

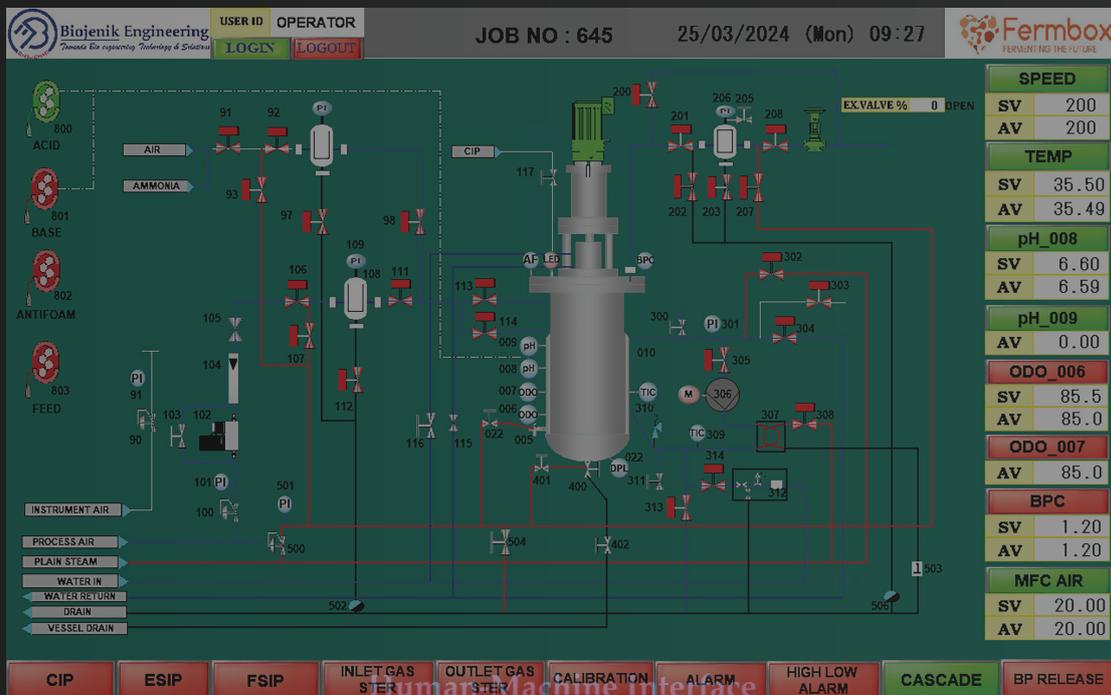


Biojenik Engineering

Towards Bio engineering Technology & Solutions

Biojenik Engineering has been providing innovation and reliable bioprocess engineering solution for over 15 years

HMI Operator Manual



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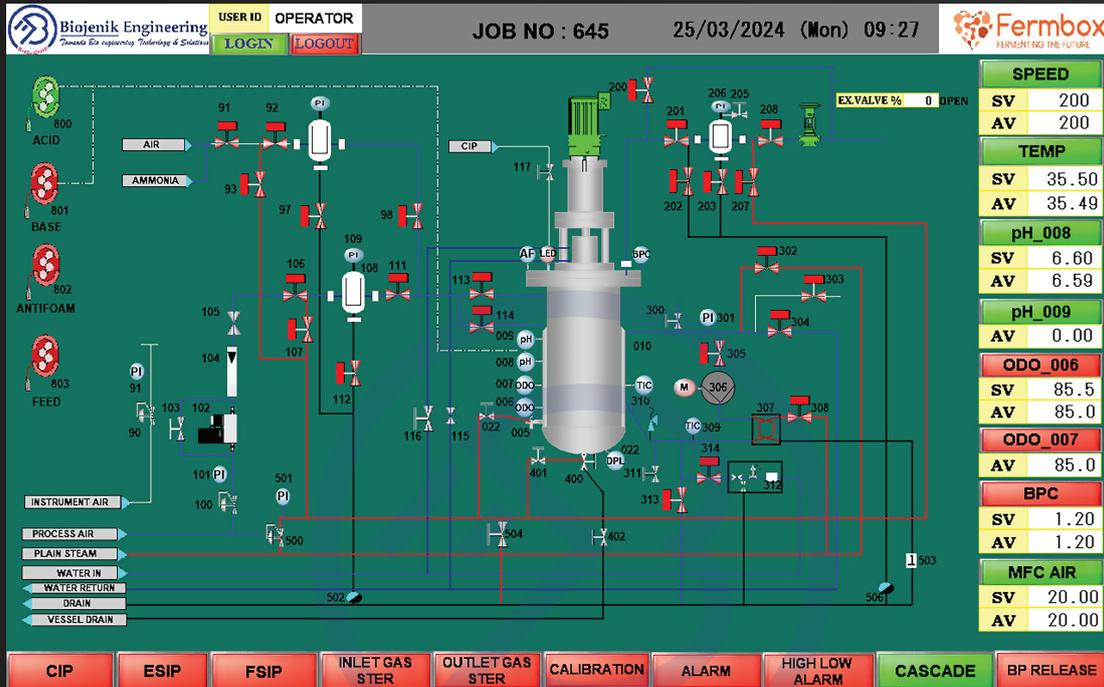
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1. Main Screen

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.

PROFILE MODE			
<input type="button" value="ON"/>		<input type="button" value="OFF"/>	
PROFILE MODE OFF			
S.NO	SPEED	TIME	
1.	200	5	MIN
2.	230	15	MIN
3.	280	5	MIN
4.	320	25	MIN
5.	400	20	MIN

AGITATOR 		
<input type="button" value="ON"/>	<input type="button" value="OFF"/>	<input type="button" value="RESET"/>
AGITATOR OFF		
SV	200	RPM
AV	200	RPM
OUTPUT	17	%

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)

PIC

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

BPC FUNCTION		BPC HOLDING FUNCTION	
<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
PRESSURE LINE OFF		PRESSURE HOLD OFF	
PIC SET VALUE	1.20 bar	SET VALUE	1.20 bar
MFC SET VALUE	20.00 LPM	TOLERANCE	0.05 bar
PIC ACT VALUE	1.20 bar	ACT VALUE	1.20 bar
PID PARAMETER		STABLE TIME	2 Mins
P VALUE	0.1	HOLDING TIME	35 Mins
I VALUE	0.5	ACT STABLE TIME	0 Mins
D VALUE	1.0	ACT HOLDING TIME	0 Mins
<input type="checkbox"/> MFC BYPASS		<input type="checkbox"/> EX. FILTER BYPASS	

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

FSIP

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

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

ESIP

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

ESIP	
ON	OFF
ESIP OFF	
DRAIN SET TIME	2 MIN
ESIP SET TIME	20 MIN
SET TEMP	122.00 DEG
STEAM SET PIC	1.20 BAR
PROCESS SET PIC	0.50 BAR
DRAIN ACT TIME	1 MIN
ESIP ACT TIME	0 MIN
ACT TEMP	35.30 DEG
ACT PRESSURE	0.00 BAR

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_1 STERILIZATION	
ON	OFF
INLET STERILIZATION 1 OFF	
ON TIME	15 MINS
ACT TIME	0 MINS

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_2 STERILIZATION	
ON	OFF
INLET STERILIZATION 1 OFF	
ON TIME	15 MINS
ACT TIME	0 MINS

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 	
ON	OFF
OUTLET STERILIZATION OFF	
ON TIME	20 MINS
ACT TIME	0 MINS

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)

TEMPERATURE 		
ON	OFF	
TEMP OFF		
PROCESS SV	35.00	
PROCESS AV	34.99	
JACKET AV	36.20	
OFFSET	0.5	
PARAMETER	HEAT	COOL
P VALUE	0.1	0.1
I VALUE	0.5	0.5
D VALUE	1.0	1.0

TEMP

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



CIR. PUMP 	
ON	OFF
PUMP OFF	

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)

MFC AIR 	
<input type="button" value="ON"/>	<input type="button" value="OFF"/>
MFC ON	
SET VALUE	10.00
ACT VALUE	20.00
<input type="checkbox"/> MFC BYPASS	
<input type="checkbox"/> FILTER BYPASS	
PID PARAMETER	
P VALUE	0.0
I VALUE	0.0
D VALUE	0.0



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)

DO SETTINGS 	
<input type="button" value="ON"/>	<input type="button" value="OFF"/>
DO OFF	
MFC AIR	<input checked="" type="checkbox"/>
DO SV	86 %
DO PV	85 %
MFC AIR MAX	20.00
PID PARAMETER	
P VALUE	0.1
I VALUE	0.5
D VALUE	1.0



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

CASCADE

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	<input checked="" type="checkbox"/>	800	600	500	400	300	200	100	100	100	100	50
MFC AIR	<input checked="" type="checkbox"/>	20.00	18.00	16.00	14.00	12.00	10.00	8.00	6.00	4.00	2.00	2.00
BPC	<input checked="" type="checkbox"/>	1.50	1.40	1.30	1.20	1.10	1.00	0.80	0.60	0.40	0.20	0.20
FEED PUMP	<input checked="" type="checkbox"/>	100	90	80	70	60	50	8	30	20	10	10
CASCADE RAMP FUNCTION		AGITATOR <input checked="" type="checkbox"/>			MFC AIR <input checked="" type="checkbox"/>			FEED <input checked="" type="checkbox"/>				
		MINIMUM	200	RPM	MINIMUM	10.00	LPM	MINIMUM	30.0	RPM		
DO SV	100.0 %	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
<input checked="" type="checkbox"/> pH(008)	<input type="checkbox"/> 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	

pH

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.

ACID PUMP		
ON	OFF	
PUMP ON		
SET SPEED	20.0 RPM	
PRIME	START	
ON TIME	0	SEC

BASE PUMP		
ON	OFF	
PUMP OFF		
SET SPEED	30.0 RPM	
PRIME	START	
ON TIME	0	SEC

14. Antifoam

ANTIFOAM		
MANUAL MODE		
MANUAL OFF		
ON	OFF	
SET SPEED	30.0 RPM	
PRIME	START	
ON TIME	0	SEC
AUTO MODE		
AUTO MODE OFF		
ON	OFF	
ON TIME	2	SEC
OFF TIME	10	SEC



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

VESSEL LIGHT 		
<div style="display: flex; justify-content: space-around;"> ON OFF </div>		
LIGHT OFF		
ON TIME	10	MINS
ACT TIME	0	MINS



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.

FEED PUMP 				FEED <input type="checkbox"/>																										
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>TIME FUNCTION MODE</p> <p>MANUAL MODE OFF</p> <div style="display: flex; justify-content: space-around;"> ON OFF </div> <p>SV <input style="width: 50px;" type="text" value="50.0"/> RPM</p> <p>TIME FUNCTION MODE</p> <p>TIME FUNC MODE OFF</p> <div style="display: flex; justify-content: space-around;"> ON OFF </div> <p>ON TIME <input style="width: 30px;" type="text" value="50"/> SEC</p> <p>OFF TIME <input style="width: 30px;" type="text" value="50"/> SEC</p> <p>SET SPEED <input style="width: 30px;" type="text" value="50.0"/> RPM</p> <p>ACT STEP <input style="width: 30px;" type="text" value="0"/></p> <p>PRIME MODE START</p> </div> <div style="width: 50%;"> <p>PROFILE MODE</p> <div style="display: flex; justify-content: space-around;"> ON OFF </div> <p>PROFILE MODE OFF</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>S.NO</th> <th>SPEED</th> <th>TIME</th> <th></th> </tr> </thead> <tbody> <tr><td>1</td><td>50.0</td><td>60</td><td>S</td></tr> <tr><td>2</td><td>40.0</td><td>60</td><td>S</td></tr> <tr><td>3</td><td>30.0</td><td>60</td><td>S</td></tr> <tr><td>4</td><td>20.0</td><td>60</td><td>S</td></tr> <tr><td>5</td><td>10.0</td><td>60</td><td>S</td></tr> </tbody> </table> <p>NO. OF CYCLES <input style="width: 30px;" type="text" value="0"/></p> <p>ON TIME <input style="width: 30px;" type="text" value="50"/> SEC</p> </div> </div>				S.NO	SPEED	TIME		1	50.0	60	S	2	40.0	60	S	3	30.0	60	S	4	20.0	60	S	5	10.0	60	S	MINIMUM	30.0	RPM
S.NO	SPEED	TIME																												
1	50.0	60	S																											
2	40.0	60	S																											
3	30.0	60	S																											
4	20.0	60	S																											
5	10.0	60	S																											
MAXIMUM	150.0	RPM																												
RAMP	10.0	RPM																												
TIME DELAY	2	MIN																												

17. Alarm Handling

Setting High/Low Alarm Limits

HIGH_LOW ALARM 		
PARAMETER	HIGH	LOW
AGITATOR <input checked="" type="checkbox"/>	350	200
TEMPERATURE <input checked="" type="checkbox"/>	40.0	35.0
PRESSURE <input checked="" type="checkbox"/>	1.50	0.50
pH-008 <input checked="" type="checkbox"/>	8.00	5.00
pH-009 <input type="checkbox"/>	0.00	0.00
DO-006 <input checked="" type="checkbox"/>	80.0	60.0
DO-007 <input type="checkbox"/>	0.0	0.0
MFC AIR <input checked="" type="checkbox"/>	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:

HOME 25/03/2024 (Mon) 14:44

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JOB NO : 645

 **Fermbox**
FERMENTING THE FUTURE

02:44	MFC AIR LOW ALARM	24/03/25
02:44	MFC AIR HIGH ALARM	24/03/25
02:44	DO LOW ALARM	24/03/25
02:44	DO-007 SENSOR DISCONNECTE	24/03/25
02:44	DO HIGH ALARM	24/03/25
02:44	PH LOW ALARM	24/03/25
02:44	PH HIGH ALARM	24/03/25
02:44	TEMPERATURE LOW ALARM	24/03/25
02:44	PRESSURE LOW ALARM	24/03/25
02:44	PRESSURE HIGH ALARM	24/03/25
02:44	TEMPERATURE HIGH ALARM	24/03/25
02:44	AGITATOR LOW ALARM	24/03/25
02:44	AGITATOR HIGH ALARM	24/03/25
02:44	AGITATOR ALARM	24/03/25
02:44	PH-009 SENSOR DISCONNECTE	24/03/25
02:44	AIR MFC DISCONNECTED	24/03/25
02:44	DO-006 SENSOR DISCONNECTE	24/03/25
02:44	PH-008 SENSOR DISCONNECTE	24/03/25
02:44	PRESSURE SENSOR DISCONNEC	24/03/25
02:44	JACKET SENSOR DISCONNECTE	24/03/25

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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