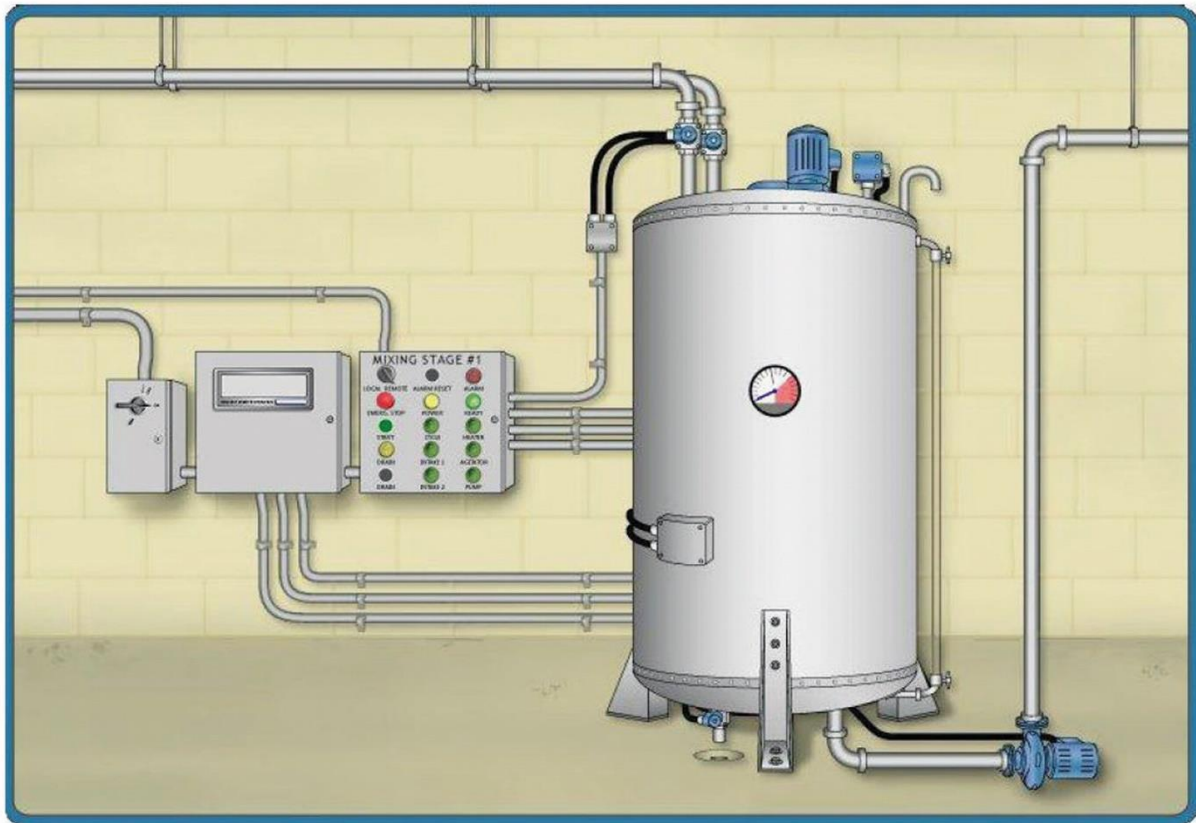


# Fluid Processing System FPS 3000

## System Operation Manual



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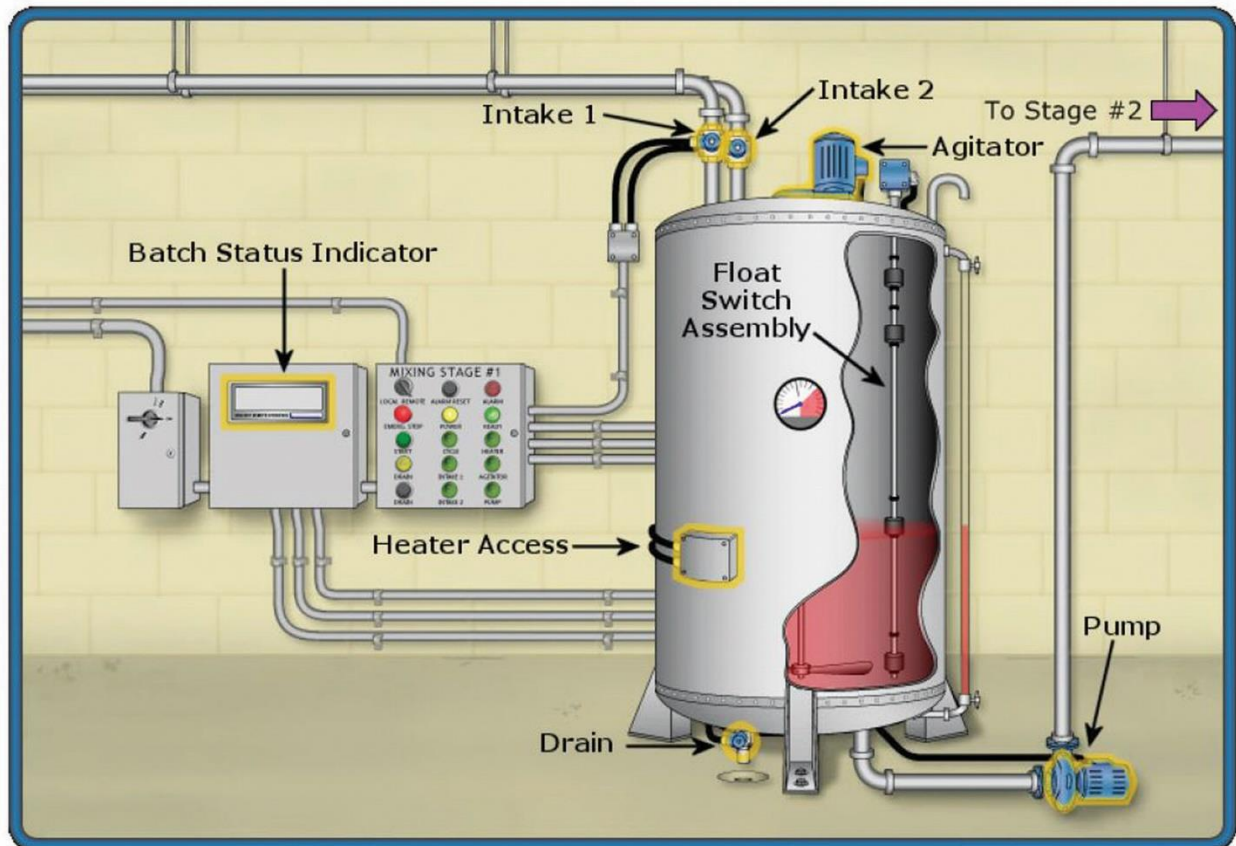
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## Fluid Processing System - FPS 3000

The FPS 3000 Simulator is designed simulate a process of mixing and heating of two different fluids, and then pumping this mixture onto the next stage for additional processing.

Systems similar to this simulation may be found anywhere the mixing of two fluids is required. It is well suited to certain chemical processes, as well as production lines in the food industry.



## The Process

### Input

When the system starts, the first of two fluids begins to enter the tank through Intake #1. When the correct volume of fluid #1 has entered the tank, Intake #1 closes and the second fluid will begin entering the tank through Intake #2. When the correct volume of fluid #2 has entered the tank, Intake #2 closes.

Note that the quantity of fluid 1 is 40% of tank volume and fluid 2 is 45%. These amounts are fixed and cannot be adjusted. Changing these settings would require replacing the float assembly with one set to the desired values.

## Processing

Once the tank has the proper liquid levels, the agitator begins mixing the fluids. After 5 to 10 seconds the heater comes on to heat the liquid. The heater and agitator stay on until the liquid temperature reaches 70 °C. At this point the liquid is ready and the agitator and heater will stop.

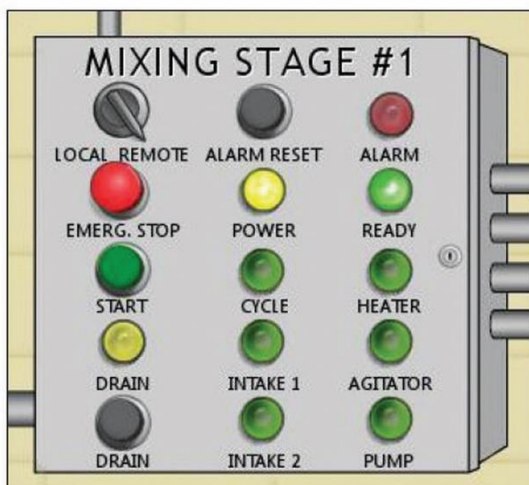
Note that the maximum temperature that the liquid should reach is 70 °C. This set point is fixed and changing it would require replacing the temperature switch with one set to the desired value.

## Output

Once the liquid reaches 70 °C, the liquid must rest for 5 to 10 seconds; afterwards the pump will start and transfer the liquid from the tank to the next processing stage (Stage 2). Once Stage 2 is ready for a new batch, it will send a remote start signal to the control to begin a new batch.

When Stage 2 receives a batch, it is tested for quality. If the batch does not pass the quality check it is sent to the reclaiming unit. Also, if the batch does not reach Stage 2 within a certain time, it can still be used but production targets will be missed. Notification of the result is sent to the Batch Status Indicator.

## Control Panel



### Control Panel Indicators:

- Power On
- Ready
- Cycle On
- Heater On
- Agitator On
- Pump On
- Intake 1 Open
- Intake 2 Open
- Drain Open
- Alarm – indicates either a high level alarm or a high temperature alarm.

### Operator Controls:

- Local / Remote – Selects Local or Remote system operation
- Emergency Stop – Stops the system when in either Local or Remote
- Start – Starts the system when operation is Local
- Drain – Drains the tank when in either Local or Remote
- Alarm Reset – Resets the alarm warning light

## Tank Indicators

There are two tank indicators.

- Temperature gauge on tank. This monitors the temperature of the contents of the tank.
- Sight gauge on side of tank showing the level of liquid.

## Batch Status Indicator

This device monitors and displays status of each batch received by Stage 2 when in Remote Operation. There are five possible results, and the display shows the result of the previous four batches.

- Passed: meets quality control specifications
- Failed: does not meet quality control specifications
- Incomplete: received only a partial batch
- Delayed: received a batch but not within the allowed time
- Timed Out: batch was requested but no batch received

This device also has a control to allow a request to be sent to the system operator for a Remote Operation.



Batch Status Indicator

## System Operation

The control system processes one batch at a time. The system can be started either locally or remotely and will proceed through one cycle. It must receive a start signal to begin another cycle. The following describes the process through one cycle.

### Automatic Operation

Initially:

- Power indicator indicates power is on
- Ready light indicates system is ready

- Control Switch set to Remote

When Control receives a remote start signal:

- Cycle indicator comes on
- Ready indicator goes off
- Intake 1 opens
- Intake 1 indicator comes on
- Tank liquid level increases
- Float Switch 1 closes

When level in tank reaches 40% (approx. 10 seconds):

- Float Switch 2 operates
- Intake 1 closes
- Intake 1 indicator goes off
- Intake 2 opens
- Intake 2 indicator comes on

When level in tank reaches 85% (approx. 10 seconds):

- Float Switch 3 operates
- Intake 2 closes
- Intake 2 indicator goes off
- Agitator Motor starts
- Agitator indicator comes on

After a 5 to 10 second delay:

- Heater is energized
- Heater indicator comes on
- Liquid temperature begins to rise

Once liquid reaches a temperature of (70 °C) (approx. 20 seconds):

- Heater turns off
- Heater indicator goes off
- Agitator turns off
- Agitator indicator goes off

After a 5 to 10 second delay:

- Discharge Pump starts
- Pump indicator comes on
- Liquid level decreases

When liquid level reaches 0 %:

- Float Switch 1 operates
- Discharge Pump stops
- Pump indicator goes off
- System stops
- Ready light goes on

When the control receives another remote start signal, the process will repeat.

## Manual Operation

The system can also be manually operated.

- Set the control switch to Local. This also prevents the control from responding to the remote start signal and the batch results are not sent to the Batch Status Indicator.
- The Ready light must be on.
- To start the system, press the Start pushbutton.
- The same sequence of events will occur as the automatic operation.

## Draining the System

If there is a malfunction in the system or it is stopped part way through the cycle, the tank must be drained before it can be operated again.

- The tank can be only drained while the Cycle light is not lit and Power light is on.
- Press the Drain pushbutton.
- If there is fluid in the tank and the cycle is not running then the drain solenoid will be energized.
- Drain solenoid will close when the tank is empty.

Note that when the tank is drained, the mixture is sent to be reclaimed.

## Emergency Stop and Alarms

The system can be shut down at any time by pressing the Emergency Stop button. This works in both Remote and Local control switch settings.

The system has two alarms conditions:

- If liquid level reaches 95% then the system shuts down and the Alarm light comes on.
- If temperature exceeds 90 °C then the system shuts down and the Alarm light comes on.

The process can not be started while in the alarm condition. When the condition causing the alarm has cleared, the alarm can be reset by pressing the Alarm Reset button on the control panel.

Note: The tank is also equipped with a safety check valve in the breather which prevents tank overflows.

## Operational Parameters

- It is important that the fluids be mixed correctly. The next stage (Stage 2), that receives the finished batch, will detect any substandard mixtures and stop operations. Any batch that does not pass quality control will be reclaimed. The Batch Status Indicator (located on the power panel) shows the status of the previous four batches. The specifications of a proper batch are:

- Liquids must be in the proper proportion: 40% from Intake 1, 45% from Intake 2.
- Liquid mixture must be agitated for 5 to 10 seconds before being heated.
- The mixture must then be heated to 70 °C.
- The mixture must rest for 5 to 10 seconds before being pumped to the next stage.
- The entire process must take less than 75 seconds.
- Once the tank begins to fill, if the process is stopped before completing the cycle, the tank contents must be drained before the process can be restarted.
- When tank contents are drained they are sent to the reclaiming unit.
- Heaters are designed to be immersed in liquid when operating. If these elements are operated for a significant amount of time without being submersed, they will overheat and burn out.