

D&W Diesel

Blower Test Room Control System

HMI Manual

2. Process Overview Screen

6. Change Blower Screen

7. Alarms Screen

8. Results Screen

9. Settings Screen

12. Remote Access to HMI Instructions

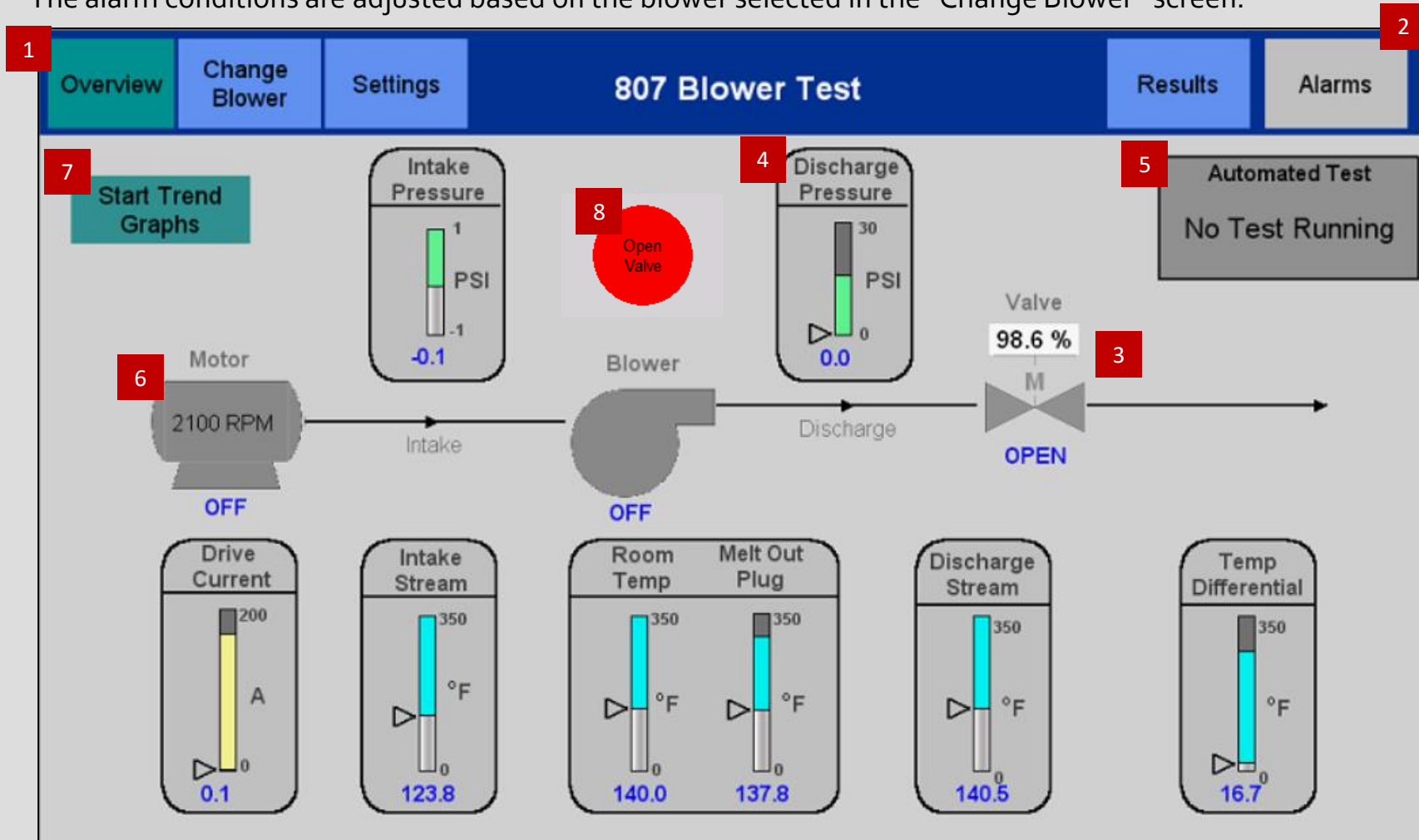
13. Data Collection Instructions

Process Overview Screen:

1 The system overview screen allows for an over-all glance at the status of the system. Navigation to the other various screens can be done from the main top menu of the screen.

Tapping on the Valve icon 2 or the Automated Test icon 3 will open a more detailed control display. The numerical display on the valve icon represents the percent open of the valve at that time.

Alarms will be displayed as banners across the bottom of the screen. The use of the color red on the display is reserved for alarm conditions. The alarm conditions are adjusted based on the blower selected in the "Change Blower" screen.



"Open Valve" Push Button:

The "Open Valve" push button on both MCP and LCP control panels are used as safety switches which will automatically fully open the valve. If this pushbutton is pressed or power is lost, the system will need to be reset. The reset button will be displayed in the valves control screen.

8 The "Open Valve" icon is shown on the overview screen when a remote user is logged on. This operates the same as the push buttons on the enclosure. This is needed in order to have a fast and safe way to open the valve while monitoring the blower from a different location.

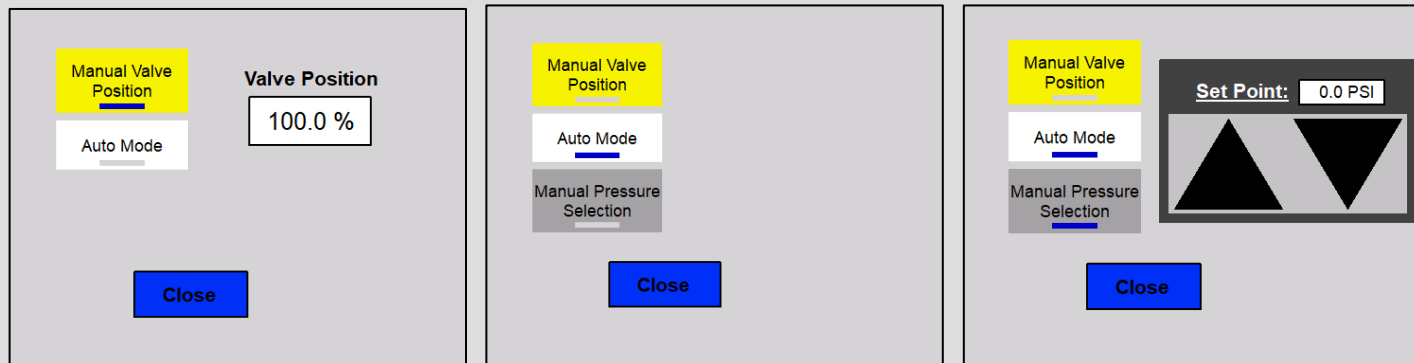
Emergency Stop:

The MCP and LCP control panels do not control the drive. In an emergency, the E-Stop next to either control panel should be used to power down the drive.

Process Overview Screens:

The process overview screen provides the following details and control functions:

- 2 Alarms Button** – This button will navigate to the [Alarms Screen](#). When there are no alarm conditions active the icon will be displayed gray. The icon will turn red when there is an alarm condition to help notify the operator of the alarm.
- 3 Valve Indicator** – The current position of the valve is displayed (% Open). The Auto and Manual modes of the PID controller can be selected from this control screen.



Manual Valve Position:

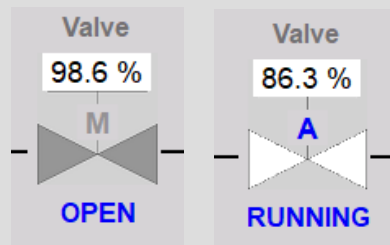
Switches the PID to Manual Mode in the PLC. This allows the user to control the output of the valve. [100% = Full Open , 0% = Full Closed]

Auto Mode:

Switches the PID to Auto Mode in the PLC. This allows the operator to run an automated test.

Manual Pressure Selection:

This option becomes visible when the PID is in Auto Mode. This allows the operator to control the discharge pressure setpoint manually. The setpoint value has upper and lower limits based on the blower selected.

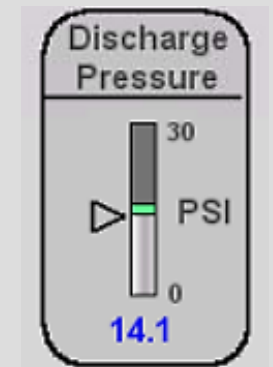


Valve Status:

The Icon color is dark grey when the valve is open and white when the valve is in motion. The valve Icon also displays if the PID is currently in Auto or Manual Mode by showing an "M" or "A".

4 Moving Numeric Indicators:

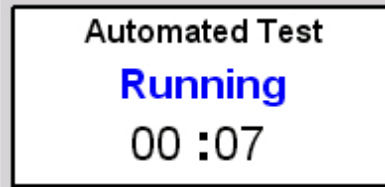
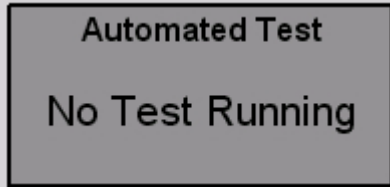
Process monitoring points are displayed using these moving indicators. They provide a quick analysis of the process condition. The current process value is indicated by the blue numbers below the graph. The gray bar and pointer also indicate the process value in relation to the alarm condition shown in dark gray. If the variable reaches the alarm condition the dark gray bar will turn red in order to draw attention from the operator. The alarm condition changes automatically based on the blower selected.



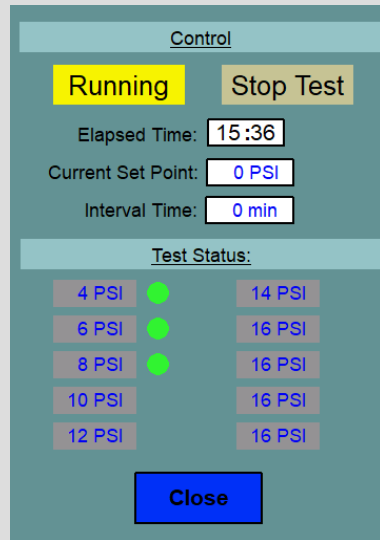
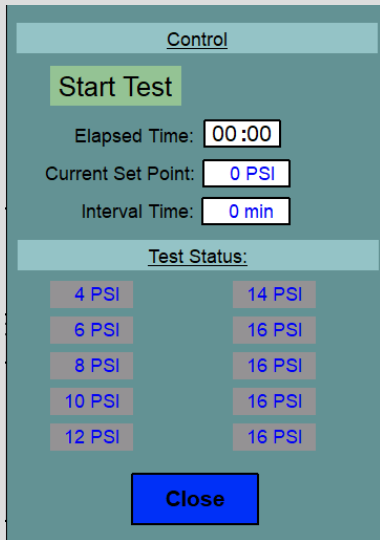
Process Overview Screens:

5

Automated Test Display – The automated test display clearly indicates the status of the test. The display is dark gray when no test is running and turns white when there is a test running. The display also shows the elapsed time the current test has been running.



Automated Test Control Screen – The automated test control screen can be accessed by clicking on the display panel. In order to start the automated test, the valve needed to be in auto mode and a blower needs to be selected (Cyclo, D807, or HPD450). If one of these parameters are not met, the test will not start, and a message box will notify the user.

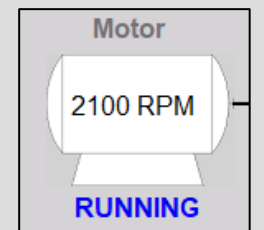
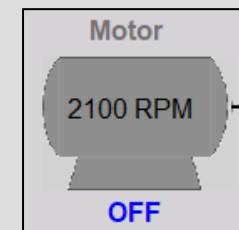


When the test has been started, a yellow running indicator is clearly shown, and a stop test button is displayed. The elapsed time of the test, the current setpoint value, and the interval time at each setpoint value is also displayed. The Interval time can be edited from this screen by tapping on the value. In order to edit this value a security code must be entered. The testing setpoints are shown in blue text under the "Test Status" heading. These values are changed based on the blower that is selected. The green indicator shown next to the pressure value is used to indicate that the interval time at that pressure is done and the results have been recorded to the [Results Screen](#).

The "Stop Test" button will automatically set the controller back to manual mode and hold the current valve position. This is for the case that a blower needs to be run longer.

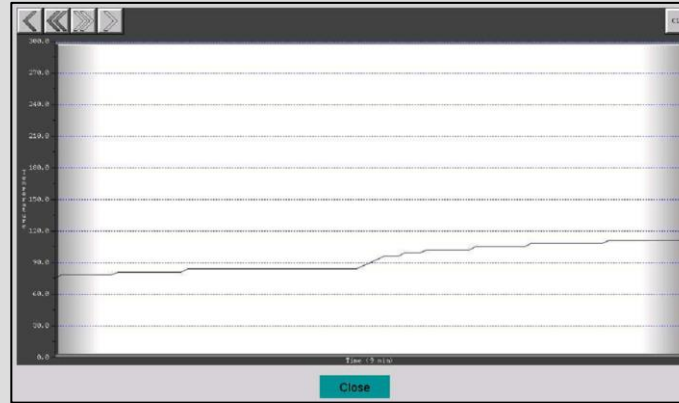
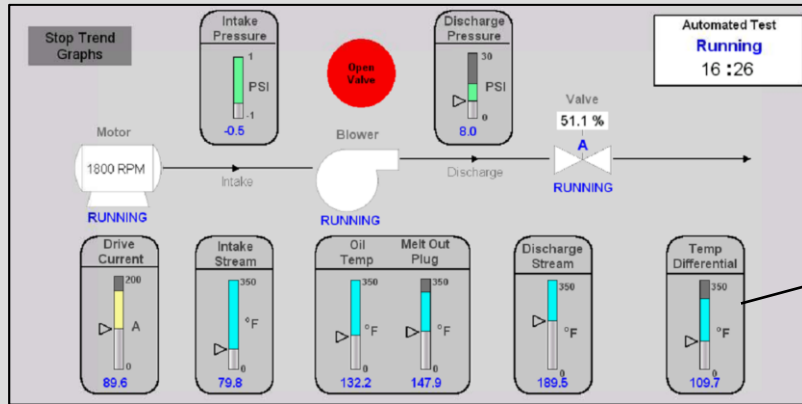
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Motor Indicator – The motor indicator clearly displays to the user when the motor is running. The icon is dark grey when it is not running and turns white when it is running. This is also indicated by the blue text under the icon. The icon also displays the testing RPM needed to test the current blower selected.



Process Overview Screens:

7 Start Trend Graphs – This button is used to start the trend graphs that can be accessed by clicking on any of the bar graphs.

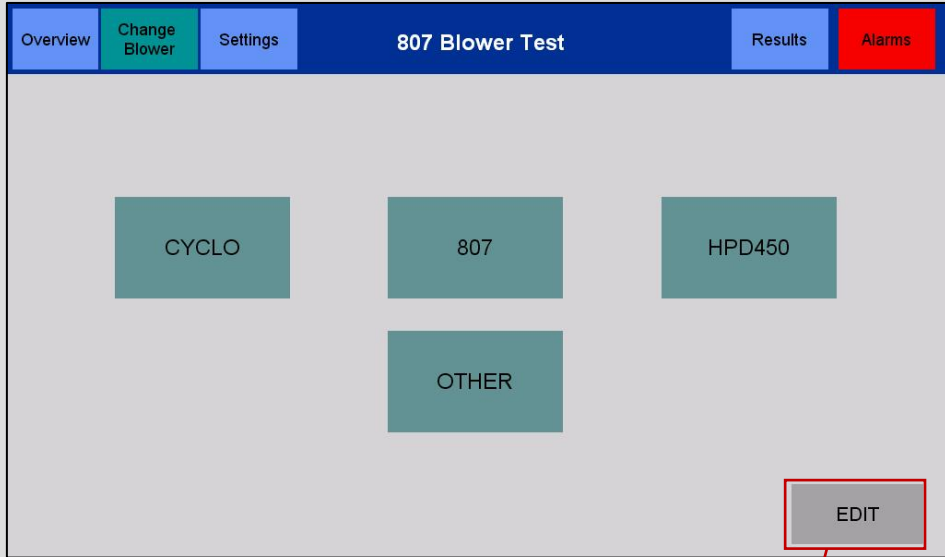


Each graph shows a 9-minute interval to help operator determine if the parameter has leveled out.

Trend graphs are available for the following parameters:

- Discharge Pressure
- Current
- Melt Out Plug Temp
- Discharge Stream Temp
- Temp Differential

Change Blower Screen:



The "Change Blower" screen is used to select the blower that is being tested. When the blower has been selected the title of the blower will appear on the heading of all screens.

The "Edit" button can be used to edit the current setpoint limits seen along with the automated test set point pressure values. This can also be used to add a new blower into the system. Once you have edited the table, the user must select the "Load" button write these changes to the PLC. In order to edit these values a security code must be entered.

		Lower Setpoint Limit	Upper Setpoint Limit	Lower PV Limit	Upper PV Limit
BLOWER SELECTION					
BLOWER	VALVE_LMT_SP_LIMITLO...	VALVE_LMT_SP_LIMITUP...	VALVE_LMT_PV_LIMITLO...	VALVE_LMT_PV_LIMITUP...	
1 CYCLO / 807	0	16.0	0	20.0	
2 807	0	16.0	0	20.0	
3 HPD450	0	25.0	0	30.0	
4 New Blower	0	0.0	0	0.0	

		Lower Setpoint Limit	Upper Setpoint Limit	Lower PV Limit	Upper PV Limit
BLOWER SELECTION					
BLOWER	VALVE_LMT_SP_LIMITLO...	VALVE_LMT_SP_LIMITUP...	VALVE_LMT_PV_LIMITLO...	VALVE_LMT_PV_LIMITUP...	
1 CYCLO / 807	0	16.0	0	20.0	
2 807	0	16.0	0	20.0	
3 HPD450	0	25.0	0	30.0	
4 New Blower	0	0.0	0	0.0	

Close 0

Load Edit

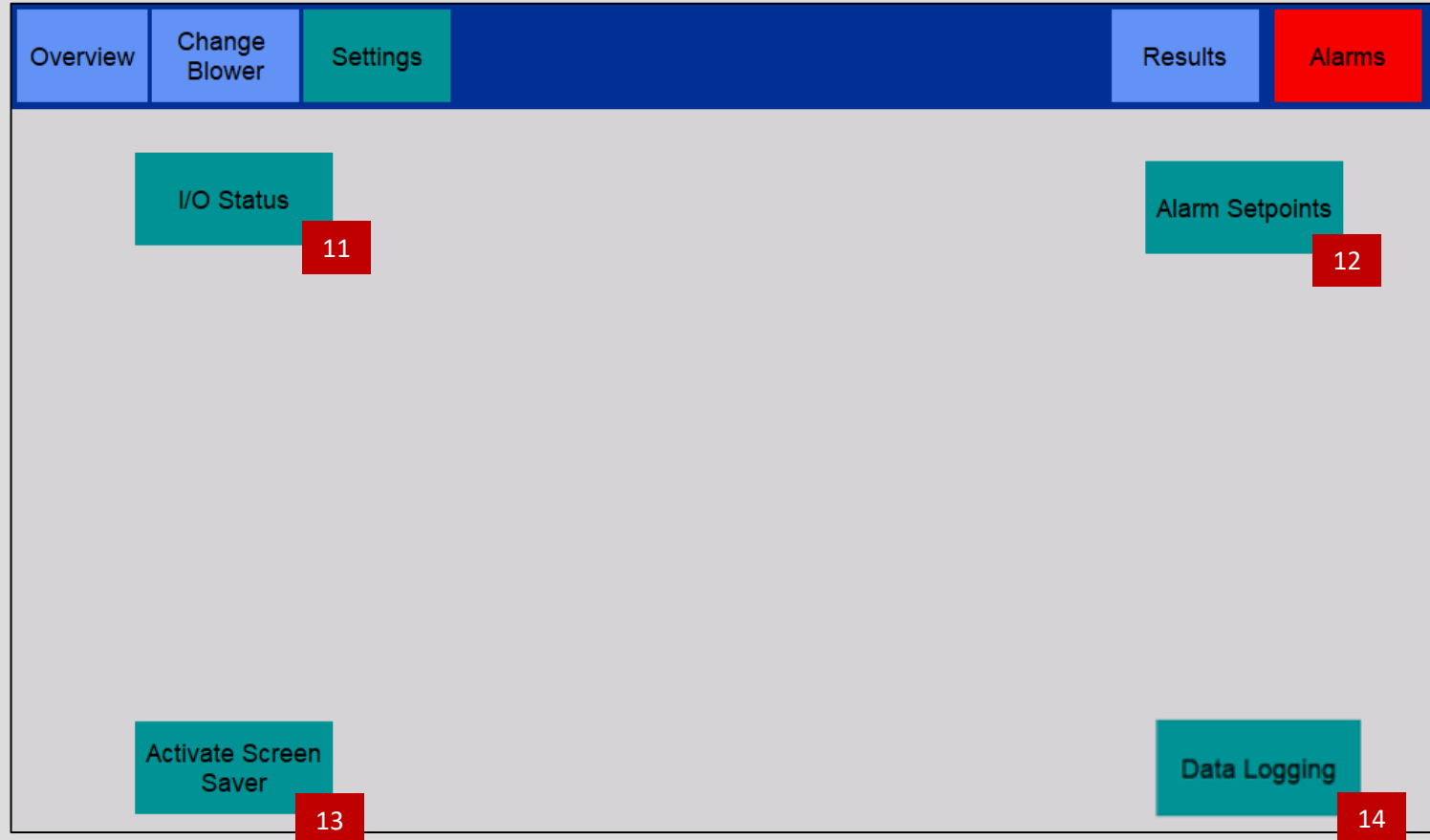
Results Screen:

The Results screen records the data captured every 5-minute interval during the automated test. When a new test is started all values in the table are written to 0 to avoid confusion by the operator if the test was ended early.

Overview	Change Blower	Settings	Cyclo Blower Test					Results	Alarms
Time (min)	Discharge Pressure (PSI)	Inlet Vacuum Pressure (PSI)	Inlet Stream Temp (F)	Discharge Stream Temp (F)	Temp Differential (F)	Drive Current (A)	Melt Out Plug Temp (F)	Test Date: 07/01/21	
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
35	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
45	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

The date displayed shows the date of when the retained results were recorded.

Settings Screen:



11 The I/O Status button will navigate to the I/O status screens.

12 The Alarm Setpoints button will navigate to the alarm setpoints screen.

13 The Activate Screen Saver button can be used to immediately turn the screen off.

14 The Data Logging button is used to access the data logging trend graph along with tuning parameters of the PID.

I/O Status Screens:

The screenshot shows the 'Cyclo Blower Test' interface with the 'Digital I/O' tab selected. The top navigation bar includes 'Overview', 'Change Blower', 'Settings', 'Results', and 'Alarms'. Below the tabs, there are three sub-tabs: 'Digital I/O', 'Analog I/O', and 'Thermocouple I/O'. The main content area is divided into two sections: 'PLC Slot 1 - Inputs' and 'PLC Slot 1 - Outputs'. Each input and output is represented by a horizontal bar with a status indicator (a circle) and a label.

Input/Output	Status	Label
1	Inactive	Open Valve - MCP
2	Active	Open Valve - LCP
3	Active	Valve Open
4	Inactive	Spare
1	Inactive	+24VDC
1	Inactive	Spare
2	Inactive	Spare
3	Inactive	Spare
4	Inactive	Spare

The I/O status screens show the Input and output of every point in the control system. The tabs allow the user to navigate through the different modules. The digital I/O are displayed red when active and gray when inactive. Analog values are displayed in a numerical value ranging from 0 to 100 to represent the 4 – 20mA signal. The Thermocouple Inputs are displayed as temperature values in degrees Fahrenheit.

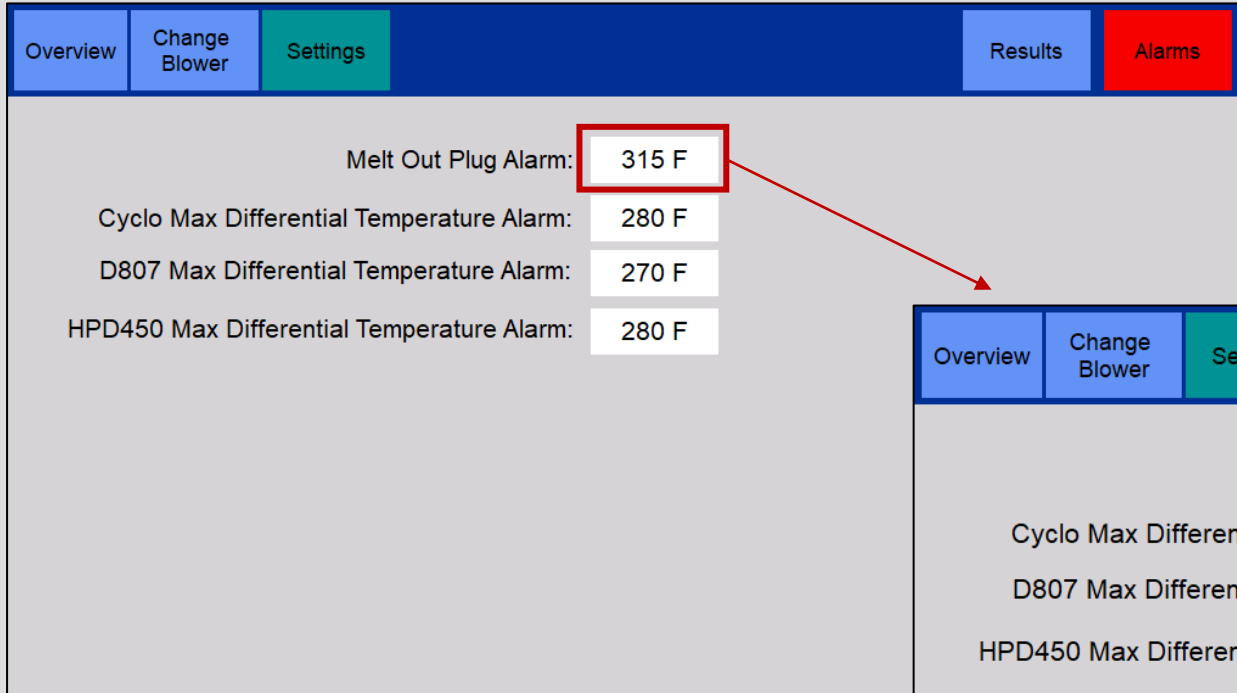
The screenshot shows the 'Cyclo Blower Test' interface with the 'Analog I/O' tab selected. The top navigation bar is the same as the previous screenshot. Below the tabs, there are three sub-tabs: 'Digital I/O', 'Analog I/O', and 'Thermocouple I/O'. The main content area is divided into two sections: 'PLC Slot 1 - Inputs' and 'PLC Slot 1 - Outputs'. Each input and output is represented by a horizontal bar with a numerical value, a status indicator (a circle), and a label.

Input/Output	Value	Status	Label
AD1I	-15	Active	Inlet Pressure
AD2I	0	Inactive	Discharge Pressure
AD3I	0	Inactive	Spare
AD4I	0	Inactive	Spare
CH1	99	Active	Valve Feedback Signal
CH2	0	Inactive	VFD Current Signal
CH3	0	Inactive	Spare
CH4	0	Inactive	Spare
DA1I	100	Active	Valve Output Signal
DA2I	0	Inactive	Spare

Critical Alarm Setpoint Screen:

The alarm setpoint screen is used to display setpoint values that the critical alarms are set at. Critical alarms consist of the alarms that will end the test and open the valve immediately if energized.

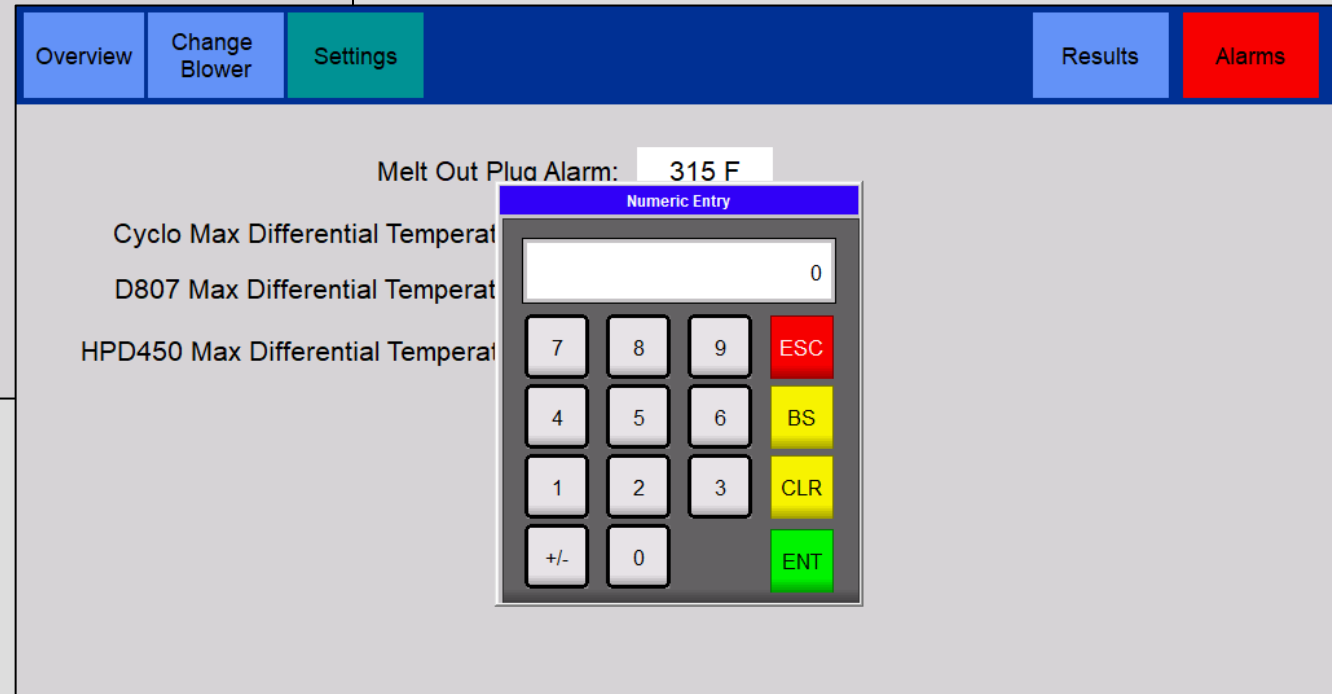
This screen also allows this setpoint to be edited via the HMI. Just tap on the numerical display and enter the new value on the keypad. A security code will need to be entered before the value can be edited.



Overview Change Blower Settings Results Alarms

Melt Out Plug Alarm:	315 F
Cyclo Max Differential Temperature Alarm:	280 F
D807 Max Differential Temperature Alarm:	270 F
HPD450 Max Differential Temperature Alarm:	280 F

A red box highlights the '315 F' value for the Melt Out Plug Alarm, with a red arrow pointing to the keypad in the adjacent screenshot.



Overview Change Blower Settings Results Alarms

Melt Out Plug Alarm: 315 F

Cyclo Max Differential Temperature Alarm: 280 F

D807 Max Differential Temperature Alarm: 270 F

HPD450 Max Differential Temperature Alarm: 280 F

Numeric Entry

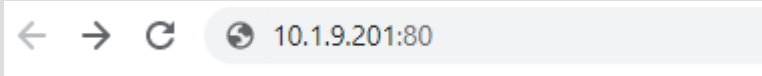
7	8	9	ESC
4	5	6	BS
1	2	3	CLR
+/-	0		ENT

The keypad is currently showing '0' in the input field.

Remote Viewing of HMI:

Remote viewing of the HMI is useful for the operator to monitor the test at his workstation while having the ability to work on other jobs.

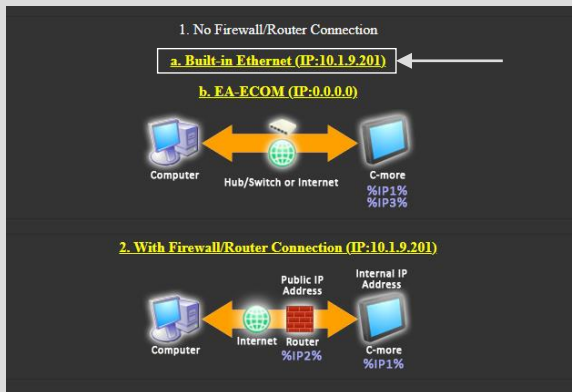
1. Type IP address and port number into search bar of computer that is connected to the network.



2. Click on "Remote Access" link

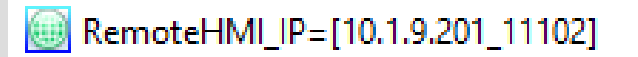


3. Click on "Built in Ethernet" link

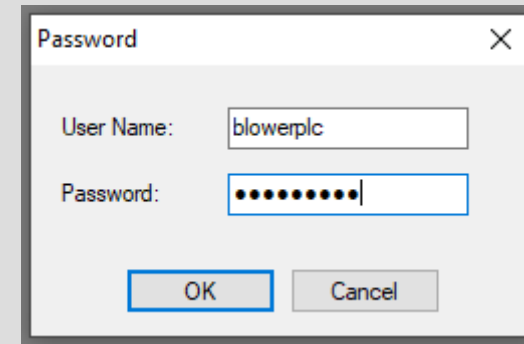


4. The remote access application can be found in the downloads folder and should be moved to the desktop of the computer being used.

This link can be used from now on to connect to the HMI



5. Login credentials are needed every time you connect to the HMI.



Username: blowerplc
Password: blowerplc

Data Collection Instructions:

This can be very useful for further tuning of the system in the future along with other applications like collecting pressure data on blow off valves for Part Qualifications.

1. Go to the settings screen on the HMI and select “Data Logging”



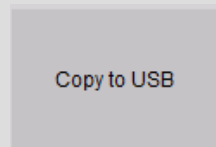
2. Make sure the “USB Ready” light is on



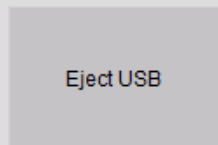
3. Click “Start Data Log” to begin recording data and “Stop Data Log” when you are finished.



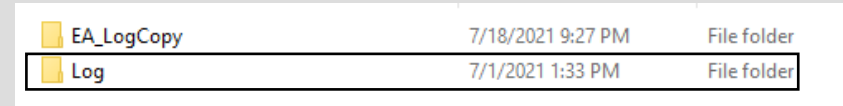
4. Before removing USB, click “Copy to USB” to ensure all data is transferred.



5. After data has been copied, select “Eject USB”



6. Remove Flash drive from back of HMI and plug into computer. Select the “Log” folder to access the logged .txt files



7. Copy data to excel in order to graph

- Data points are recorded every second

