



AyrDyne[®] v3.0
monitoring system

**Installation, Operation, and
Maintenance Manual**

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INTRODUCTION

The purpose of this document is to outline proper installation, maintenance, operation, and care of the AyrDyne® Monitoring System Human Machine Interface (HMI). This document is in no way intended to be used to determine the reliability of this product outside of its originally intended application. It is the duty of the end user or integrator to perform the appropriate risk analysis in order to determine the relevance of its use within any specific application.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

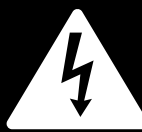
Failure to follow the guidelines outlined in this manual may result in injury, harm, or improper operating results. Failure to observe this information may also result in equipment damage, premature wear, or failure.

SAFETY

The installation, maintenance, operation, and care of the AyrDyne® Monitoring System Human Machine Interface (HMI) should only be performed by individuals who are qualified and trained to do so. A “qualified” person in this context is a person who has skills and knowledge related to the construction and operation of electrical equipment and its installation through both work experience and training. Additionally, a qualified person is one who has received and undergone safety training specific to electrical maintenance. Anyone who has not undergone safety training specific to this system should not operate or perform maintenance on the system.

In terms of maintenance of this system, “lock out tag out” safety protocol applies. This means that any time maintenance on this system is performed, the machine must be shut down, unplugged and tagged or labeled, explaining that maintenance is taking place.

DenTech is not liable for any consequences arising from misuse of this system. If you are unsure of whether you are qualified to use or maintain this system, please contact an electrician or other qualified professional for assistance. Failure to follow safety protocol for this and any other system could result in serious bodily harm or other injury. **No responsibility is assumed by DenTech for any consequences arising out of the use of this material.**



This symbol indicates that an electrical hazard exists which could result in personal injury if the instructions are not followed.



This safety alert symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

2.1 REMOVAL OF HMI

CAUTION!
MECHANICALLY UNSTABLE TERMINAL
Always keep HMI stable in panel cut-out while you are installing or removing installation fasteners.
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY, OR EQUIPMENT DAMAGE.

WARNING!
ELECTRICAL SHOCK HAZARD EXISTS
- Ensure that the control enclosure within which you are working is powered down and locked out.
- Verify that all power sources are in a zero energy state.
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY, DEATH, OR EQUIPMENT DAMAGE.



Figure 2.3.1a
Front view of HMI.



Figure 2.3.1b
Rear view of HMI.

REMOVAL OF HMI

2.1



Figure 2.3.1c
Power connection removed from HMI.

2.1 REMOVAL OF HMI

- 1 Pull green connector downward to remove power connection from HMI.
- 2 Use a T-20 Torx screwdriver to remove the ground wire.

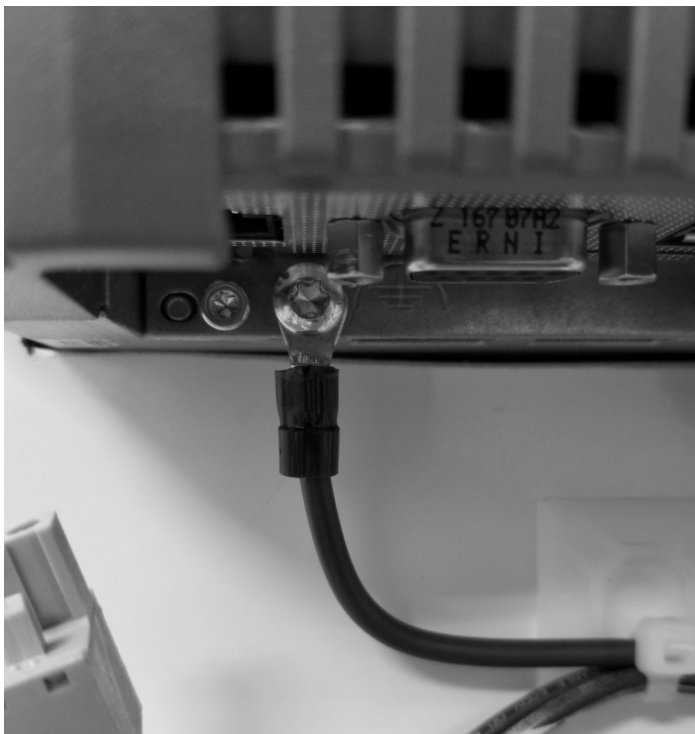


Figure 2.3.2
Ground wire with T-20 Torx screw.

REMOVAL

- 3 With the HMI free from all electrical wiring, begin to loosen the 10 installation fasteners that secure the HMI to the control enclosure door using a small flat head screwdriver. Make sure to support the HMI with the other hand.
- 4 Continue to loosen fasteners until they can be removed from the HMI.



Figure 2.3.3
Loosening HMI fasteners.



Figure 2.3.4
Installation fasteners removed.

REMOVAL & INSTALLATION 2.1



Figure 2.3.5a
Removal of the HMI from the front of the enclosure.

- 5** Once the installation fasteners have been removed, gently remove the AyrDyne HMI from the front of the enclosure door, taking care not to damage or displace the installation gasket.

2.2 INSTALLATION OF HMI

- 1** To install the HMI, follow the steps on pages six through nine in reverse order.



Figure 2.3.5b
HMI completely removed.

INSTALLATION & REMOVAL

2.3

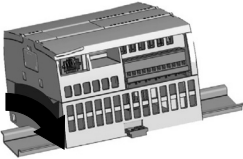
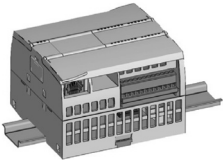
INSTALLING & REMOVING PLC

For the removal of the PLC portion of the AyrDyne Monitoring System, please visit the AyrDyne website for a link to the Siemens installation manual.

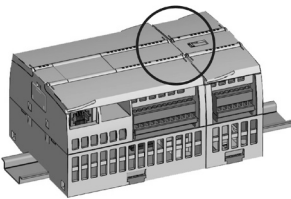
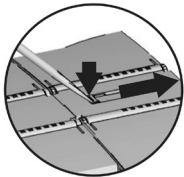
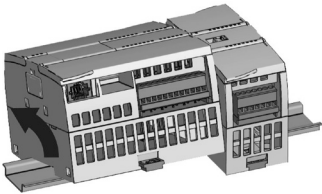
[Siemens S7-1200 Manual](#) System Manual, 04/2012, A5E02486680-06
Pages 50-55

2.3.1 INSTALLING & REMOVING THE CPU ON A DIN RAIL

// a) INSTALLING THE CPU ON A DIN RAIL

TASK	PROCEDURE
	<ol style="list-style-type: none"> 1. Install the DIN rail. Secure the rail to the mounting panel every 75 mm. 2. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 3. Hook the CPU over the top of the DIN rail. 4. Pull out the DIN rail clip on the bottom of the CPU to allow the CPU to fit over the rail.
	<ol style="list-style-type: none"> 5. Rotate the CPU down into position on the rail. 6. Push in the clips to latch the CPU to the rail.

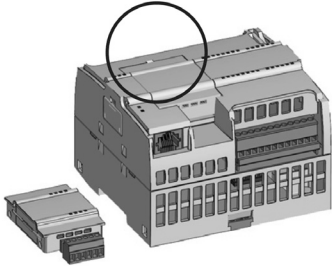
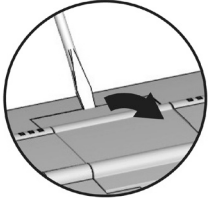
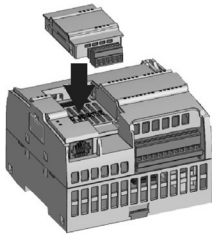
// b) REMOVING THE CPU FROM A DIN RAIL

TASK	PROCEDURE
 	<ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Disconnect the I/O connectors, wiring, and cables from the CPU (Page 55). 3. Remove the CPU and any attached communication modules as a unit. All signal modules should remain installed.
	<ol style="list-style-type: none"> 4. If an SM is connected to the CPU, retract the bus connector: <ul style="list-style-type: none"> - Place a screwdriver beside the tab on the top of the signal module. - Press down to disengage the connector from the CPU. - Slide the tab fully to the right. 5. Remove the CPU: <ul style="list-style-type: none"> - Pull out the DIN rail clip to release the CPU from the rail. - Rotate the CPU up and off the rail, and remove the CPU from the system.

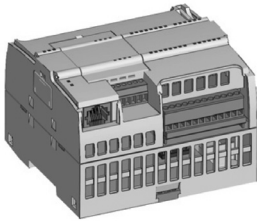
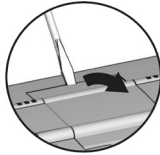
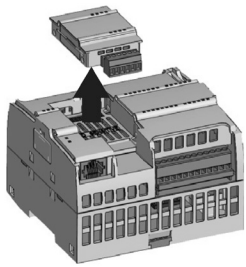
INSTALLING & REMOVING PLC 2.3

2.3.2 INSTALLING & REMOVING AN SB, CB or BB

// a) INSTALLING AN SB, CB, or BB

TASK	PROCEDURE
	<ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Remove the top and bottom terminal block covers from the CPU. 3. Place a screwdriver into the slot on top of the CPU at the rear of the cover.
	 <ol style="list-style-type: none"> 4. Gently pry the cover up and remove it from the CPU. 5. Place the module straight down into its mounting position in the top of the CPU. 6. Firmly press the module into position until it snaps into place. 7. Replace the terminal block covers.

// a) REMOVING AN SB, CB, or BB

TASK	PROCEDURE
	 <ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Remove the top and bottom terminal block covers from the CPU. 3. Place a screwdriver into the slot on top of the module.
	<ol style="list-style-type: none"> 4. Gently pry the module up to disengage it from the CPU. 5. Remove the module straight up from its mounting position in the top of the CPU. 6. Replace the cover onto the CPU. 7. Replace the terminal block covers.

2.3 INSTALLING & REMOVING PLC

2.3.3 INSTALLING OR REPLACING THE BATTERY IN THE BB 1297 BATTERY BOARD

The BB 1297 requires battery type CR1025. The battery is not included with the BB 1297 and must be purchased by the user.

TO INSTALL A NEW BATTERY, FOLLOW THESE STEPS:

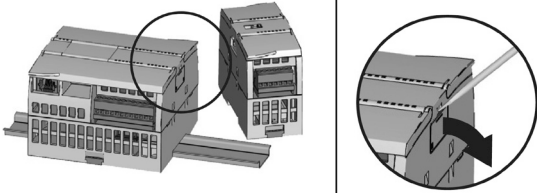
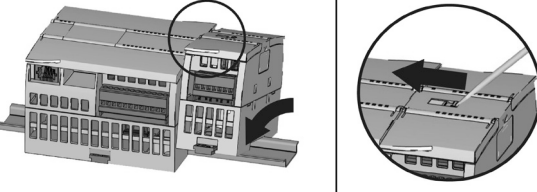
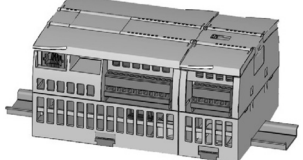
- 1 In the BB 1297, install a new battery with the positive side of the battery on top, and the negative side next to the printed wiring board.
- 2 The BB 1297 is ready to be installed in the CPU. Follow the installation directions on page 11 to install the BB 1297.

TO REPLACE THE BATTERY IN THE BB 1297:

- 1 Remove the BB 1297 from the CPU following the removal directions on page 11.
- 2 Carefully remove the old battery using a small screwdriver. Push the battery out from under the clip.
- 3 Install a new CR1025 replacement battery with the positive side of the battery on top and the negative side next to the printed wiring board.
- 4 Re-install the BB 1297 battery board following the installation directions on page 11.

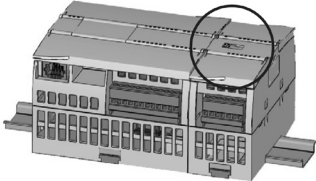
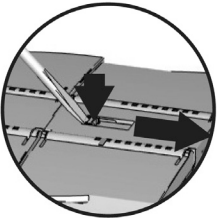
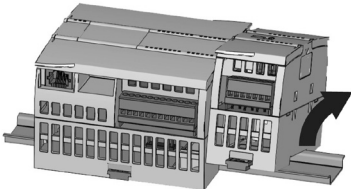
2.3.4 INSTALLING & REMOVING AN SM

// a) INSTALLING AN SM

TASK		PROCEDURE
		Install your SM after installing the CPU. <ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Remove the cover for the connector from the right side of the CPU. 3. Insert a screwdriver into the slot above the cover. 4. Gently pry the cover out at its top and remove the cover. Retain the cover for reuse.
		Connect the SM to the CPU: <ol style="list-style-type: none"> 1. Position the SM beside the CPU. 2. Hook the SM over the top of the DIN rail. 3. Pull out the bottom DIN rail clip to allow the SM to fit over the rail. 4. Rotate the SM down into position beside the CPU and push the bottom clip in to latch the SM onto the rail.
		Extending the bus connector makes both mechanical and electrical connections for the SM. <ol style="list-style-type: none"> 1. Place a screwdriver beside the tab on the top of the SM. 2. Slide the tab fully to the left to extend the bus connector into the CPU. Follow the same procedure to install a signal module to a signal module.

INSTALLING & REMOVING PLC 2.3

// b) REMOVING AN SM

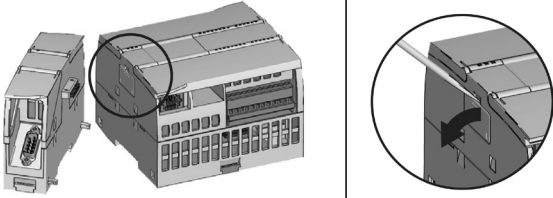
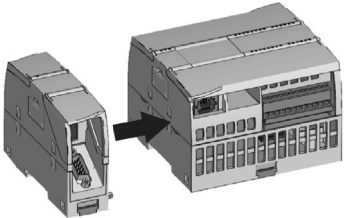
TASK	PROCEDURE
	<p>You can remove any SM without removing the CPU or other SMs in place.</p> <ol style="list-style-type: none">1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power.2. Remove the I/O connectors and wiring from the SM (Page 55).3. Retract the bus connector.<ul style="list-style-type: none">- Place a screwdriver beside the tab on the top of the SM.- Press down to disengage the connector from the CPU.- Slide the tab fully to the right.
	<p>If there is another SM to the right, repeat this procedure for that SM.</p>
	<p>Remove the SM:</p> <ol style="list-style-type: none">1. Pull out the bottom DIN rail clip to release the SM from the rail.2. Rotate the SM up and off the rail. Remove the SM from the system.3. If required, cover the bus connector on the CPU to avoid contamination. Follow the same procedure to remove a signal module from a signal module.

2.3 INSTALLING & REMOVING PLC

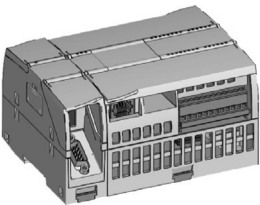
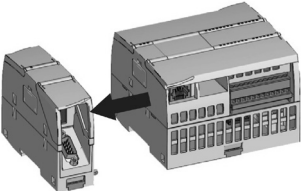
2.3.5 INSTALLING & REMOVING A CM OR CP

Attach any communication modules to the CPU and install the assembly as a unit, as shown in Installing and Removing the CPU (page 49).

// a) INSTALLING A CM OR CP

TASK	PROCEDURE
	<ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Attach the CM to the CPU before installing the assembly as a unit to the DIN rail or panel. 3. Remove the bus cover from the left side of the CPU: <ul style="list-style-type: none"> - Insert a screwdriver into the slot above the bus cover. - Gently pry out the cover at its top.
	<ol style="list-style-type: none"> 4. Remove the bus cover. Retain the cover for reuse. 5. Connect the CM or CP to the CPU: <ul style="list-style-type: none"> - Align the bus connector and the posts of the CM with the holes of the CPU - Firmly press the units together until the posts snap into place. 6. Install the CPU and CP on a DIN rail or panel.

// b) REMOVING A CM OR CP

TASK	PROCEDURE
	<p>Remove the CPU and CM as a unit from the DIN rail or panel.</p> <ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Remove the I/O connectors and all wiring and cables from the CPU and CMs. 3. For DIN rail mounting, move the lower DIN rail clips on the CPU and CMs to the extended position.
	<ol style="list-style-type: none"> 4. Remove the CPU and CMs from the DIN rail or panel. 5. Grasp the CPU and CMs firmly and pull apart.

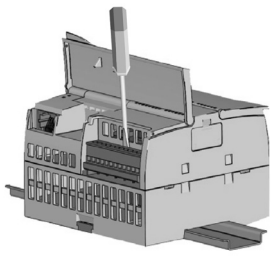
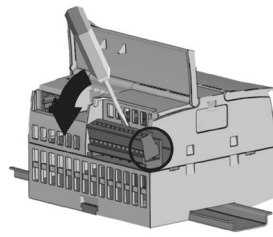
CAUTION!
 Do not use a tool to separate the modules because this will damage the units.

INSTALLING & REMOVING PLC 2.3

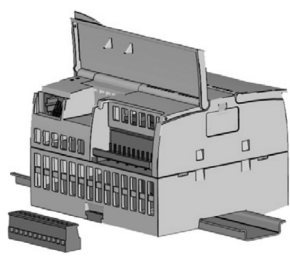
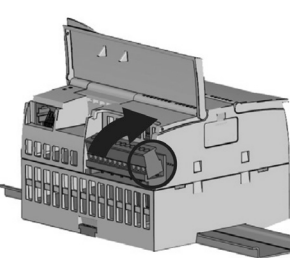
2.3.6 REMOVING & REINSTALLING THE S7-1200 TERMINAL BLOCK CONNECTOR

The CPU, SB, and SM modules provide removable connectors to make connecting the wiring easy.

// a) REMOVING THE CONNECTOR

TASK	PROCEDURE
	<p>Prepare the system for terminal block connector removal by removing the power from the CPU and opening the cover above the connector.</p> <ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Inspect the top of the connector and locate the slot for the tip of the screwdriver. 3. Insert a screwdriver into the slot.
	<ol style="list-style-type: none"> 4. Gently pry the top of the connector away from the CPU. The connector will release with a snap. 5. Grasp the connector and remove it from the CPU.

// b) INSTALLING THE CONNECTOR

TASK	PROCEDURE
	<p>Prepare the components for terminal block installation by removing power from the CPU and opening the cover for connector.</p> <ol style="list-style-type: none"> 1. Ensure that the CPU and all S7-1200 equipment are disconnected from electrical power. 2. Align the connector with the pins on the unit. 3. Align the wiring edge of the connector inside the rim of the connector base.
	<ol style="list-style-type: none"> 4. Press firmly down and rotate the connector until it snaps into place. <p>Check carefully to ensure that the connector is properly aligned and fully engaged.</p>

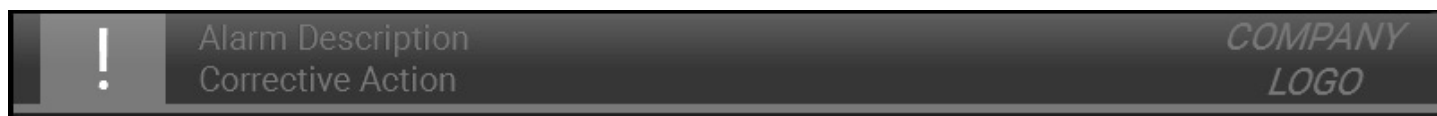
3.1 SCREEN OVERVIEW

This section covers the navigation and operation of the standard AyrDyne monitoring system. The operation and functionality of each screen is covered in detail in later sections. The table below shows the layout of the screens. Available screens depend on system requirements and configuration.

Home	An overview of the system and the first screen to display when power is applied	
Filters	Contains all monitoring, settings, and controls related to the filters	
	Primary Filter	Primary filter differential pressure monitoring and cleaning
	Hand Clean	Primary filter cleaning system monitoring and manual control
	Secondary Filter	Secondary filter differential pressure monitoring
Airflow	Contains all monitoring, settings, and controls related to airflow	
	Airflow Settings	Airflow monitoring and control settings
	VFD Settings	VFD monitoring and control settings
Discharge	Contains all monitoring, settings, and controls related to the discharge system	
Safety	Contains all monitoring, settings, and controls related to safety	
System	Contains system wide monitoring, settings, and controls	
	Alarms	Monitors and controls alarms
	Settings	System settings
	I/O	Input/Output monitoring and control settings
	Metrics	System Metrics
	Service Reminders	Service reminder settings

SCREEN OVERVIEW 3.1

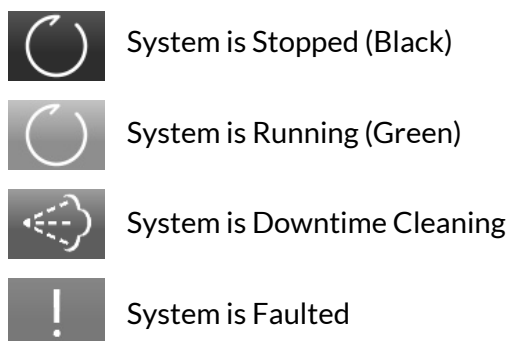
3.1.1 STATUS BAR



The status bar, which displays system information, is visible on all screens. This bar displays system information, active alarm description, and corrective action.

1 SYSTEM STATE INDICATOR

This graphic display shows the current system state.



2 SYSTEM FAULTS

This text display shows details of any active faults as well as corrective actions.

3 LOGO

This graphic display shows the logo of the company that you may contact for information on the system, spare, or replacement parts ordering and help with the system. Pressing the logo will display the contact information. Once on the contact information screen, you may press anywhere on the screen to return to the home screen.

3.1.2 NAVIGATION BAR



The navigation bar is located at the bottom of each screen and can be used to navigate through the various systems. The underline indicates the section currently displayed. The circle with the exclamation symbol denotes when a section is in alarm.

1 AYRDYNE

This button displays the home screen

2 FILTERS

This button displays the filters screen

3 AIRFLOW

This button displays the airflow screen

4 DISCHARGE

This button displays the discharge screen

5 SAFETY

This button displays the safety screen

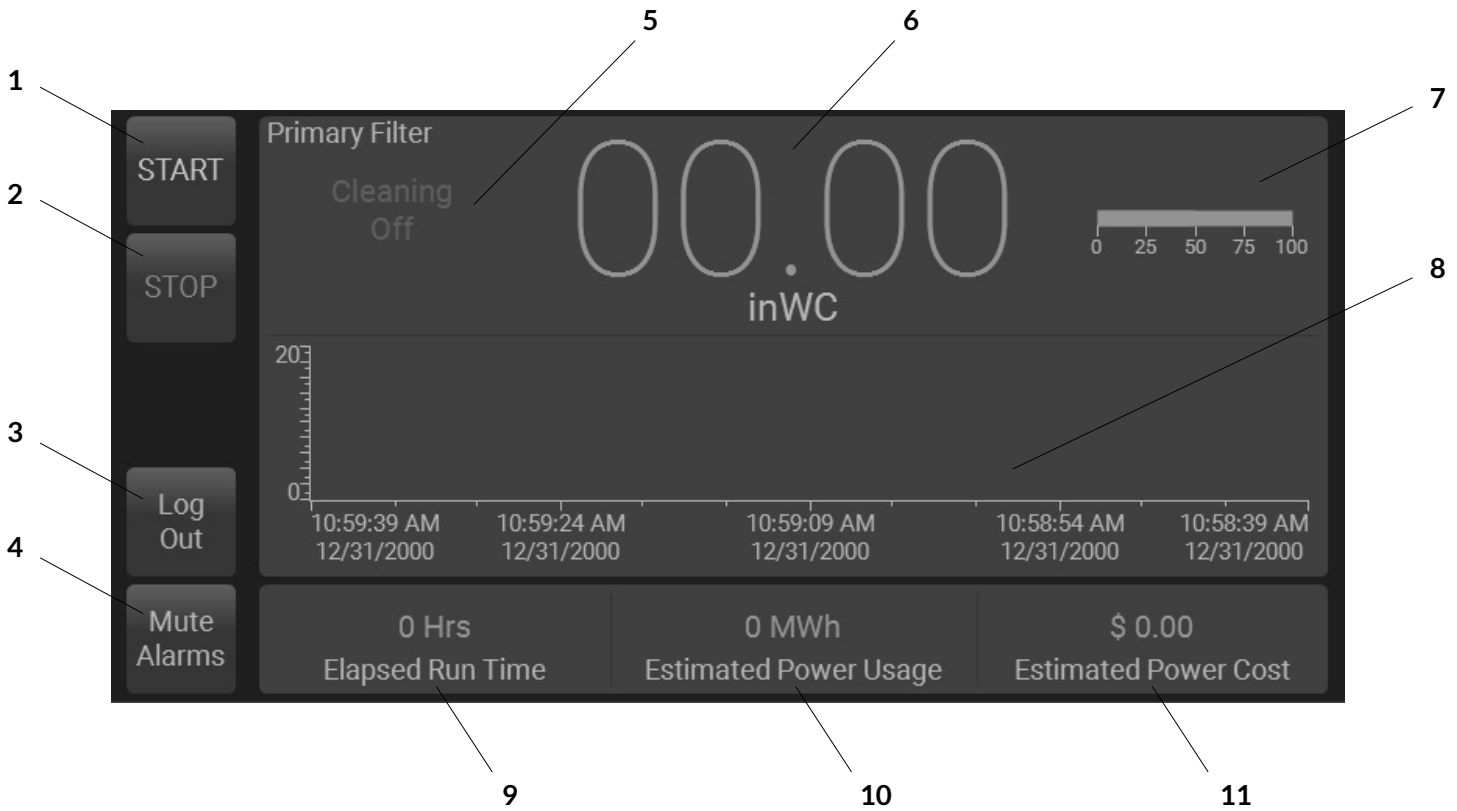
6 SYSTEM

This button displays the system screen

3.1 SCREEN OVERVIEW

3.1.3 HOME

The home screen serves as the overview for the system. This screen will be the first screen displayed once the system is powered up.

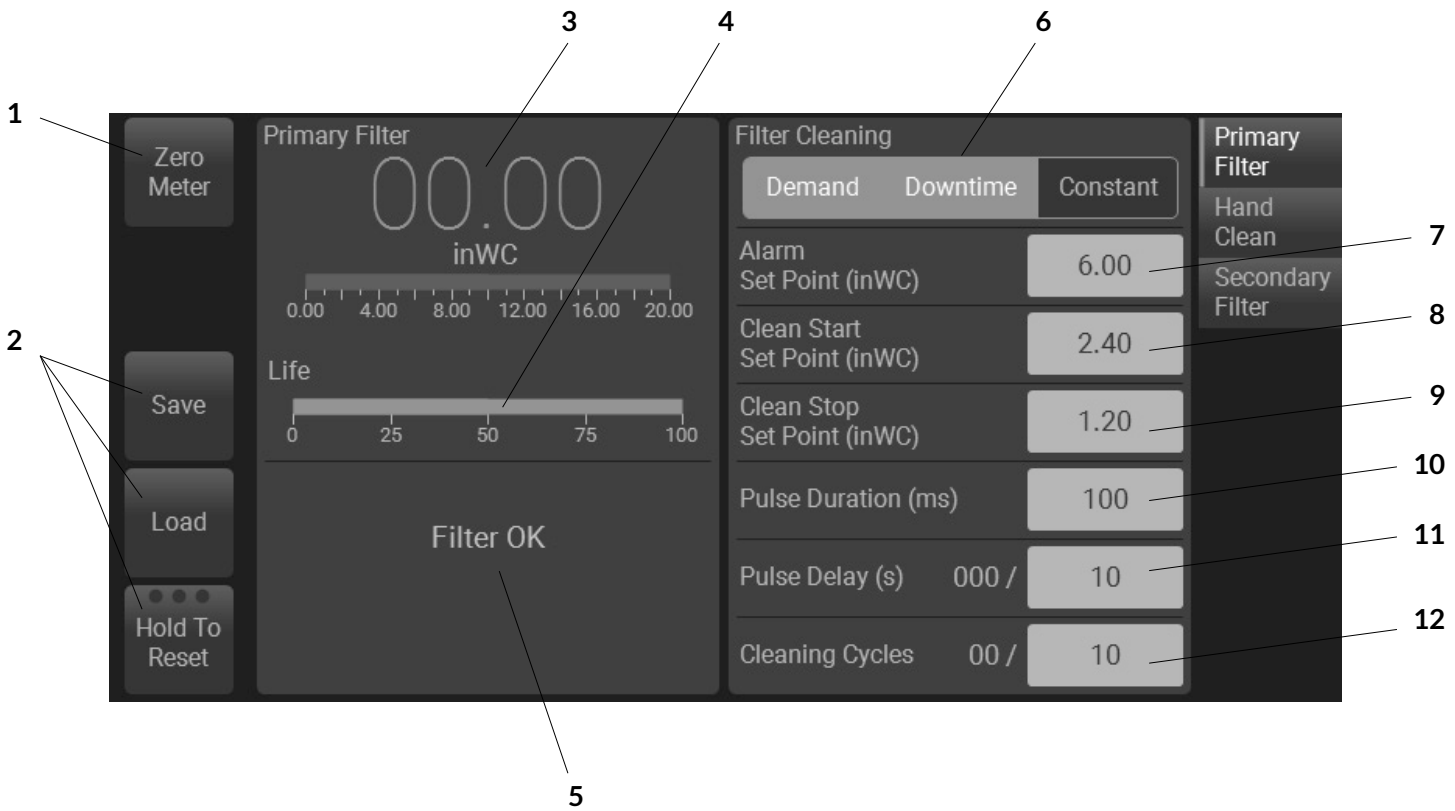


- 1 START**
This button starts the system.
- 2 STOP**
This button stops the system on the first press and stops the downtime cleaning, if running, on the second press.
- 3 LOG OUT**
This button allows the user to log-out.
- 4 MUTE ALARMS**
This button mutes the alarm horn, if equipped. New alarms will reactivate the alarm horn.
- 5 PRIMARY FILTER CLEANING STATE**
This text display shows the current state of the filter cleaning system.
- 6 PRIMARY FILTER DP (inWC)**
This numeric display shows the current differential pressure measured between clean and dirty sides of the filter(s).
- 7 PRIMARY FILTER LIFE**
This text and bar graph display shows filter status and remaining life.
- 8 PRIMARY FILTER DP TREND**
This trend display shows the historic trend of the filter DP. This data is lost when the HMI is powered off.
- 9 ELAPSED RUN TIME (Hrs)**
This numeric display shows the run time of the system.
- 10 ESTIMATED POWER USAGE (MWh)**
This numeric display shows estimated power usage if equipped with a VFD.
- 11 ESTIMATED POWER COST (USD)**
This numeric display shows estimated power usage cost if equipped with a VFD.

3.2 FILTERS

The Filters section contains screens related to filtering. Screens may vary based on system configuration.

3.2.1 PRIMARY FILTER



- 1 ZERO METER**
The Zero push button will zero the differential pressure reading, should it wander from zero over the lifespan of the differential pressure sensor. This can only be done when the system is not running. Additionally, the pneumatic tubing should be disconnected from the control panel.
- 2 SAVE, LOAD AND RESET**
These buttons affect items on the displayed screen only. The reset button must be held until all indicators in the button turn blue, approximately 3 seconds.
 - a) Save**
Saves the settings for later use.
 - b) Load**
Loads previously saved settings.
 - c) Hold To Reset**
Resets settings to factory defaults.

- 3 PRIMARY FILTER DP**
This numeric display and bar graph show the filter differential pressure measured between the dirty and clean sides of the filters.
- 4 LIFE**
This bar graph shows the remaining life of the filter.
- 5 PRIMARY FILTER STATUS**
The filter status shows filter life. When the filter is nearing end of life, it will remind you to order or schedule the filter change. Once the filter has reached end of life, it will prompt you to change the filter.
- 6 CLEAN MODE SELECTION**
This multi-selector sets the type of filter cleaning performed by the system. There are three types of cleaning: On Demand, On

Demand with Downtime, or Constant. On Demand with Downtime is the recommended setting.

- (a) **On Demand**
Cleans the filters based on the filter DP reading.
 - i. Cleaning starts when Filter DP rises above Clean Start Set Point
 - ii. Cleaning stops when Filter DP falls below Clean Stop Set Point
- (b) **Downtime**
Cleans the filters based on the downtime cleaning settings. This will start as soon as the system is stopped and run through all the set cycles.
- (c) **Constant**
This will run the cleaning cycle constantly.

7**ALARM SET POINT**

This numeric entry/display shows the set point that the differential pressure must rise above to initiate an alarm. This value is adjustable between the Clean Start Set Point and maximum transmitter output. Recommended setting is 6 inWC.

8**CLEAN START SET POINT**

This numeric entry/display shows the set point that the differential pressure must rise above to start On Demand cleaning. This value is adjustable between the Clean Stop Set Point and Alarm Set Point. Recommended setting is 2.4 inWC.

9**CLEAN STOP SET POINT**

This numeric entry/display shows the set point that the differential pressure must fall below to stop On Demand cleaning. This value is adjustable between minimum transmitter output and the Clean Start Set Point. Recommended setting is 1.2 inWC.

10**PULSE DURATION (ms)**

This numeric entry/display shows the duration of each cleaning pulse. This value is adjustable between 50 and 500 milliseconds (ms). Recommended setting is 100 ms.

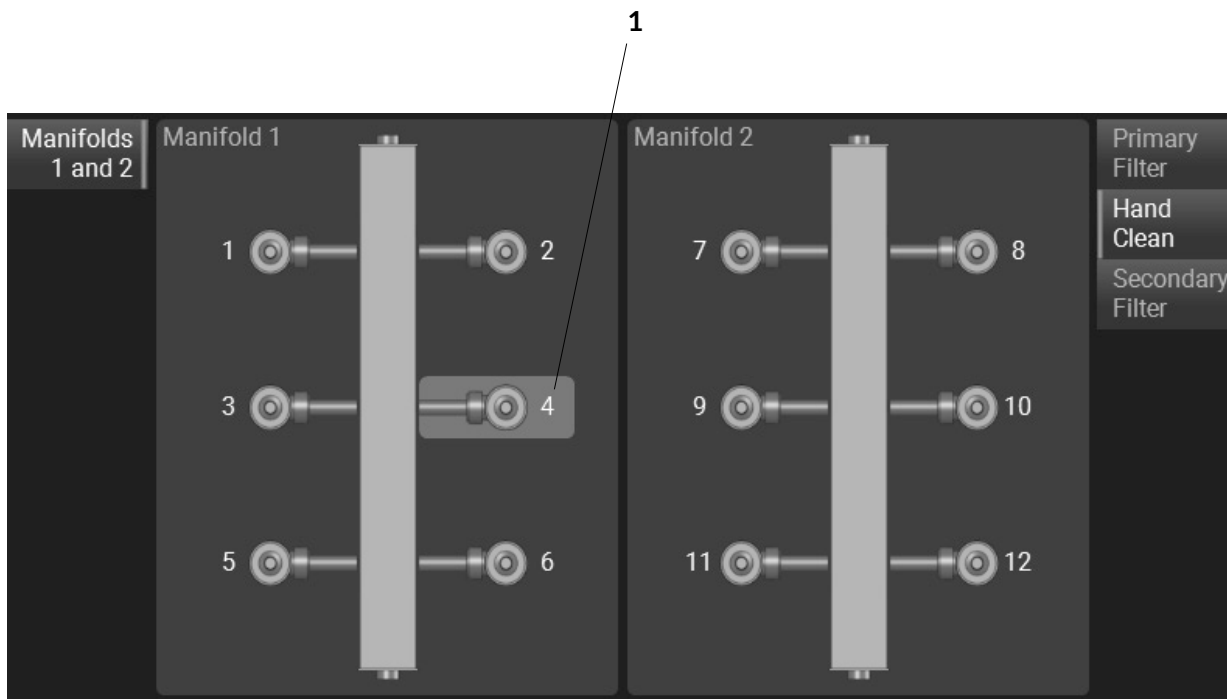
11**PULSE DELAY (s)**

This numeric entry/display shows the delay between each cleaning pulse. The elapsed time display (xxx/) shows how long until the next pulse. This value is adjustable between 1 and 20 seconds (s). Recommended setting is 10s.

12**CLEANING CYCLES**

This numeric entry/display shows the number of cleaning cycles that will occur during downtime cleaning, if enabled. A cycle is completed when all solenoids have fired once. The completed cycles display (xx /) shows how many cycles have been completed. This value is adjustable between 1 and 20. Recommended setting is 10 cycles.

3.2.2 HAND CLEAN



This screen enables the user to manually pulse each solenoid valve on the selected module. Each solenoid is numbered and may be pressed to manually activate the solenoid valve.

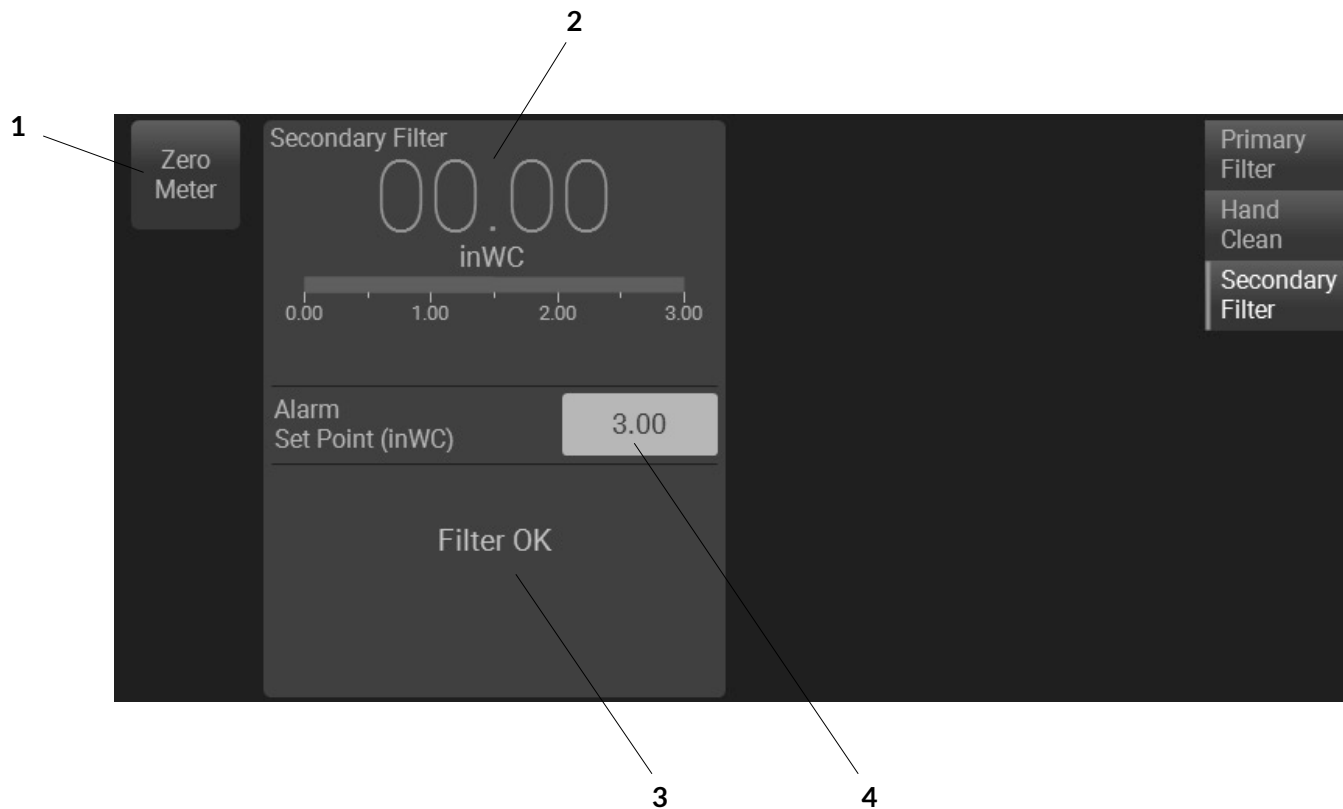
1

COMPRESSED AIR MONITORING DEVICE

When equipped with a Compressed Air Monitoring Device, the solenoids will appear red, if a fault is detected. The number of modules and valves per module is dependent upon the user's system. Modules not displayed on the screen may be selected from the navigation buttons on the left of the screen.

The Compressed Air Monitoring Device detects solenoid failures and leaks, if equipped with the airflow monitoring device. When the same solenoid fails to pulse three times, it is highlighted red and an alarm is produced. In addition, the monitoring device will also detect air leaks on the solenoid manifold, at which time it will alarm. The leak can also be pointed to a solenoid if it started after a specific solenoid was pulsed.

3.2.3 SECONDARY FILTER



1

ZERO METER

The Zero push button will zero any differential pressure reading, should it wander from zero over the lifespan of the differential pressure sensor. This can only be done when the system is not running. Additionally, the pneumatic tubing should be disconnected from the control panel.

2

SECONDARY FILTER DP

This numeric display and bar graph show the filter differential pressure measured between the dirty and clean sides of the filters.

3

SECONDARY FILTER STATUS

The filter status will alarm once the filter has reached end of life and prompt you to change the filter.

4

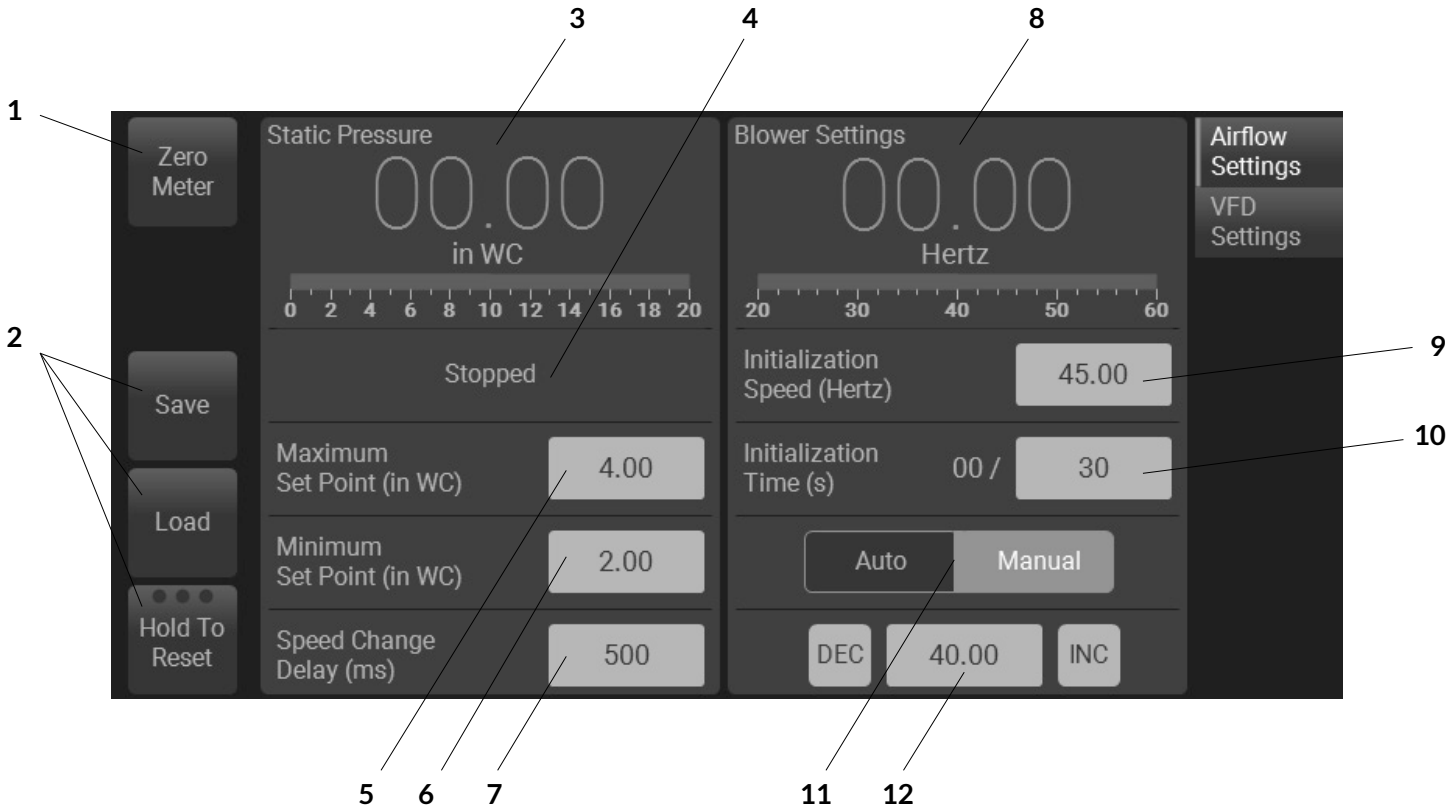
ALARM SET POINT

This numeric entry/display shows the set point that the differential pressure must rise above to initiate an alarm. This value is adjustable between the minimum and maximum transmitter outputs. Recommended setting is 6 inWC.

3.3 AIRFLOW

The Airflow section contains screens related to airflow control. Screens may vary based on system configuration.

3.3.1 AIRFLOW SETTINGS



- 1 ZERO METER**
 The Zero push button will zero any reading, should it wander from zero over the lifespan of sensor. This can only be done when the system is not running. Additionally, the pneumatic tubing should be disconnected from the control panel.
- 2 SAVE, LOAD AND RESET**
 These buttons affect items on the displayed screen only. The reset button must be held until all indicators in the button turn blue, approximately 3 seconds.

 - (a) **Save**
Saves the settings for later use.
 - (b) **Load**
Loads previously saved settings.
 - (c) **Hold To Reset**
Resets settings to factory defaults.

- 3 STATIC PRESSURE**
 This numeric display and bar graph show the system static pressure measured between the clean side of the filter and atmosphere.
- 4 AIRFLOW CONTROLLER STATUS**
 This text display shows details of the current status of the controller.

 - (a) **Stopped**
System is stopped.
 - (b) **Initializing**
Waiting for airflow to become stable prior to initializing control.
 - (c) **Increasing Blower Speed**
System is running below the minimum set point and increases blower speed in order to increase airflow.

- d) **Decreasing Blower Speed**
System is running above the maximum set point and decreases blower speed in order to decrease airflow.
- e) **Maintaining Blower Speed**
System is running inside the minimum and maximum range.
- f) **Manual Blower Speed**
System is in manual mode and the blower speed is controlled by the Manual Speed numeric entry/display.
- g) **Blower Running at Limit**
System is running outside of the minimum and maximum range but the blower is running at limit which prevents further airflow adjustment.

5**MAXIMUM SET POINT**

This numeric entry/display shows the maximum set point for the static pressure. When static pressure rises above this set point, blower speed is decreased. This value is adjustable between the minimum set point and the maximum transmitter output. Factory default setting is 4 inWC.

6**MINIMUM SET POINT**

This numeric entry/display shows the minimum set point for the static pressure. When static pressure falls below this set point, blower speed is increased. This value is adjustable between the minimum transmitter output and maximum set point. Factory default setting is 2 inWC.

7**SPEED CHANGE DELAY (ms)**

This numeric entry/display shows the delay before increasing or decreasing blower speed. Change this value to adjust how the blower responds to changing readings of static, velocity, or flow. This value is adjustable between 0 and 5000 milliseconds (ms). Factory default setting is 500ms.

8**OUTPUT FREQUENCY (Hertz)**

This numeric display and bar graph shows blower speed in hertz.

9**INITIALIZATION SPEED (Hertz)**

This numeric entry/display shows the speed that the blower will run at when the system is started. This value is adjustable between minimum and maximum blower speed, normally set at 20 and 60 hertz. Factory default setting is 45 hertz.

10**INITIALIZATION DELAY (s)**

This numeric entry/display shows the amount of time that the blower will maintain its initialization speed when the system is started. The elapsed time display (xx /) shows how much time has accumulated. This value is adjustable between 0 and 300 seconds (s). Factory default setting is 30s.

11**MODE SELECTION**

The mode selection allows the user to choose between Auto or Manual control of the Airflow Controller system.

a) Auto

Default and recommended mode of operation. The controller adjusts the blower speed in order to maintain a constant airflow.

b) Manual

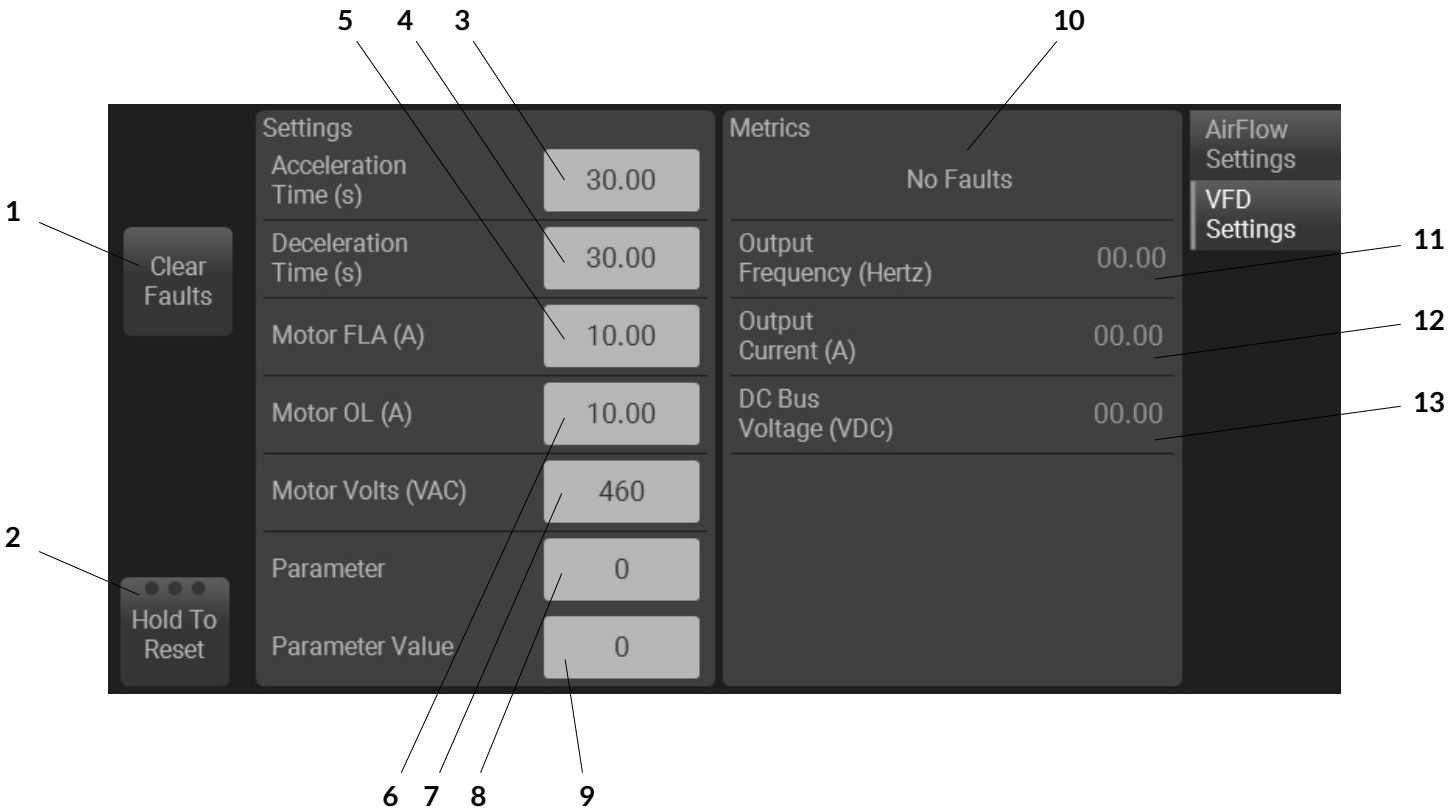
Blower speed set according to Manual Speed numeric entry/display.

12**MANUAL SPEED (Hertz)**

When in Manual mode, Manual Speed numeric entry/display is made visible and the blower speed is set to this value. This is used to set and maintain blower speed.

3.3 AIRFLOW

3.3.2 VFD SETTINGS



- 1 CLEAR FAULTS**
This button will clear any faults as long as the fault condition is no longer present.
- 2 HOLD TO RESET**
This button will reset VFD settings to default and reupload configuration. This does not reset all parameters to factory default. Consult the VFD manual for instructions on how to reset all parameters to factory default. After resetting to factory default, make sure to press “reset settings” to download parameters needed for operation of the drive. This button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.
- 3 ACCELERATION TIME (s)**
This numeric entry/display shows the acceleration time. This value is adjustable between 1 and 500s. Factory default setting is 30s.

- 4 DECELERATION TIME (s)**
This numeric entry/display shows the deceleration time. This value is adjustable between 1 and 500s. Factory default setting is 30s.
- 5 MOTOR FLA (A)**
This numeric entry/display shows the motor full load amperage. Set to the motor nameplate rated full load amps.
- 6 MOTOR OL (A)**
This numeric entry/display shows the motor overload. Set to the maximum allowable motor current.
- 7 MOTOR VOLTS (VAC)**
This numeric entry/display shows the motor voltage. Set to the motor nameplate rated volts.

8**PARAMETER**

This numeric entry/display shows which parameter to view or edit.

9**PARAMETER VALUE**

This numeric entry/display shows the value of the parameter selected to view or edit. Use caution when modifying parameters as it may render the drive unusable.

10**VFD STATUS**

This text display shows the current status of the VFD. If faulted, a fault code and brief description of the fault will be shown.

11**OUTPUT FREQUENCY (Hertz)**

This numeric display shows VFD output frequency.

12**OUTPUT CURRENT (A)**

This numeric display shows VFD output current.

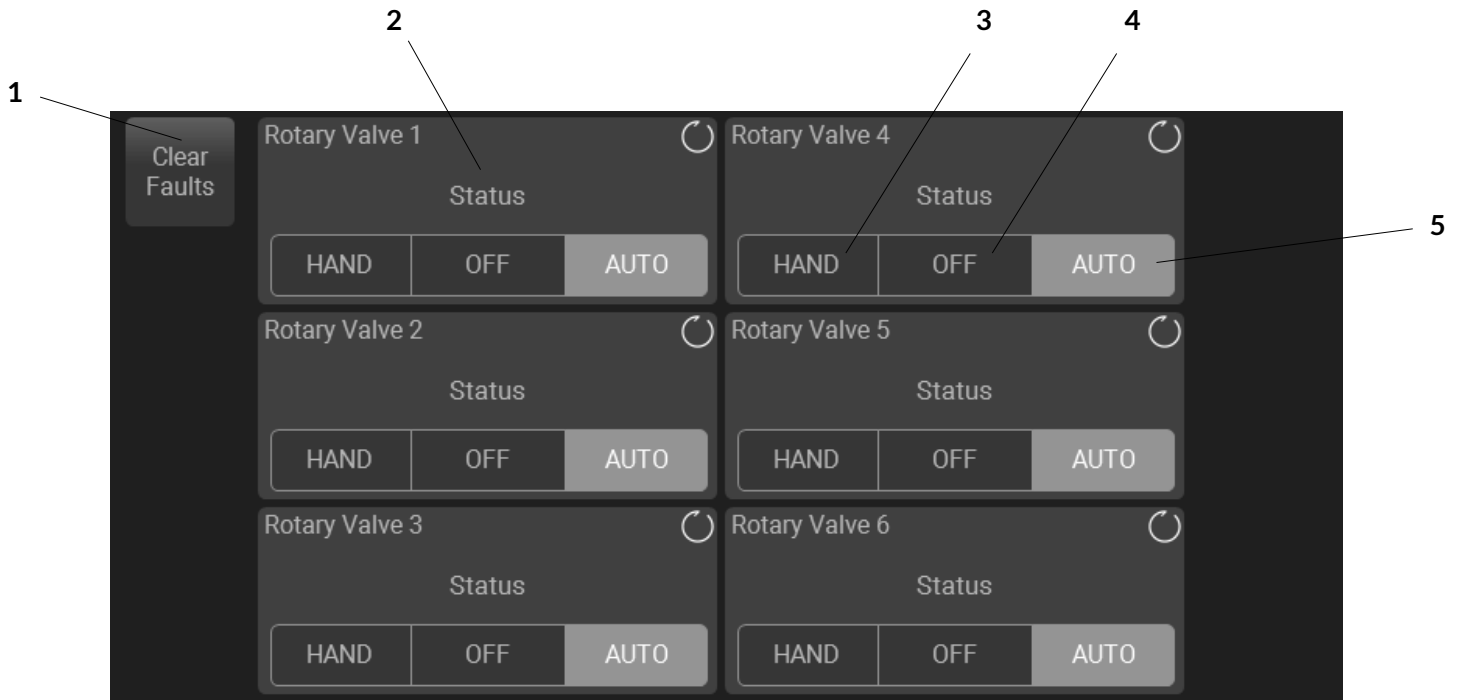
13**DC BUS VOLTS (VDC)**


This numeric display shows the VFD DC Bus voltage.

3.4 DISCHARGE

The Discharge section contains screens related to discharge control. Screens may vary based on system configuration.

3.4.1 ROTARY VALVES



 **CAUTION!**
USE CAUTION WHEN MANUALLY ENABLING ROTARY VALVE AIR LOCK
Be sure all personnel are clear and equipment is in mechanically sound condition. Failure to follow this instruction could result in equipment damage, injury, or death.

1**CLEAR FAULTS**

This button will clear any faults as long as the fault condition is no longer present.

2**STATUS**

This text display shows the following conditions:

- (a) **Stopped**
Valve is stopped
- (b) **Running**
Valve is running
- (c) **Overload Tripped**
Valve is faulted on overload condition
- (d) **Zero Speed Tripped**
Valve is told to run, but the zero speed switch does not detect motion (if equipped)
- (e) **Bypassed**
Valve is OFF while the system is running

3**HAND**

This button places the rotary valve into Hand Mode. When engaged, and all interlocks are met, the valve will run continuously.

4**OFF**

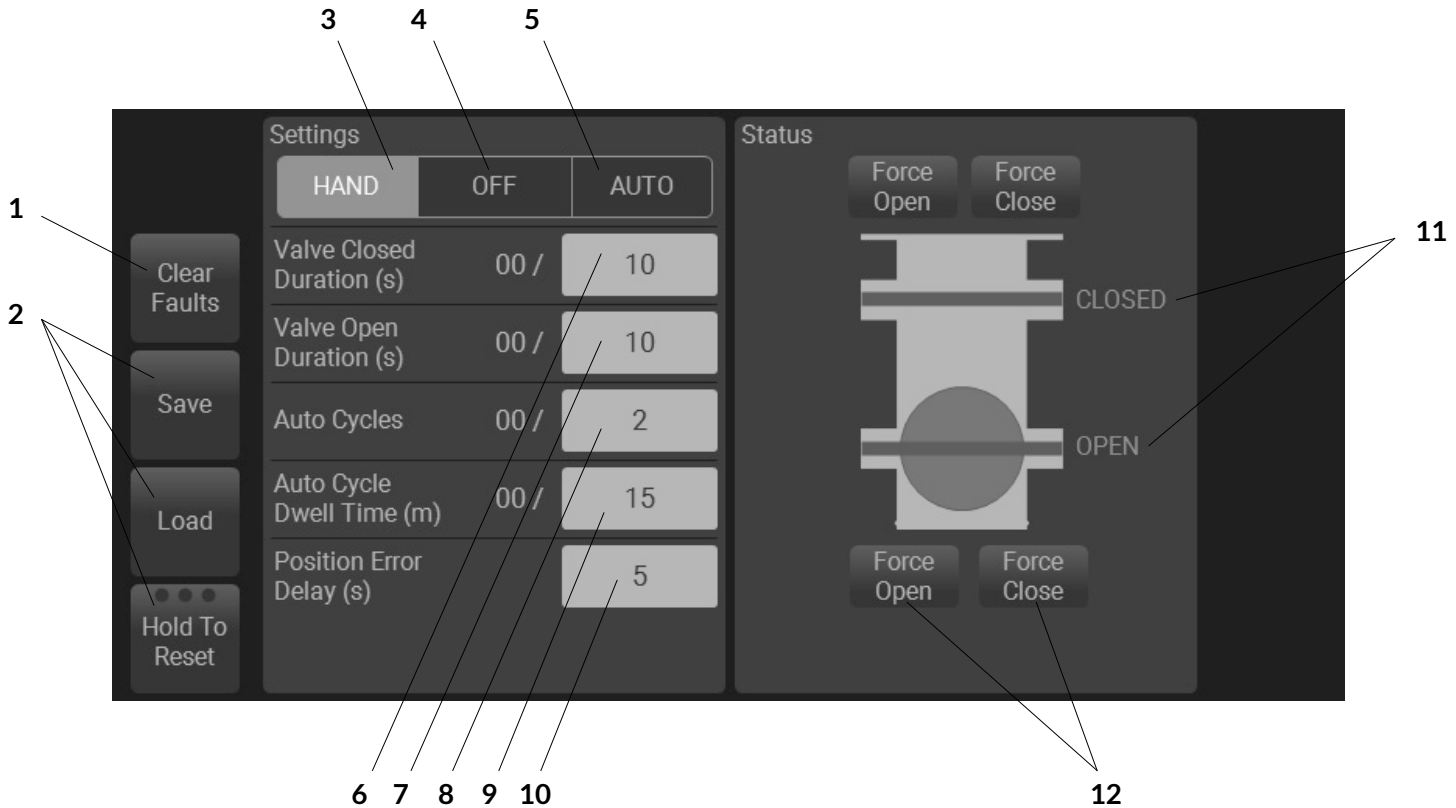
This button places the valve in Off Mode and prevents the valve from running. This is not intended for servicing the valve. Follow LOTO rules when servicing.

5**AUTO**

This button places the rotary valve into Auto Mode. When engaged, the valve will run if the blower is running, or if the system is cleaning the primary filters.

3.4 DISCHARGE

3.4.2 DOUBLE DUMP



- 1 CLEAR FAULTS**
This button will clear any faults as long as the fault condition is no longer present.
- 2 SAVE, LOAD AND RESET**
These buttons affect items on the displayed screen only. The reset button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.
 - a Save**
Saves the settings for later use
 - b Load**
Loads previously saved settings
 - c Hold To Reset**
Resets settings to factory defaults

- 3 HAND**
This button places the rotary valve into Hand Mode. When engaged, and all interlocks are met, the valve will run continuously.
- 4 OFF**
This button places the valve in Off Mode and prevents the valve from running. This is not intended for servicing the valve. Follow LOTO rules when servicing.
- 5 AUTO**
This button places the rotary valve into Auto Mode. When engaged, the valve will run if the blower is running, or if the system is cleaning the primary filters.

6**VALVE CLOSED DURATION (s)**

This numeric entry/display shows how long the valves will be closed. The elapsed time display (xx /) shows how long the valve has been closed. This value is adjustable between 10 and 60s. Factory default setting is 10s.

7**VALVE OPEN DURATION (s)**

This numeric entry/display shows how long the valves will be open. The elapsed time display (xx /) shows how long the valve has been open. This value is adjustable between 10 and 60s. Factory default setting is 10s.

8**AUTO CYCLES**

This numeric entry/display shows how many continuous cycles are executed in auto mode. The elapsed cycles display (xx /) shows how many cycles have been completed. This value is adjustable between 1 and 10. Factory default setting is 2.

9**AUTO CYCLE DWELL TIME (m)**

This numeric entry/display shows how long the system dwells in between cycles. The elapsed time display (xx /) shows how long until the next cycle. This value is adjustable between 0 and 60 minutes (m). Factory default setting is 15 m.

10**POSITION ERROR TIME (s)**

This numeric entry/display shows how long the valves have to open or close before a position fault is produced. This value is adjustable between 0 and 10s. Factory default setting is 10s. If set to 0, position fault is disabled.

11**VALVE STATUS**

This text display shows the status of the valve. Some of the following conditions rely on the position sensor.

- a Open**
Valve is in the open position (if equipped with position sensor)
- b Closed**
Valve is in the closed position (if equipped with position sensor)
- c Opening**
Valve is being told to open, but has not reached the open position
- d Closing**
Valve is being told to close, but has not reached the closed position
- e Position Error**
Valve has not reached position in time

12**FORCE OPEN / FORCE CLOSE**

These buttons are intended for service and are only visible when the Double Dump Valve is set to OFF. The buttons will force the valve open or closed. The upper and lower dump are interlocked so that they can never both be open at the same time.

3.5 SAFETY

The Safety section contains screens related to safety. Screens may vary based on system configuration.

3.5.1 SAFETY RELAY

3.5.2 ISOLATION VALVE



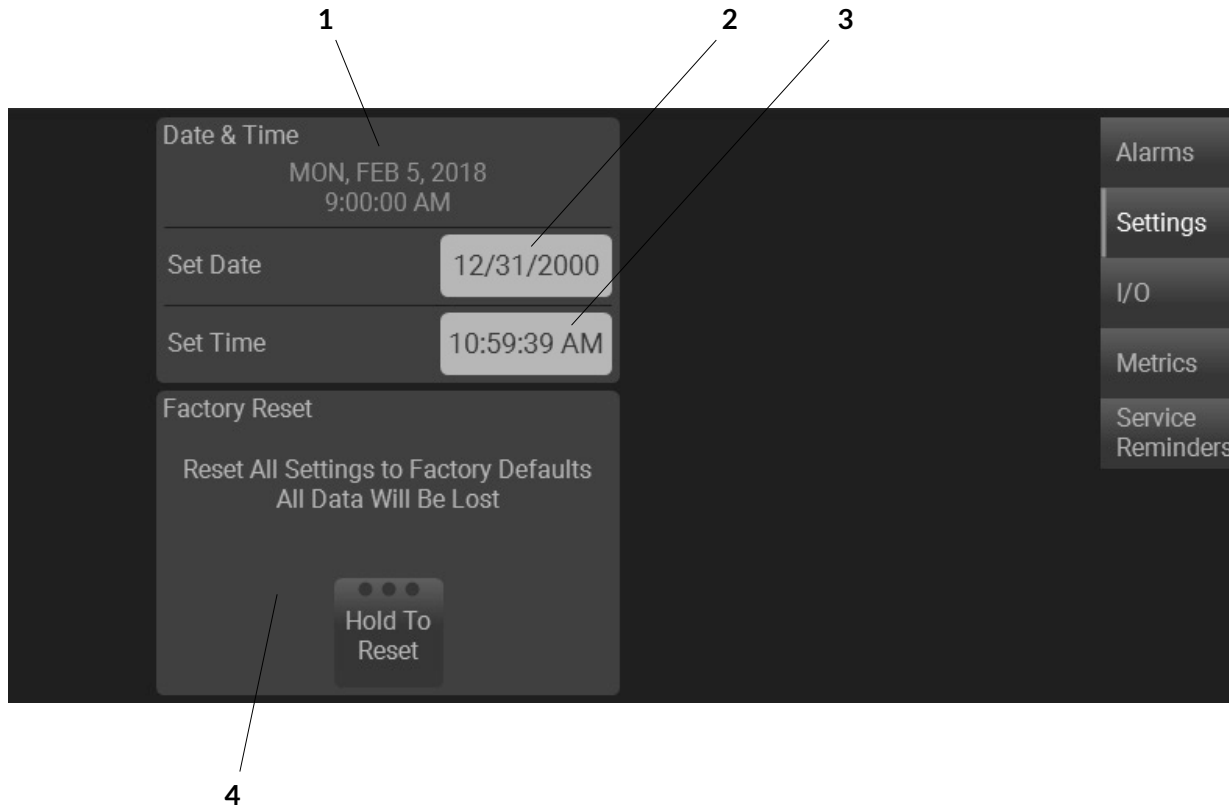
Safety Relay:

- 1 STATUS**
This text display shows the status of the safety relay.
- 2 INPUT A AND INPUT B**
Safety relay circuit status:
 - (a) OK**
All devices in safety circuit are set
 - (b) OPEN**
At least one device in the safety circuit is not set
- 3 OUTPUT K1/K2**
Safety relay condition:
 - (a) OK**
Safety Relay is set
 - (b) TRIPPED**
Safety Relay is tripped

Isolation Valve:

- 4 STATUS**
This text display shows the status of the isolation valve.
- 5 EXCESSIVE MATERIAL ACCUMULATION DETECTED:**
 - (a) YES**
 - (b) NO**
- 6 EVENT DETECTED:**
 - (a) YES**
 - (b) NO**

3.6.2 SETTINGS



1

DATE & TIME

This text display shows the current date and time of the system. Time automatically adjusts for daylight savings time (DST).

2

SET DATE

This text entry/display allows the user to change the date of the system.

3

SET TIME

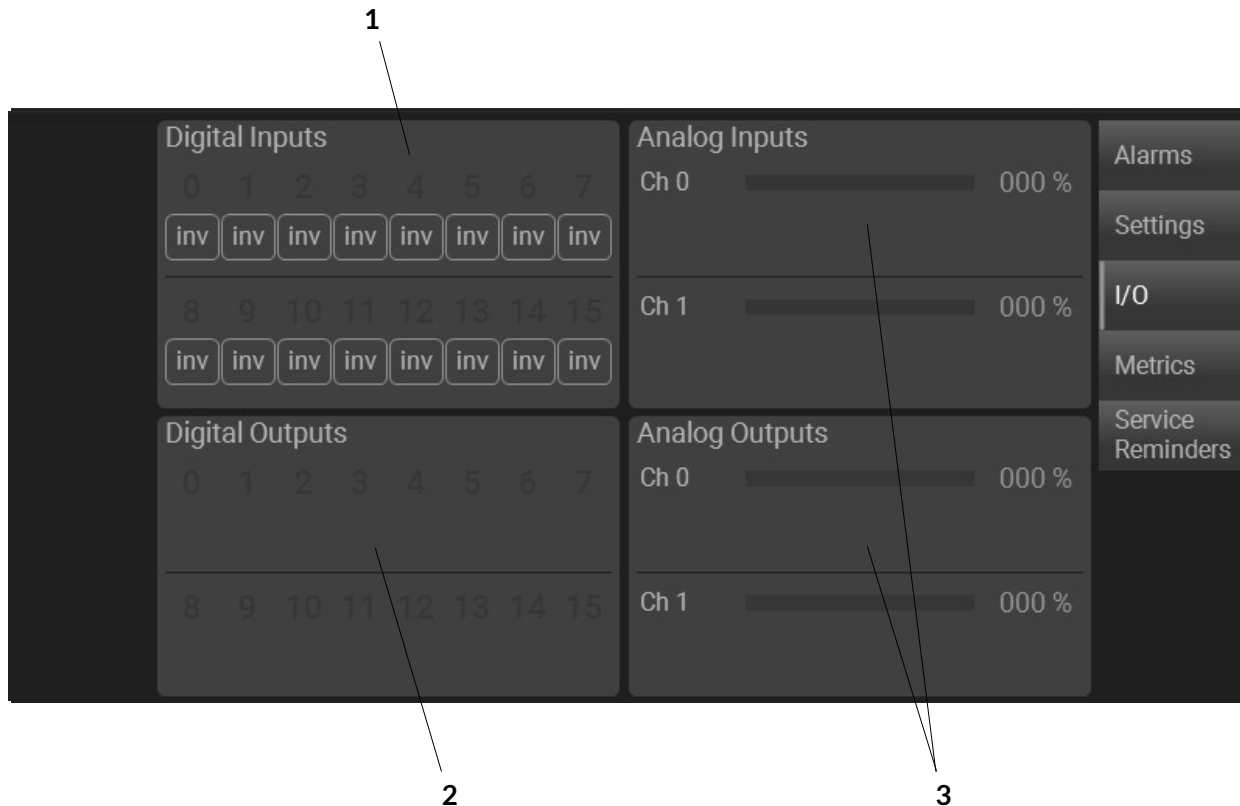
This text entry/display allows the user to change the time of the system.

4

FACTORY RESET

This button resets all settings and data to factory defaults. Note that this will delete all data.

3.6.3 I/O



1

DIGITAL INPUTS

This graphic display shows the status of each input. A gray number indicates that the corresponding input is OFF; a blue number indicates that the corresponding input is ON. Each input may also be inverted by the “inv” button immediately below. When the “inv” button is gray, the input remains as wired; when the “inv” button is blue, the input state is inverted.

2

DIGITAL OUTPUTS – This graphic display shows the status of each output. A gray number indicates that the corresponding output is OFF; a blue number indicates that the corresponding output is ON.

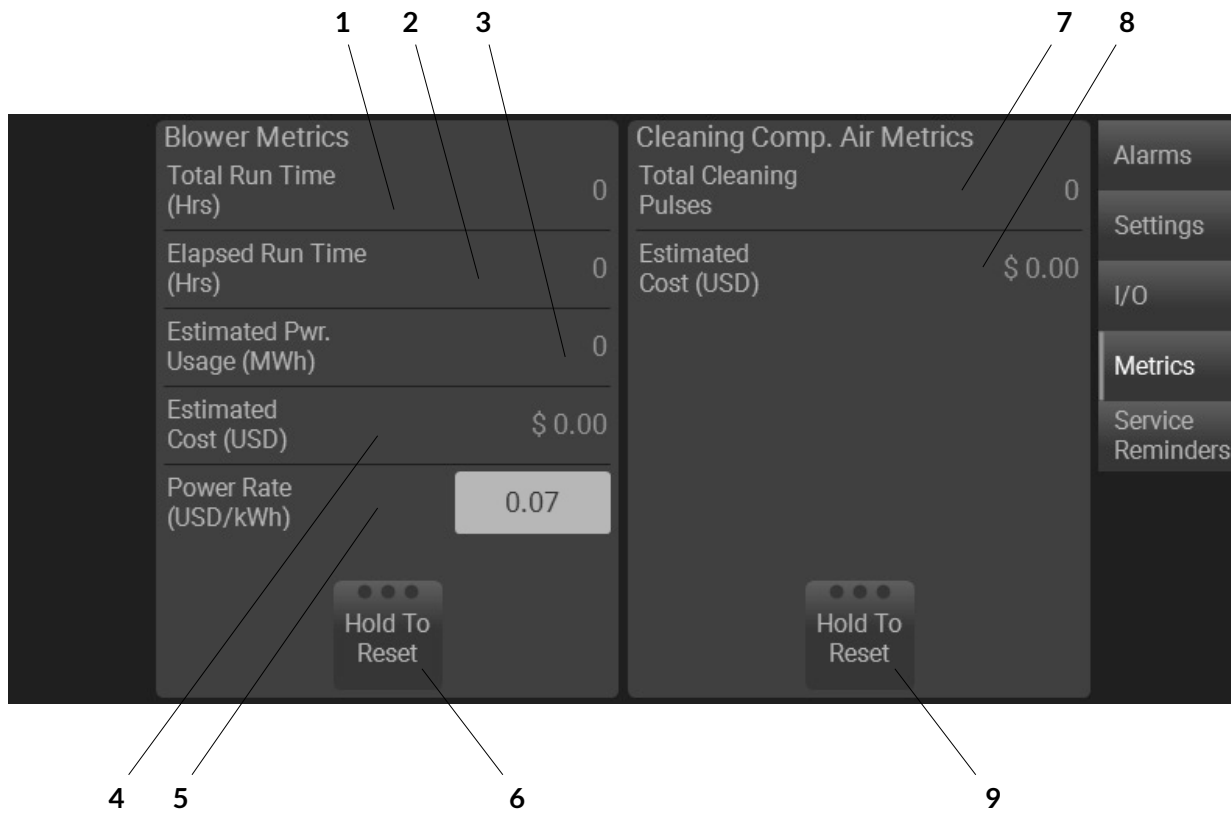
3

ANALOG INPUTS / OUTPUTS

This graphic display shows the signal of each analog input / output from 0 - 100%.

3.6 SYSTEM

3.6.4 METRICS



BLOWER METRICS

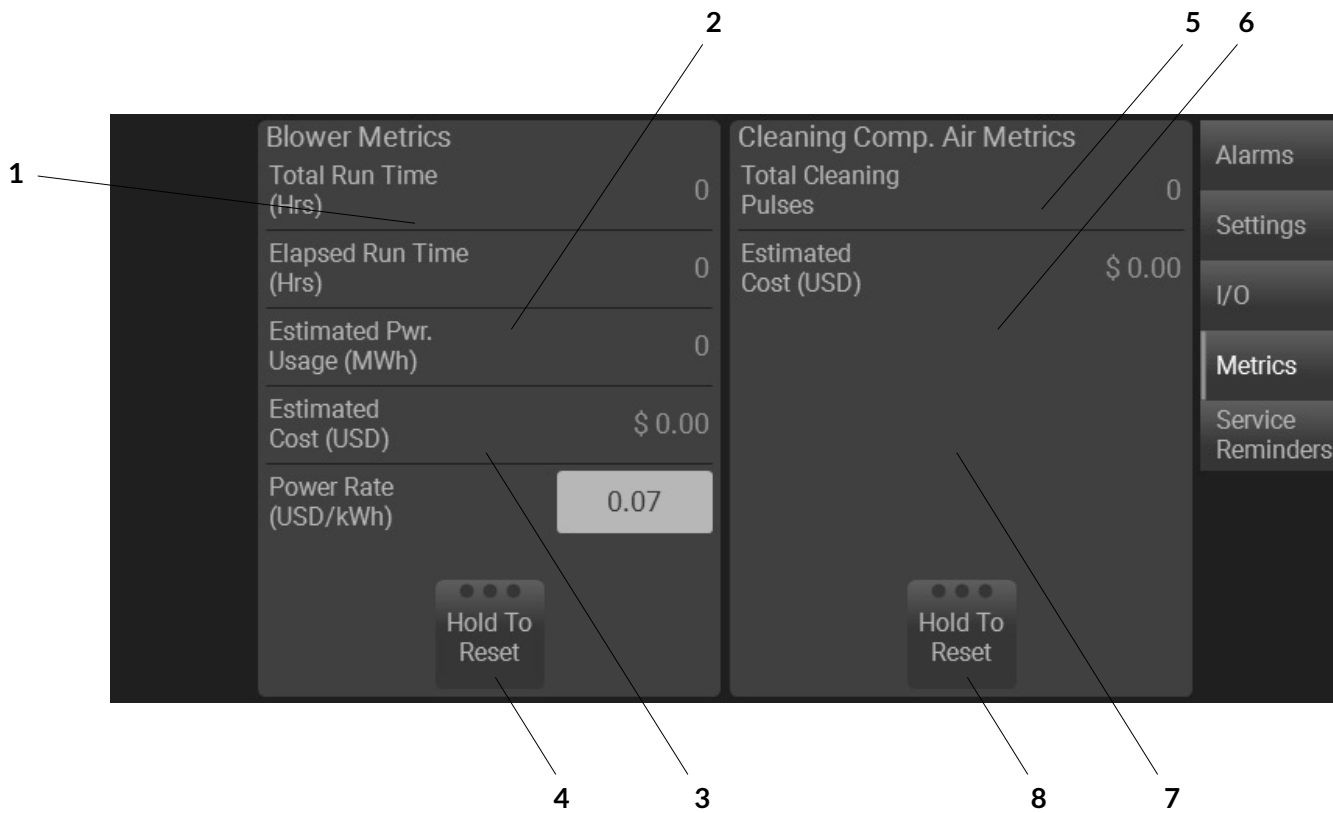
- 1 TOTAL RUN TIME (Hrs)**
This numeric display shows the total system run time. This metric is not resettable.
- 2 ELAPSED RUN TIME (Hrs)**
This numeric display shows the run time of the system.
- 3 ESTIMATED PWR. USAGE (MWh)**
This numeric display shows estimated power usage, if equipped with a VFD.
- 4 ESTIMATED COST (USD)**
This numeric display shows estimated power usage cost, if equipped with a VFD.
- 5 POWER RATE (USD/kWh)**
This numeric entry/display shows power rate, if equipped with a VFD.
- 6 HOLD TO RESET**
This button will reset the blower metrics. This button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.

CLEANING COMPRESSED AIR METRICS

- 7 TOTAL CLEANING PULSES**
This numeric display shows total cleaning pulses executed by the pulse cleaning system, if equipped.
- 8 ESTIMATED COST (USD)**
This numeric display shows estimated compressed air usage cost, if equipped with a pulse cleaning system.
- 9 HOLD TO RESET**
This button will reset the blower metrics. This button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.

3.6 SYSTEM

3.6.5 SERVICE REMINDERS



PRIMARY FILTER SERVICE REMINDER

1

STATUS

This text display shows the current status of the filter.

2

BAR GRAPH

This graph, scaled from 0 – 100%, displays remaining filter life.

3

DP, RUN TIME, CALENDAR

This selector changes the primary filter life calculation method.

a) DP

Calculation is based on the DP reading of the filter. The AyrDyne will detect non-recovery of the filter DP in the current cleaning range. When non-recovery is detected the AyrDyne will self-adjust to the next cleaning range in order to conserve compressed air usage. Once the set points are adjusted near the alarm set point, the system will prompt you to order and replace the primary filter.

b) Run Time

Calculation is based on primary filter run time which is incremented anytime the blower is running.

c) Calendar

Calculation is based on calendar.

4

HOLD TO RESET

This button will reset the primary filter service reminder. This button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.

DUST COLLECTOR SERVICE REMINDER

5

STATUS

This text display shows the current status of the system.

6

BAR GRAPH

This graph, scaled from 0 – 100%, displays remaining system operation prior to preventative maintenance.

7

RUN TIME, CALENDAR

This selector changes the system maintenance calculation method.

a) Run Time

Calculation is based on system run time which is incremented anytime the blower is running.

b) Calendar

Calculation is based on calendar.

8

HOLD TO RESET

This button will reset the system service reminder. This button must be held until all indicators in the button turn blue, which takes approximately 3 seconds.

TROUBLESHOOTING

4.1 ALARMS

This section contains some basic troubleshooting guidelines. Only a qualified individual should troubleshoot the system.

The alarms list below is to be used as a method of troubleshooting. Alarms may differ based on system configuration and features.

ALARM TEXT	POTENTIAL CAUSE	CORRECTIVE ACTION
Remote Stop Button Missing or Pressed	<ul style="list-style-type: none"> Remote stop button missing or pressed 	<ul style="list-style-type: none"> Install Remote Stop Release Remote Stop
Schedule System Maintenance	<ul style="list-style-type: none"> System is nearing maintenance due set point 	<ul style="list-style-type: none"> Schedule System Maintenance
Perform System Maintenance	<ul style="list-style-type: none"> System has reached maintenance due set point 	<ul style="list-style-type: none"> Perform System Maintenance
Primary Filters Clogged	<ul style="list-style-type: none"> Filters are dirty or clogged Clogged or damaged tubing 	<ul style="list-style-type: none"> Inspect filters and replace as needed Unclog or repair tubing
Time to Order Primary Filters and Schedule Service	<ul style="list-style-type: none"> Filters are nearing end of life 	<ul style="list-style-type: none"> Order and Schedule Primary Filters Service
Time to Replace Primary Filters	<ul style="list-style-type: none"> Filters have reached end of life 	<ul style="list-style-type: none"> Replace Primary Filters
Cleaning System Pulse Solenoid Failure	<ul style="list-style-type: none"> Cleaning solenoid failed Compressed air low or off 	<ul style="list-style-type: none"> Inspect solenoid and replace as needed Adjust or turn on compressed air
Cleaning System Compressed Air Leak Detected	<ul style="list-style-type: none"> Compressed air leak detected Compressed air flow switch stuck ON 	<ul style="list-style-type: none"> Inspect cleaning system for compressed air leaks Inspect compressed air flow switch for proper operation
Cleaning System Compressed Air Low or Off	<ul style="list-style-type: none"> Compressed air low or off All cleaning solenoids failed Compressed air flow switch stuck OFF 	<ul style="list-style-type: none"> Adjust or turn on compressed air Inspect solenoids and replace as needed Inspect compressed air flow switch for proper operation
Secondary Filter Clogged	<ul style="list-style-type: none"> Filter Dirty or Clogged Clogged and/or damaged tubing 	<ul style="list-style-type: none"> Inspect filters and replace as needed Unclog or repair tubing
Blower Running at Limit	<ul style="list-style-type: none"> System not balanced 	<ul style="list-style-type: none"> Schedule System Balancing
Blower VFD Faulted. Check VFD screen for fault code.	<ul style="list-style-type: none"> VFD Fault 	<ul style="list-style-type: none"> Obtain fault codes from the VFD Settings screen Reference VFD manual for detailed corrective actions
Blower Motor Overload Tripped	<ul style="list-style-type: none"> Overload tripped 	<ul style="list-style-type: none"> Inspect motor for proper operation Reset the overload Verify motor current draw is within nameplate parameters
Rotary Valve Motor Overload Tripped	<ul style="list-style-type: none"> Overload tripped 	<ul style="list-style-type: none"> Clear any material from valve Verify proper chain tension Reset the overload Verify motor current draw is within nameplate parameters
Rotary Valve Bypassed	<ul style="list-style-type: none"> Rotary Valve OFF while the system is running 	<ul style="list-style-type: none"> Place the Rotary Valve in either AUTO or HAND mode
Rotary Valve Not Turning	<ul style="list-style-type: none"> Valve not turning Sensor needs adjustment 	<ul style="list-style-type: none"> Clear any material from valve Verify proper chain tension
Double Dump Valve Bypassed	<ul style="list-style-type: none"> Double Dump Valve OFF while the system is running 	<ul style="list-style-type: none"> Place the Double Dump Valve in either AUTO or HAND mode

ALARM TEXT	POTENTIAL CAUSE	CORRECTIVE ACTION
Double Dump Valve Upper Dump Valve Position Fault	<ul style="list-style-type: none"> Compressed air low or off Error delay time low Solenoid malfunction Sensor malfunction 	<ul style="list-style-type: none"> Adjust or turn on compressed air Adjust error delay time Inspect solenoid for proper operation and replace if needed Inspect sensor for proper operation and replace if needed
Double Dump Valve Lower Dump Valve Position Fault	<ul style="list-style-type: none"> Compressed air low or off Error delay time low Solenoid malfunction Sensor malfunction 	<ul style="list-style-type: none"> Adjust or turn on compressed air Adjust error delay time Inspect solenoid for proper operation and replace if needed Inspect sensor for proper operation and replace if needed
Emergency Stop Circuit Tripped	<ul style="list-style-type: none"> LOTO (lock-out tag-out) Power outage Emergency Stop 	<ul style="list-style-type: none"> Verify that all devices in the E-Stop circuit are ready Verify that all E-Stop buttons are twisted out Press the E-Stop Reset button
Fire Suppression System Activated	<ul style="list-style-type: none"> Fire suppression system activated or malfunctioned 	<ul style="list-style-type: none"> Reset fire suppression system as per manufacturer's guidelines
Isolation Valve Excessive Material Accumulation Detected	<ul style="list-style-type: none"> Material accumulation detected Sensor needs adjusted 	<ul style="list-style-type: none"> Clear water or debris from sensor Adjust sensor as per manufacturer's guidelines
Isolation Valve Flap Failed to Open	<ul style="list-style-type: none"> Material build up Start delay time too low Sensor needs adjusted 	<ul style="list-style-type: none"> Clear debris Increase start delay time Adjust sensor as per manufacturer's guidelines
Isolation Valve Flap Failed to Close	<ul style="list-style-type: none"> Material build up Stop delay time too low Sensor needs adjusted 	<ul style="list-style-type: none"> Clear debris Increase stop delay time Adjust sensor as per manufacturer's guidelines
Isolation Valve Event Detected	<ul style="list-style-type: none"> Potential explosion 	<ul style="list-style-type: none"> Inspect pertinent explosion protection components
Isolation Valve Excessive Wear Detected	<ul style="list-style-type: none"> Isolation valve has excessive wear 	<ul style="list-style-type: none"> Inspect the Isolation Valve per manufacturer's guidelines Repair or replace worn out components
Isolation Valve Wiring or Sensor Problem	<ul style="list-style-type: none"> Wiring problem Sensor problem 	<ul style="list-style-type: none"> Inspect and correct position sensor wiring Inspect position sensor and replace if needed



CAUTION!

The installation, maintenance, operation, and care of the AyrDyne® Monitoring System Human Machine Interface (HMI) should only be performed by individuals who are qualified and trained to do so.

A "qualified" person in this context is a person who has skills and knowledge related to the construction and operation of electrical equipment and its installation through both work experience and training. Additionally, a qualified person is one who has received and undergone safety training specific to electrical maintenance. Anyone who has not undergone safety training specific to this system should not operate or perform maintenance on the system.

In terms of maintenance of this system, "lock out tag out" safety protocol applies. This means that any time maintenance on this system is performed, the machine must be shut down, unplugged and tagged or labeled, explaining that maintenance is taking place.

DenTech is not liable for any consequences arising from misuse of this system. If you are unsure of whether you are qualified to use or maintain this system, please contact an electrician or other qualified professional for assistance. Failure to follow safety protocol for this and any other system could result in serious bodily harm or other injury. **No responsibility is assumed by DenTech for any consequences arising out of the use of this material.**

GLOSSARY

DIFFERENTIAL PRESSURE (DP):

The difference in pressure measured between two points. In this system, DP is measured between the clean and dirty sides of the filter. The higher the number, the more restriction across the filter.

HUMAN MACHINE INTERFACE (HMI):

A mechanism, often graphical, used for monitoring and controlling a machine or process.

PROGRAMMABLE LOGIC CONTROLLER (PLC):

A modular computer which performs various tasks based on customized instructions.

QUALIFIED INDIVIDUAL:

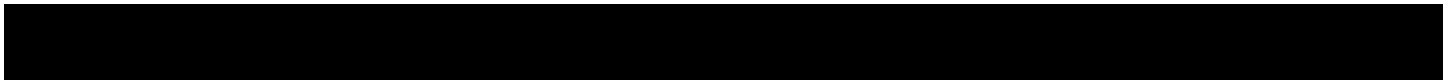
One who meets the skill level and experience to perform the essential functions of the activity.

STATIC PRESSURE (SP):

The pressure exerted by a still liquid or gas. In this system, SP is measured between the dirty side of the filter and atmosphere. The higher the number, the more suction capacity.

VARIABLE FREQUENCY DRIVE (VFD):

A motor control system that manipulates output frequency in order to run an electrical motor at any desired speed.





Installation, Operation, and Maintenance Manual

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