Biojenik Engineering

Towards Bio engineering Technology & Solutions

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HMI

Operator Manual

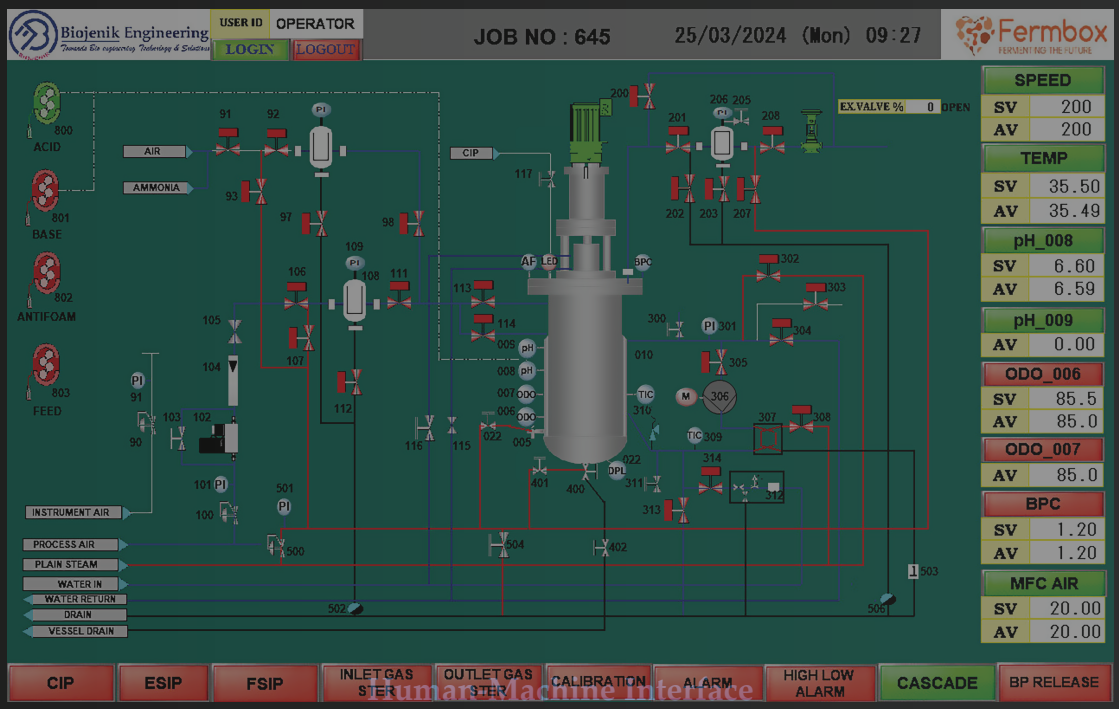

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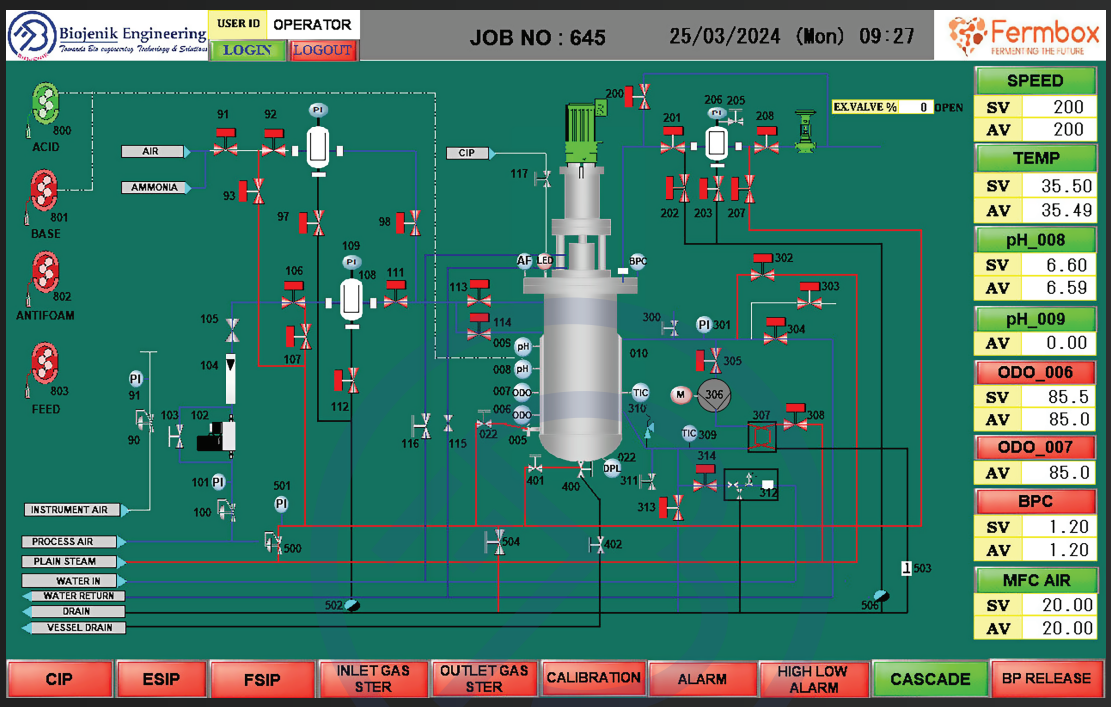
Table of Contents

1. Main Screen

The Main Screen serves as the central navigation hub for controlling various fermentation parameters. It provides access to all key components.

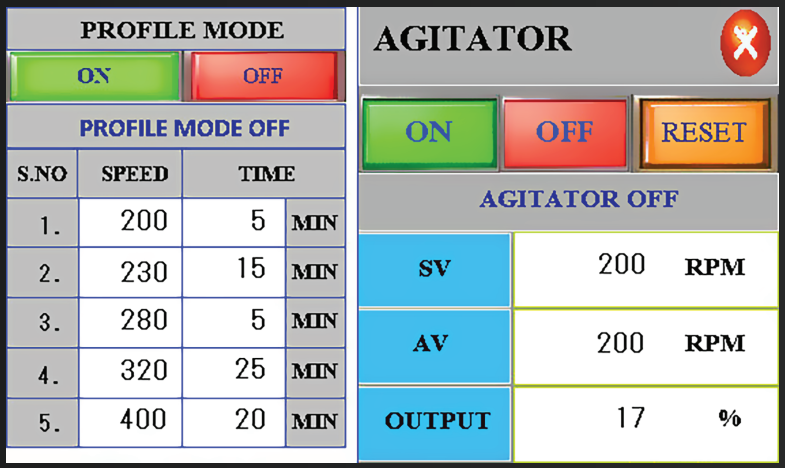
Navigation: Click on the respective buttons to navigate to the desired control section.

Display: The screen displays real-time information on key parameters.



2. Agitator (Speed Range: 50–1000 rpm)

Click on the **Speed** Button located on the Desktop home screen.



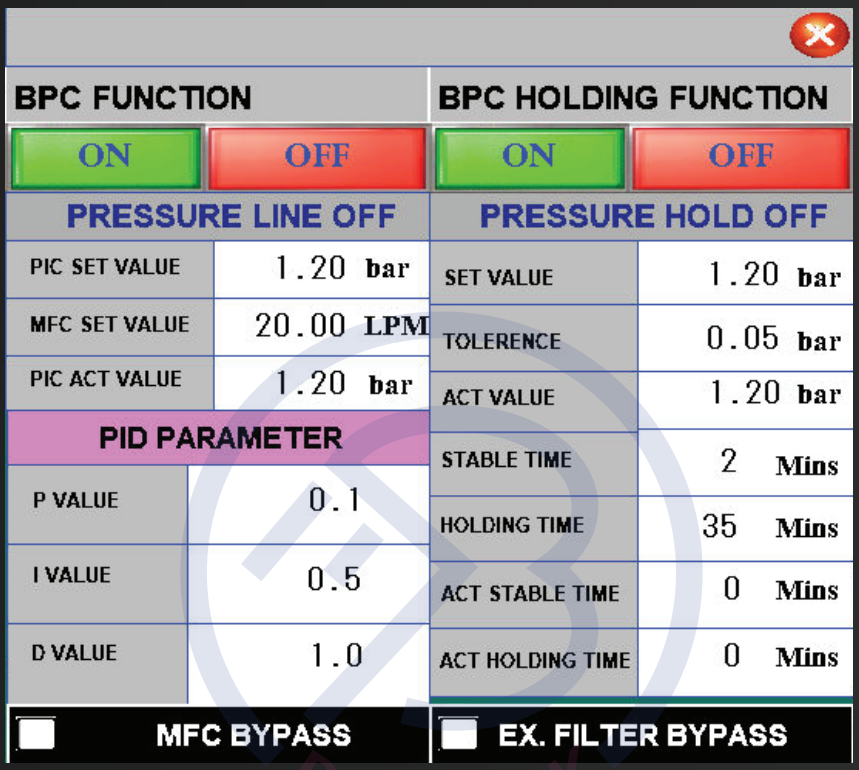
This controls the speed of the agitator.

Operation: Set your desired speed and press the **"ON"** button to start. If there's a problem, an alarm pops up; press **"Drive Reset"** to acknowledge it.

Profile Mode: You can set up to 5 different speeds and times. The agitator will run through these in sequence.

3. Pressure Control (Pressure Range: -1 to 5 bar)

Click on the **Pressure** Button located on the Desktop home screen.



This section manages pressure within the fermentation system.

Functions:

- ✓ Conduct pressure or leak tests by setting a pressure value and holding time.
- ✓ Maintain back pressure with the Pressure Control Mode (PIC).

PIC Control:

- ✓ Set the desired pressure, then switch on the ON button. The exhaust control valve will maintain the set pressure once it's reached.

Bypass Options:

- ✓ MFC Bypass: If the MFC is not working, enable the bypass manually to allow air flow.
- ✓ Filter Bypass: If the filter is choked, replace it and open the bypass valve manually. Enable the bypass in the PIC screen.

4. Fermenter Sterilization

Click on the **FSIP** Button located on the Desktop home screen.

FSIP 1		PARAMETERS	
FSIP1 OFF		STER-TEMP SV	122.00
ON / OFF		SAFTEY TEMP SV	85.00
		DEGAS TEMP SV	95.00
FSIP 2		COOLING TEMP SV	100.00
FSIP2 OFF		DEAD BAND SV	1.00
ON / OFF		PROCESS TEMP SV	35.00
TEMP SET VALUE	122.00	SPEED SV	200
TEMP ACT VALUE	34.99	STER. SET TIME(M)	20
JACKET AV	36.20	FILL SET TIME(M)	2
STER. ACT TIME(M)	0	DRAIN SET TIME(M)	2
FILL ACT TIME(M)	0	MFC SET VALUE	10.0
DRAIN ACT TIME(M)	0	BPC SET VALUE	1.2

FSIP-1

- ✓ Set sterilization parameters and start the process.
- ✓ Initially, the cooling valve, agitator, and circulation pump are ON. As the temperature rises, the heating valve activates.
- ✓ After reaching degas temperature, acknowledge the pop-up message.
- ✓ The timer starts upon reaching the sterilization temperature. Once complete, cooling mode activates.
- ✓ After vacuum break temperature is reached, acknowledge the pop-up message.
- ✓ Once the set process temperature is reached, sterilization is complete.

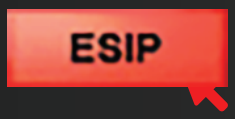
FSIP-2

The process is similar to FSIP-1 but for a different Fermenter Sterilization-In-Place mode.

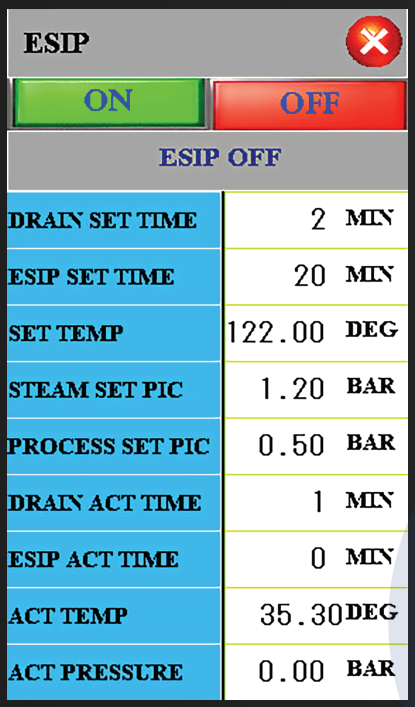
Procedure:

- ✓ Set sterilization parameters and start the process.
- ✓ Initially, the air valve, drain valve, and agitator are ON. The rest follows the same pattern as FSIP-1.

5. ESIP Sterilization



Click on the **ESIP** Button located on the Desktop home screen.

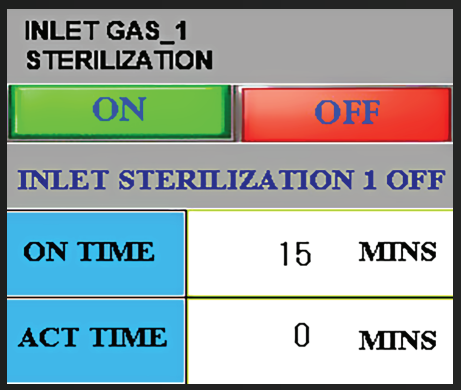


Empty Sterilization-In-Place (ESIP) is for empty fermenters.

Procedure:

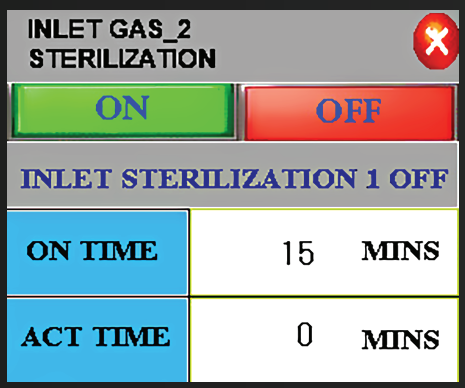
- ✓ Set the sterilization parameters and start the process.
- ✓ The sequence is similar to FSIP-1 but applies to empty vessels.

6. Inlet Gas Sterilization



Inlet Gas Sterilization-1 :

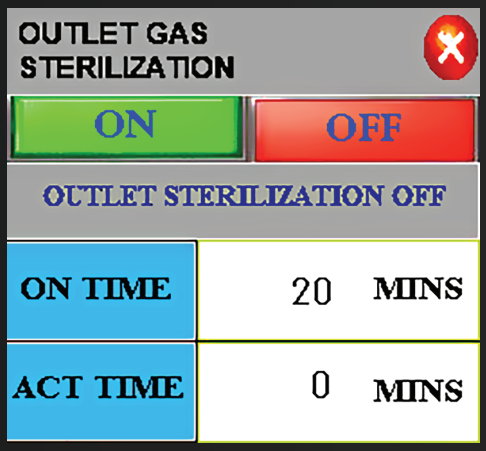
- ✓ Set the parameters and start the process.
- ✓ Initially, V-93 is ON, and V-97 operates in pulse mode. After the set time, both valves turn off.



Inlet Gas Sterilization-2 :

- ✓ Set the parameters and start the process.
- ✓ Initially, V-107 is ON, and V-112 operates in pulse mode.

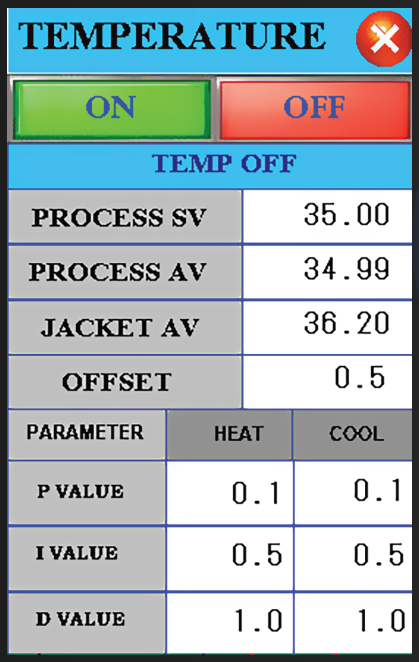
7. Outlet Gas Sterilization



Outlet Gas Sterilization

- ✓ Set the parameters and start the process.
- ✓ Initially, V-207 is ON, and V-203 operates in pulse mode.

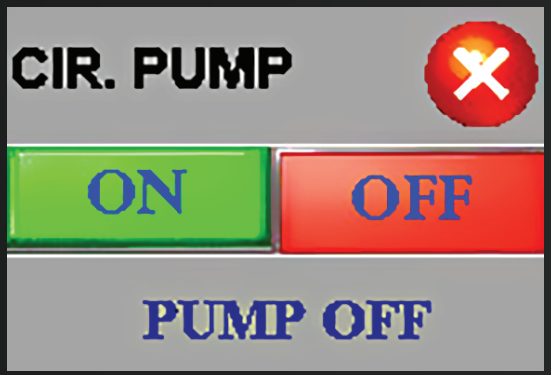
8. Temperature Control **(Temperature Range: 0-150°C)**



Click on the **TEMP** Button located on the Desktop home screen.

The circulation pump and heating or cooling valves operate based on the set temperature.

9. Circulation Pump



Click on the **CIR. PUMP** Button located on the Desktop home screen.

This section controls the circulation pump in manual mode.

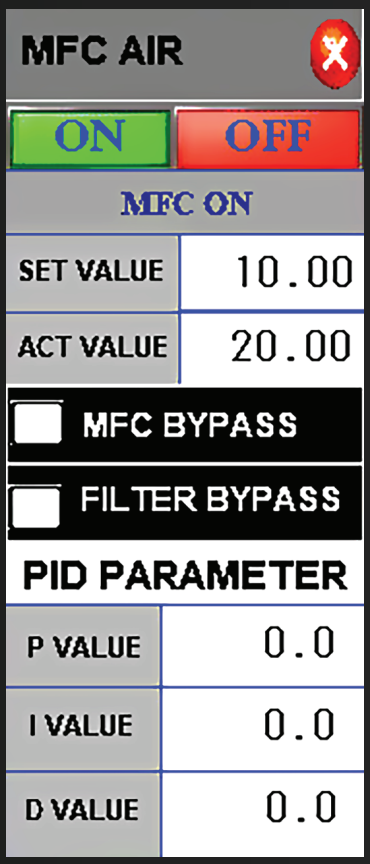
Manual Control:

- ✓ Allows manual operation of the circulation pump.

Auto Mode:

- ✓ The circulation pump operates automatically to maintain the set temperature.

10. Air MFC (Flow Range: 0-500 LPM)



Click on the **MFC AIR** Button located on the Desktop home screen.

Manages the Air Mass Flow Controller (MFC).

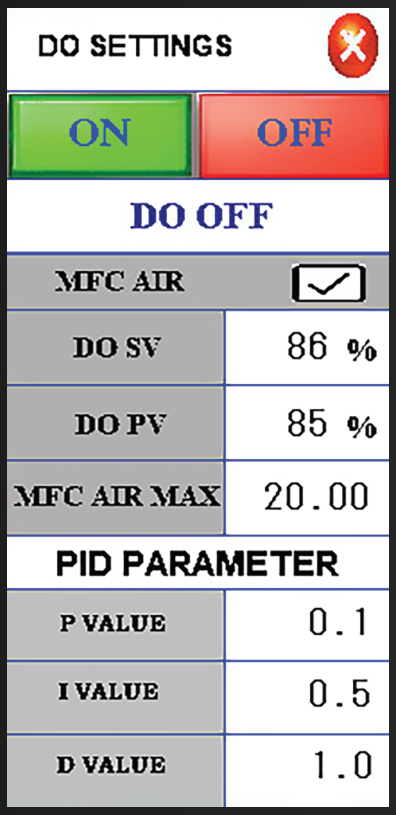
Control:

✓ Set the desired airflow in LPM and turn it on. The airflow remains constant until manually turned off.

Back Pressure Control:

✓ The control valve will open to maintain the desired pressure level.

11. Dissolved Oxygen (DO)



Click on the **DO** Button located on the Desktop home screen.

Controls the level of dissolved oxygen in the fermentation system.

✓ **Control:**
Set the desired DO percentage. The MFC will open to maintain the set value.

✓ **Max Flow:**
Set the maximum flow to maintain DO levels.

12. Cascade Loop

Click on the **CASCADE** Button located on the Desktop home screen.

Manages the Cascade Loop for automatic DO control.

Control:

- ✓ Set the desired agitator speed, Air MFC flow rate, and back pressure to maintain DO levels.
- ✓ When started, the Cascade Loop operates these controls based on the set DO percentage.

DO CASCADE

CASCADE LOOP	ON	OFF	CASCADE LOOP OFF	DO ACTUAL	0

DO	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
SPEED ☑	800	600	500	400	300	200	100	100	100	100	50
MFC AIR ☑	20.00	18.00	16.00	14.00	12.00	10.00	8.00	6.00	4.00	2.00	2.00
BPC ☑	1.50	1.40	1.30	1.20	1.10	1.00	0.80	0.60	0.40	0.20	0.20
FEED PUMP ☑	100	90	80	70	60	50	8	30	20	10	10

CASCADE RAMP FUNCTION			AGITATOR ☑		MFC AIR ☑			FEED ☑		
DO SV	100.0	%	MINIMUM	200 RPM	MINIMUM	10.00 LPM		MINIMUM	30.0	RPM
			MAXIMUM	800 RPM	MAXIMUM	20.00 LPM		MAXIMUM	150.0	RPM
DO AV	85.0	%	RAMP	10 RPM	RAMP	2.00 LPM		RAMP	10.0	RPM
			TIME DELAY	2 MIN	TIME DELAY	1 MIN		TIME DELAY	2	MIN

13. pH Control

pH

ON	OFF
☑ pH(008)	☐ pH(009)

PH ON	
SET VALUE	6.60
ACT VALUE	6.59
OFFSET	0.5

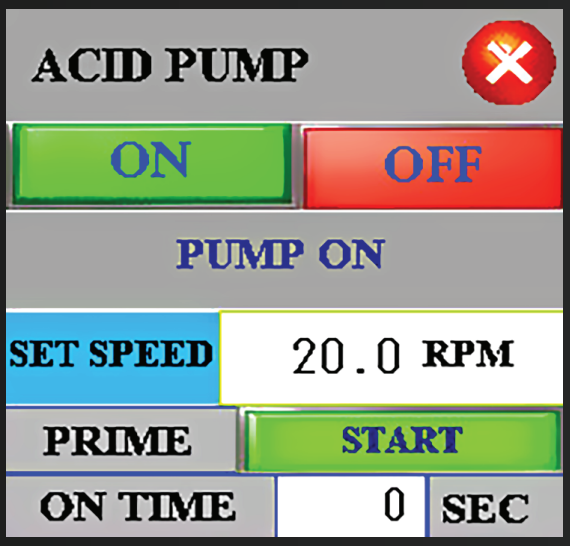
PID PARAMETER		
P VALUE	0.1	0.1
I VALUE	0.5	0.5
D VALUE	1.0	1.0
ACID MAX SPEED		10.0
BASE MAX SPEED		5.0

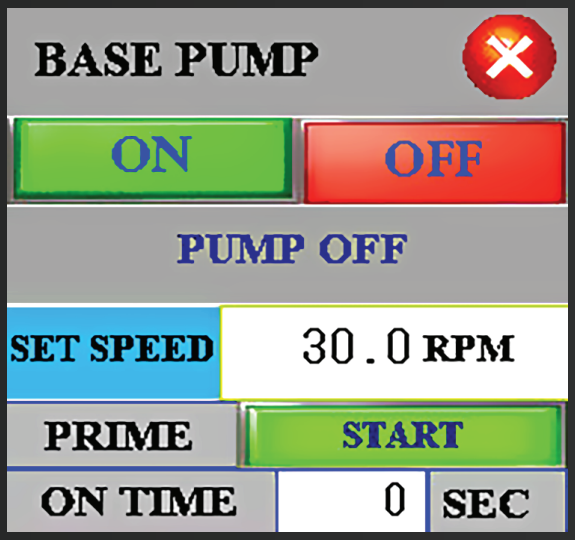
Click on the **pH** Button located on the Desktop home screen.

Controls the pH level in the fermentation system.

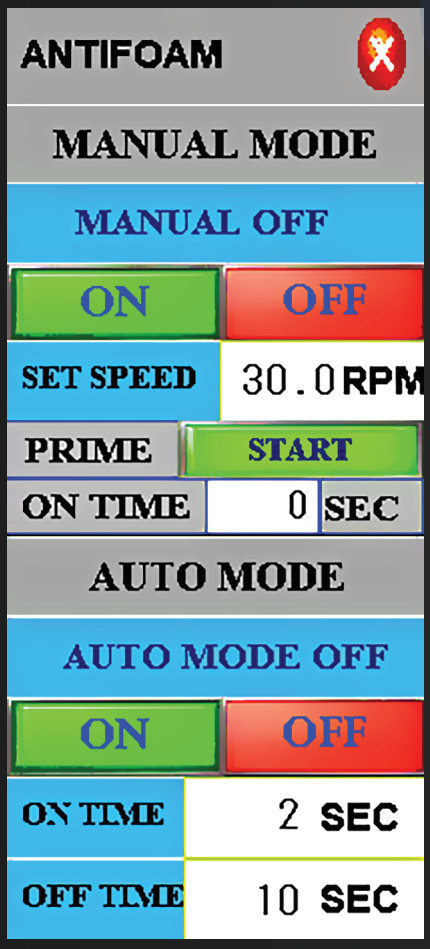
Control:

- ✓ Set the desired pH value. Acid or base pumps operate to maintain the set value.
- ✓ Once within the set tolerance, both pumps will turn off.





14. Antifoam



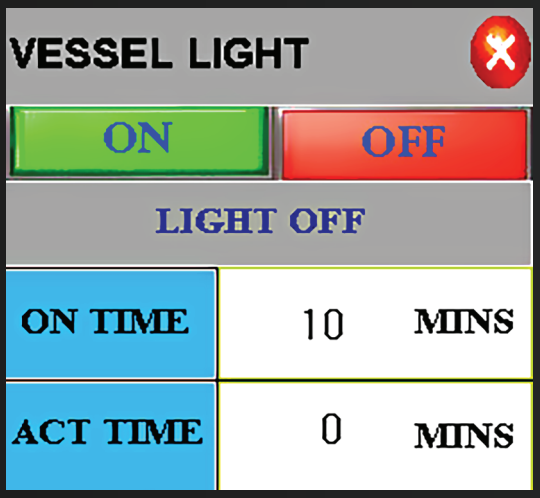
Click on the **Antifoam** Button located on the Desktop home screen.

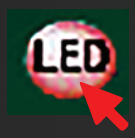
Controls the antifoam system.

Manual Mode:
Allows manual operation of the antifoam pump at a fixed speed.

Auto Mode:
The pump runs automatically when the foam sensor detects foam, operating as per set ON/OFF times.

15. Vessel Light





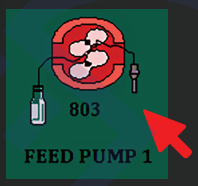
Click on the **Vessel Light** Button located on the Desktop home screen.

This section controls the vessel light.

Control:

Use the respective button to toggle the vessel light on or off.

16. Feed Pump



Click on the **Feed Pump** Button located on the Desktop home screen.

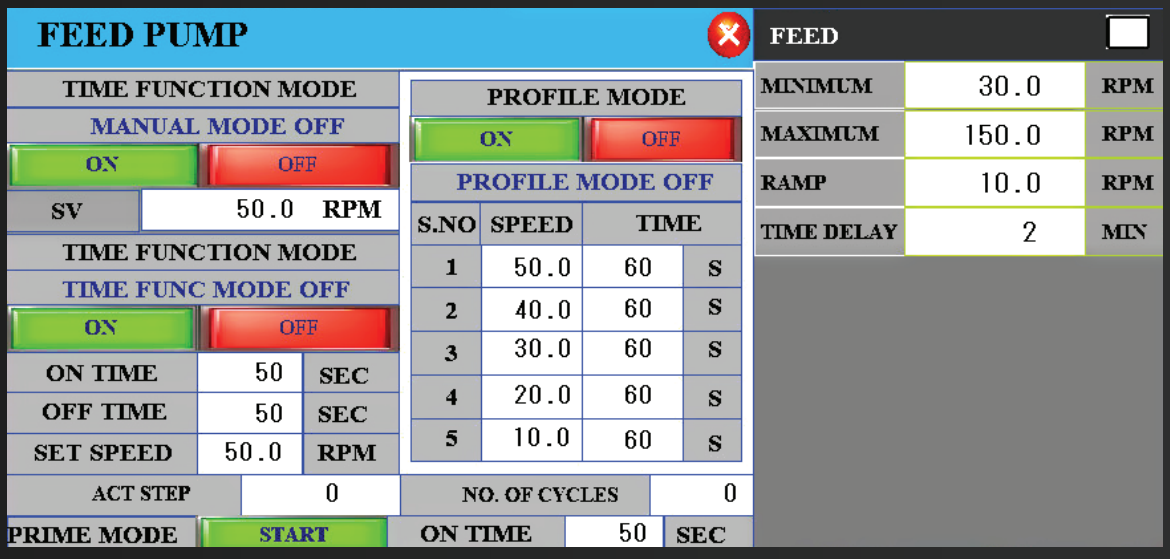
Controls the operation of the feed pump.

Modes:

Manual Mode: Operates the feed pump at a set rpm until manually stopped.

Time Mode: Set the pump's rpm and ON/OFF times. The pump operates accordingly.

Profile Mode: Allows setting different rpm and times for a sequence of up to five steps.



17. Alarm Handling

Setting High/Low Alarm Limits

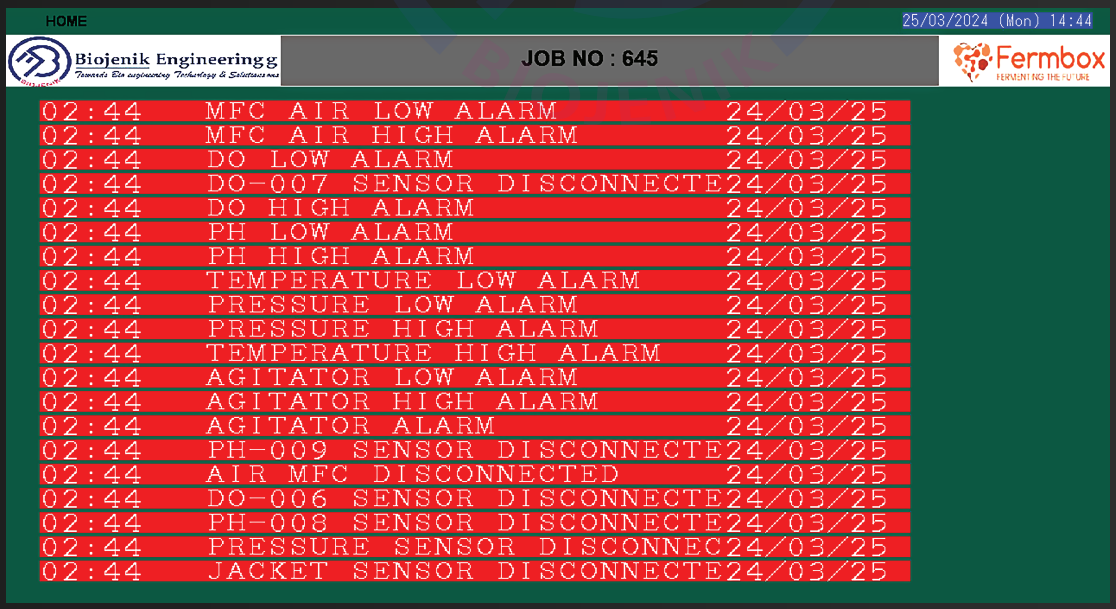
HIGH_LOW ALARM

PARAMETER	HIGH	LOW
AGITATOR ☑	350	200
TEMPERATURE ☑	40.0	35.0
PRESSURE ☑	1.50	0.50
pH-008 ☑	8.00	5.00
pH-009 ☐	0.00	0.00
DO-006 ☑	80.0	60.0
DO-007 ☐	0.0	0.0
MFC AIR ☑	15.00	2.00

Purpose: Keep the system within safe ranges.

How to Set: Choose a parameter, then set its high and low limits. When the parameter goes outside these limits, an alarm is triggered.

Alarm Messages:



When an alarm is triggered, the message appears on the alarm page. Check the alarm page and acknowledge the alarm by pressing **"ACK."**

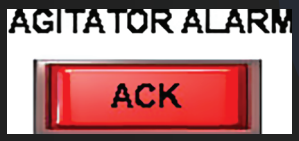
Emergency Button Pressed:

If the emergency button is pressed, an alarm will appear. Release the button, then acknowledge the alarm.

Overload Relay (OLR) Trip:

If the OLR trips, an alarm is triggered. Release the OLR button and then acknowledge the alarm.

Miniature Circuit Breaker (MCB) Trip



If the MCB trips or a cable is disconnected, an alarm is triggered. Fix the issue, then acknowledge it.

Degas Temperature Reached

When the degas temperature is reached, an alarm is triggered on the home page. Acknowledge the alarm.

Cooling Set Temperature Reached

If the cooling set temperature is reached, the alarm is stored on the home page. Acknowledge it.

Mass Flow Controller (MFC) Air High

If the MFC air value goes above its limit, acknowledge the alarm after fixing the problem.

Mass Flow Controller (MFC) Air Low

If the MFC air value goes below its limit, the alarm is stored. Correct the issue and acknowledge the alarm.

pH Value Low

If the pH value drops below its limit, an alarm appears. Fix the pH, then acknowledge the alarm.

pH Value High

If the pH value is too high, correct it, then acknowledge the alarm.

Temperature High

If the temperature exceeds its high limit, resolve it and acknowledge the alarm.

Temperature Low

If the temperature drops below its limit, acknowledge the alarm after fixing the problem.

Agitator Speed High

If the agitator speed goes above its limit, fix it, then acknowledge the alarm.

Agitator Speed Low

If the agitator speed goes below its limit, the alarm is triggered. Correct it and acknowledge.

Pressure Indicator Control (PIC) High

If the PIC value exceeds its high limit, resolve it, then acknowledge the alarm.

Pressure Indicator Control (PIC) Low

If the PIC value is below its limit, fix it and acknowledge the alarm.

Dissolved Oxygen (DO) High

If the DO value goes above its limit, fix it and acknowledge the alarm.

Dissolved Oxygen (DO) Low

If the emergency button is pressed, an alarm will appear. Release the button, then acknowledge the alarm.

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