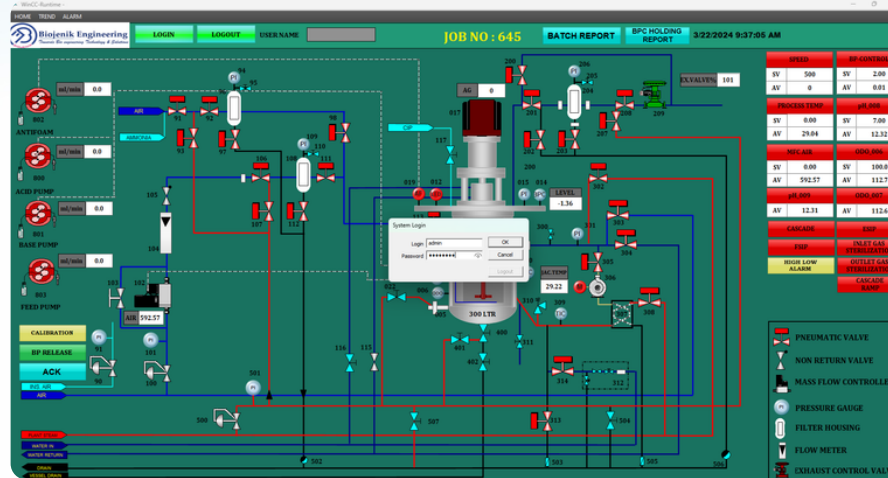




BIOJENIK ENGINEERING
Towards Bio engineering Technology & Solutions



SCADA Software for Bioreactors & Fermenters

Streamlining Biotech Operations with Advanced SCADA Solutions

BIOJENIK ENGINEERING

Your Trusted Partner in Bioprocess Engineering

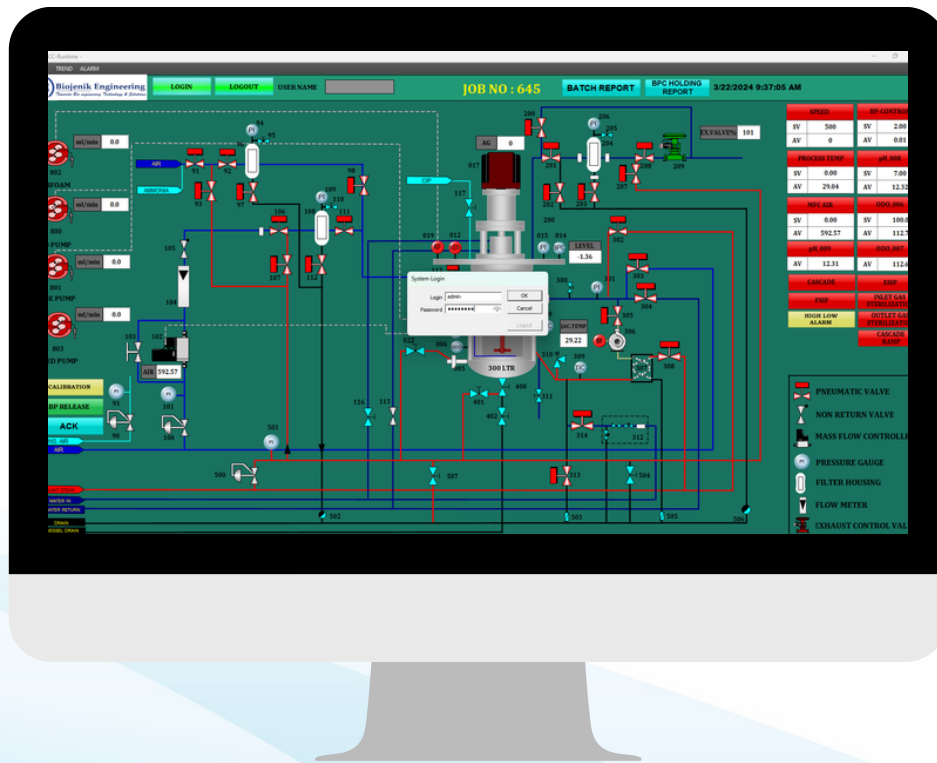
Biojenik Engineering has been providing innovation and reliable bioprocess engineering solution for over 15 years



www.biojenikengineering.com

Biojenik Engineering SCADA Software

Biojenik Engineering's SCADA (Supervisory Control and Data Acquisition) software provides an advanced solution for managing laboratory, pilot, and industrial-scale bioreactors and fermenters. Specifically designed for batch, fed-batch, and continuous processes, our SCADA software enhances process automation and control, ensuring optimal performance and stability. Its scalable architecture makes it suitable for facilities of any size, from small research laboratories to large industrial operations.



SCADA Functionality

SCADA serves as the critical interface for managing automated systems. The core functions include:

Graphical Visualization

Provides operators with intuitive, real-time graphical representations of system performance.

Event Handling

Monitors system status and raises alerts when predefined criteria are met, allowing for prompt corrective actions.

Key Features of Biojenik Engineering SCADA Software

Feature	Description
Advanced Control and Automation	Efficient management of complex systems with customizable modes, sequences, and profiles for optimal process stability.
Batch Recipe Management	Design, program, and execute batch recipes to ensure consistency and repeatability throughout the process.
Dynamic Setpoint Programming	Automatic adjustment of control setpoints based on predefined profiles or historical data for precise control.
Comprehensive Calculation Module	Real-time calculation of derived variables for process optimization and informed decision-making.
Culture File Library	Access a library of predefined culture conditions, streamlining operations for consistent results.
Customizable Process Displays	Tailor dashboards for operators to display clear, real-time visual representations of system performance.
Real-Time Data Recording & Export	Continuous data recording with the ability to export for analysis, reporting, or regulatory compliance.
Batch & Dosage Management	Track batch progress and manage dosages accurately, ensuring efficient use of resources.
Access Control & Compliance	Role-based user access control with full process traceability, ensuring regulatory compliance.
Event Alarms & Historical Data Analysis	Set custom alarms for process deviations and leverage historical data for post-process analysis and optimization.
Simulation Mode for Process Validation	Generate random process values for testing and validation in a controlled environment, ensuring system functionality and calibration.
Remote Controller Set Point Transfer	Enable remote transfer of controller set points (e.g., temperature, pH, dissolved oxygen) via a web-based platform, offering flexibility and operational efficiency.

Hardware and Software Integration

Hardware:

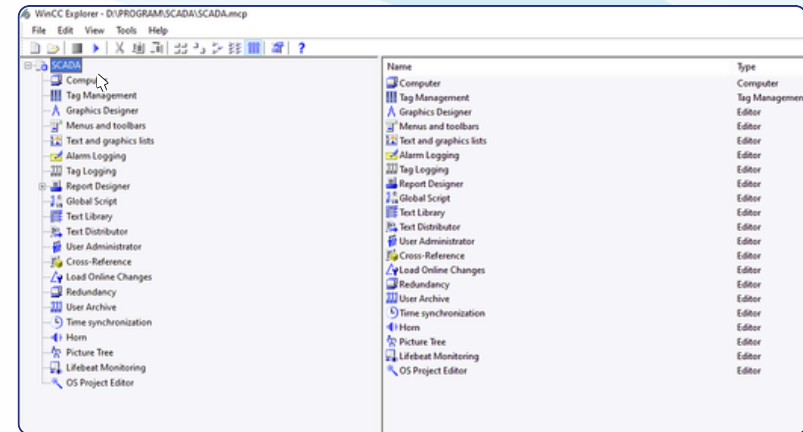
The SCADA system integrates with Programmable Logic Controllers (PLCs), enabling efficient data I/O management and automated process control, including valve operations for sterilization procedures.



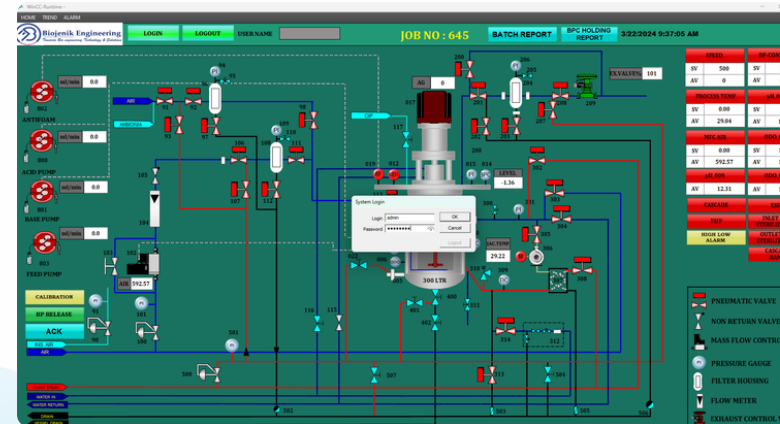
Software:

Biojenik Engineering's custom-designed software offers comprehensive plant visualization, setpoint control, data management, and batch control, ensuring process reproducibility and full audit compliance.

- Locate and click on the **SCADA icon** on your Desktop home screen.
- The **activation window** will appear.
- Click the "**Activate**" button to open the **runtime window**.



- In the runtime window, click on the **"Login"** button.
- Enter the following credentials: **Login: admin | Password: Biojenik**
- After successfully entering the credentials, the **fermenter parameter window** will open.



3. Agitator Control

SPEED SETTINGS			
DRIVE OFF			
ON		OFF	
SET VALUE	500		
ACTUAL VALUE	0		
DRIVE RESET			

PROFILE MODE			
PROFILE MODE OFF			
START		STOP	
S.NO	SET TIME	SET SPEED	
1	0 M	200	
2	0 M	300	
3	0 M	400	
4	0 M	500	
5	0 M	600	

Set Agitator Speed:

- Click on the **Agitator Control** button.
- Set the desired **RPM** (Agitator Speed range: **50–1000 RPM**).
- Press the **"ON"** button.
- Ensure the **Act value** (actual speed) matches the **Set value** (desired speed), confirming that the agitator is running.

Agitator Alarm

- If an issue like a voltage drop occurs, an **Agitator Alarm popup** window will appear.
- Press the **"Drive Reset"** button to acknowledge and reset the alarm.

Profile Mode

- Set up to 5 RPM and time values.
- Start Profile Mode – the agitator will run at each RPM for the set time.
- After 5 steps, it will keep running at the last RPM until stopped.

4. Back Pressure Control (BPC)

BP CONTROL SETTINGS	
BPC FUNCTION	
PIC OFF	
ON	OFF
SET VALUE	2.00
ACT VALUE	0.01
MFC SV	20.0
PID PARAMETERS	
P VALUE	0.0
I VALUE	0.0
D VALUE	0.0

PRESSURE HOLDING TEST	
HOLDING OFF	
ON	OFF
SET VALUE	2.00
TOLERANCE	0.20
ACT VALUE	0.01
STABILIZE TIME	0 M
HOLDING TIME	1 M
ACT STABLE TIME	1 M
ACT HOLD TIME	0 M
☐ MFC BYPASS	
☐ EXHAUST FILTER BYPASS	

- **Range: -1 to 5 bar.**
- Click on the **BPC** button.

Users can:

- Control and monitor the **pressure** during the process.
- Perform a **leak** test to ensure system integrity before starting the batch.

5. Fermenter Sterilization

STERILIZATION		
FSIP_1 SETTINGS		
FSIP OFF		
ON	OFF	
FSIP_2 SETTINGS		
FSIP OFF		
ON	OFF	
SET VALUE	0.000	
PROCESS TEMPERATURE AV	29.090	
JACKET TEMP AV	29.350	
STERILIZATION ACT TIME	0	MINS
J.FILLING ACTUAL TIME	0	MINS
J.DRAIN ACT TIME	0	MINS
PARAMETERS		
STERILIZATION SET TEMP	121.000	
SAFTY TEMP	80.000	
DEGAS SET TEMP	95.000	
COOLING SET TEMP	100.000	
PROCESS SET TEMP	35.000	
DEAD BAND SET VALUE	1.000	
SPEED SET VALUE	200	
PRESSURE SET VALUE	2.00	
MFC SET VALUE	20.00	
JACKET DRAIN SET MIN	1	MINS
JACKET FILLING SET MIN	2	MINS
STERILIZATION SET TIME	3	MINS

FSIP-1:

- Set sterilization parameters.
- Turn on **Cooling Valve, Agitator, and Circulation Pump** during filling.
- Switch off **Cooling Valve** and turn on **Heating Valve** to increase temperature.
- Acknowledge **Degas Temperature** popup.
- Start the timer when sterilization temperature is reached.
- After timer completion, activate **Cooling Mode**.
- Acknowledge **Vacuum Break Temperature** popup and connect the inlet filter.
- Turn on **MFC** and **Pressure Valve** as per settings.
- Sterilization ends when the set process temperature is maintained.

FSIP-2:

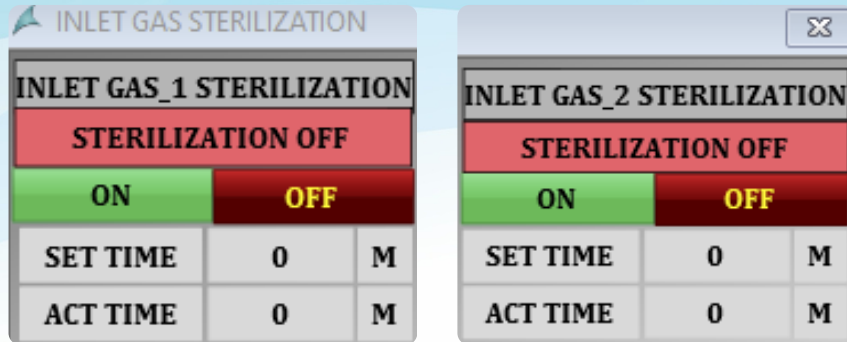
- Set parameters and start the process.
- Turn on **Air Valve, Drain Valve, and Agitator** during jacket drain.
- Acknowledge **Degas Temperature** popup.
- Start the timer when sterilization temperature is reached, then activate **Cooling Mode**.
- Acknowledge **Vacuum Break Temperature** popup and connect the inlet filter.
- Turn on **MFC** and **Pressure Valve** as per settings.
- Sterilization completes at the set process temperature.

6. ESIP (External Sterilization):

ESIP		
ESIP OFF		
ON	OFF	
DRAIN SET TIME	2	M
SET TIME	3	M
SET TEMP	121.00	DEG
STEAM SET PRESSURE	2.00	BAR
SET PRESSURE	0.50	BAR
DRAIN ACT TIME	0	M
ACT TIME	0	M
ACT TEMP	29.09	DEG
ACT PRESSURE	0.01	BAR

- Set sterilization parameters.
- Turn on **Cooling Valve, Agitator, and Circulation Pump** during filling.
- Turn off **Cooling Valve** and turn on **Heating Valve** to increase temperature.
- Acknowledge the **Degas Temperature** popup.
- Start the timer when sterilization temperature is reached.
- Turn on **Cooling Mode** after the timer ends.
- Acknowledge the **Vacuum Break Temperature** popup and connect the inlet filter.
- Turn on **MFC** and **Pressure Valve**.
- Sterilization is complete when the set temperature is maintained.

7. Inlet Gas Sterilization



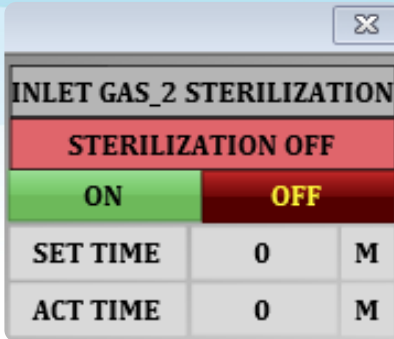
INLET GAS STERILIZATION

STERILIZATION OFF

ON OFF

SET TIME 0 M

ACT TIME 0 M



INLET GAS_2 STERILIZATION

STERILIZATION OFF

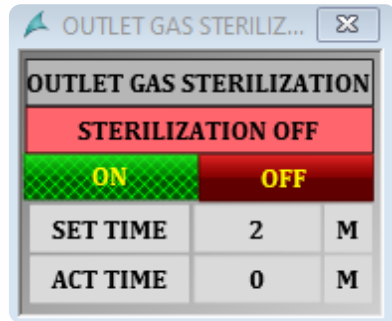
ON OFF

SET TIME 0 M

ACT TIME 0 M

- Click Inlet **Gas Sterilization-1** or **Inlet Gas Sterilization-2**.
- Set parameters and start the process.

8. Outlet Gas Sterilization



OUTLET GAS STERILIZATION

STERILIZATION OFF

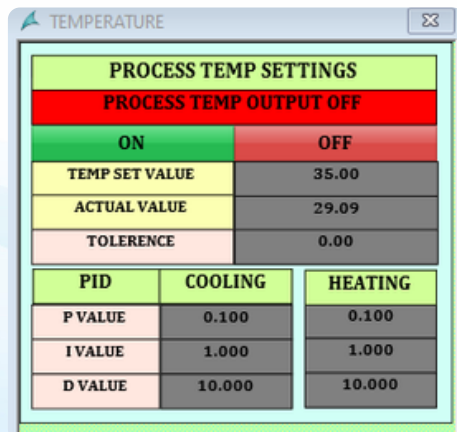
ON OFF

SET TIME 2 M

ACT TIME 0 M

- Click **Outlet Gas Sterilization**.
- Set parameters and start the process.

9. Temperature Control



TEMPERATURE

PROCESS TEMP SETTINGS

PROCESS TEMP OUTPUT OFF

ON OFF

TEMP SET VALUE 35.00

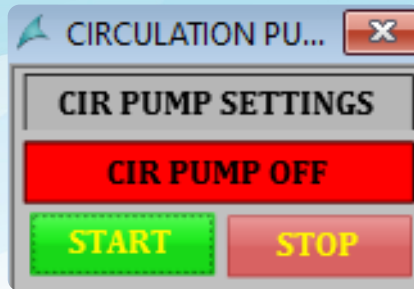
ACTUAL VALUE 29.09

TOLERANCE 0.00

PID	COOLING	HEATING
P VALUE	0.100	0.100
I VALUE	1.000	1.000
D VALUE	10.000	10.000

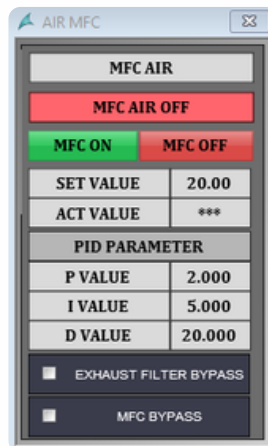
- Temperature Control
- Click the **Temperature Control** button.
- Set the desired temperature within the range of **0-150°C**.

10. Circulation Pump



- Click the **Circulation Pump** button.
- Use manual mode to control the pump as needed.

11. Air Mass Flow Controller (MFC)



- Click on the **Air MFC** button.
- Set the airflow in **liters per minute (LPM)** (range: **0–500 LPM**).
- Activate the airflow, which will continue until turned off, directing it to the fermenter.
- The **Back Pressure Control (BPC)** valve will automatically open to **100%** in this mode.

12. Dissolved Oxygen (DO) Control



- Click the **DO** button.
- Set the desired **DO percentage** (range: **0–100%**).
- Choose between **Air**, **Oxygen (O2)**, or both.
- The **Mass Flow Controller (MFC)** will open to maintain the set DO value.
- Optionally, set a **maximum flow** to regulate the DO level.

13. Cascade Loop (DO Regulation)

RAMP FUNCTION

DO CASCADE RAMP FUNCTION		
SET VALUE	100.0	%
ACT VALUE	***	%
TOLERANCE	10.0	%
☐ AGITATOR		
MINIMUM SPEED	200	RPM
MAXIMUM SPEED	800	RPM
RAMP	20	RPM
TIME DELAY	10	SEC
☐ MFC AIR		
MINIMUM LPM	100.00	LPM
MAXIMUM LPM	400.00	LPM
RAMP	10.00	LPM
TIME DELAY	10	SEC

- Click the Cascade Loop button.
- Set the **agitation speed**, **MFC airflow (LPM)**, and **back pressure** within the **0–100% DO range**.
- Start the loop, and it will automatically adjust the agitator, MFC, and back pressure to regulate DO.

CASCADE

DO CASCADE	CASCADE ON	CASCADE OFF	CASCADE OFF									
DO	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
☐ AG	100	200	300	400	500	600	700	800	900	950	1000	
☐ PIC	0.15	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.20	
☐ AIRMFC	10.00	10.00	20.00	30.00	30.00	58.00	10.00	80.00	20.00	20.00	20.00	
☐ FEED	200	198	0	0	0	0	0	0	0	0	0	

14. pH Control

pH

PH SETTINGS

PH OUTPUT OFF

START **STOP**

☒ pH(008) ☐ pH(009)

PH SET VALUE: 7.00

PH ACT VALUE: 12.32

TOLERANCE: 0.00

PARAMETER	ACID	BASE
P VALUE	0.100	0.100
I VALUE	0.500	0.500
D VALUE	1.000	1.000
ACID MAX SPEED	20.00	
BASE MAX SPEED	40.00	

- Click on the **pH** button.
- Set the desired **pH value** (range: **2–12**).
- The system will use the **acid** or **base pump** to adjust the pH accordingly.
- Once the desired pH is reached, both pumps will stop.

ACID PU... **BASE PU...**

ACID ON **BASE ON**

ACID OFF **BASE OFF**

SET SPEED

25.0 100.0

PRIME

PRIME

START **START**

0 50

15. Antifoam Control

ANTIFOAM

ANTIFOAM

MANUAL MODE

MANUAL OFF

ON OFF

SET SPEED

10.0

PRIME

START

ON TIME 10 S

AUTO MODE

AUTO OFF

ON OFF

ON TIME 10 S

OFF TIME 10 S

Manual Mode:

- Operate the **antifoam pump** manually for foam control.

Auto Mode:

- The antifoam pump runs automatically when foam is detected.
- It follows pre-set **ON** and **OFF** times based on foam sensor readings.

16. Feed Pump Control

FEED PUMP

FEED PUMP SETTINGS

MANUAL MODE

MANUAL MODE OFF

START STOP

SET SPEED 10.0 RPM

TIME MODE

TIME MODE OFF

START STOP

ON TIME 60 M

OFF TIME 60 M

SPEED 10 RPM

PRIME

DO CASCADE RAMP FUNCTION

PROFILE MODE

PROFILE MODE OFF

S.NO	SET TIME	SET SPEED
1	60 M	10
2	60 M	50
3	60 M	100
4	60 M	150
5	60 M	200

ACT STEP 0

NO. OF CYCLE 0

FEED

MIN SET SPEED	50.0	LPM
MAX SET SPEED	150.0	LPM
RAMP	10.0	LPM
TIME DELAY	10	SEC

START ON TIME 20 SEC

Manual Mode:

- Click the **Feed Pump** button.
- Set the **RPM** and start the pump. It will run until manually stopped.

Time Mode:

- Set the **RPM** and define **On** and **Off** times.
- The pump will run at the set RPM according to the specified schedule.

Profile Mode:

- Set **different RPM** and **time settings** for 5 steps.
- The pump will run through the steps repeatedly until manually stopped.

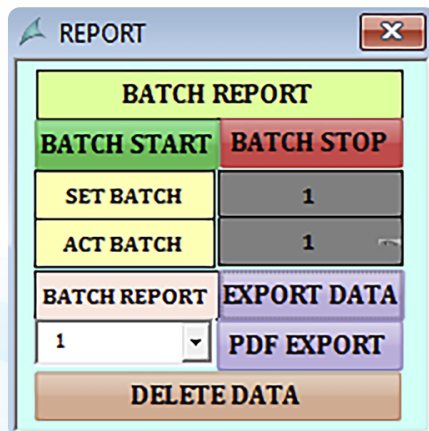
17. Vessel Light Control



The screenshot shows a window titled "VESSEL LIGHT" with a close button. Inside, there is a "LAMP FUNCTION" section. Below it is a red button labeled "LAMP OFF". Underneath are two buttons: a green "ON" button and a red "OFF" button. Below these are two rows of controls: "ON TIME" with a value of "10" and a unit "M", and "ACT TIME" with a value of "0" and a unit "M".

- Click on the **Vessel Light** button.
- Set the **duration** for LED activation.

18. Batch Reporting



The screenshot shows a window titled "REPORT" with a close button. Inside, there is a "BATCH REPORT" section. Below it are two buttons: a green "BATCH START" button and a red "BATCH STOP" button. Underneath are two rows of controls: "SET BATCH" with a value of "1", and "ACT BATCH" with a value of "1". Below these are two rows of controls: "BATCH REPORT" with a dropdown menu showing "1", and "EXPORT DATA" with a button labeled "PDF EXPORT". At the bottom is a button labeled "DELETE DATA".

Batch Setup:

- Enter the **batch name** (numerical format).
- Click **Batch Start** to begin.

Data Logging:

- Process set values and actual values are automatically logged every minute in **Excel format**.

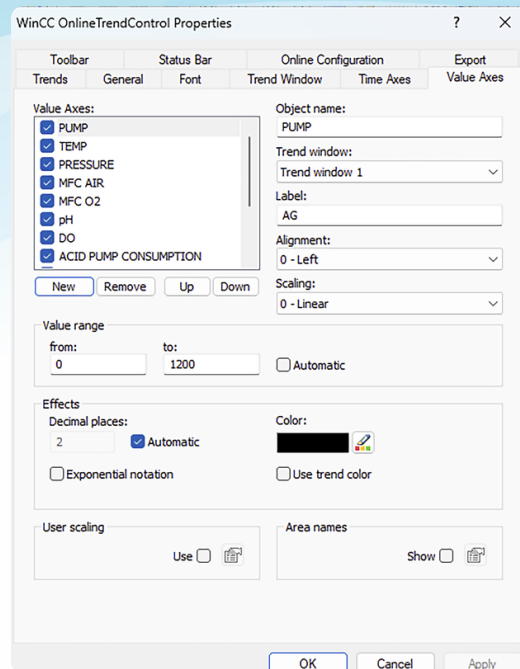
Batch Completion:

- Click **Batch Stop** when the batch is complete.

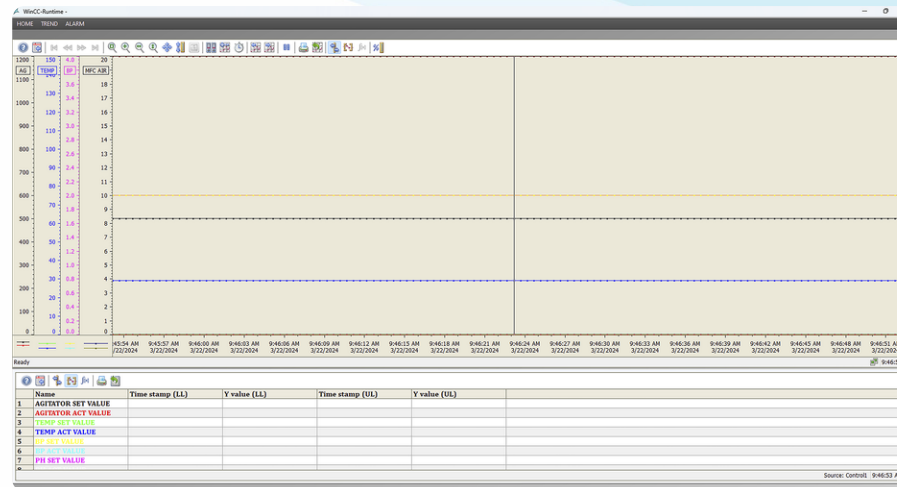
Report Generation:

- Enter the **batch name**.
- Click **Export Data** to generate the report.

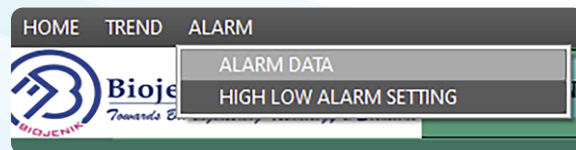
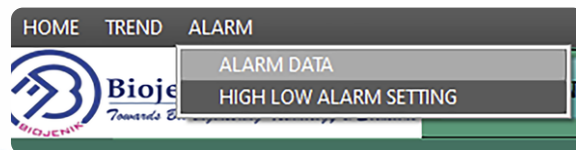
19. Trend Analysis



- Click on the **Trend** button.
- Select process parameters to view **graphical trends**.



20. Alarm Management



Access Alarm Data:

- Click the **Alarm** button and select **Alarm Data**.
- All alarm values will be stored here.

High/Low Alarm Settings:

- Click on the **Alarm** tab and select **High & Low Alarm Data**.
- Set **high** and **low** alarm values.
- If a parameter exceeds these thresholds, the message will be stored in the alarm data page.

HIGH LOW ALARM			
HIGH LOW SETTINGS			
PARAMETER		HIGH	LOW
PH-008	☐	7.00	6.00
PH-009	☐	7.50	7.30
DO-006	☐	15.00	26.00
DO-007	☐	32.00	25.00
TEMP	☐	40.00	35.00
BP	☐	1.50	2.00
MFC AIR	☐	450.00	20.00
AGITATOR	☐	80	50

WinCC Runtime			
Biojenik Engineering			
LOGIN		LOGOUT	USER NAME: admin
FAULT ACK		ALARM ACK	3/22/2024 9:47:54 AM
Type	Value	Type	Value
22/03/24	09:36:33	At PH-008 SENSOR DISCONNECT	91
22/03/24	09:36:33	At PH-009 SENSOR DISCONNECT	92
22/03/24	09:36:33	At DO-007 SENSOR DISCONNECT	93
22/03/24	09:36:33	At DO-006 SENSOR DISCONNECT	94

21. Valve Control

V_91

VALVE 91

VALVE OFF

ON

OFF

ON TIME

2

S

OFF TIME

2

S

V_92

VALVE 92

VALVE OFF

ON

OFF

ON TIME

23

S

OFF TIME

0

S

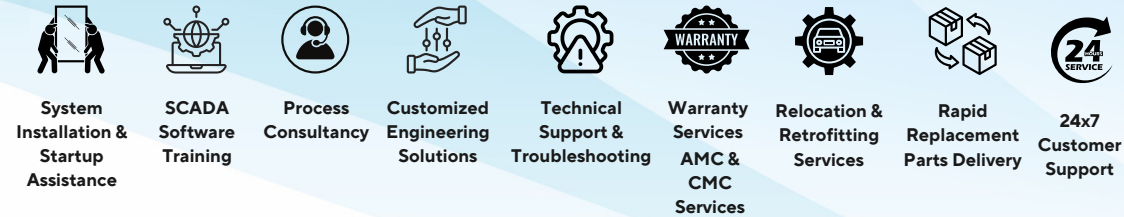
- Manually control valve **on/off** as needed.

Our Valuable Clients



Biojenik Engineering Services

We offer a comprehensive range of services to ensure the smooth operation and longevity of your systems:



Our Certifications



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