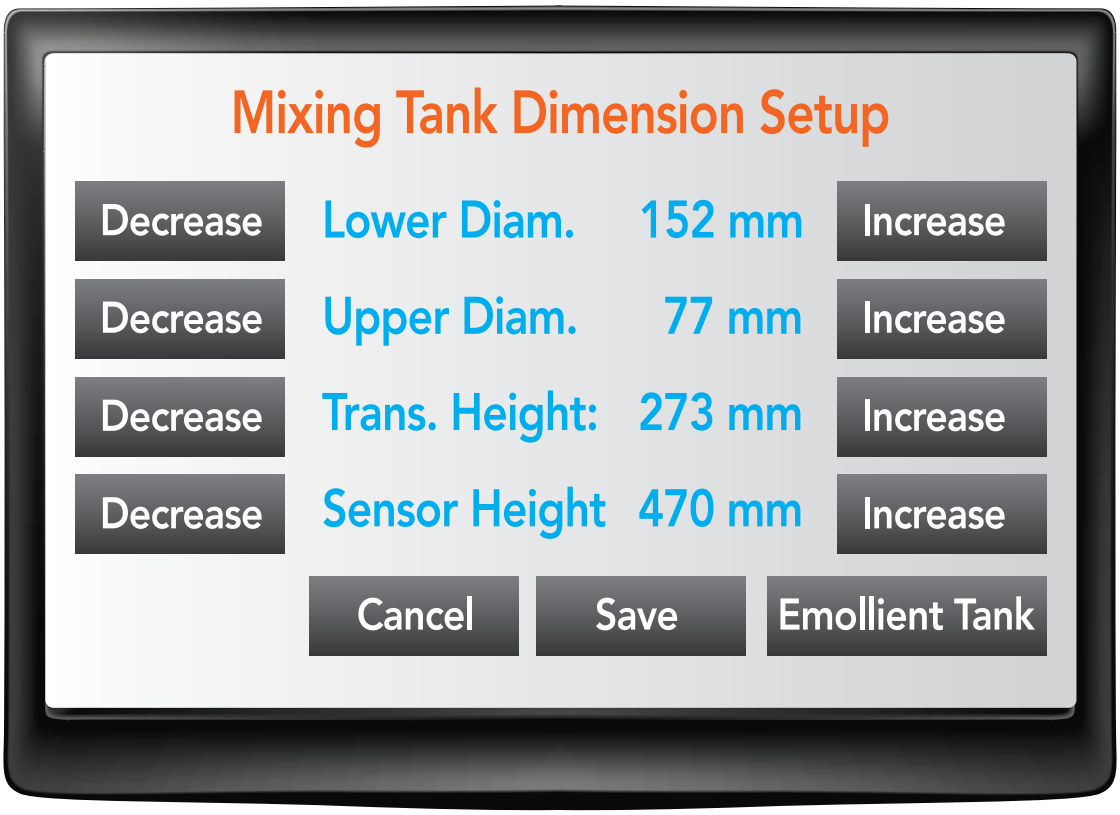




Mixing Tank

This tank has a wide bottom and a narrow top diameter. There is a total of four parameters that can be configured in the software:

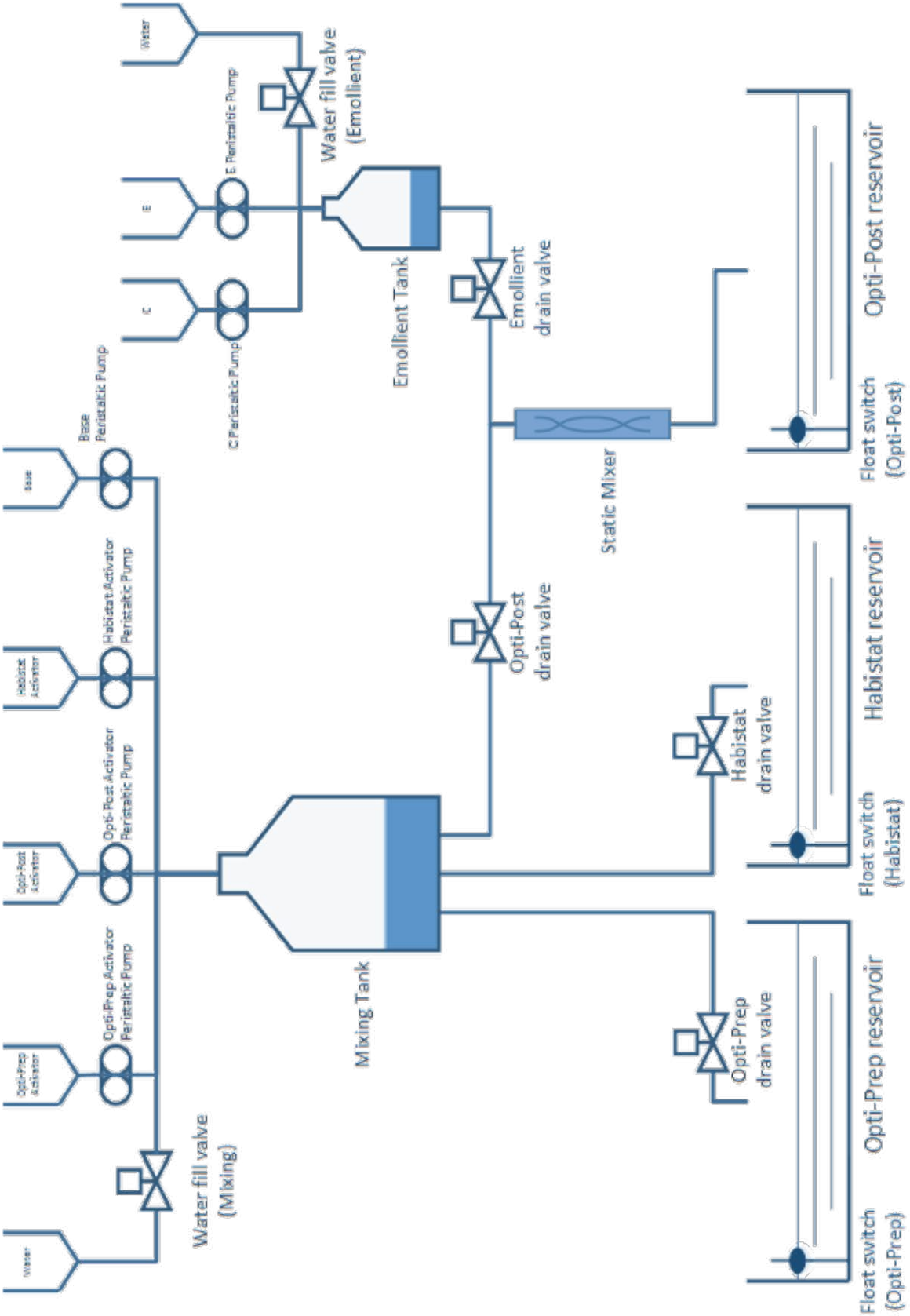




If the volume measurement is not accurate, check the following:

- Ensure that the parameters in the software match the actual tank dimensions (factory presets shown above).
- Ensure that the sensor is installed at the correct height matching the value in the software.
- Ensure that no objects are blocking the sensor from detecting the liquid in the tank. Any objects protruding into the detection area can cause a change in the measured distance value.
- Check the wiring of the sensor.

5 Appendix
System Diagram

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HYGIENE BLENDING SYSTEM

NOVA® SMART SYSTEM INSTALLATION INSTRUCTIONS

1. Mount the NOVA® SMART Blending Control Panel (Left) in a clean dry location.
2. The NOVA® SMART Hygiene Blending System (Right) needs to be within 2 ft of the NS Control Panel.
   a. The NOVA SMART Hygiene Blending System must gravity drain into RTU containers.
   b. The NOVA SMART Hygiene Blending System needs to be installed 1 ft minimum above height of RTU container.
3. Supply Air – 90 psi ¼" tubing to the NOVA SMART Hygiene Blending System.
4. Supply soft (<5 grains), potable water 3/8" OD tubing to the NOVA® SMART Hygiene Blending System.
5. Supply 110 v power outlet to the NOVA® SMART Hygiene Blending System.
6. Install suction tubes for:
   a. NOVA® ACTIV
   b. NOVA® BASE
   c. NOVA® BLUE
   d. NOVA® SOFT
   e. NOVA® FOAM
7. Install float assemblies in RTU Containers.
8. Attach the wires from the level switches to the control panel. The terminals are labeled according to wire color.
9. Level Sensor wire colors: Black – Common / Yellow – Working level / Blue – High level / Red – Low level
10. Attach the RTU pre- and post- dip drain hoses from the blending system to the float assembly lid
11. The lid also has a suction tube attachment to attach to the pumping systems for the parlor. No need to drill any additional holes.

Start up

1. Turn the switch below the cabinet to the left – this turns off the level sensors
2. Turn on NOVA SMART Blending Control Panel
   a. To program formulations
      i. Enter password 1847
      ii. Go to Pre-Dip
         1. Enter the desired levels of NOVA® ACTIV and NOVA® BASE
         2. If NOVA® BLUE / SOFT or FOAM is desired enable the function for each product and set the desired levels.
         3. Press Save
      iii. Repeat the same steps for the Post Dip settings.

   b. Turn the switch below the cabinet to the far right– this will turn off the low and high alarm function, during initial fill.
      i. When you do this it will trigger an low level alarm
      ii. Press any button on the touch screen to reset
         1. After reset the alarm is disabled for 1 hour

   c. System will start to make RTU product.
      i. After both RTU drums have reached the desired level
         1. Turn the switch below the cabinet to the middle RUN position.
         2. Now all level sensors are active including the high and low alarm
         3. Verify PPM and ORP of NOVA PREP and NOVA POST products

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For more information, call Aceptec™ or your local representative.

ACEPTEC™, LLC is an animal health based company that is focused on the development of state-of-the-art animal hygiene technologies. Our Company's mission is to apply innovative animal hygiene technologies into the agricultural and veterinary market sectors. **Visit us at www.acepsis.com.**

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