ASCO™

Dust Collector Performance Analyzer & Controller
P151 Basic

OPERATING MANUAL

www.emerson.com | V_10032 | Rev AA

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1 Technical Support Contact

ASCO provides industry leading Engineering and technical support for all product lines. The technical support department is staffed with a team of engineering professionals. Areas of assistance provided by the Technical Support department include:

- Pre-Installation Site Analysis
- Product Installation
- General Operation
- Application Specific Review
- Routine Calibration
- EPA Compliance
- Performance Upgrades and Add-On Features

To assure the best and most efficient technical support please be prepared with the following information prior to contacting ASCO. If it is determined that the component must be returned for evaluation/repair, a Return Material Authorization (RMA) number will be issued. You must include the RMA number on the packing slip and mark the outside of the shipping container.

- Company Name _____
- Product Model Number _____
- Product Serial Number _____
- Date of Installation _____
- Reason for Return _____

Emerson Technical Support may be reached through:

Website: www.emerson.com/ASCO

- Any control unit or particulate sensor that was exposed to hazardous materials in a process must be properly cleaned in accordance with OSHA standards and a Material Safety Data Sheet (MSDS) must be completed before it is returned to the factory.
- All shipments returned to the factory must be sent by prepaid transportation.
- All shipments will be returned F.O.B. factory.
- Returns will not be accepted without an RMA number.

2 Notifications

2.1 Disclaimer

This document contains important information necessary for proper operation of the product. It is strongly urged that all users of the product read this manual in its entirety. All instructions should be followed properly and any questions that arise should be discussed with ASCO.

Any use or distribution of this documents without the express consent of ASCO is strictly prohibited. Any reproduction is prohibited without written permission.

In no event will ASCO be liable for any mistake, including lost profits, lost savings, environmental compliance costs or other incidental or consequential damages or injury arising out of the use or inability to use this manual, even if advised of the possibility of such damages, or any claim by any other party.
Terms and conditions supplied with each order contain additional liability limitations related to this product.

2.2 Symbols and Conventions

WARNING 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Warning statements help you to: • Identify a hazard • Avoid a hazard • Recognize the consequences
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
	Identifies information, sections or statements in this manual that apply to approved hazardous area systems, regulations or installation.

2.3 Safety

WARNING

DEVICE SUITABILITY

Area Classification

Before installing any device confirm area classification requirements. Do not install any device that is not tagged as suitable for the required area classification.

Environment

Before installing any device, confirm ambient temperature, process temperature and process pressure requirements. Do not install any device that is not tagged as suitable for the required temperatures and pressures.

WARNING

NOT A SAFETY RATED DEVICE

This model must not be used independently for safety or as a critical input signal to a safety system. This model is designed for general process control, diagnostics and environmental monitoring. Safety must be addressed with detailed engineering, redundancy and safety certified components where applicable. Consult factory for critical safety applications.

WARNING

APPLYING POWER

This apparatus complies with IEC61131-2 clause 11-14, safety requirements for industrial programmable controllers, and has been supplied in a safe condition. Before applying power, verify that the correct safety precautions have been taken.

WARNING

GROUNDING AND FUSING

Before turning on the instrument, you must connect the protective earth terminal of the instrument to a proper earth ground. Grounding to the neutral conductor of a single-phase circuit is not sufficient protection.

Only fuses with the required current, voltage and specified type should be used. Do not use repaired fuses or short-circuited fuse holders.

2.4 Environment

WARNING

ENVIRONMENT

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters (6562 ft) without de-rating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

WARNING

OPEN-TYPE EQUIPMENT

If this equipment is sold as open-type equipment it must be mounted within an enclosure that is designed for environmental conditions present and to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool.

Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications. In addition to this publication, see: NEMA Standards publication 250 and IEC publication 60529, as applicable, for information about the degrees of protection provided by different types of enclosures.

2.5 Installation Personnel

WARNING

INSTALLATION PERSONNEL

Only appropriately licensed professionals should install this product.

Always disconnect power before servicing.

2.6 Field Service

WARNING

FIELD SERVICE

All power must be removed prior to performing any field service. Do not attempt to service a system with power applied. Modules are not hot swappable.

Service of individual modules is limited to replacement of the line fuse, connectors, battery or SD card. Do not attempt to disassemble modules. Any components that are not operating properly should be returned to FilterSense for service.

3 P151 Basic Introduction

P152 Basic is a user-friendly and reliable baghouse performance analyzer and controller based on ASCO MICS™ platform (Modular Instrumentation and Control System).

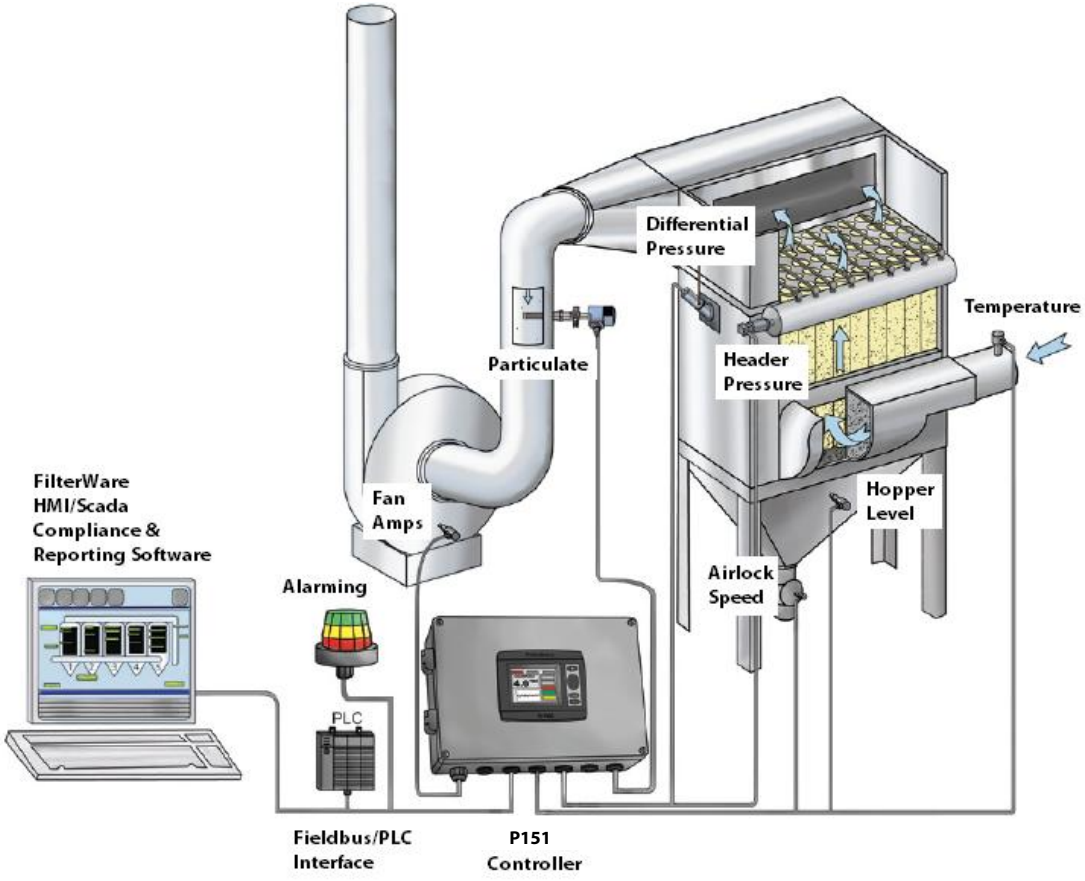
IMPORTANT

This manual is applicable to device Firmware version 2.0 and higher.

Many features are optional, consult "Ordering Information" in MICS Hardware Manual or ASCO sales department for quotation.

ASCO Typical Baghouse Application

Monitoring, Control, Diagnostics & EPA Compliance



The P151 Basic is a state-of-the-art monitoring, control, diagnostic and optimization system for bag style fabric filters (i.e. baghouses) and cartridge type dust collectors. It combines simple, yet advanced control with several diagnostics features to enable optimizing the process while at the same time lowering operating costs, maintenance expenses and energy use.

Integration of advanced control and sensing enable numerous benefits including:

Benefits

Intelligent filter cleaning to minimize compressed air use, lowers emissions and maximize filter life

Highly stable differential pressure control to maintain desired process airflow

The ability to detect and locate filter leaks well before emissions are visible

Instant detection and locating of ruptured or frozen pulse-jet diaphragms preventing large losses of compressed air

Instant detection and locating of failed solenoids preventing plugged filters

Continuous solenoid valve short circuit protection

Various configurations and control capabilities are offered to meet the wide range of baghouses sizes and styles as well as customer needs, P151 systems can be configured for all types of cleaning systems including:

Configurations

Pulse-jet single compartment

Pulse-jet multi compartment

Rotary arm

Reverse air

Shaker

Other

The P151 Basic integrates the following capabilities:

Capability	Detail
All Types of Filters and Cleaning Methods	Configurable to all types of baghouses and cleaning methods: • Baghouse and Cartridge Filters • Single, Multi and Split Compartment Baghouses • Pulse-Jet, Reverse Air, Rotary Arm and Shaker Cleaning • Other, consult factory
Intelligent Pulse Intelligent Pulse jet Cleaning Control	Intelligent Pulse is the most advanced pulse-jet cleaning system available and includes single row, multiple row, row skipping, custom user defined pattern sequences along with remote control through discrete input and/or fieldbus, multiple additional modes and overrides available.
Differential Pressure Monitoring and Control	Integrated tubing style sensor or optional ASCO P850AD high accuracy non-clogging differential pressure transmitter combined with Smart cleaning provide stable differential pressure control.
Particulate Monitoring and Leak Analysis	Integrated standard or advanced particulate monitors including options for EPA compliant automatic self-checks. For use with ASCO P152 series particulate sensors.
Continuous Process Diagnostics	• Failed solenoid detection • Failed diaphragm detection • Leak locating by row • Support for multiple header tanks and outlet stacks per baghouse
Auxiliary Sensor Monitoring	Process sensors for auxiliary monitoring points available for direct connection, display, alarming and logging through the P151 Basic • Header manifold pressure sensor ASCO P850AS • Temperature sensor • Fan amp sensor • Airflow sensor • Hopper level sensor • Other, consult factory
Energy Analysis	Real-time analysis of cleaning system compressed air energy use.
Fieldbus Networking	Fully certified fieldbus interface for PLC/DCS connection. • DeviceNet • Ethernet/IP • Modbus/RTU • Modbus/TCP • Profibus DP • ControlNet • Other, consult factory
Alarming	Powerful and flexible alarming system with multiple alarms per sensor, process diagnostic alarms, system self-test alarms, multiple alarm acknowledge options, remote acknowledge/clear, alarm grouping, fail-safe alarms and more.
Data logging	Integrated data logger with direct storage of time stamped data to removable SD memory card. Storage of all process readings, alarm transitions, self-check results and system/diagnostics messages.

EPA Compliance

The P151 Basic is also the most comprehensive and forward-thinking solution for EPA compliance. Optional equipment and proper configurations may be required to meet a specific compliance requirement. Consult the factory for an application review.

3.1 User Interface

The user interface consists of a membrane keypad and a graphic display. The process screens (Home Screen) are displayed at power up and show process data values and status as well as cleaning control information. The main menu allows access to detailed screens such as alarms and system information screens. The main menu is also used to access setup wizards used to modify system settings.

The keypad is used to navigate through available screens. The home key is used to show the process screens. The menu key is used to access the main menu. The up/down, left/right, and enter keys are used to scroll through screens and modify system settings. The available keys are shown below.

User Interface

Keypad

Key	Description
	Home key
	Menu key
	Enter key
	Up/Down keys
	Left/Right keys

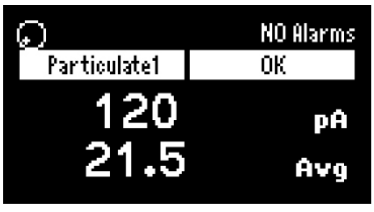
3.2 Home 

Pressing the home key (and upon power up) will display the first of several process screens. Process screens show readings and status from all sensors along with operating status of the cleaning system, diagnostics and real time energy consumption. Process screens automatically scroll every 5 seconds. The left/right keys allow the user to temporarily suspend scrolling and manually scroll through all available process screens. Auto-scrolling resumes after several minutes of no user activity or if the enter key is pressed. The format of process screens that show readings may be changed with the up/down keys as shown below:

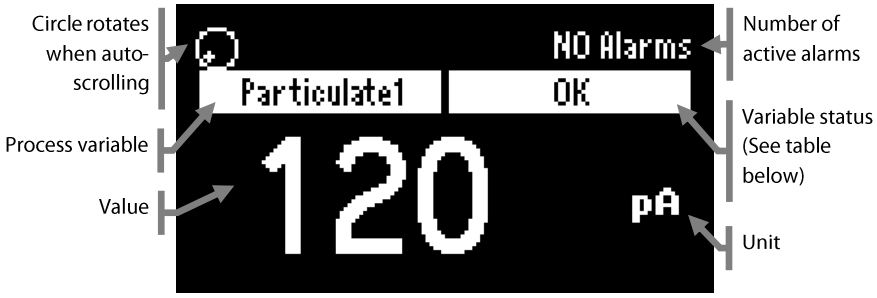
Process Screen - Basic

Process Screen with Percentage

Process Screen with Average



The basic process reading screen displays the reading in a large number format as shown below.

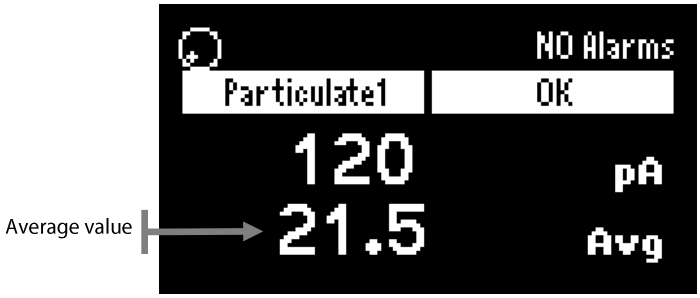


Process Variable Status Values

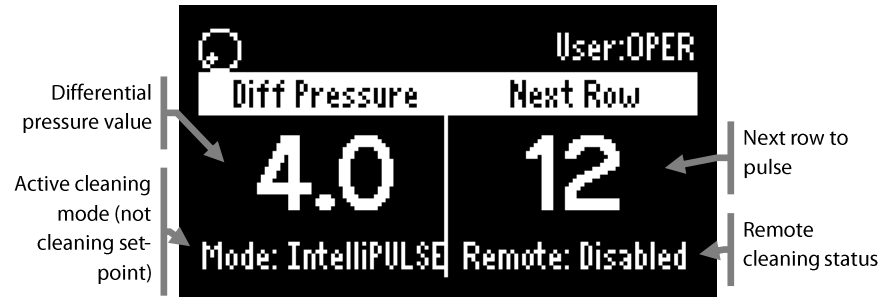
Status	Description
OK	The process data status is OK
ALARM	One of the alarms associated with the process data is activated
SELF CHECK	The process data is from a module that has the self-check running
ERROR	The process data is from a module that has a zero or upscale check error

The percentage process reading screen displays the reading in numeric, percentage and bar graph format. The percentage value provides a percent of full scale range for the analog output corresponding to the sensor reading. The bar graph displays the percentage value in bar graph format.

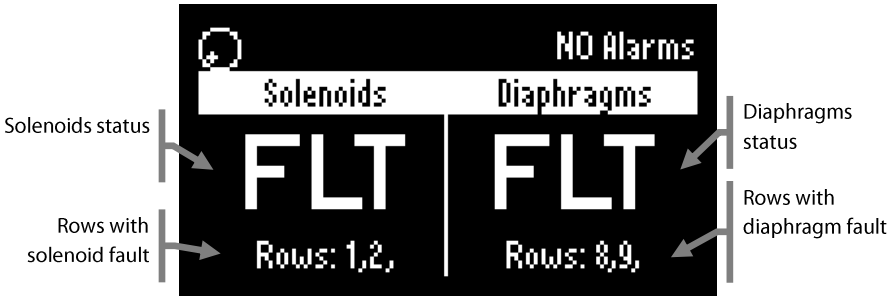
The average process reading screen displays the reading in both real-time and averaged formats. Adjustments to averaging parameters are available through the hardware wizard/process variable input setup.



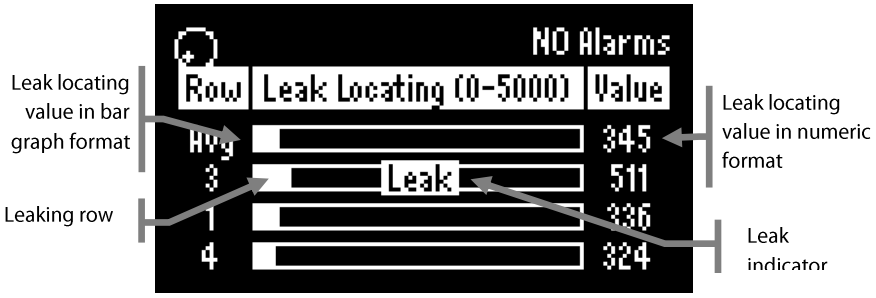
The cleaning process screen displays real-time status of the cleaning system including mode, next row to pulse and the status of cleaning remote overrides.



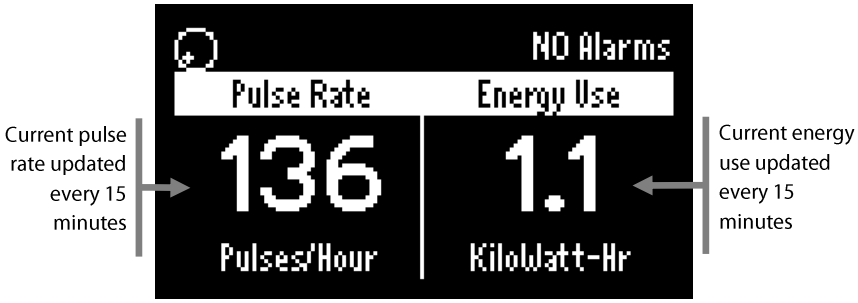
The solenoid/diaphragm diagnostics summary process screen displays summarized status of the failed solenoid and failed diaphragm diagnostics detection. If no faults are detected the status will indicate OK. If a fault is detected, the status will indicate FLT and the row where the fault occurred is listed. A detailed view of all diagnostic status including filter leak locating is available through the detailed process diagnostics screens.



The leak locating diagnostics summary process screen displays summarized status of the filter leak locating diagnostics. The latest leak locating value for each row is shown both in bar graph format and as a numeric value. The data is sorted so rows with the highest values are displayed first. The top row displays an average of all leak locating values. Thresholds may be set to trigger a leak alarm based on consistently high leak locating values; they are displayed on the screen with a flashing indicator.

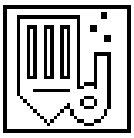
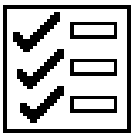
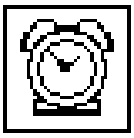
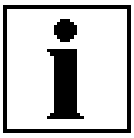
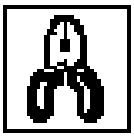
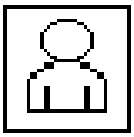


The energy process screen displays real-time energy usage of the pulse jet cleaning system. Values are updated every 15 minutes. Energy use is calculated based on compressed air manifold pressure, diaphragm valve parameters and several other process parameters. Adjustments to energy use calculation and valve parameters are available through the cleaning wizard.

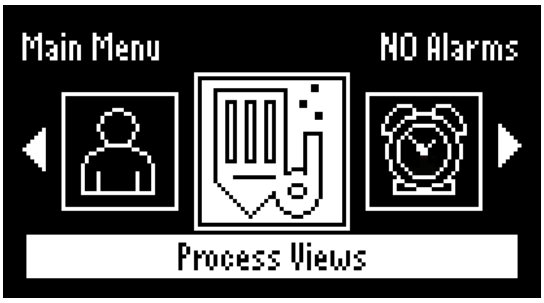

NO Alarms
Pulse Rate
Energy Use
136
1.1
Pulses/Hour
KiloWatt-Hr
Current pulse rate updated every 15 minutes
Current energy use updated every 15 minutes

3.3 Main Menu 

Pressing the menu key will display the Main Menu screen. The left/right keys are used to select the desired option. The enter key is used to access the selected option. The available menu options are presented in the table below.

Icon	Description	Icon	Description
	Process Views		Process Diagnostics
	Active Alarms		System Info
	Setup Wizards		User Login

Main Menu



Display Process Screen

No Action

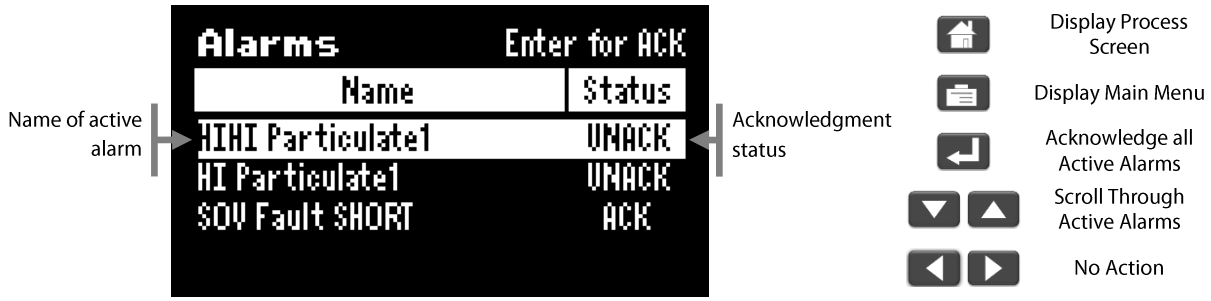
Display Menu Item

No Action

Select Option

3.3.1 Active Alarms 

Selecting Active Alarms from the Main Menu will display the Active Alarms screen. Active alarms, acknowledged and unacknowledged alarms that have not been cleared, are displayed in a list format. Pressing the enter key will acknowledge all unacknowledged alarms. New alarms that have not been acknowledged will display UNACK status. Alarms that have been acknowledged will display ACK status. The latching option determines how alarms are cleared. Alarms are cleared automatically when alarm condition is removed if latching is off and requires acknowledgment if latching is on. The alarms settings are accessible through the Alarm Wizard. Acknowledging alarms will cause the corresponding relay to turn off if this option is enabled through the System Wizard.



3.3.2 Setup Wizards

Selecting Setup Wizards from the Main Menu will display the Setup Wizards selection screen. The setup wizards guide the user through setting adjustment in a step by step sequence. The available setup wizards are presented in the table below. Some settings are security protected and require user login to be displayed and modified.

Wizard Name	Description
Cleaning Wizard	Adjusts filter cleaning settings
Diagnostics Wizard	Adjusts cleaning diagnostics settings
Alarm Wizard	Adjusts alarms settings
System Wizard	Adjusts real time clock, data-log sample rate, and other system settings
Fieldbus Wizard	Adjusts Fieldbus settings
Hardware Wizard	Adjusts input and output scaling and other hardware related settings

Setup Wizards Selection Screen

Setup Wizards Navigation

The left/right keys are used to navigate to the previous/next step in a setup wizard without changing any values. Values will only be stored when the enter key is pressed. The following are examples from the Alarm Wizard showing how to modify non-numeric and numeric values

:

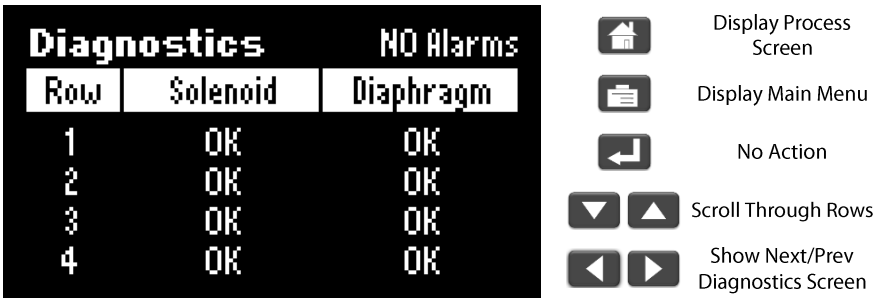
Modifying a Non-Numeric Value

Modifying a Numeric Value

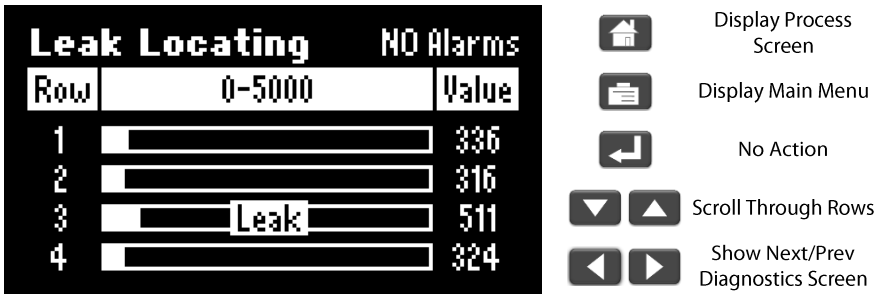
3.3.3 Process Diagnostics

Selecting Process Diagnostics from the Main Menu will display the solenoid-diaphragm diagnostics screen. Leak locating and manual pulsing diagnostic screens are accessed by pressing the left/right keys.

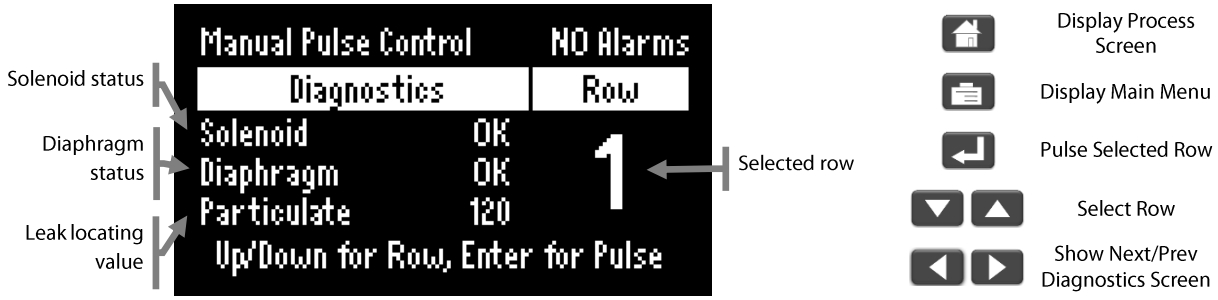
The solenoid-diaphragm diagnostics screen displays the status of each solenoid and diaphragm in the system. The solenoid status for each row shows "OK" when operating properly, "OPEN" when an open circuit is detected and "SHRT" when a short circuit is detected. The diaphragm status for each row shows "OK" when operating properly and "FAIL" when a failure is detected.



The leak locating diagnostics screen displays the leak locating values for each row. The latest leak locating value for each row is shown both in bar graph format and as a numeric value.



The manual pulsing diagnostics screen displays complete diagnostic status for a selected row and allows the valve to be manually pulsed for testing. All diagnostics are automatically performed when a valve is manually pulsed.

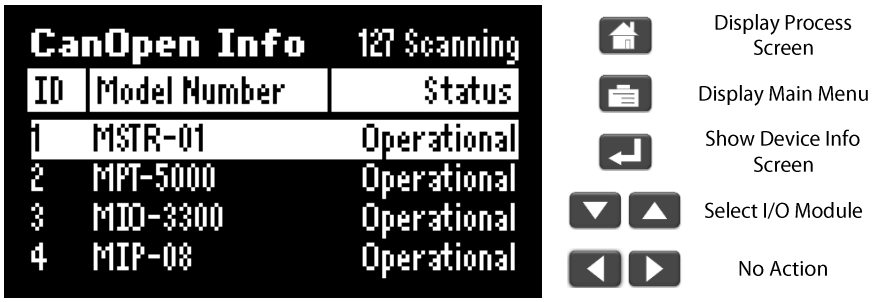


3.3.4 System Information

Selecting System Information from the Main Menu will display the System Information selection screen. System information screens provide information about the configuration, status, and general operation of system features. Additional information about specific entries in a system information screen may be displayed by pressing the enter key.

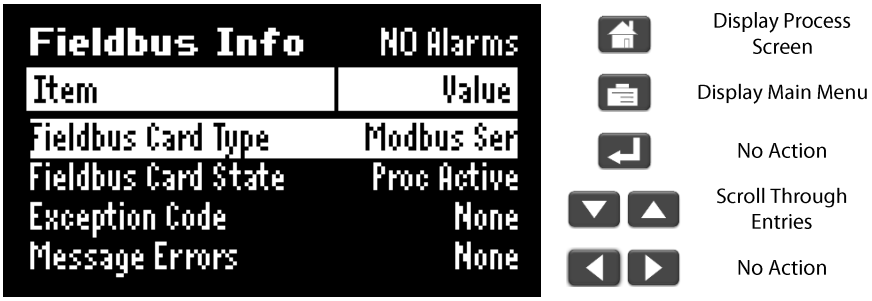
CanOpen Information Screen

The CanOpen information screen displays a list of all MICS I/O modules on the CanOpen DIN rail bus network and the status of each module. While the CanOpen information screen is displayed, the system will scan all IDs on the CanOpen network and determine the status of all detected modules.



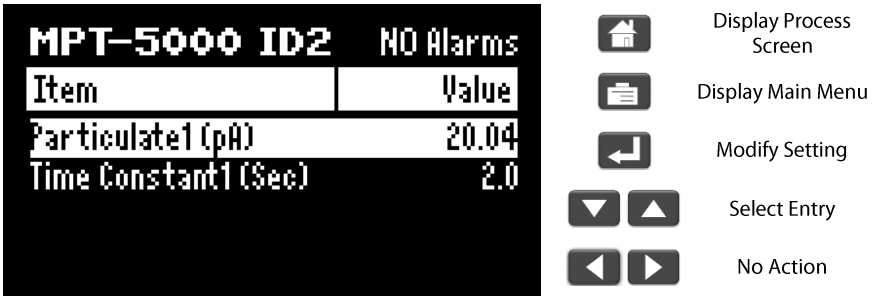
Fieldbus Information Screen

The Fieldbus information screen displays the type of fieldbus network card installed, its status, any errors that are present in the card or in the fieldbus messages and data sizes for I/O connections. Fieldbus card state indicates "Proc Active" when normal communication is occurring and "Wait Proc" when waiting for communication to begin.



I/O Module Information Screen

The I/O module information screen displays readings, status and settings from individual I/O and sensor modules on the CanOpen network. Modules that contain outputs also include ability to force outputs to specific values for testing. The following is an example I/O module information screen for the particulate module (MPT-5000):



3.3.5 User Login 

Selecting User Login from the Main Menu will display the User Login screen. Three unique user levels are available which provide security against unintended changes to critical system settings such as alarm levels and filter cleaning settings. Once the correct password is entered, the login will be valid until power is removed or there has been 15 minutes of no user activity. The current user level is displayed in the upper right corner of the screen. The user levels and their passwords are given in the table below. The required user level to acknowledge alarms from the Active Alarms screen can be configured through the System Wizard. Consult the factory for a procedure to change user level passwords if required.

User Level	Displayed Status	Password Required	Default Password	Permissions
Operator	User:OPER	No	—	Change cleaning mode only
Supervisor	User:SUP	Yes	5	Change cleaning set points Change alarm set points Change Fieldbus set points
Engineer	User:ENG	Yes	55	Change cleaning set points Change alarm set points Change Fieldbus set points Change all hardware configuration set points

User Login Screen

4 Filter Cleaning Control

The P151 Basic can be configured for baghouses and catridge filters with all types of cleaning systems including pulse-jet, reverse air, rotary arm and shaker. This manual covers pulse-jet only.

IMPORTANT In the following section of this manual the term "Rows" refers to the number of rows of filters in a typical pulse jet baghouse or cartridge type dust collector. Each row includes a single pilot solenoid and main diaphragm valve to perform pulse cleaning of the entire row of filters.

4.1 Intelligent Pulse-Jet Cleaning Control

The P151 Basic features the most advances pulse jet cleaning control system available. Intelligent Pulse mode automatically maintains a constant pressure drop across the filter using the least amount of compressed air. Intelligent Pulse also extends filter life through reduced pulsing and maintains low emissions and constant air flow by maintaining the proper filter cake. The operator can also select other cleaning modes such as Continuous, High Low, and Cycle. All cleaning modes may be overridden remotely with a discrete contact or through the fieldbus interface.

Cleaning Mode	Description
Intelligent Pulse	Automatically adjusts and optimizes off time between pulses to maintain a constant differential pressure drop across the filter while using the least amount of compressed air and extending filter life.
Continuous	Continuously pulses rows with fixed off time between pulses. Not controlled by differential pressure.
Cycle	Pulses rows with fixed off time between pulses a defined number of times. It can be used to perform a cycle down, a manual single cycle, or manual multiple cycles.
High Low	Rows are pulsed with fixed off time between pulses only when the differential pressure rises above the high setting. Pulsing stops when differential pressure falls below the low setting.
Off	All pulsing is stopped.

The sequence and pattern of pulsing is user adjustable. Sequencing is available as Sequential, Sequential Multiple Row, Basic Pattern, and Basic Pattern Multiple Row.

Pulsing Sequence	Description
Sequential	Rows are pulsed in sequential order one at a time, this is the default sequence.
Sequential Multiple Row	Multiple rows are pulsed at once in sequential order, normally used when single row pulsing does not sufficiently reduce differential pressure.
Basic Pattern	Rows are pulsed in staggered order one at a time, normally used to prevent dust re-entrainment on adjacent rows of filters.
Basic Pattern Multiple Row	Multiple rows are pulsed at once in staggered order, normally used when single row pulsing does not sufficiently reduce differential pressure and to prevent dust re-entrainment on adjacent rows of filters.
Single Row Diagnostic Pulsing	Process diagnostic checks (for failed diaphragms and filter leaks) are performed after each row pulse.

Multiple Row Diagnostic Pulsing	Single row pulses are automatically interleaved with multiple row pulses to perform process diagnostic checks (for failed diaphragms and filter leaks).

General Cleaning Related Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Operating Mode	Operator	Off	Current cleaning mode (Off, Intelligent Pulse, Continuous, High Low, Cycle)
Pulse ON Time	Supervisor	0.1 Seconds	On duration of the pulses
Number of Rows	Engineer	16	Total number of rows (pulse jet valves)

The ***Operating Mode*** setting is ignored when in fieldbus cleaning control and the cleaning mode received through fieldbus I/O data is used. Refer to section 5.4 Fieldbus Cleaning Control for further details.

4.1.1 Intelligent Pulse

The Intelligent Pulse cleaning mode automatically adjusts and optimizes off time between pulses to maintain a constant differential pressure drop across the filter while using the least amount of compressed air and extending filter life. The user simply adjusts the ***IP Hold Pressure*** to the desired differential pressure and Intelligent Pulse will control the pulsing to maintain the exact pressure setting. The range of the off time adjustment that the Intelligent Pulse operates over may be limited by the ***IP Min Off Time*** and ***IP Max Off Time*** settings if desired. The outputs will pulse at a rate defined by the ***IP Max Off Time*** even if the differential pressure is below the ***IP HOLD Pressure*** setting and the outputs will be pulsed no faster than a rate defined by the ***IP Min Off Time***. The ***IP Max Off Time*** is used to ensure periodic pulsing even with low differential pressure based on user preferences. The ***IP Min Off Time*** is used to limit compressed air use and prevent re-entrainment of dust on adjacent filters.

Intelligent Pulse Mode Settings (Cleaning Wizard)

Setting	Login	Default	Notes
IP HOLD Pressure	Supervisor	4.0 inWC	Hold pressure for Intelligent Pulse mode
IP Min Off Time Enable	Supervisor	Enabled	Enable or disable IP minimum off time limiting. If disabled, the minimum off time is 3 seconds
IP Min Off Time	Supervisor	3 Seconds	Minimum time allowed between pulses for Intelligent Pulse mode
IP Max Off Time Enable	Supervisor	Disabled	Enable or disable IP maximum off time limiting. If disabled, the maximum off time is infinite.
IP Max Off Time	Supervisor	30000 Seconds	Maximum time allowed between pulses for Intelligent Pulse mode
IP DP PVIN Channel	Engineer	PVIN1	Process variable input channel to be used as a differential pressure signal for pressure based cleaning modes

WARNING

INTELLIGENT PULSE CONSIDERATIONS

- Increasing the ***IP Min Offtime*** setting too much can limit Intelligent Pulse's ability to reduce filter differential pressure during periods of high filter inlet loading. This can lead to reduced process gas velocity and may damage filters.
- Using Intelligent Pulse on processes with variable speed fans controlled from process pressure may require careful setpoint adjustment. Consult factory for assistance.

4.1.2 Continuous

The continuous cleaning mode is used to continuously pulse rows with fixed off time between pulses. The ***Pulse OFF Time*** setting is used to set the time between pulses.

Continuous Mode Setting (Cleaning Wizard)

Setting	Login	Default	Notes
Pulse OFF Time	Supervisor	10 Seconds	Off duration between pulses for fixed time cleaning modes

4.1.3 High Low

The High Low cleaning mode is used to pulse outputs only when the differential pressure is high. Pulsing starts when the differential pressure rises above the ***HILO ON Pressure*** setting and stops when the differential pressure drops below the ***HILO OFF Pressure*** setting. The off time between pulses is defined by the ***Pulse OFF Time*** setting.

High Low Mode Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Pulse OFF Time	Supervisor	10 Seconds	Off duration between pulses for fixed time cleaning modes
HILO ON Pressure	Supervisor	6.0 inWC	Pressure limit above which pulsing is turned on in High Low cleaning mode
HILO OFF Pressure	Supervisor	2.0 inWC	Pressure limit below which pulsing is turned off in High Low cleaning mode
IP DP PVIN Channel	Engineer	PVIN1	Process variable input channel to be used as a differential pressure signal for pressure based cleaning modes

4.1.4 Cycle

The Cycle cleaning mode is used to pulse all outputs a defined number of times. It can be used to perform a cycle down, a manual single cycle, or manual multiple cycles. The outputs are pulsed starting from the first row for the number of cycles selected by the ***Cycle Mode Cycles*** setting. Each cycle is complete when all rows are pulsed. After all cycles are complete, the unit returns to the off mode or to the previous cleaning mode depending on the value of the ***Cycle Mode Return*** setting.

Cycle Mode Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Pulse OFF Time	Supervisor	10 Seconds	Off duration between pulses for fixed time cleaning modes
Cycle Mode Cycles	Supervisor	3	Number of times to cycle through all rows in Cycle mode
Cycle Mode Return	Supervisor	Previous	Cleaning mode to return to once all Cycle mode cycles are complete (Off, Previous)

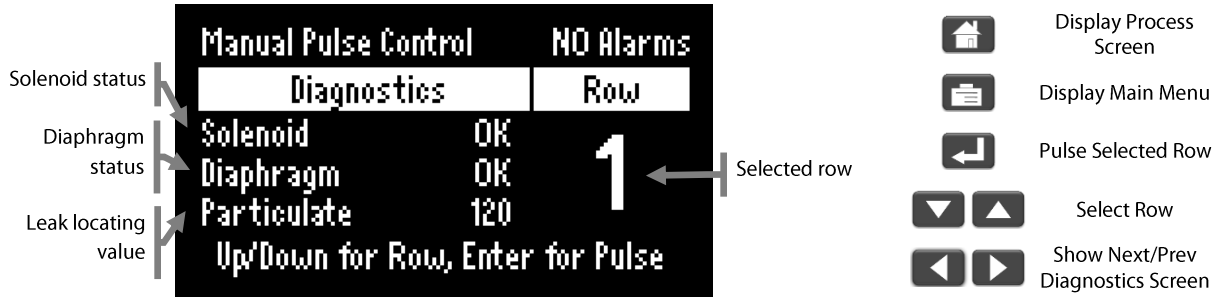
4.1.5 Off Mode

The Off mode disables pulsing of all rows.

4.1.6 Manual Pulsing from the Controller

Manual pulsing from the controller is supported on firmware V2.01 and higher.

The manual pulsing screen can be used to pulse individual rows manually if logged in as Engineer. The diaphragm and leak locating diagnostics run when rows are pulsed manually from the controller. Manual pulsing from the controller can be used for troubleshooting or to initiate diagnostics manually. The manual pulsing screen is accessible from the Main Menu by selecting "Process Diagnostics", pressing the enter key, and then pressing the left or right key until the screen is displayed.



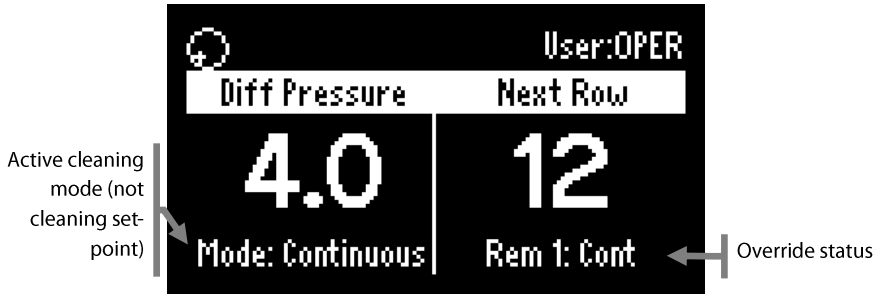
4.2 Cleaning Remote Override

One or more discrete inputs may be configured to initiate an override of the existing cleaning mode when connected to a remote device such as a selector switch, motor starter auxiliary contact, or PLC discrete output. This remote override feature allows the cleaning mode to be changed when the user may not have access to the display/keypad, or to be automatically changed when the process fan is turned ON or OFF. The available override modes include the cycle override, continuous override, Intelligent Pulse override, HILO override, and off override. Up to three override modes can be configured and each override mode can use a different discrete input. Any of the three override modes can be used to initiate an override of the existing cleaning mode. However, if more than one override mode is triggered, the override mode with the highest priority will be used. Remote 1 has the highest priority followed by Remote 2 then Remote 3. All cleaning remote overrides can be initiated from the fieldbus. Only one override mode is supported on firmware V2.31 and lower.

Remote Override Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Remote 1 Mode	Supervisor	Continuous	First override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled)
Remote 2 Mode (fware V2.32+)	Supervisor	Disabled	Second override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled)
Remote 3 Mode (fware V2.32+)	Supervisor	Disabled	Third override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled)
Remote 1 DIN Channel	Engineer	DIN1	Discrete input channel to be used as the activation signal for the first remote override
Remote 2 DIN Channel (fware V2.32+)	Engineer	DIN2	Discrete input channel to be used as the activation signal for the second remote override
Remote 3 DIN Channel (fware V2.32+)	Engineer	DIN3	Discrete input channel to be used as the activation signal for the third remote override

Cleaning Process Screen with Remote Override



Remote Override Indicators

Remote Override Mode	Mode Indicator when Remote is Activated	Remote Indicator when Remote is Activated
Cycle	Cycle	Cycle
Off	Off	Off
Continuous	Continuous	Cont
Intelligent Pulse	Intelligent Pulse	Smart
HILO	HILO	HILO
Disabled	Existing Cleaning Mode	Disabled

The remote discrete input values are ignored when in fieldbus cleaning control and the remote cleaning bits received through fieldbus I/O data are used to trigger the cleaning remote override. Refer to section 4.4 Fieldbus Cleaning Control for further details.

4.2.1 Cycle Mode Override

Setting ***Remote Mode*** to Cycle overrides the current cleaning mode with Cycle mode. The override is triggered when an On to Off transition is detected on the corresponding discrete input. Outputs are pulsed for the number of cycles specified by the ***Cycle Mode Cycles*** setting. Once complete, the unit returns to the off mode or to the previous cleaning mode depending on the ***Cycle Mode Return*** setting. The discrete input is typically connected to a main fan motor starter auxiliary contact to initiate Cycle cleaning when the fan turns off.

4.2.2 Off Mode Override

Setting ***Remote Mode*** to Off overrides the current cleaning mode with Off mode. The cleaning mode will be set to Off when the corresponding discrete input is Off and will return to the previous cleaning mode when the discrete input is On. The discrete input is typically connected to a main fan motor starter auxiliary contact to turn off cleaning when the fan turns off, or to a remotely located on/off selector switch.

4.2.3 Continuous Mode Override

Setting ***Remote Mode*** to Continuous overrides the current cleaning mode with continuous mode. The override is enabled when the corresponding discrete input is On and disabled when the discrete input is Off. The discrete input is typically connected to a remotely located on/auto selector switch.

4.2.4 Intelligent Pulse Mode Override

Setting ***Remote Mode*** to Intelligent Pulse overrides with current mode with Intelligent Pulse mode. The override is enabled when the corresponding discrete input is On and disabled when the discrete input is Off. The discrete input is typically connected to a remotely located on/auto selector switch.

4.2.5 HILO Mode Override

Setting ***Remote Mode*** to HILO overrides the current cleaning mode with HILO mode. The override is enabled when the corresponding discrete input is On and disabled when the discrete input is Off. The discrete input is typically connected to a remotely located on/auto selector switch.

4.2.6 Disabling all Overrides

Setting ***Remote Mode*** to Disabled disables all remote overrides. The corresponding discrete input value is ignored.

4.3 Pulsing Sequence and Patterns

The sequence in which rows are pulsed may be changed to create different patterns. The control over the sequence is provided with different sequencing modes which include Sequential, Sequential Multiple Row, Basic Pattern, and Basic Pattern Multiple Row. If process diagnostics is needed when pulsing multiple rows at the same time, the ***Multi-row Diag*** setting should be set to ON. This will cause a single row pulse to be inserted after each multi-row pulse to run diagnostics. Multiple rows can be pulsed at the same time for processes with a large number of rows or a high input particulate loading. Also, rows can be skipped to prevent particulate re-entrainment on adjacent filters and to more quickly distribute cleaning across large dust collectors.

Pulsing Sequences Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Multi-row Number	Supervisor	1	Number of rows to pulse at once
Multi-row Diag	Supervisor	On	Include single row diagnostics pulse in multi-row sequence
Rows to Skip	Supervisor	0	Number of rows to skip in the pulsing sequence
Number of Rows	Engineer	16	Total number of rows (pulse jet valves)

4.3.1 Sequential

In the Sequential mode, rows are pulsed in order one at a time. This is the default operating mode. It is configured by setting the ***Rows to Skip*** to 0 and the ***Multi-row Number*** to 1.

Sequential Example (Number of Rows = 16, Multi-row Number = 1, Rows to Skip = 0)

	Rows Pulsed (✸)															
Next Row Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	✸															
2		✸														
3			✸													
4				✸												
5					✸											
6						✸										
7							✸									
8								✸								
9									✸							
10										✸						
11											✸					
12												✸				
13													✸			
14														✸		
15															✸	
16																✸

4.3.2 Sequential Multiple Row

In the Sequential Multiple Row mode, multiple rows are pulsed at once as defined by the ***Multi-row Number*** setting. The ***Rows to Skip*** setting should be adjusted to 0.

To ensure pulsing is evenly distributed across all rows an offset is calculated by dividing the ***Number of Rows*** setting by the ***Multi-row Number*** setting, for example, Number of Rows = 16, Multi-row Number = 2, Offset = 16/2 (8). The next row to pulse indicates the first of multiple rows to be pulsed. Additional rows as defined by the ***Multi-row Number*** setting will be determined by adding the calculated offset to the next row to pulse. Continuation from the last row back to row 1 is automatically handled to ensure all rows are pulsed evenly over multiple pulsing cycles. This mode is utilized on processes with a large number of rows or a high input particulate loading. An example is given below:

Sequential Multi-Row Example (Number of Rows = 16, Multi-row Number = 2, Rows to Skip = 0)

	Rows Pulsed (✸)															
Next Row Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	✸				offset				✸							
2		✸				offset				✸						
3			✸				offset				✸					
4				✸				offset				✸				
5					✸				offset				✸			
6						✸				offset				✸		
7							✸				offset				✸	
8								✸				offset				✸
9	✸								✸				offset			
10		✸								✸				offset		
11			✸								✸				offset	
12		offset		✸								✸				offset
13			offset		✸								✸			offset
14				offset		✸								✸		
15					offset		✸								✸	
16						offset		✸								✸

4.3.3 Multiple Row with Diagnostics

The multi-row diagnostics feature provides the ability to diagnose individual row problems reliably while also pulsing multiple rows and patterns. The multi-row offset is calculated as in 5.3.2 above. Setting the ***Multi-row Diag*** setting to ON will cause a single row pulse to be inserted before each multi-row pulse. This single row pulse allows diaphragm and leak locating diagnostics to pinpoint problems down to an individual row.

Multi-Row Diagnostics Example (Number of Rows = 16, Multi-row Number = 2, Multi-row Diag = ON)

	Rows Pulsed (✸)															
Next Row Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1 Diagnostic	✸															
1 Multi-Row	✸	offset							✸							
2 Diagnostic		✸														
2 Multi-Row		✸	offset							✸						
3 Diagnostic			✸													
3 Multi-Row			✸	offset							✸					
4 Diagnostic				✸												
4 Multi-Row				✸	offset							✸				
5 Diagnostic					✸											
5 Multi-Row					✸	offset							✸			
6 Diagnostic						✸										
6 Multi-Row						✸	offset							✸		
7 Diagnostic							✸									
7 Multi-Row							✸	offset							✸	
8 Diagnostic								✸								
8 Multi-Row								✸	offset							✸

4.3.4 Basic Pattern

In the Basic Pattern mode, rows are pulsed in staggered order as defined by the ***Rows to Skip*** setting. The ***Rows to Skip*** defines the number of rows to be skipped between successive pulses. This mode creates a basic distributed pulsing pattern to prevent particulate re-entrainment on adjacent filters and to more quickly distribute cleaning across large dust collectors. Skipped rows will be pulsed on subsequent cycles and the sequencing logic guarantees that all rows will be pulsed evenly with no rows missed. The ***Multi-row Number*** setting should be adjusted to 1.

Basic Pattern Example (Number of Rows = 16, Multi-row Number = 0, Rows to Skip = 3)

	Rows Pulsed (✸)															
Next Row Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	✸	skipped														
5					✸	skipped										
9									✸	skipped						
13													✸	skipped		
2		✸	skipped													
6						✸	skipped									
10										✸	skipped					
14														✸	skipped	
3			✸	skipped												
7							✸	skipped								
11											✸	skipped				
15															✸	
4	skipped			✸	skipped											
8								✸	skipped							
12												✸	skipped			
16																✸

4.3.5 Basic Pattern Multiple Row

In the Basic Pattern Multiple Row mode, multiple rows as selected by the ***Multi-row Number*** are pulsed in staggered order as defined by the ***Rows to Skip***. The multi-row offset is calculated as in 4.3.2 above. Skipped rows will be pulsed on subsequent cycles and the sequencing logic guarantees that all rows will be pulsed evenly with no rows missed.

Basic Pattern Multiple Row Example (Number of Rows = 16, Multi-row Number = 2, Rows to Skip = 2)

	Rows Pulsed (✸)															
Next Row Indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	✸	skip				offset			✸							
4				✸	skip			offset				✸				
7							✸	skip			offset				✸	
10		✸								✸	skip			offset		
13		offset			✸								✸	skip		
16				offset				✸								✸
2		✸	skip			offset				✸						
5					✸	skip			offset				✸			
8								✸	skip			offset				✸
11			✸								✸	skip		offset		
14			offset			✸								✸	skip	
3			✸	skip			offset				✸					
6						✸	skip			offset				✸		
9	✸								✸	skip			offset			
12				✸	skip			offset				✸				
15							✸	skip			offset				✸	
Total Pulses	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

4.4 Fieldbus Cleaning Control

Fieldbus cleaning control is supported on firmware V2.01 and higher.

Cleaning settings are accessible through the fieldbus interface. Reading cleaning settings from the P151 has no effect on cleaning operation. Writing cleaning settings to the P151 will overwrite any existing settings configured through the user interface unless the controller is in fieldbus cleaning control mode.

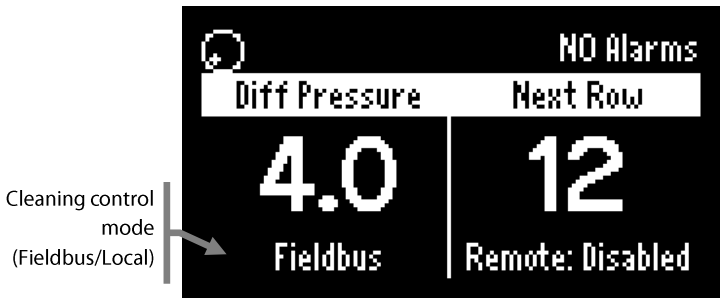
Several cleaning settings may be adjusted either through fieldbus or through the P151 local user interface. Values from the fieldbus take effect when the ***Cleaning Control Mode*** setting is set to fieldbus. Values from the P151 local user interface take effect when the ***Cleaning Control Mode*** setting is set to local. This allows the user to take over local control of these critical cleaning settings from the P151 local user interface if needed and prevents fieldbus data from overwriting settings until the ***Cleaning Control Mode*** is set back to fieldbus.

The ***Operating Mode*** setting is ignored when in fieldbus cleaning control and the cleaning mode received through fieldbus I/O data is used. Also, the remote discrete input values are ignored and the remote cleaning bits received through fieldbus I/O data are used to trigger the cleaning remote override. Refer to the MICS™ Fieldbus Manual for complete details on fieldbus cleaning control.

Fieldbus Cleaning Control Mode Setting (Cleaning Wizard)

Setting	Login	Default	Notes
Cleaning Control Mode (Fieldbus or Local)	Engineer	Local	Current cleaning control mode selects between Local for P151 control and Fieldbus for fieldbus control

The active cleaning control mode is indicated on the cleaning process screen as shown below. The entry toggles between the cleaning control mode and the cleaning mode.



5 Process Diagnostics

One of the main features of the P151 is the ability to continuously analyze filter operation and diagnose problems and faults. Three diagnostic features are available, failed solenoid detection, failed diaphragm detection and filter leak-locating by row. When the cleaning system is set to pulse multiple rows at once, the ***Multi-row Diagnostics*** setting should be enabled. This will cause a single row pulse before each multi-row pulse to properly run the diagnostics. Refer to section 4.3 Pulsing Sequence and Patterns for further details.

Process Diagnostics Settings (Cleaning Wizard)

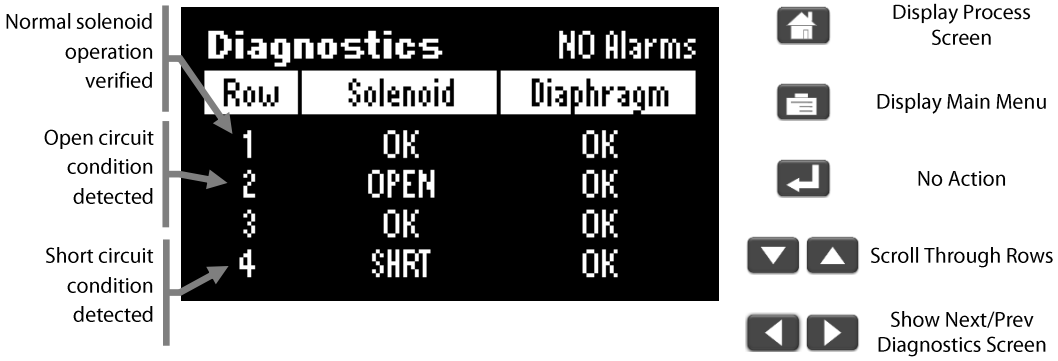
Setting	Login	Default	Notes
Multi-row Number	Supervisor	1	Number of rows to pulse at once
Multi-row Diag	Supervisor	On	Include single row diagnostics pulse in multi-row sequence

5.1 Failed Solenoid Diagnostics

Failed solenoid diagnostics detect open and short circuit conditions for each attached solenoid as described in the table below. Failures are reported to the user interface, fieldbus port and alarming system automatically.

Failure	Description
Open Circuit Solenoid	Open circuit conditions are detected on the specified output channel. Most likely causes are a loose connection or failed solenoid coil.
Short Circuit Solenoid	Short circuit conditions are detected on the specified output channel. Most likely causes are a shorted connection, failed solenoid coil, or water entry into the solenoid enclosure. Outputs for which a short circuit is detected are automatically disabled before the Intelligent Pulse module fuse blows, allowing all other outputs for the module to continue to function normally. The outputs will be automatically enabled when the short circuit condition is removed.

The solenoid-diaphragm diagnostics screen displays the status of each solenoid. The status shows “OPEN” for open circuit and “SHRT” for short circuit faults.

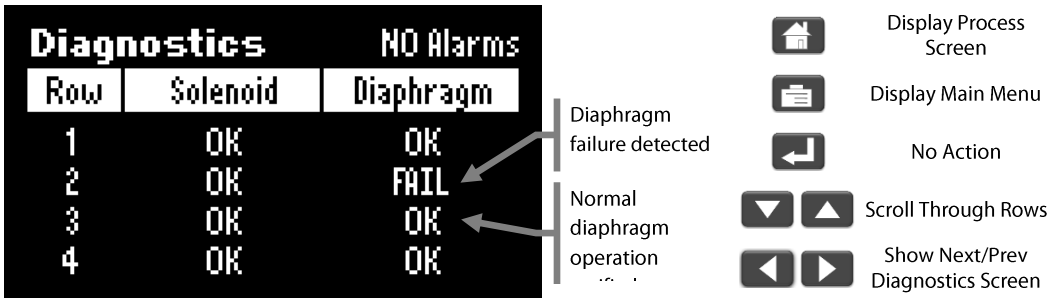


5.2 Failed Diaphragm Diagnostics

Operation of the pulse diaphragm valves is monitored for problems or faults. Failures are reported to the user interface, fieldbus port and alarming system automatically. The diagnostics detect frozen or stuck diaphragm conditions as well as open or torn diaphragm conditions as described in the table below. Diagnostics are automatically disabled if the header pressure signal drops below 20PSI.

Failure	Description
Frozen or Stuck Diaphragm	Diaphragm valve fails to open fully when the pilot solenoid was energized. Most likely causes are a main diaphragm that is stuck closed or a poor pneumatic connection between the pilot solenoid and the main diaphragm.
Open or Torn Diaphragm	Diaphragm valve is stuck open or has a torn diaphragm. Most likely causes are a tear in the main diaphragm or a loose or leaking tube connection to the pilot solenoid.

The solenoid-diaphragm diagnostics screen displays the diaphragm status for each row. The status shows "FAIL" to report a diaphragm fault.



The P151 features an automated adjustment feature that optimizes diaphragm diagnostics settings specifically for the process it is operating on. The user should run this automated feature upon initial commissioning or after any major changes are made to the compressed air system or diaphragm valves. Set the ***Run DIA Diag Auto Configure*** setting to Yes to initiate. The routine will pulse 10 valves spaced evenly across all rows then calculate the result and return to the previous cleaning mode. This feature is supported by firmware V2.11 and higher.

The diaphragm diagnostics supports up to six banks of consecutive rows. The number of rows in each bank is configured using the ***Bank x DIA Diag Num of Rows*** setting where x represents the bank number. Bank 1 starts at row 1 while each of the other banks starts after the last row of the previous bank as shown in the example below. The header pressure signal for each bank is configured using the ***Bank x DIA Diag PVIN Chan*** setting where x represents the bank number. This feature is supported by firmware V2.12 and higher.

Diaphragm Diagnostics Example with Two Banks (Number of Rows = 16)

Bank	*DIA Diag Num of Rows* Setting	Start Row	End Row
1	8	1	8
2	8	9	16

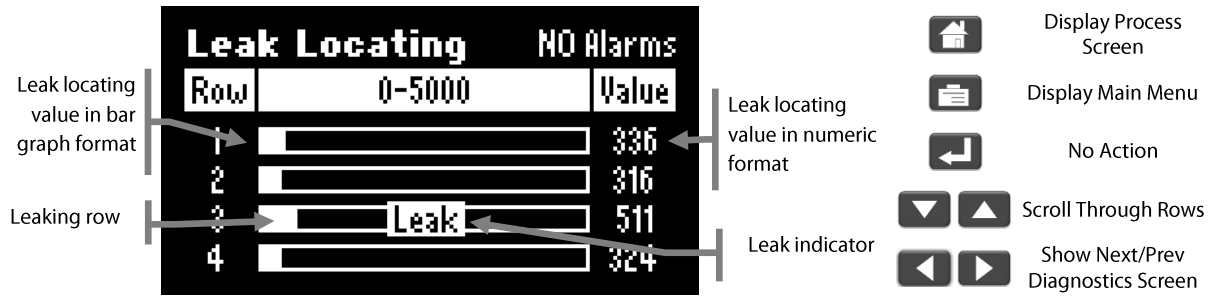
Failed Diaphragm Diagnostics Settings (Diagnostics Wizard)

Setting	Login	Default	Notes
Run DIA Diag Auto Configure	Engineer	No	Runs automatic configuration of diaphragm diagnostics settings
Bank 1 DIA Diag Num of Rows	Engineer	128	The number of rows in Bank 1 diaphragm diagnostics
Bank 1 DIA Diag PVIN Chan	Engineer	PVIN3	Process variable input channel to be used as a header pressure signal for Bank 1 diaphragm diagnostics
Bank 2 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 2 diaphragm diagnostics
Bank 2 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 2 diaphragm diagnostics
Bank 3 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 3 diaphragm diagnostics
Bank 3 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 3 diaphragm diagnostics
Bank 4 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 4 diaphragm diagnostics
Bank 4 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 4 diaphragm diagnostics
Bank 5 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 5 diaphragm diagnostics
Bank 5 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 5 diaphragm diagnostics
Bank 6 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 6 diaphragm diagnostics
Bank 6 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 6 diaphragm diagnostics

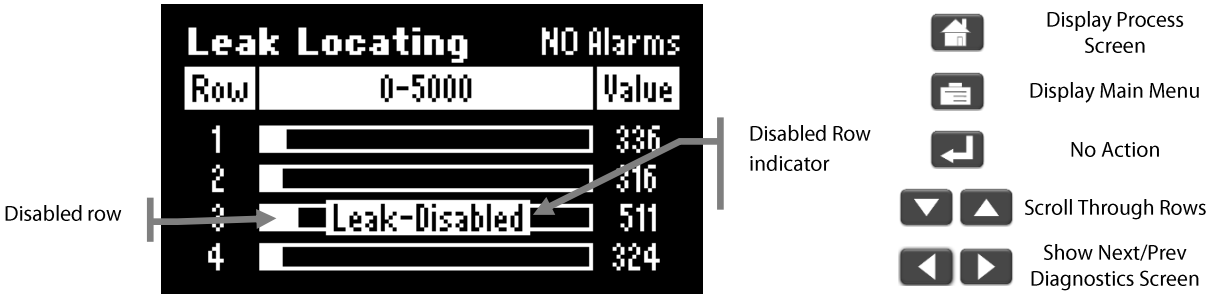
5.3 Leak-Locating Diagnostics

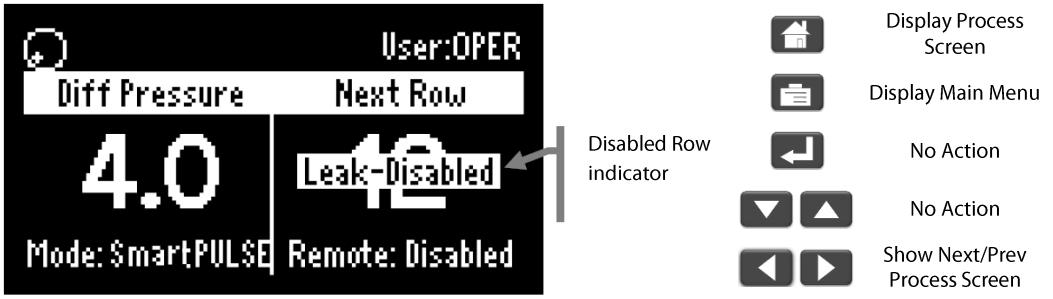
The leak-locating feature uses advanced signal processing to analyze particulate levels by row. The amount of particulate leaking through the filter immediately after a cleaning pulse is normally significantly higher than the baseline bleed-through. When a row is pulsed, the filter cake is temporarily removed from the outside of the filter on that row and the filter media is stretched, allowing a momentary increase in particulate. When filters have small tears or worn areas, cleaning cycles will amplify the existence of the small tears and worn filter media allowing even more particulate to leak through the filters, causing the readings to increase. Leaking rows, or rows with developing leaks, may be detected by performing a row-by-row comparison of filter leak values. Rows that have filter leak levels significantly higher than others are typically leaking. Limits may be set to trigger a leak locating diagnostic alarm resulting from consistently high leak locating values. Leak locating diagnostic alarms are supported by firmware V2.17 and higher.

The leak locating diagnostics screen displays the leak locating values for each row. The latest leak locating value for each row is shown both in bar graph format and as a numeric value. Leak alarms are displayed on the screen with a flashing indicator.



When the leak locating diagnostic alarm is enabled, the controller can be configured to automatically disable pulsing of leaking rows up to a maximum of 10% of the total number of rows. The pulsing of a disabled row will be automatically re-enabled after 25 pulses. Disabling pulses can be configured using the ***Disable Leaking Rows*** setting in the System Wizard. The disabled leaking rows are displayed on the leak locating diagnostics screen with a flashing indicator. Also, the next row on the cleaning process screen is shown with a flashing indicator when the row is disabled. Disabling leaking rows is supported by firmware V2.18 and higher.





The leak locating diagnostics supports up to six banks of consecutive rows. The number of rows in each bank is configured using the ***Bank x LL Diag Num of Rows*** setting where x represents the bank number. Bank 1 starts at row 1 while each of the other banks starts after the last row of the previous bank as shown in the example below. The particulate signal for each bank is configured using the ***Bank x LL Diag PVIN Chan*** setting where x represents the bank number.

Leak Locating Diagnostics Example with Two Banks (Number of Rows = 16)

Bank	*LL Diag Num of Rows* Setting	Start Row	End Row
1	8	1	8
2	8	9	16

Leak Locating Diagnostics Setting (Diagnostics Wizard)

Setting	Login	Default	Notes
Bank 1 LL Diag Num of Rows	Engineer	128	The number of rows in Bank 1 leak locating diagnostics
Bank 1 LL Diag PVIN Chan	Engineer	PVIN2	Process variable input channel to be used as a particulate signal for Bank 1 leak locating diagnostics
Bank 2 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 2 leak locating diagnostics
Bank 2 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 2 leak locating diagnostics
Bank 3 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 3 leak locating diagnostics
Bank 3 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 3 leak locating diagnostics
Bank 4 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 4 leak locating diagnostics
Bank 4 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 4 leak locating diagnostics
Bank 5 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 5 leak locating diagnostics
Bank 5 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 5 leak locating diagnostics
Bank 6 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 6 leak locating diagnostics
Bank 6 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 6 leak locating diagnostics
Leak Locating Diag Alarm Limit	Engineer	500	Threshold (in pA) above which a leak locating value indicates a filter is leaking. Used to generate leak locating diagnostic alarms.
Leak Locating Diag Alarm Count	Engineer	3	Number of consecutive cleaning cycles of an individual row that must have a leak locating value above the limit before a leak locating diagnostic alarm is issued.

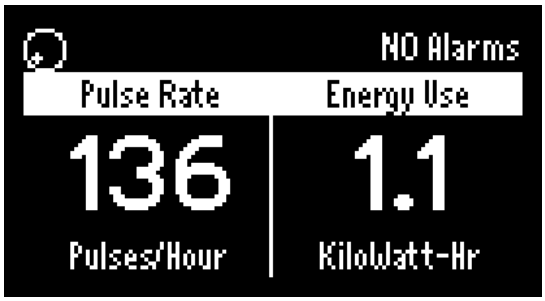
Disable Leaking Rows Setting (System Wizard)

Setting	Login	Default	Notes
Disable Leaking Rows	Engineer	No	Disable rows with registered leak locating diagnostic alarm

6 Energy Analysis

The energy analysis feature is used to calculate the energy use of the compressed air system. It can be used to evaluate different cleaning modes in order to determine the most efficient mode. The compressed air use in CFM, Kilowatt-Hr, and $/year are estimated using the real time pulse rate and are updated every 15 minutes. The Kilowatt-Hr compressed air use is shown on the energy process screen. The CFM and $/year compressed air use are accessible through the Fieldbus. The energy analysis takes into account the following to arrive to an accurate result:

- Cleaning system pulse rate
- Density of air in the pulse valve manifold
- Flow settings of the diaphragm pulse valves
- Air delivery rate of the air compressor system
- Efficiency and size of compressor motors
- Average Electric Utility rate



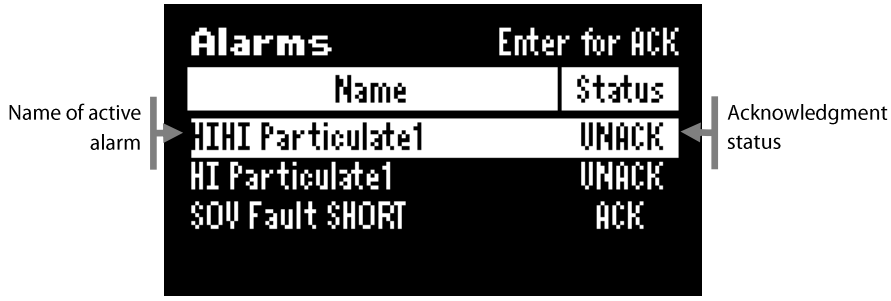
Energy Analysis Settings (Cleaning Wizard)

Setting	Login	Default	Notes
Pulse ON Time	Supervisor	0.1 Seconds	On duration of the pulses
Valve Diameter	Engineer	1.3 Inches	Pulse valve diameter used to estimate Valve Flow-rate when value is out of range (0.25 to 3.00 Inches)
Valve Flow-rate	Engineer	17.0 gal/Hr	Air flow rate through pulse valve used to calculate energy use (1 to 150 gal/Hr)
Valve Graph Factor	Engineer	3750.0	Standard flow setting for pulse valve used to calculate energy use (100 to 10000)
Manifold Pressure	Engineer	90 PSI	Average header manifold operating pressure used to estimate Valve Graph Factor when value is out of range (10 to 150 PSI)
Manifold Air Temp	Engineer	60 degrees C	Average header manifold air temperature used to estimate Valve Graph Factor when value is out of range (10 to 100 degrees C)
Air Delivery Rate	Engineer	4.0 hp/CFM	Air compressor delivery rate used to calculate energy use
Motor Efficiency	Engineer	98.5%	Air compressor electric motor efficiency used to calculate energy use
Utility Rate	Engineer	0.1 $/kWh	Electrical utility rate for air compressor used to calculate $/year energy use

7 Alarms

Two alarms are available for every active process variable input. An alarm will be activated when the process variable goes beyond the ***Alarm Set point*** continuously for a period longer than the ***Alarm Delay*** setting. Diagnostics and system alarms are also available. Alarms can be inhibited when the process is off to prevent activation of new alarms if this feature is enabled. The default alarm configuration is listed below. Alarms will be added or removed automatically as additional process variable inputs are enabled or disabled.

Active Alarms Screen



Default Alarm Configuration

Alarm	Type	Group	Level	Delay	Description
Differential Pressure	HIHI	1	8	10	HIHI alarm of differential pressure reading
Differential Pressure	HI	2	7	10	HI alarm of differential pressure reading
Particulate	HIHI	1	100	5	HIHI alarm of particulate reading
Particulate	HI	2	30	10	HI alarm of particulate reading
Header Pressure	LOLO	1	50	10	LOLO alarm of header pressure reading
Header Pressure	LO	2	60	10	LO alarm of header pressure reading
SOV Fault OPEN	Diagnostic	1	-	-	Failed solenoid alarm registers when open circuit conditions are detected on one of the solenoids
SOV Fault SHORT	Diagnostic	1	-	-	Failed solenoid alarm registers when short circuit conditions are detected on one of the solenoids
DIA Fault	Diagnostic	1	-	-	Diaphragm fault alarm registers when diaphragm fault conditions are detected on one of the rows
CAN Network ERR	System	1	-	-	Can network error alarm which signals that communication with one of the I/O modules is lost
Real Time Clock ERR	System	1	-	-	Invalid time or date values detected after power up which signals that the battery is discharged
SD Card Alarm (fware V2.31+)	System	1	-	-	Unable to log data to the SD card due to card error, card full or no card inserted

Alarm Settings – Typical for Each Process Alarm (Alarm Wizard)

Setting	Login	Default	Notes
Select Alarm	Supervisor		Select the alarm to be modified
Set point	Supervisor	Varies	Limit for alarm activation
Delay	Supervisor	Varies	Amount of time reading must exceed set point to activate alarm
Group	Supervisor	Varies	Group associated with the selected alarm
Latching	Supervisor	Off	Requires user acknowledgment to clear alarm if latching is On
Logic	Supervisor	Varies	Activation logic (HI, HIHI, LO or LOLO)

7.1 Alarm Logic

Alarm logic defines how process variable alarms are activated. When the ***Alarm Logic*** setting is set to HIHI or HI, the alarm is activated when the input exceeds the ***Alarm Set point*** continuously for a period longer than the ***Alarm Delay***. When ***Alarm Logic*** is set to LOLO or LO, the alarm is activated when the input is below the ***Alarm Set point*** continuously for a period longer than the ***Alarm Delay***.

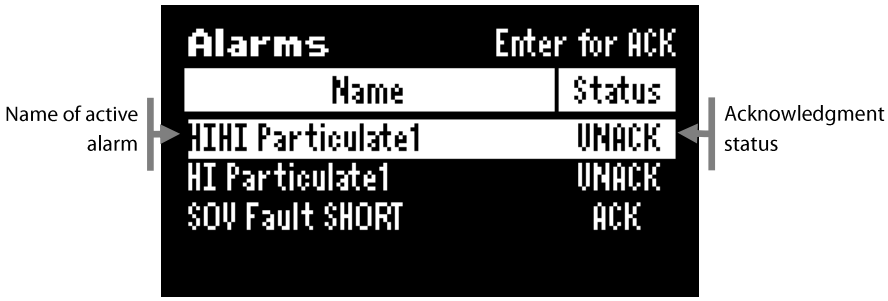
7.2 Alarm Groups

Alarm groups are used to group similar alarms or alarms with the same level of severity so that they can be mapped to the same discrete output. Also, alarms from the same group can be acknowledged from the same digital input as described in section 8.3 Alarm Acknowledgement. The alarm group for each process variable alarm is configured using the ***Alarm Group*** setting. By default, the group value represents the discrete output channel that will be activated for the selected alarm (for example, group 4 corresponds to DOUT 4). The group for each of the diagnostics and system alarms is fixed at 1. However, when the master alarm feature is enabled, the first discrete output DOUT 1 is used for the master alarm and the discrete output corresponding to each group is shifted by one (for example, group 4 corresponds to DOUT 5). Refer to section 7.8 Master Alarm for further details.

7.3 Alarm Acknowledgement

Alarms can be acknowledged from the keypad, through the fieldbus, or remotely using discrete inputs.

Active Alarms Screen



Alarm Acknowledgement through User Interface Keypad

Alarms may be acknowledged from the user interface keypad by pressing the enter key within the Active Alarms screen. Pressing the enter key acknowledges all alarms at once. The minimum required login level to acknowledge alarms through the keypad is defined by the ***Alarm Ack User Level*** setting.

User Interface Alarm Acknowledgement Setting (System Wizard – firmware V2.06 and higher)

Setting	Login	Default	Notes
Alarm Ack User Level	Engineer	Operator	Minimum login level to acknowledge alarms through the keypad

Alarm Acknowledgement through Fieldbus

Alarms may be acknowledged through the fieldbus interface in both the I/O data and parameter data areas. This can be done by setting the alarm acknowledge word to a value of 1 for 2 seconds then returning it to a value of 0. The alarm acknowledge word should not be left at 1 since this would acknowledge any new alarms. Refer to the MICS™ Fieldbus Manual for complete details on alarm acknowledgment through fieldbus.

Alarm Acknowledgement through Remote Discrete Signal

Alarms may be acknowledged remotely through I/O module discrete inputs. A discrete input can be used to acknowledge all alarms or to acknowledge alarms from a specific alarm group. The remote acknowledge settings are accessible from the Alarm Wizard by selecting Global for acknowledging all alarms or the group number for a specific alarm group.

Remote Acknowledge Settings (Alarm Wizard)

Setting	Login	Default	Notes
Select Alarm Group	Engineer		Select the alarm group to modify
Remote Ack	Engineer	Disabled	Remote acknowledge feature enable
Remote DIN	Engineer	DIN1	Discrete input channel used to acknowledge alarms from the selected group

7.4 Alarm Latching Logic

Alarm latching allows alarms to be latched in the active state until cleared and acknowledged. This prevents plant personnel from missing an alarm that may only be active for a short period of time. If the ***Alarm Latching*** setting is set to Off, an active alarm is cleared when the process variable returns to normal, no acknowledgment is required. If the ***Alarm Latching*** setting is set to On, an active alarm is cleared by acknowledging the alarm after the process variable returns to normal. Latching for each of the process diagnostics and device system alarms is set to off by default.

7.5 Alarm Relay Clearing

When any new alarm occurs the associated alarm group relay will be activated. The method to clear an active alarm relay is adjustable with several settings as described below. Clearing an alarm group relay does not mean the active alarm condition has been resolved or that the alarm is no longer present.

Action Required to Clear Relay	Alarm Latching Setting	Clear Alarm Relay when Acknowledged Setting
Remove alarm condition	OFF	DISABLED
Remove active alarm condition or Acknowledge the active alarm group	OFF	ENABLED
Remove alarm condition and Acknowledge the active alarm group	ON	DISABLED
Acknowledge the active alarm group	ON	ENABLED

Clear Alarm Relay when Acknowledged Setting (System Wizard – firmware V2.08 and higher)

Setting	Login	Default	Notes
Clear Alarm Relay When Ack	Engineer	Disabled	If enabled, alarm relay is cleared when alarm is acknowledged

7.6 Fail-Safe Relay Logic

Alarm relay logic may be set to normal or fail-safe mode. In normal mode, the alarm relay contact is open under normal conditions and closes when an associated alarm is active. In fail-safe mode, the alarm relay contact is closed under normal conditions and opens when an associated alarm is active or when power to the control unit is removed. The fail-safe mode can be configured by setting the ***Invert Logic*** setting for the alarm discrete output channel to 1 as described in section 10.6 Discrete Output.

7.7 Alarm Inhibit

The alarm inhibit feature may be used to inhibit new alarms from being activated when the process is off. Each alarm can be configured to use one of the process run signals as the inhibit signal. The alarm will operate normally as long as the inhibit signal is low. If the inhibit signal goes high while the alarm is registered, the alarm will still operate normally. The alarm will not be cleared unless alarm conditions are removed and may require acknowledging the alarm when latching is on. If the inhibit signal is high and the alarm is not registered, the alarm will not be registered even if alarm conditions are detected. The process run signal can use a discrete input and/or a process variable input with a threshold to determine the process state. See section 10.7 Process Run Signal for more details about process run signal configuration.

7.8 Master Alarm

The master alarm feature will activate discrete output DOUT 1 if any alarm in any alarm group is active. If the ***Master Alarm Mode*** setting is set to normal, the discrete output channel is activated when there is at least one unacknowledged alarm. If the ***Master Alarm Mode*** setting is set to critical, the discrete output channel is

activated when there is at least one alarm even if it is acknowledged. Note that when the master alarm feature is enabled, the discrete output corresponding to each alarm group is shifted by one (for example, group 4 corresponds to DOUT 5). The master alarm feature is only supported on firmware V2.20 and higher.

Master Alarm Settings (Alarm Wizard)

Setting	Login	Default	Notes
Master Alarm Enabled	Engineer	Enabled	Disables or enables the master alarm feature
Master Alarm Mode	Engineer	Normal	Selects the master alarm mode (normal or critical)
Master Alarm Invert Logic	Engineer	0	Inverts master alarm discrete output when set to 1

8 Data-logging

The internal data-logging system stores time stamped data to an industrial SD memory card. The supported data logging types are presented in the table below.

Log Type	SD Card Folder	Filename Prefix	Description
Process Log	PROCESS	P	Stores all process values that are configured in the system at a fixed sample rate which is configurable by the user through the System Wizard
Alarm Log	ALARM	A	Stores alarm events and transitions for all configured alarms
Particulate Monitor Self-Test Log	SELFTEST	T	Stores particulate monitor module self-test results after self-check runs or when an error is detected or cleared.
Event Log	EVENT	E	Stores system events and errors for use in system validation and troubleshooting. Values such as results of power-on system self-test, memory tests, configuration errors and run-time operating errors are stored.

IMPORTANT DATA-LOGGING CONSIDERATIONS

- The use of the on board data-logging feature for EPA compliance record keeping should be accompanied by redundancy and/or backup. A system that provides option for backup and redundancy is recommended
  FilterWare is further recommended for regulations with short windows of allowed out of compliance/downtime requirements.
- The SD card data should be checked periodically when logging data for an extended period of time.
- Data is not stored to system memory and will be lost when the SD card is not installed.
- The data-logging system relies on the real time clock to maintain the current time and date for use in log file names and to time-stamp logged records. The real-time clock requires a battery to maintain time when power is removed. When replacing the battery, follow the battery replacement procedure in section 9.9 Real Time Clock and Battery to prevent damaging the board.
- Data logging should be disabled when removing and inserting the SD card, follow the procedure in section 9.2 to prevent possible data corruption

8.1 SD Memory Card

SD and SDHC memory cards with capacity between 128 Mbyte and 32 Gbyte are supported by the data-logging system. The process log contains the vast majority of data and can be used to estimate overall storage rate as listed in the table below.

Overall SD Memory Card Storage Size over Time

Number of Logged Process Values	Storage Rate in Seconds	Logged Size in Gbytes per Year
20 (Default configuration)	1	4.9
	5	1.0
	10	0.5
	60	0.1
32	1	7.5
	5	1.5
	10	0.8
	60	0.1

It is recommended that the SD card contains only the log files and folders created by the system, and that the number of files in the root and in each folder be limited to 128 files. The system will at most create one new file each day within each folder, therefore all files on the SD card must be archived to a PC/Server and the card erased every 128 days (4 months).

SD cards store data on internal flash memory. The number of memory write operations is limited by the quality of the flash memory cell used within the SD card. Because of this limitation of flash memory and because of the required wide operating temperature range, industrial type SD cards with a write endurance specification greater than 1 million write cycles should be used.

Example Industrial SD Card: Transcend Inc. model TS4GSDHC10I (-40 to 85C, 1,000,000 write cycles)

In addition, the SD card should be replaced periodically with a new card based on the rate at which data is being logged as given in the table below.

SD Card Replacement Recommendations

Storage Rate in Seconds	SD Card Replacement Period
1 to 4	After 3 months of operation
5	After 6 months of operation
10 and higher	After 1 year of operation

IMPORTANT SD MEMORY CARD REQUIRED MAINTENANCE

- Archive data and remove all files before card becomes full, based on data storage rate and SD card capacity
- Archive data and remove all files every 128 days (4 months) of continuous logging
- Replace card after 3-12 months of operation, based on data storage rate and SD card write cycle endurance

8.2 Removing the SD Card

To prevent possible data corruption the data logging system must be disabled before removing the SD card. The ***Data Logging Enable/Disable*** setting is available in the System Wizard to easily enable and disable data logging for safe card removal.

IMPORTANT TO PROPERLY REMOVE THE SD CARD

- Login as Engineer level user
- Set data logging to disabled through the System Wizard
- Remove the SD card

In addition, to prevent the possible loss of data due to failure to re-enable data logging the system will automatically re-enable data logging 2 minutes after a card is inserted into the SD card slot.

8.3 SD Card Alarm

A system alarm is provided that will generate a Group 1 alarm if the data logging system is enabled and there is any problem with data logging to the SD card including:

- No SD card installed
- SD card is full
- SD card is corrupt
- SD card contains too many files

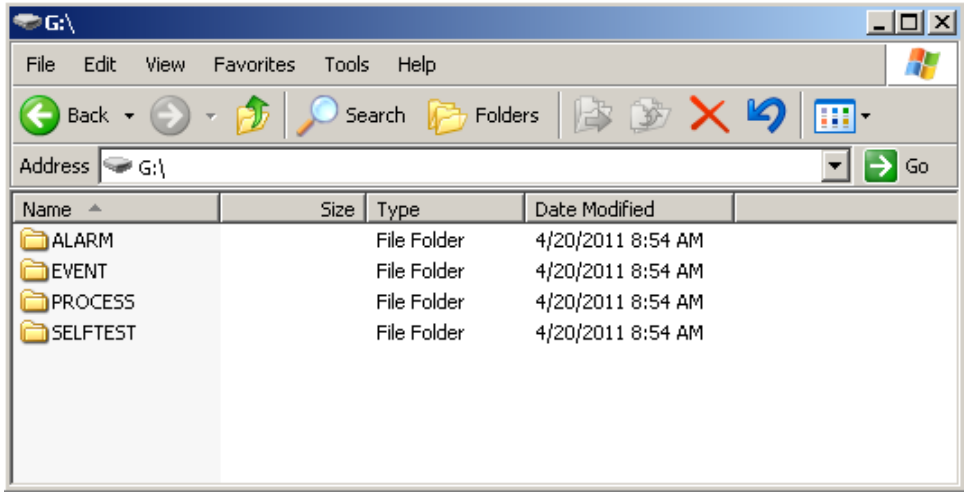
This alarm may be disabled if desired with the ***SD Card Alarm Enable/Disable*** setting in the System Wizard.

8.4 Files and Folders

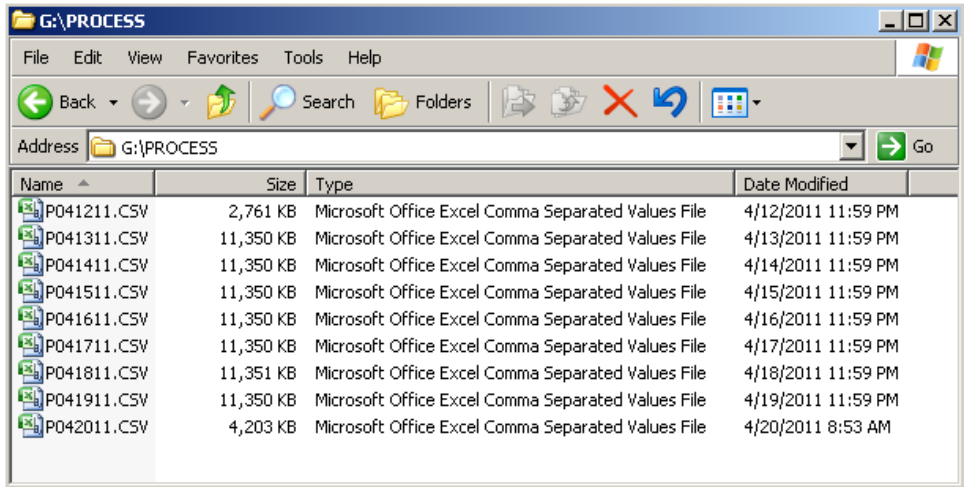
The data-logging system creates a folder for each log type such as process and alarm. Records are stored to data-log files in the created folders with a new file created each day. Files are stored in comma separated variable format which may be easily opened with any text editor, with Microsoft Excel, or imported into various standard databases. The file names consist of a prefix representing the log type, a date stamp for the current date, and a suffix representing the file type. The following is an example of a process log file:

Folder Name:	PROCESS
File Name:	P042011.CSV
Prefix:	P for process log file
Date Stamp:	042011 is formatted as MMDDYY for April 20, 2011
Suffix:	.CSV for comma separated variable type file

Folders Created by the Data-Logging System



Process Files Created by the Data-Logging System



8.5 Process Log

The process log file includes a header stored at the beginning of the file showing details of the log file and controller. The header also includes a legend for the logged process value names and units. Additional system information is listed in the header such as data type and network address index/sub-index. This information shows process log configuration that is not important to the user. Records are written to the process log file periodically as defined by the ***Data-log Sample Rate*** setting. Each record contains a date/time stamp which indicates the exact time the data was sampled along with a value for each process variable.

Process Log Sample Rate Setting (System Wizard)

Setting	Login	Default	Notes
Data-log Sample Rate	Engineer	60 Seconds	Process variable data-logging sample rate

Process Log File Example

	A	B	C	D	E	F	G	H	I
1	ASCO Data File for Log: Process Log								
2	Filename: P041211.csv								
3	Created: 04-12-2011 08:43:25.408								
4	Serial Number: 0								
5									
6	:FirmwareVersion=2.03								
7	:OBDVersion=1.200								
8	:PFileVersion=1.100								
9									
10	Label	Eng Units	Data Type	Addr Index	Addr Subindex	Signal			
11	Val1	pA	8	0x3400	0x1	Particulate1			
12	Val2	pA	8	0x3401	0x1	Particulate2			
13	Val3	pA	8	0x3402	0x1	Particulate3			
14	Val4	pA	8	0x3403	0x1	Particulate4			
15	Val5	pA	8	0x3404	0x1	Particulate5			
16	Val6	pA	8	0x3405	0x1	Particulate6			
17	Val7	pA	8	0x3406	0x1	Particulate7			
18	Val8	pA	8	0x3407	0x1	Particulate8			
19									
20	Timestamp	Val1	Val2	Val3	Val4	Val5	Val6	Val7	Val8
21	8:43:22.441	1.369	0.053	0.075	0.521	0.21	0.116	0.074	0.445
22	8:43:23.351	2.191	0.052	0.073	0.509	0.207	0.113	0.072	0.444
23	8:43:24.399	2.571	0.052	0.07	0.499	0.209	0.11	0.068	0.44
24	8:43:25.408	2.688	0.051	0.073	0.487	0.202	0.108	0.062	0.431
25	8:43:26.360	2.671	0.05	0.073	0.479	0.198	0.107	0.06	0.42

8.6 Alarm Log

The alarm log file includes a header stored at the beginning of the file showing details of the log file and system. Records are written to the alarm log file whenever there is an alarm event or transition. Each record contains a date/time stamp which indicates the exact time of the event along with the alarm state and settings.

Alarm Log File Example

	A	B	C	D	E	F	G	H	I	J	K
1	ASCO Data File for Log: Alarm Log										
2	Filename: A040611.csv										
3	Created: 04-06-2011 14:16:59.859										
4	Serial Number: 0										
5											
6	:FirmwareVersion=2.03										
7	:OBDVersion=1.200										
8	:AFileVersion=1.100										
9											
10	Timestamp	ProcessID	State	Description	Group	Type	Process Value	Setpoint	Delay	Logic	Latching
11	14:16:57.107	ALM	INALM	HI Particulate	Group 1	ANALOG	49.11	30	8	HI	NO
12	14:17:11.167	ALM	UNACKRTN	HI Particulate	Group 1	ANALOG	28.63	30	8	HI	NO
13	14:17:33.203	ALM	INALM	HI Particulate1	Group 2	ANALOG	48.68	30	8	HI	NO
14	14:17:40.207	ALM	UNACKRTN	HI Particulate1	Group 2	ANALOG	20.5	30	8	HI	NO

Alarm Log States

State	Description
INALM	Alarm is activated
UNACKRTN	Alarm is cleared without acknowledgment
ACKALM	Alarm is acknowledged
ACKRTN	Alarm is cleared after acknowledgment
INHON	Alarm is inhibited and will not be activated
INHOFF	Alarm is no longer inhibited and can be activated

8.7 Particle Monitor Self-Test Log

The particulate monitor self-test log file includes a header listed at the beginning of the file showing details of the log file and system. Records are written to the particulate self-test log file whenever there is a self-test event. Each record contains a date/time stamp which indicates the exact time of the event along with the module ID and details.

Self Test Log File Example

	A	B	C	D	E
1	ASCO Data File for Log: Particulate Self Test Log				
2	Filename: T041211.csv				
3	Created: 04-12-2011 08:44:15.323				
4	Serial Number: 0				
5					
6	:FirmwareVersion=2.03				
7	:OBDVersion=1.200				
8	:TFileVersion=1.100				
9					
10	Timestamp	NodeID	ProcessID	Event	Status
11	8:44:12.536	4	SelfCk	Self Ck Run	
12	8:44:12.537	4	SelfCk	Zero Ck Results	PASS
13	8:44:12.537	4	SelfCk	HiGain Results	PASS
14	8:44:12.538	4	SelfCk	MidGain Results	PASS
15	8:44:12.539	4	SelfCk	LoGain Results	PASS
16	8:44:12.541	4	SelfCk	Sensor Ck Results	PASS

Self-Test Log ProcessID Values

ProcessID	Description
SelfCk	Indicates that a particulate monitor self-check has run and lists the zero, upscale, and sensor check results
Ground	Indicates that a particulate sensor ground error is set or cleared
Temp	Indicates that a particulate monitor temperature error is set or cleared
SigQual	Indicates that a particulate sensor signal quality error is set or cleared

8.8 Event Log

The event log file includes a header stored at the beginning of the file showing details of the log file and controller. Records are written to the event log file whenever there is a system event. Each record contains a date/time stamp which indicates the exact time of the event along with the event description. The events include results of the tests performed at power up, events such as user login, self-test results, and any encountered errors.

Event Log File Example

	A	B	C
1	ASCO Data File for Log: Event Log		
2	Filename: E050411.csv		
3	Created: 05-04-2011 09:04:59.607		
4	Serial Number: 0		
5			
6	:FirmwareVersion=2.04		
7	:OBDVersion=1.200		
8	:EFileVersion=1.100		
9			
10	Timestamp	ProcessID	Event
11	9:01:47.432	SYS	System RESET
12	9:01:47.432	SYS	SCU_SYSSTATUS Register:
13	9:01:47.433	SYS	SRAM_ERROR = 0
14	9:01:47.433	SYS	ACK_PFQBC = 0
15	9:01:47.433	SYS	LVD_RESET = 0
16	9:01:47.434	SYS	WDG_RST = 0
17	9:01:47.434	SYS	LOCK_LOST = 0
18	9:01:47.434	SYS	LOCK = 1
19	9:01:47.434	SYS	HW Init PASSED

8.9 Real Time Clock and Battery

The data-logging system relies on the real time clock to maintain the current time and date for use in log file names and to time-stamp logged records. The user is required to set the correct date and time for the data-logging system to function properly. The current time and date may be viewed through the controller system information screen.

Real Time Clock Settings (System Wizard)

Setting	Login	Default	Notes
Date - Century	Supervisor	N/A	Real time clock current century (20 for 2011)
Date - Year	Supervisor	N/A	Real time clock current year (11 for 2011)
Date - Month	Supervisor	N/A	Real time clock current month (1-12)
Date - Day	Supervisor	N/A	Real time clock current day (1-31)
Date - Weekday	Supervisor	N/A	Real time clock current weekday (Monday-Sunday)
Time - Hour	Supervisor	N/A	Real time clock current hour (0-23)
Time - Minute	Supervisor	N/A	Real time clock current minute (0-59)

The real time clock requires a battery to maintain correct time and date when power is removed. If the battery becomes discharged the clock will not maintain an accurate value with power removed. A Real Time Clock ERR alarm will be activated if the clock is set to an invalid date or time value as commonly happens if power is removed with a discharged battery. The battery should be replaced once a year. It can be ordered as part of the MICS accessory kit given below:

Order Number	Name	Description
MAC-SK1	MICS accessory kit	Includes: Lithium coin battery for MICS controller real-time clock, qty 2

The battery can be replaced by following the steps below:

IMPORTANT BATTERY REPLACEMENT PROCEDURE

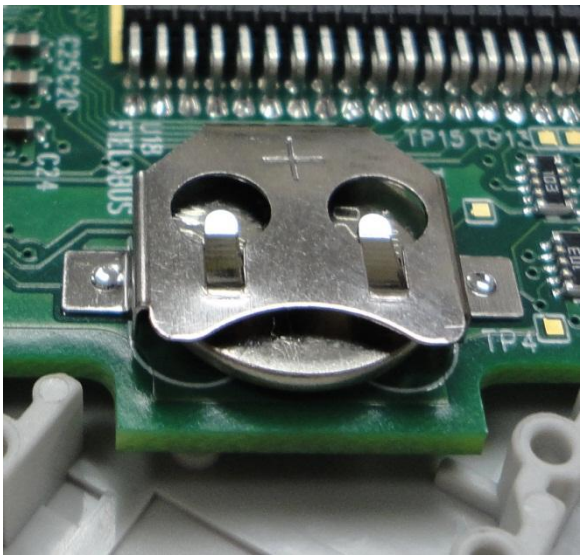
- Power controller off and remove from DIN rail bus.
- Locate the back of the controller.
- Remove the end-cap on the middle row of the last column away from the home key to locate the battery holder.
- Ensure that your body is grounded to prevent damaging the unit from electrostatic discharge (Such as by touching grounded metal).
- Remove the old battery carefully using needle-nose pliers.
- Install the new battery carefully using needle-nose pliers so that the (+) side faces away from the printed circuit board.

WARNING

BATTERY REPLACEMENT PRECAUTIONS

- Electrostatic discharge can damage semiconductor devices inside the controller. Do not touch the connector pins or other sensitive areas
- Take care when using tools such as tweezers or needle nose pliers to remove and replace the battery. Do not damage the internal circuit boards or circuit board components.

Controller Battery Holder



Controller Battery Area

9 System and I/O Information

System and I/O information screens are used to access important information about the status and configuration of the controller and configured I/O modules.

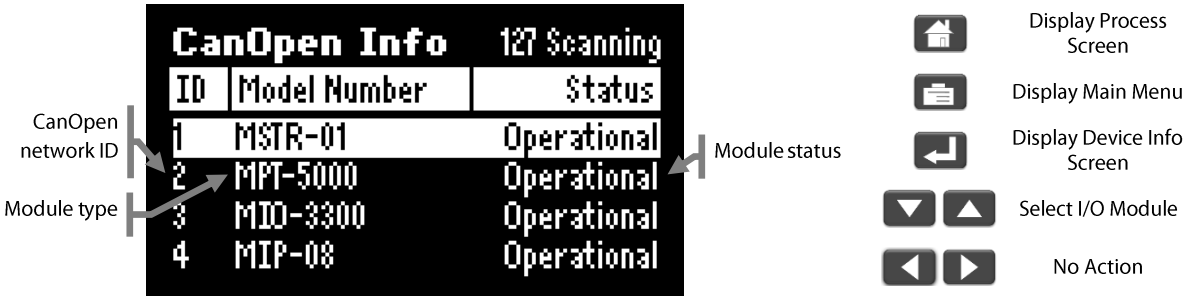
9.1 CanOpen

The CanOpen information screen displays a list of all I/O modules on the CanOpen DIN rail bus network and the status of each module. The status will show Operational for all configured modules that are operating properly. The screen is accessed by selecting System Information from the Main Menu then selecting CanOpen Info from the System Info selection screen. While the CanOpen information screen is displayed, the system will scan all IDs on the CanOpen network and determine the status of all detected modules.

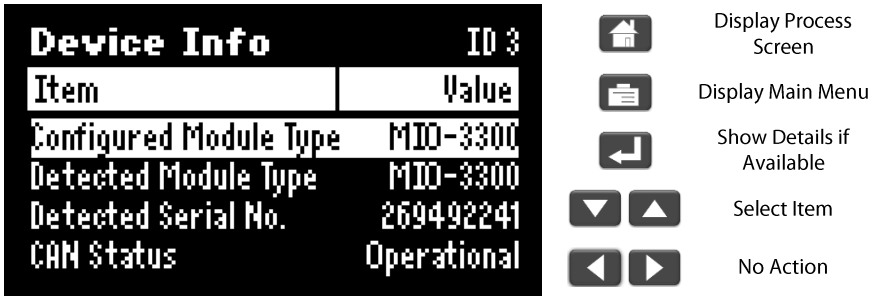
CanOpen Info Status Values

Status	Description
Operational	Communication with module is started
Disabled	Module is offline
Comm Failed	Communication with module has stopped
Mismatch	Detected module type is different than configured type
New	Detected module is not configured
Boot up	Module is booting up
Preoperational	Module boots up with no errors but communication is not started
Stopped	Communication with module was stopped by the controller to try to fix issues with the module
Waiting 1st	Waiting for communication with module to start
Timeout Ck	Module communication is being checked

CanOpen Info Screen



The Device Info screen for a selected module can be displayed by pressing the enter key. It shows details about the module such as the serial number which may be used to verify that the correct module is configured to the required ID.



The Device Info screen can be used to change the module network ID when logged in as Engineer by following the steps below:

IMPORTANT I/O MODULE NETWORK ID CHANGE PROCEDURE

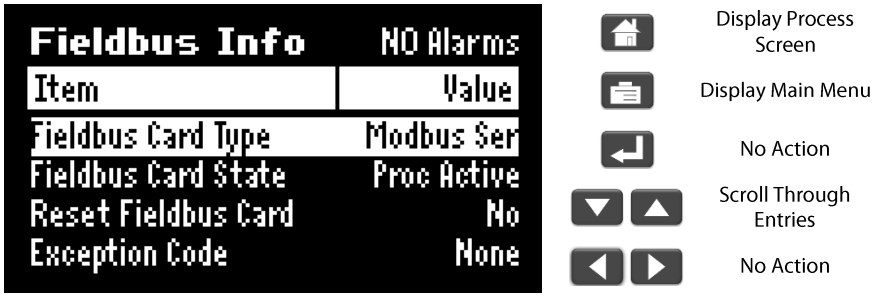
- Select the Reset Slave ID entry.
- Press the enter key to display the Confirm Change ID screen.
- Select Yes and press the enter key to display the Enter NEW ID screen.
- Select the new module ID and press the enter key to initiate the ID change.
- Cycle power to the I/O Module to apply the new ID.

Confirm Change ID Screen

Enter NEW ID Screen

9.2 Fieldbus

The Fieldbus information screen displays information about the fieldbus system. The screen is displayed by selecting System Information from the Main Menu then selecting fieldbus Status from the System Info selection screen.



The Fieldbus Info screen shows the type and status of the fieldbus card and the fieldbus card exception codes as described in the tables below.

Fieldbus Card Types

Fieldbus Card Type	Description
Unknown	No fieldbus card is installed
DeviceNet	DeviceNet card installed
Modbus Ser	Modbus Serial card installed
Ethernet_IP	Ethernet/IP card installed
Modbus_TCP	Modbus/TCP card installed
Profibus_DP	Profibus DP card installed
ControlNet	ControlNet card installed

Fieldbus Card States

Fieldbus Card State	Description
Setup	Fieldbus system is performing power up initialization tasks.
Network Init	Fieldbus system is performing network-related initialization tasks.
Wait Process	The network Process Data channel is temporarily inactive.
Idle	The network interface is idle.
Proc Active	The network Process Data channel is active and error free.
Error	There is at least one serious network error. Check the network settings applicable to your fieldbus card such as the IP address, node ID, baud rate, parity, start bit, and stop bit.
Exception	An error occurred that caused an unrecoverable state that requires restarting the system.

Fieldbus Card Exception Codes (Consult Factory)

Exception Code	Description
None	No exception
App Timeout	Application timeout
ID Error	Invalid device address
Comm Set Err	Invalid communication settings
App Error	Unrecoverable application event
Wait App Rst	Waiting for application reset
Pdata Error	Invalid process data configuration
App Resp Err	Invalid application response
Cksum Error	Nonvolatile memory checksum error

The Fieldbus Info screen also shows the IO Write Size Bytes which is the size in bytes of the I/O data sent to the network and the IO Read Size Bytes which is the size in bytes of the I/O data received from the network. I/O data received from the network is only supported by DeviceNet, Ethernet/IP, and Profibus DP fieldbus cards. Refer to the MICS Platform Fieldbus Manual for more details about the fieldbus interface.

9.3 I/O Module Operation

The I/O modules information screens display a list of process data and settings for the selected I/O module. The screens are displayed by selecting System Information from the Main Menu, selecting I/O Modules from the System Info selection screen, then selecting the CanOpen DIN rail bus network ID of the I/O module.

9.3.1 Forcing Outputs

The I/O module process outputs can be forced by following the steps below:

IMPORTANT

I/O MODULE OUTPUT FORCING PROCEDURE

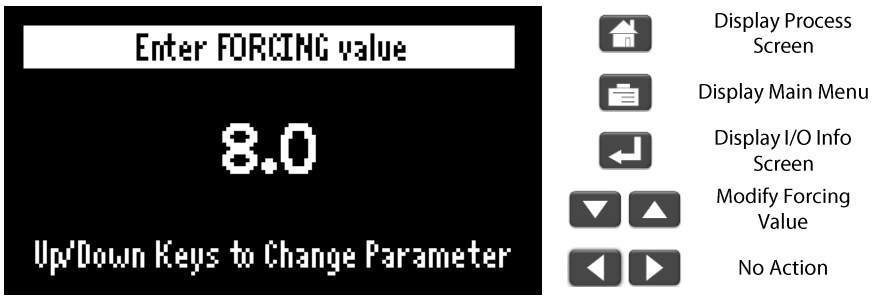
- Log on at Engineer user level.
- Select the process output entry and press the enter key to display the Enable Force Output screen.
- Select Forcing Enabled and press the enter key to display the Enter Forcing Value screen.
- Modify the forcing value.
- Press the enter key to display the I/O information screen (See
- MIO-1122 **Information Screen with AOUT1 Forced** figure below).

After the process output is forced, it will stay forced until forcing is disabled by following the steps below:

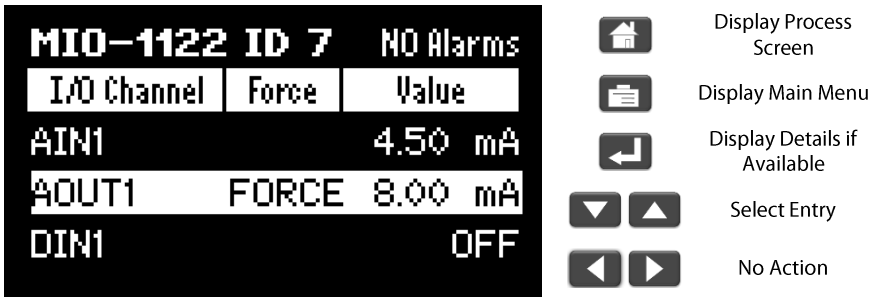
- Select the process output entry and press the enter key to display the Enable Force Output screen.
- Select Forcing Disabled and press the enter key.

Enable Force Output Screen

Enter Forcing Value Screen



MIO-1122 Information Screen with AOUT1 Forced



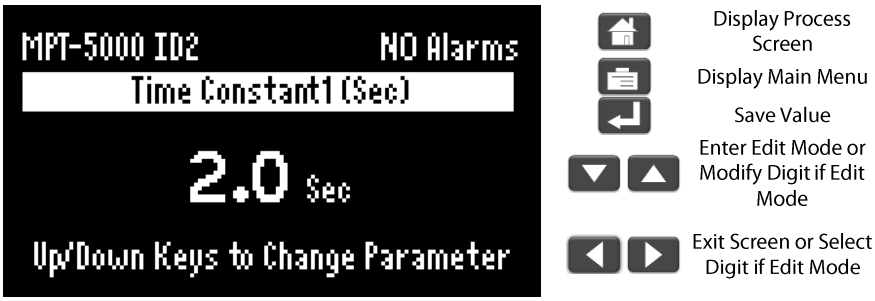
9.3.2 Modifying Settings

The I/O module settings can be modified by following the steps below:

IMPORTANT MODIFYING I/O MODULE SETTINGS PROCEDURE

- Log on at Engineer or Supervisor user level depending on the setting to be modified.
- Select the setting entry and press the enter key to display the setting screen.
- Modify the setting and press the enter key.

I/O Setting Screen Example



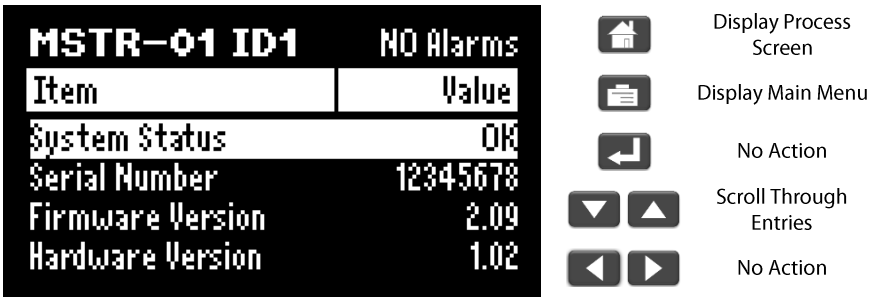
9.3.3 Module Type Master Controller MSTR-01

The MSTR-01 information screen displays the settings and status of the controller. It shows controller information, status and the status of the different system components. The System Status entry should show OK if there are no system errors. If it shows Error, scroll down the list to determine the cause of the error. Consult factory if errors remain present even after a power cycle.

System Errors

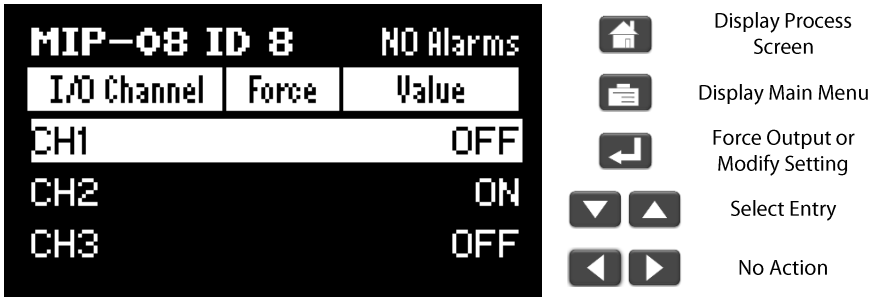
Error	Description
System Error SCU	Master processor clock system error
System Error FMI	Master processor memory error
System Error COPINIT	CanOpen network initialization error
System Error COPPROC	CanOpen network process startup error
System Error NV	Non-volatile memory CRC error
System Error NLIST	Node list startup error
System Error PDO	CanOpen PDO configuration error
System Error ALM	Alarming system configuration error
System Error PV	Process variable configuration error
System Error SDNR	SD card error
System Error EFSFS	File system general error
System Error EFSFL	File system file error
System Error DLG2	Data log system error

Controller Information Screen



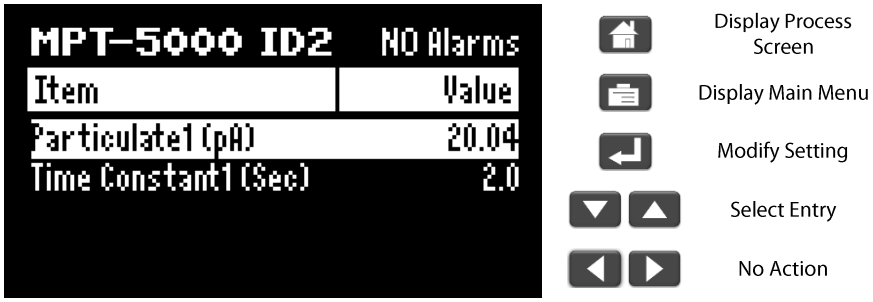
9.3.4 Module Type Intelligent Pulse Output MIP-08

The Intelligent Pulse information screen displays the process data and settings of the Intelligent Pulse I/O·module. It shows the state of each output and allows the user, if logged in as Engineer, to force the outputs. It also displays the instantaneous and pulse mA currents of connected solenoids when logged in as Engineer.



9.3.5 Module Type Basic Particulate MPT-5000 and MPT-50002

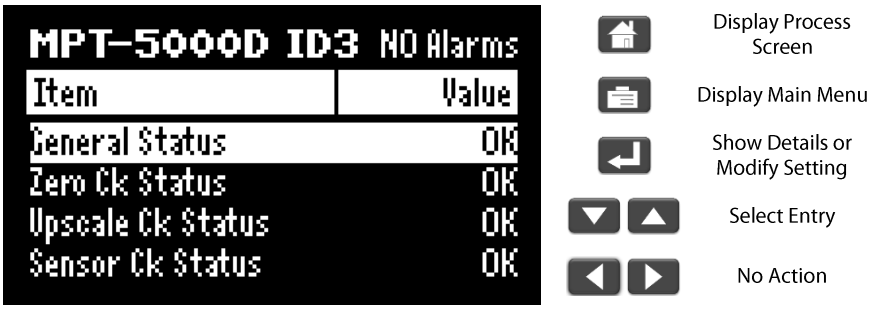
The MPT-5000 (single channel) or MPT-50002 (dual channel) information screen displays the process data and settings of the MPT-5000 or MPT-50002 particulate module. It shows the particulate reading and time constant setting for each channel. Engineer login is required to modify the time constant. The particulate reading is calculated from the raw data by applying an averaging routine that can be adjusted using the time constant. Increasing the time constant makes the reading smoother.



9.3.6 Module Type Plus Particulate MPT-5000D

The MPT-5000D information screen displays the process data, settings, and status of the advanced particulate module with advanced signal processing and automatic self-test features. The internal self-check circuitry is used to automatically or manually perform zero and upscale checks of the measurement circuit and to check the performance of the sensing probe and cable. Additional self-checks include continuous temperature, ground connection, and signal quality checks.

Information Screen for the Plus Particulate Module



Information Screen

The information screen entries for Engineer login level are described in the table below. When not logged in as Engineer, the Signal Quality Status, Ground Status, and Temperature Status are combined into one System Status entry and the Run Self Ck and Clear Self Ck Errors entries are not displayed.

Entry	Values	Description
General Status	OK/Self Ck/Error	Shows Error when there is a system or module self-check error, Self Ck when self-check is running, and OK otherwise
Zero Ck Status	OK/Self Ck/Error	Shows Error when there is a zero check error, Self Ck when zero check is running, and OK otherwise
Upscale Ck Status	OK/Self Ck/Error	Shows Error when there is an upscale check error, Self Ck when upscale check is running, and OK otherwise
Sensor Ck Status	OK/Self Ck/Error	Shows Error when there is a sensor check error, Self Ck when sensor check is running, and OK otherwise
Signal Quality Status	OK/Error	Shows Error when particulate reading is not varying within parameters
Ground Status	OK/Error	Shows Error when the Plus particulate module system is not grounded properly
Temperature Status	OK/Error	Shows Error when the Plus particulate module system temperature is too high or low
Run Self Ck	NO	Used to initiate self-check when logged in as Engineer
Clear Self Ck Errors	NO	Used to clear self-check errors when logged in as Engineer
Periodic Self Ck	Disabled/Daily/ Weekly/Monthly	Starts periodic self-check wizard used to set periodic self-check date and time when logged in as Engineer
Averaging Time (Sec)	5.0 (Default)	Shows averaging time used by the averaging routine which can be modified by pressing the enter key - Increase to make the reading smoother

Particulate Reading

The ***Input Channel*** setting of the process variable input for the advanced particulate module is configured in the factory and should not be changed to ensure proper operation. The particulate reading can be made smoother by increasing the ***Averaging Time*** setting. The ***Averaging Time*** is displayed on the module information screen and can be modified by selecting it and pressing the enter key when logged in as Engineer.

Self-Check

The self-check feature allows the user to check the measurement circuitry and the remote sensing probe and cable. Self-checks may be initiated manually from the keypad, through the fieldbus interface or automatically at a specific periodic date and time. The self-check tests include zero, upscale, and sensor and cable checks as described in the table below.

Self Check Test	Description
Zero	Checks the offset of the measurement circuit - Consult factory when error
Upscale	Injects pA inputs for the low, mid, and high ranges and verifies that the reading is correct - Consult factory when error
Sensor and Cable	Checks sensor and cable for shorts – Check coax cable and sensor when error and consult factory if error is not cleared

Self-checks may be initiated by following the steps below:

IMPORTANT METHODS TO INITIATE A SELF CHECK

- Select the Run Self Ck entry in the information screen while logged in as Engineer.
- Press the enter key to display the Run Self Ck screen.
- Select Yes and press the enter key to initiate the self-check.

Self-check errors and results may be cleared using the Clear Self Ck Errors entry in the system information screen by following the same steps as for running the self-check.

MPT-5000D Run Self Ck Screen

The periodic self-check may be configured by following the steps below:

IMPORTANT PROCEDURE TO CONFIGURE A PERIODIC SELF CHECK

- Select the Periodic Self Ck entry in the information screen while logged in as Engineer.
- Press the enter key to display the Periodic Self Ck screen.

- Select how often to run the self-check and press the enter key.
- Scroll through all the steps to set the time and date when the self-check will run.

MPT-5000D Periodic Self Ck Screen

MPT-5000D Periodic Self Ck Wizard

The process screen for advanced particulate monitor shows SELF CHECK when self-check is running and shows ERROR when there is a zero or upscale check error. In addition, the analog outputs scaled from process variable inputs for advanced particulate modules can be used to indicate when the self-check is running and/or when there is a zero or upscale check error as described in the table below. The analog output features are enabled by default and they can only be disabled in the factory.

Settings		Analog Output		
Output 3.6mA When Zero/ Upscale Error	**Output 3.8mA When Self Check is Running**	**Self-Check Running**	**Self-Check Not Running and No Zero/Upscale Error**	**Self-Check Not Running and Zero/Upscale Error**
Disabled	Disabled	Scaled output	Scaled output	Scaled output
Enabled	Disabled	Scaled output	Scaled output	3.6mA
Disabled	Enabled	3.8mA	Scaled output	Scaled output
Enabled	Enabled	3.8mA	Scaled output	3.6mA

Advanced Particulate Status

Plus particulate modules continuously perform system checks to ensure proper operation of the measurement system. The module checks the ground connection, module temperature, and signal quality as described in the table below.

System Check	Description
Signal Quality	Detects when measured reading is not varying within parameters - Check coax cable and sensor for shorts
Ground	Detects ground connection issue - Check ground connection
Temperature	Detects when module temperature is too high or low – Consult factory

Data Logging

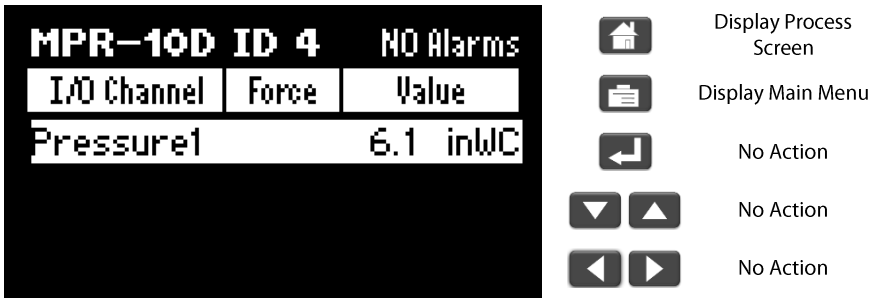
The data logging system logs particulate monitor self-check results and error events to the SD card.

Fieldbus

The fieldbus interface may be used to control the self-check for the Plus particulate module and access the module status values using parameter data. Refer to the MICS Platform Fieldbus Manual for more details about the fieldbus parameters.

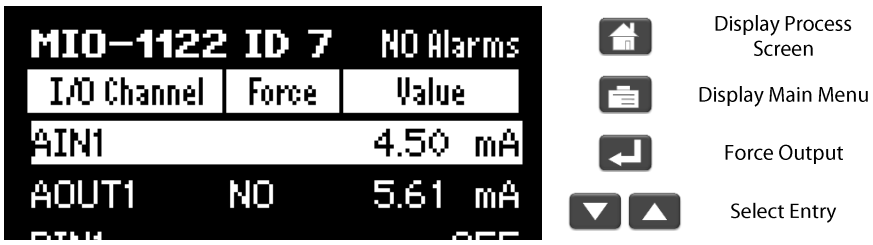
9.3.7 Module Type Differential Pressure MPR-10D

The MPR-10D information screen displays the process value of the differential pressure module. It shows the measured differential pressure in inches of water column.



9.3.8 Module Type Mixed I/O MIO-1122

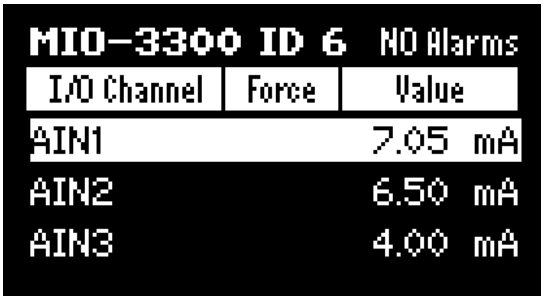
The MIO-1122 information screen displays the process data of the MIO-1122 mixed I/O module. It shows the measured milliamps from AIN1 and the milliamps output at AOUT1. It also shows the input values from DIN1 and DIN2 and the output state of DOUT1 and DOUT2. The process outputs AOUT1, DOUT1, and DOUT2 can be forced by the user if logged in as Engineer.



No Action

9.3.9 Module Type Analog I/O MIO-3300

The MIO-3300 information screen displays the process data of the MIO-3300 analog I/O module. It shows the measured milliamps from AIN1, AIN2, and AIN3. It also shows the milliamps output at AOUT1, AOUT2, and AOUT3. The process outputs AOUT1, AOUT2, and AOUT3 can be forced by the user if logged in as Engineer.



Display Process Screen

Display Main Menu

Force Output

Select Entry

No Action

9.3.10 Module Type Discrete I/O MIO-0033

The MIO-0033 information screen displays the process data of the MIO-0033 discrete I/O module. It shows the input values from DIN1, DIN2, and DIN3. It also shows the output state of DOUT1, DOUT2 and DOUT3. The process outputs DOUT1, DOUT2 and DOUT3 can be forced by the user if logged in as Engineer.

Display Process Screen

Display Main Menu

Force Output

Select Entry

No Action

10 Hardware Configuration

The hardware configuration wizard is used to adjust input and output scaling and other hardware related settings. It can be accessed by selecting Setup Wizards from the Main Menu then selecting Hardware Wizard. The Hardware Config selection screen is displayed to allow the user to select one of the hardware configuration types as presented in the table below.

Hardware Configuration	Description
Nodelist	Configures expected I/O module types at each CanOpen network ID
Process Variable IN	Configures process variable input settings
Process Variable OUT	Configures process variable output settings
Discrete IN	Configures discrete input settings
Discrete OUT	Configures discrete output settings
Process Run Signal	Configures process run signal settings

10.1 Node list

The node list is used to configure I/O modules installed in the CanOpen DIN Rail bus. I/O modules must be included in the node list at the appropriate network ID to be able to exchange data with the controller. This can be done by following the steps below:

IMPORTANT NODELIST ADJUSTMENT PROCEDURE

- Enter the node list hardware wizard.
- Select the network ID of the module.
- Set the model number of the module.
- Cycle power to the controller.

The CanOpen system information screen may be used to verify that all I/O modules in the node list are configured properly and are operational.

Node List Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select ID	Engineer	ID 2	Network ID for I/O module to be configured
Model Number	Engineer	None	I/O module type (MIO-1122, MIO-3300, etc..)

10.2 Process Variable Input

A process variable input represents a reading or value from a process sensor that is connected to the system through generic input channel or dedicated sensor module such as particulate or differential pressure. Process variable inputs are continuously read from input channels and scaled to appropriate engineering units 10 times per second for display on the process screens. Each process variable input has two configurable alarms. Also, each process variable input is mapped to the process variable output with the same channel number (for

example PVIN 4 is mapped to PVOUT 4). The percentage equivalent of the process variable output value is displayed on the process screen. In addition, the process variable input values can be logged to the SD card.

Process Variable Input Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select Process Variable Input	Engineer	PVIN 1	Select PVIN channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PVIN channel
Process Name	Engineer	None	Process name (differential pressure, particulate, header pressure…)
Engineering Units	Engineer	None	Unit (inWC, PSI, pA...)
Raw MINIMUM	Engineer	0	Minimum value of the I/O input (example 4.0mA)
Raw MAXIMUM	Engineer	0	Maximum value of the I/O input (example 20.0mA)
Scaled MINIMUM	Engineer	0	Minimum value of the scaled I/O input (example 0.0PSI)
Scaled MAXIMUM	Engineer	0	Maximum value of the scaled I/O input (example 150.0PSI)
Relative Factor	Engineer	1	Relative factor to be used as a multiplier of the scaled I/O input
Input Slave ID	Engineer	0	I/O module network ID to acquire data from
Input Channel	Engineer	AIN 1	I/O module channel to acquire data from (AIN1, AIN2, DIN1…)

The I/O module input is scaled using the ***Raw MINIMUM***, ***Raw MAXIMUM***, ***Scaled MINIMUM***, and ***Scaled MAXIMUM*** settings. The resulting value is multiplied by the ***Relative Factor*** setting to produce the process variable input value. As an example, the following table shows how to configure differential pressure from the second 4-20mA input of an MIO-3300 module with ID 2 as PVIN 1 such as 4-20mA corresponds to 0-10inWC.

Setting	Value
Select Process Variable Input	PVIN 1
PVIN 1 Enabled	Enabled
PVIN 1 Process Name	Diff Pressure
PVIN 1 Engineering Units	inWC
PVIN 1 Raw MINIMUM	4
PVIN 1 Raw MAXIMUM	20
PVIN 1 Scaled MINIMUM	0
PVIN 1 Scaled MAXIMUM	10
PVIN 1 Anti-Log Decades	0
PVIN 1 Relative Factor	1
PVIN 1 Input Slave ID	2
PVIN 1 Input Channel	AIN 2

10.3 Process Variable Input Averaging

Process variable input readings can be averaged for display on the process screens. The average values can also be logged to the SD card. The ***Averaging Period*** setting can be used to set the period to a value between 1 and 60 minutes. The ***Averaging Buffer Clear*** setting can be used to clear the averaging buffer.

Process Variable Input Averaging Settings (Hardware Wizard)

Setting	Login	Default	Notes
Averaging Period	Engineer	6 Minutes	Period for the process variable input average
Averaging Buffer Clear	Engineer	NO	Clears the buffer used to calculate the process variable input average

10.4 Process Variable Output

The process variable output scales process variable input data and sends it to the analog output channel of an I/O module in the network. Each process variable input is mapped to the process variable output with the same channel number (for example PVIN 4 is mapped to PVOUT 4). The ***Log Scale Decades*** setting is used to select between linear and logarithmic output scale. When the process variable input is acquired from an advanced particulate module, the corresponding process variable output is set to 3.8mA when the self-check is running and to 3.6mA when there is a zero or upscale check error.

Process Variable Output Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select Process Variable Output	Engineer	PVOUT 1	Select PVOUT channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PVOUT channel
Raw MINIMUM	Engineer	0	Minimum value of the process variable input (example 0.0PSI)
Raw MAXIMUM	Engineer	0	Maximum value of the process variable input (example 150.0PSI)
Scaled MINIMUM	Engineer	0	Minimum value of the process variable output which is typically 4.0mA
Scaled MAXIMUM	Engineer	0	Maximum value of the process variable output which is typically 20.0mA
Log Scale Decades	Engineer	0	Number of decades - Set to 0 for linear scale and 1 to 10 for logarithmic scale
Output Slave ID	Engineer	2	I/O module network ID to send output to
Output Channel	Engineer	AOUT1	I/O module channel to send output to (AOUT1, AOUT2...)

If ***Log Scale Decades*** is 0, the process variable input value is scaled using the ***Raw MINIMUM***, ***Raw MAXIMUM***, ***Scaled MINIMUM***, and ***Scaled MAXIMUM*** settings. For example, in order to linearly scale the particulate reading represented by PVIN 1 so that 0-1000pA corresponds to 4-20mA and use the AOUT channel of the MIO-1122 with ID 2, the following settings are required:

Setting	Value
Select Process Variable Output	PVOUT 1
PVOUT 1 Enabled	Enabled
PVOUT 1 Raw MINIMUM	0
PVOUT 1 Raw MAXIMUM	1000
PVOUT 1 Scaled MINIMUM	4
PVOUT 1 Scaled MAXIMUM	20
PVOUT 1 Log Scale Decades	0
PVOUT 1 Output Slave ID	2
PVOUT 1 Output Channel	AOUT1

If ***Log Scale Decades*** is between 1 and 10, the logarithmic scale is used so that the process variable input is scaled starting from ***Raw MINIMUM***. For example, in order to logarithmically scale the particulate reading represented by PVIN 1 so that 5-5000pA corresponds to 4-20mA and use the AOUT channel of the MIO-1122 with ID 2, the following settings are required:

Setting	Value
Select Process Variable Output	PVOUT 1
PVOUT 1 Enabled	Enabled
PVOUT 1 Raw MINIMUM	5
PVOUT 1 Raw MAXIMUM	0
PVOUT 1 Scaled MINIMUM	4
PVOUT 1 Scaled MAXIMUM	20
PVOUT 1 Log Scale Decades	3
PVOUT 1 Output Slave ID	2
PVOUT 1 Output Channel	AOUT1

10.5 Discrete Input

The discrete input represents a value from a generic discrete input channel of an I/O module. Discrete inputs are continuously read from input channels, and inverted if needed, to be used as a cleaning override or alarms acknowledge input. It can also be logged to the SD card.

Discrete Input Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select Discrete Input	Engineer	DIN 1	Select DIN channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected DIN channel
Process Name	Engineer	None	Process name (cleaning override, hopper level, process run signal…)
Invert Logic	Engineer	0	Inverts I/O input when set to 1
Input Slave ID	Engineer	0	I/O module network ID to acquire data from
Input Channel	Engineer	DIN1	I/O module channel to acquire data from (example DIN1, DIN2...)

10.6 Discrete Output

The discrete output sends data to a relay or discrete output channel of an I/O module in the network. By default, each alarm group is mapped to the discrete output with the same group/channel number (For example group 4 is mapped to DOUT 4). However, when the master alarm feature is enabled, the first discrete output DOUT 1 is used for the master alarm and the discrete output corresponding to each group is shifted by one (for example, group 4 is mapped to DOUT 5). Refer to section 8.8 Master Alarm for further details. If the ***Invert Logic*** setting is set to 0, the discrete output is normally 0 (open relay) and is set to 1 when new alarms are activated from the group. If ***Invert Logic*** is set to 1, the discrete output is normally 1 (closed relay) and is set to 0 when new alarms are activated from the group.

Discrete Output Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select Discrete Output	Engineer	DOUT 1	Select DOUT channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected DOUT channel
Invert Logic	Engineer	0	Inverts discrete output when set to 1
Output Slave ID	Engineer	0	I/O module network ID to send output to
Output Channel	Engineer	DOUT1	I/O module channel to send output to (DOUT1, DOUT2…)

10.7 Process Run Signal

The process run signal indicates if the process is running using a discrete input, a process variable input, or both. If configured in the factory, the process run signals may be used to inhibit alarms and may be logged to the SD card to cache them and record in-situ self-checks of process sensors. See section 7.7 Alarm Inhibit for more details about alarm inhibits.

Process Run Signal Settings (Hardware Wizard)

Setting	Login	Default	Notes
Select Process Run Signal	Engineer	PRS 1	Select PRS channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PRS channel
PVIN Channel	Engineer	Disabled	PVIN channel to be used as a source of the process run signal (Disabled, PVIN 1, PVIN 2…)
PVIN Threshold	Engineer	0	Threshold for the selected PVIN channel
DIN Channel	Engineer	Disabled	DIN channel to be used as a source of the process run signal (Disabled, DIN1, DIN2…)

The process run signal value of 1 indicates that the process is running. The following table presents the conditions required to indicate that the process is running.

DIN Channel	PVIN Channel	Process Running Conditions
Disabled	Disabled	N/A
DINx	Disabled	DINx value is 1
Disabled	PVINx	PVINx value is greater than the threshold for at least 2 seconds

DINx	PVINx	PVINx value is greater than the threshold for at least 2 seconds and DINx value is 1 at the same time

11 Saving and Loading System Settings

The save and load settings features allow the user to store all system settings to the SD card or load the settings from a settings file in the SD card. They can be used to transfer configuration from one unit to another or request a new configuration from the factory. They can also be used to transfer system settings when updating firmware. The save and load settings features are only supported on firmware V2.02 and higher.

IMPORTANT TAKE CARE WHEN LOADING NEW SYSTEM SETTINGS

The settings required for the unit to function properly such as hardware and system configuration may be modified when using the load feature. Therefore, care must be taken when using this feature.

Saving and Loading Settings (System Wizard)

Setting	Login	Default	Notes
Save Settings to SD Card	Engineer	NO	Save a settings file to the SD card
Load Settings from SD Card	Engineer	NO	Load settings from the SD card

11.1 Saving the Settings

Saving settings to the SD card can be performed by following the steps below:

IMPORTANT SAVING SETTINGS TO SD CARD PROCEDURE

- Insert an SD card into the unit.
- Set the ***Save Settings to SD Card*** setting to Yes and press the enter key to initiate saving the settings.
- The progress screen is displayed.
- Wait for the progress screen to show Done then press the enter key.
- The settings file "NVBACKUP.CSV" should be in the SD card.
- Contact factory if any error message is displayed.

The following screens show an example of saving settings to the SD card.

Saving Settings in Progress

Saving Settings Complete

11.2 Loading the Settings

Loading settings from the SD card requires a valid settings file either created using the save settings feature or acquired from the factory. Loading settings will replace all current settings including system and hardware settings required for the unit to function properly. It can be performed by following the steps below:

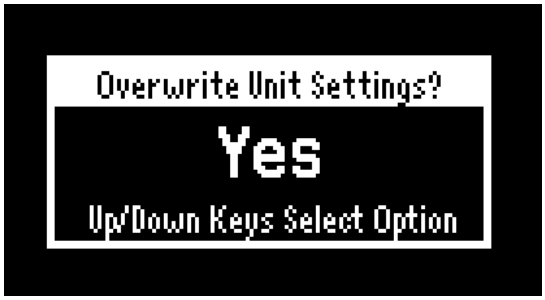
IMPORTANT LOADING SETTINGS FROM SD CARD PROCEDURE

- Save a backup of current settings to the SD card as described in section 11.1 Saving the Settings.
- Place the new settings file in the SD card and rename it "NVBACKUP.CSV" if needed.
- Insert the SD card into the unit.
- Set the ***Load Settings from SD Card*** setting to Yes and press the enter key to start testing the settings file.
- The progress screen is displayed.
- Wait for the overwrite settings confirmation screen.
- Select Yes and press the enter key to start replacing unit settings.
- The progress screen is displayed.
- Wait for the progress screen to show Done then press the enter key.
- Cycle power and verify that the power up screen shows "Self-Test: PASSED".
- Verify that the CanOpen status LED for all installed modules is solid green.
- Test the system to verify that it is functioning properly.
- Contact factory if any error message is displayed.

The following screens show an example of loading settings from the SD card.

Step1 - Testing Settings File in Progress

Step2 - Overwrite Settings Confirmation Screen



Step3 - Loading Settings in Progress

Step4 - Loading Settings Complete

Step5 - Power Up Screen Showing "Self Test: PASSED"

12 Bootloader

The P151 Basic includes a bootloader that can be used to update firmware in the field, save an image of installed firmware or program a new firmware. System settings should be saved before programming firmware. The bootloader automatically starts installed firmware after 30 seconds of no user activity. The bootloader is only supported on firmware V2.01 and higher.

IMPORTANT INITIATING THE BOOTLOADER PROCEDURE

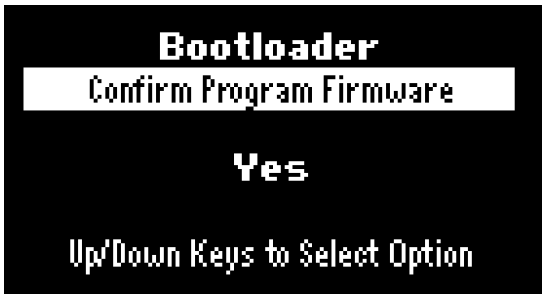
- Remove power from the unit.
- Apply power to the unit while holding the menu key to start the bootloader.
- Enter the password of 55 in the displayed Login screen.
- The Select Option screen is displayed after successful password login.

The following screens show an example of running the bootloader.

Step1 – Bootloader Login Screen

Step2 - Bootloader Select Option Screen

Step3 - Bootloader Confirm Selection Screen



12.1 Saving Firmware Backup

The bootloader can be used to create a binary image of installed firmware. The created file can be used to program a unit with a compatible hardware version. However, the file does not include system settings required for the unit to function properly. The created file is saved to the SD card as "backup.bin". Saving firmware backup can be performed by following the steps below:

IMPORTANT SAVING A FIRMWARE BACKUP PROCEDURE

- Insert an SD card into the unit.
- Enter the bootloader and select Create Firmware Backup from the Select Option screen then confirm selection.
- The Overwrite File screen is displayed to ask the user to confirm overwriting the “backup.bin” file if it exists.
- A pop up screen showing “Saving Backup...” is displayed.
- If save operation is completed successfully, a pop up screen showing “Backup Saved!” is displayed.
- Contact factory if any error message is displayed.

Bootloader Overwrite File Screen

12.2 Loading New Firmware

The bootloader can be used to program a unit using a binary image file. Programming firmware erases all system settings including system and hardware settings required for the unit to function properly. System settings must be saved to the SD card before programming firmware and re-loaded once firmware is installed successfully. The new firmware may have new features that may require configuration even after re-loading the old settings. Loading firmware can be performed by following the steps below:

IMPORTANT LOADING NEW FIRMWARE PROCEDURE

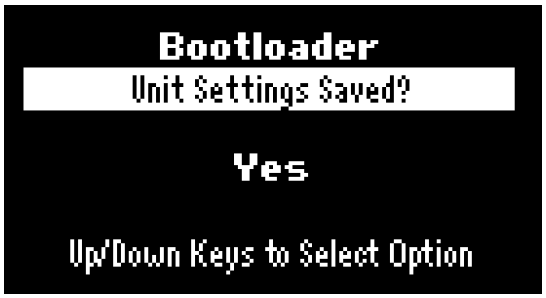
- Save a backup of current settings to the SD card as described in section 11.1 Saving the Settings.
- Place the binary image file in the SD card and rename it “firmware.bin” if needed.
- Insert the SD card into the unit.
- Enter the bootloader and select Program Firmware from the Select Option screen then confirm selection.
- Select Yes and press the enter key in the displayed Unit Settings Saved screen if settings were already saved.
- The Overwrite File screen is displayed to ask the user to confirm overwriting the “backup.bin” file if it exists.
- A pop up screen showing “Saving Backup...” is displayed.
- A pop up screen showing “Erasing Flash...” is displayed.
- A pop up screen showing “Programming...” is displayed.
- If program operation is completed successfully, a pop up screen showing “Programming Complete!” is displayed.
- Select Start Firmware from the Select Option screen and confirm

selection.

- The firmware should start and show an EEPROM Format Error Detected screen.
- Select Reset to Defaults and press the enter key.
- Confirm the selection in the Confirm Reset Default Values Screen.
- The Restoring Flash progress screen is displayed.
- If restore operation is completed successfully, the progress screen shows PASS and the firmware starts.
- Load system settings as described in section 11.2 Loading the Settings.
- Contact factory if any error message is displayed.

The following screens show an example of loading new firmware.

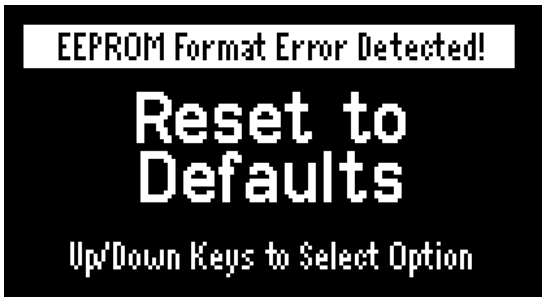
Step1 - Bootloader Unit Settings Saved Screen



Step2 - Bootloader Programming in Progress Screen

Step3 - Bootloader Programming Complete Screen

Step4 - Firmware EEPROM Format Error Detected Screen



Step5 - Firmware Confirm Reset Default Values Screen

Step6 - Firmware Restoring Flash Progress Screen

13 System Troubleshooting

The troubleshooting section can be used to help troubleshoot possible issues with the configuration and operation of the system. It presents a list of issues that might be encountered and how to troubleshoot those issues if they occur.

Process Input Troubleshooting

Issue	Possible Cause	Details
Process input reading is incorrect	Configuration	Enter the module's information screen to check the raw reading. If the raw reading is correct, there is a hardware configuration issue.
Process input reading is unresponsive	Module is offline	Enter the CanOpen information screen to verify that the module status is operational. If it is not, the module is not communicating. Try cycling power and ensure it has a solid connection to the DIN rail bus.
4-20mA input reading is incorrect	Wiring or connected devices	Connect the input to a 4-20mA source to check the reading. If the reading is correct, there is an issue with the wiring or connected devices.
Discrete input reading is incorrect	Wiring or connected devices	Connect the input to a voltage source and enter the module's information screen to check the raw reading. If the raw reading is correct, there is an issue with the wiring or connected devices.

Process Output Troubleshooting

Issue	Possible Cause	Details
Process output is incorrect	Configuration	Enter the module's information screen to force the output. If the output is correct, there is a hardware configuration issue.
Process output is unresponsive	Module is offline	Enter the CanOpen information screen to verify that the module status is operational. If it is not, the module is not communicating. Try cycling power and ensure it has a solid connection to the DIN rail bus.
4-20mA output is incorrect	Wiring or connected devices	Connect the output to a 4-20mA meter and enter the module's information screen to force the output. If the measured value is correct, there is an issue with the wiring or connected devices.
Alarm relay is not working properly	Wiring or connected devices	Remove all wiring from the output, then connect the output to an Ohmmeter and enter the module's information screen to force the relays On or Off. If the measured output is correct, there is an issue with the wiring or connected devices.

Cleaning Troubleshooting

Issue	Possible Cause	Details
Solenoids are not pulsed	Configuration	Enter the module's information screen to manually pulse outputs. If solenoids are pulsed, there is a configuration issue. Check the cleaning configuration to verify that the selected cleaning mode is

		configured properly and that the override mode is not active when it should not.
Solenoids are not pulsed (even from module's information screen)	Module is offline	Enter the CanOpen information screen to verify that the module status is operational. If it is not, the module is not communicating. Try cycling power and ensure it has a solid connection to the DIN rail bus.
	Short circuit fault	Enter the solenoid-diaphragm diagnostics screen to check solenoid status. If short circuit is detected, pulsing will be disabled. Remove the cause of the short circuit.
	Line fuse	Remove the line fuse and check with a meter. Replace fuse if needed.
	No line power	Verify that the Field Power LED on the module is solid green. Connect field power if needed.
	Wiring and connected devices	Check the wiring and verify the operation of connected devices.

13.1 Module Replacement

I/O and Sensor Module Replacement

The P151 Basic is a modular system designed so that I/O modules can be replaced or added. Each I/O module in the CanOpen DIN rail bus network must have a unique ID used for CanOpen communication. In addition, I/O modules must be added to the controller node list to be able to exchange data with the controller. An I/O module can be replaced by following the steps below:

IMPORTANT PROCEDURE FOR REPLACING AN EXISTING I/O MODULE

- Determine the network ID of the I/O module to be replaced by reading the tag on the front of the module.
- Set the new module to the ID determined in the previous step if needed as described in section 9.1 CanOpen.
- Cycle power and verify that the power up screen shows "Self Test: PASSED".
- Verify that the CanOpen status LED for all installed modules is solid green.
- Enter the module's information screen.
- Verify that all inputs are ready correctly as described in section 9.3 I/O Module Operation.
- Verify that all outputs are set correctly using the forcing feature as described in section 9.3 I/O Module Operation.

Power Up Screen Showing "Self Test: PASSED"

A new I/O module can be added by following the steps below:

IMPORTANT PROCEDURE FOR ADDING A NEW I/O MODULE

- Determine the next unused ID in the CanOpen DIN rail bus network by reading the ID tags on the front of installed modules or viewing all configured ID's in the CanOpen system information screen.
- Set the new module to the next unused ID if needed as described in section 9.1 CanOpen.
- Add the new module to the controller node list at the programmed ID as described in section 10.1 Node list.
- Configure the new module's analog and discrete input and output channels as described in section 10 Hardware Configuration.
- Cycle power and verify that the power up screen shows "Self Test: PASSED".
- Verify that the CanOpen status LED for all installed modules is solid green.
- Enter the module's information screen.
- Verify that all inputs are read correctly as described in section 9.3 I/O Module Operation.
- Verify that all outputs are set correctly using the forcing feature as described in section 9.3 I/O Module Operation.
- Configure alarms for the newly configured process variable inputs if needed.

13.2 Controller Replacement

The controller module stores all system settings in its internal flash memory including system and hardware settings required for the unit to function properly. If the controller is to be replaced the settings must be saved and loaded to the new controller using the save and load settings features. Saving and loading settings when replacing the controller can be performed by following the steps below:

IMPORTANT PROCEDURE FOR REPLACING A CONTROLLER

- Apply power to the system.
- Save settings to the SD card as described in section 11.1 Saving the Settings.
- Remove power from the system and replace the controller.
- Apply power and load saved settings to the new controller as described in section 11.1 Loading the Settings.
- If saving and loading the settings is not possible as a result of controller malfunction, follow the steps below:
- Apply power to the system.
- Login as Engineer.
- Enter Cleaning Wizard and record all cleaning settings.
- Enter Diagnostics Wizard and record all diagnostics settings.
- Enter Alarm Wizard and record the settings for all alarms and all used groups.
- Enter System Wizard and record all system settings.
- Enter Fieldbus Wizard and record all Fieldbus settings if Fieldbus card

is installed.

- Enter Hardware Wizard and record the ID and Model Number for all configured I/O modules.
- Enter Hardware Wizard and record the settings for all enabled process variable inputs, process variable outputs, discrete inputs, discrete outputs, and process run signals.
- Remove power from the system and replace the controller.
- Apply power then apply all recorded settings to the new controller.

13.3 CanOpen Troubleshooting

The CanOpen information screen can be used to troubleshoot communication issues between the controller and I/O modules. After the power up phase, the status of each I/O module should show ***operational***. The following table shows the status values indicating communication issues and recommended troubleshooting steps.

CanOpen Status Details

Status	Details
Preoperational	The controller cannot enable I/O data transfer with the I/O module. Verify that the I/O module is installed properly on the CanOpen DIN Rail bus. Verify that the CanOpen DIN Rail bus does not have two I/O modules with the same network ID. Then, cycle power to the system.
Comm Failed	The controller lost communication with the I/O module. Verify that the I/O module is installed properly on the CanOpen DIN Rail bus. Then, cycle power to the system.
Disabled	The controller was unable to communicate with the I/O module. Verify that the I/O module is installed properly on the CanOpen DIN Rail bus. Then, cycle power to the system.
Mismatch	The I/O module type configured in the node list does not match the installed I/O module. Re-configure the node list with the correct I/O module type or change the network ID of the I/O module to match the node list. Then, cycle power to the system. Refer to 10.1 Node list for the nodelist adjustment procedure and 9.1 CanOpen for the I/O module network ID change procedure.
New	The node list does not include any I/O module with this network ID. Configure the node list for this network ID or change the network ID of the I/O module to match the node list. Then, cycle power to the system. Refer to 10.1 Node list for the nodelist adjustment procedure and to 9.1 CanOpen for the I/O module network ID change procedure.

If any of the I/O modules is not in the operational state, follow the steps below to troubleshoot the issue:

IMPORTANT PROCEDURE FOR TROUBLESHOOTING THE CANOPEN NETWORK

- Remove power from the system.
- Unplug all I/O modules from the CanOpen DIN Rail bus except the first module.
- Apply power to the system and go to the CanOpen information screen.
- Verify that the module type is correct and that the status shows

operational.

- Plug the other I/O modules one at a time and repeat the previous step.
- Refer to the CanOpen Status Details table above if the ***operational*** status is not shown within 20 seconds.

14 Commissioning

Installation

Action	Reference
Verify all equipment is rated for the process environment it is installed in.	
Verify input power to the system is within the range listed on the equipment serial number tag.	Equipment S/N Tag
Verify all wire types and connections meet requirements listed in the MICS Hardware Manual and local codes.	MICS HW
Verify installation of the controller meets requirements listed in the MICS Hardware Manual and local codes.	MICS HW

Initial Power Up and I/O Check

Action	Reference
Apply power to the controller and verify that the power on self-test passes with no errors.	P151 Basic § 9.3.3
Verify all process variable inputs are operating correctly and that readings are within expected range.	P151 Basic § 10.2
Verify all discrete inputs are operating correctly when actuated from the remote device.	P151 Basic § 10.5
Verify all process variable outputs are operating correctly and that readings are scaled correctly into remote plc/dcs.	P151 Basic § 10.4
Verify all discrete alarm outputs are operating correctly and that remote indicators operate correctly.	P151 Basic §10.6, § 7
Verify all pulse outputs are operating correctly and that the correct valve is pulsed by the correct output.	P151 Basic § 4.1.6
Pulse all dust collector rows five times and verify no failed solenoids or diaphragms are detected.	P151 Basic § 4.1.2, 5

Fieldbus

Action	Reference
Verify fieldbus connection is operating correctly if installed.	MICS FIELDBUS
Verify process data and parameter data read/write operates properly	MICS FIELDBUS

Cleaning

Action	Reference
Verify cleaning modes are operating correctly, initially using continuous mode, then pressure based modes.	P151 Basic §4.1
Verify cleaning overrides are operating correctly if feature is being used	P151 Basic § 4.2
Verify cleaning pulses are sequencing correctly.	P151 Basic §.4.3
Verify fieldbus control of cleaning pulses is operating correctly if feature is being used.	P151 Basic § 4.4

Alarms

Action	Reference
Determine appropriate alarm levels, delays and groups and adjust settings as required.	P151 Basic § 7.1 § 7.2
Determine how alarm acknowledgment will be handled and adjust local and remote alarm acknowledgment settings as required.	P151 Basic § 7.3 § 7.4
Determine how alarm relays should operate and adjust latching, cleaning and fail safe settings as required.	P151 Basic § 7.4 - 7.6
Verify alarm operation by temporarily changing alarm levels or introducing a simulated signal.	P151 Basic § 3.3.1

Data Logging

Action	Reference
Verify system clock is set to correct date and time including after a power cycle	P151 Basic § 8.7
Verify SD card data logging is operating correctly if installed.	P151 Basic § 8.3 - 8.6

15 System Settings

A complete listing of all available settings is detailed below. Settings designated with (T) are only listed once for a group of similar typical settings.

Cleaning Wizard Settings

Setting	Login	Default	Notes
Operating Mode	Operator	Off	Current cleaning mode
IP HOLD Pressure	Supervisor	4.0 inWC	Hold pressure for Intelligent Pulse mode
Pulse ON Time	Supervisor	0.1 Seconds	On duration of the pulses
Pulse OFF Time	Supervisor	10 Seconds	Off duration between pulses for fixed time cleaning modes
HILO ON Pressure	Supervisor	6.0 inWC	Pressure limit above which pulsing is turned on in High Low cleaning mode
HILO OFF Pressure	Supervisor	2.0 inWC	Pressure limit below which pulsing is turned off in High Low cleaning mode
Remote 1 Mode	Supervisor	Continuous	First override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled
Remote 2 Mode (fware V2.32+)	Supervisor	Disabled	Second override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled
Remote 3 Mode (fware V2.32+)	Supervisor	Disabled	Third override mode setting (Cycle, Off, Continuous, Intelligent Pulse, HILO, and Disabled
Cycle Mode Cycles	Supervisor	3	Number of times to cycle through all rows in Cycle mode
Cycle Mode Return	Supervisor	Previous	Cleaning mode to return to once all cycle mode cycles are complete (Off/Previous)
Multi-row Number	Supervisor	1	Number of rows to pulse at once
Multi-row Diag	Supervisor	On	Include single row diagnostics pulse in multi-row sequence
Rows to Skip	Supervisor	0	Number of rows to skip in the pulsing sequence
Number of Rows	Engineer	16	Total number of rows (pulse jet valves)
IP Min Off Time Enable	Supervisor	Enabled	Enable or disable IP minimum off time limiting. If disabled, the minimum off time is 3 seconds
IP Min Off Time	Supervisor	3 Seconds	Minimum time allowed between pulses for Intelligent Pulse mode
IP Max Off Time Enable	Supervisor	Disabled	Enable or disable IP maximum off time limiting. If disabled, the maximum off time is infinite
IP Max Off Time	Supervisor	30000 Seconds	Maximum time allowed between pulses for Intelligent Pulse mode
IP DP PVIN Channel	Engineer	PVIN1	Process variable input channel to be used as a differential pressure signal for pressure based cleaning modes
Remote 1 DIN Channel	Engineer	DIN1	Discrete input channel to be used as the activation signal for the first remote override

Remote 2 DIN Channel (fware V2.32+)	Engineer	DIN2	Discrete input channel to be used as the activation signal for the second remote override
Remote 3 DIN Channel (fware V2.32+)	Engineer	DIN3	Discrete input channel to be used as the activation signal for the third remote override
Cleaning Control Mode (fware V2.01+)	Engineer	Local	Current cleaning control mode selects between local for P151 control and Fieldbus for Fieldbus control
Valve Diameter	Engineer	1.3 Inches	Pulse valve diameter used to estimate Valve Flow-rate when value is out of range (0.25 to 3.00 Inches)
Valve Flow-rate	Engineer	17.0 gal/Hr	Air flow rate through pulse valve used to calculate energy use (1 to 150 gal/Hr)
Valve Graph Factor	Engineer	3750.0	Standard flow setting for pulse valve used to calculate energy use (100 to 10000)
Manifold Pressure	Engineer	90 PSI	Average header manifold operating pressure used to estimate Valve Graph Factor when value is out of range (10 to 150 PSI)
Manifold Air Temp	Engineer	60 degrees C	Average header manifold air temperature used to estimate Valve Graph Factor when value is out of range (10 to 100 degrees C)
Air Delivery Rate	Engineer	4.0 hp/CFM	Air compressor delivery rate used to calculate energy use
Motor Efficiency	Engineer	98.5%	Air compressor electric motor efficiency used to calculate energy use
Utility Rate	Engineer	0.1 $/kWh	Electrical utility rate for air compressor used to calculate $/year energy use

Diagnostics Wizard Settings (firmware V2.12 and higher)

Setting	Login	Default	Notes
Run DIA Diag Auto Configure	Engineer	No	Runs automatic configuration of diaphragm diagnostics settings
Bank 1 DIA Diag Num of Rows	Engineer	128	The number of rows in Bank 1 diaphragm diagnostics
Bank 1 DIA Diag PVIN Chan	Engineer	PVIN3	Process variable input channel to be used as a header pressure signal for Bank 1 diaphragm diagnostics
Bank 2 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 2 diaphragm diagnostics
Bank 2 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 2 diaphragm diagnostics
Bank 3 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 3 diaphragm diagnostics
Bank 3 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 3 diaphragm diagnostics
Bank 4 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 4 diaphragm diagnostics
Bank 4 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 4 diaphragm diagnostics

Bank 5 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 5 diaphragm diagnostics
Bank 5 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 5 diaphragm diagnostics
Bank 6 DIA Diag Num of Rows	Engineer	0	The number of rows in Bank 6 diaphragm diagnostics
Bank 6 DIA Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a header pressure signal for Bank 6 diaphragm diagnostics
Bank 1 LL Diag Num of Rows	Engineer	128	The number of rows in Bank 1 leak locating diagnostics
Bank 1 LL Diag PVIN Chan	Engineer	PVIN2	Process variable input channel to be used as a particulate signal for Bank 1 leak locating diagnostics
Bank 2 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 2 leak locating diagnostics
Bank 2 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 2 leak locating diagnostics
Bank 3 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 3 leak locating diagnostics
Bank 3 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 3 leak locating diagnostics
Bank 4 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 4 leak locating diagnostics
Bank 4 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 4 leak locating diagnostics
Bank 5 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 5 leak locating diagnostics
Bank 5 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 5 leak locating diagnostics
Bank 6 LL Diag Num of Rows	Engineer	0	The number of rows in Bank 6 leak locating diagnostics
Bank 6 LL Diag PVIN Chan	Engineer	PVIN1	Process variable input channel to be used as a particulate signal for Bank 6 leak locating diagnostics
Leak Locating Diag Alarm Limit	Engineer	500	Threshold (in pA) above which a leak locating value indicates a filter is leaking. Used to generate leak locating diagnostic alarms.
Leak Locating Diag Alarm Count	Engineer	3	Number of consecutive cleaning cycles of an individual row that must have a leak locating value above the limit before a leak locating diagnostic alarm is issued.

Alarm Wizard Settings – Alarms (Typical for each alarm)

Setting	Login	Default	Notes
Select Alarm	Supervisor		Select the alarm to be modified
Setpoint	Supervisor	Varies	Limit for alarm activation
Delay	Supervisor	Varies	Amount of time reading must exceed setpoint to activate alarm
Group	Supervisor	Varies	Group associated with the selected alarm
Latching	Supervisor	Off	Requires user acknowledgment to clear alarm if latching

			is On
Logic	Supervisor	Varies	Activation logic (HI, HIHI, LO or LOLO)

Alarm Wizard Settings - Alarm Groups (Typical for each alarm group)

Setting	Login	Default	Notes
Select Alarm Group	Engineer		Select the alarm group to modify
Remote Ack	Engineer	Disabled	Remote acknowledge feature enable
Remote DIN	Engineer	DIN1	Discrete input channel used to acknowledge alarms from the selected group

Alarm Wizard Settings - Master Alarm

Setting	Login	Default	Notes
Master Alarm Enabled	Engineer	Enabled	Disables or enables the master alarm feature
Master Alarm Mode	Engineer	Normal	Selects the master alarm mode (normal or critical)
Master Alarm Invert Logic	Engineer	0	Inverts master alarm discrete output when set to 1

System Wizard Settings

Setting	Login	Default	Notes
Date - Century	Supervisor	N/A	Real time clock current century (20 for 2011)
Date - Year	Supervisor	N/A	Real time clock current year (11 for 2011)
Date - Month	Supervisor	N/A	Real time clock current month (1-12)
Date - Day	Supervisor	N/A	Real time clock current day (1-31)
Date - Weekday	Supervisor	N/A	Real time clock current weekday (Monday-Sunday)
Time - Hour	Supervisor	N/A	Real time clock current hour (0-23)
Time - Minute	Supervisor	N/A	Real time clock current minute (0-59)
Data-log Sample Rate	Engineer	60 Seconds	Process variable data-logging sample rate
Datalogging (fware V2.31+)	Engineer	Enabled	Disable or enable the data logging system (used to temporarily disable data logging before removing SD card)
SD Card Alarm Enable (fware V2.30+)	Engineer	Disabled	Disable or enable the SD Card Alarm
Alarm Ack User Level (fware V2.06+)	Engineer	Operator	Minimum login level to acknowledge alarms through the keypad
Clear Alarm Relay When Ack (fware V2.06+)	Engineer	Disabled	If enabled, alarm relay is cleared when alarm is acknowledged
Disable Leaking Rows (fware	Engineer	NO	Disable rows with registered leak locating diagnostic alarm

V2.18+)

Save Settings to SD Card	Engineer	NO	Save a settings file to the SD card
Load Settings from SD Card	Engineer	NO	Load settings from the SD card

Fieldbus Wizard Settings

Setting	Login	Default	Notes
DeviceNET Node ID	Supervisor	2	Node ID for DeviceNet network
DeviceNET Baud Rate	Supervisor	125 kbits/sec	DeviceNet network baud rate
Mbus/RTU Node ID	Supervisor	2	Node ID for Modbus RTU and ASCII serial networks
MB/RTU Parity, Stop	Supervisor	None, 1 Stop	Parity and stop bits settings for Modbus RTU and ASCII serial networks
Mbus/RTU Baud Rate	Supervisor	19200 bits/sec	Modbus RTU and ASCII networks baud rate
Mbus/RTU Mode	Supervisor	RTU	RTU or ASCII
Mbus/RTU V2 Comp	Supervisor	Disabled	Register addressing compatible with V2 control units and software
IP Address 1 of 4	Supervisor	192	First part of IP address for Ethernet Fieldbus types XXX.---.---.---
IP Address 2 of 4	Supervisor	168	Second part of IP address for Ethernet Fieldbus types ---.XXX.---.---
IP Address 3 of 4	Supervisor	0	Third part of IP address for Ethernet Fieldbus types ---.---.XXX.---
IP Address 4 of 4	Supervisor	1	Fourth part of IP address for Ethernet Fieldbus types ---.---.---.XXX
Subnet mask 1 of 4	Supervisor	255	First part of subnet mask for Ethernet Fieldbus types XXX.---.---.---
Subnet mask 2 of 4	Supervisor	255	Second part of subnet mask for Ethernet Fieldbus types ---.XXX.---.---
Subnet mask 3 of 4	Supervisor	255	Third part of subnet mask for Ethernet Fieldbus types ---.---.XXX.---
Subnet mask 4 of 4	Supervisor	0	Fourth part of subnet mask for Ethernet Fieldbus types ---.---.---.XXX
Gateway 1 of 4	Supervisor	255	First part of gateway for Ethernet Fieldbus types XXX.---.---.---
Gateway 2 of 4	Supervisor	255	Second part of gateway for Ethernet Fieldbus types ---.XXX.---.---
Gateway 3 of 4	Supervisor	255	Third part of gateway for Ethernet Fieldbus types ---.---.XXX.---
Gateway 4 of 4	Supervisor	0	Fourth part of gateway for Ethernet Fieldbus types ---.---.---.XXX
DHCP Operation	Supervisor	Disabled	Enable or disable DHCP operation
Profibus Node ID	Supervisor	2	Node ID for Profibus network

ControlNET Node ID	Supervisor	1	Node ID for ControlNet network
Process Data Input	Engineer	Disabled	Enables/Disables I/O data produced by the network and consumed by the B-PAC to be copied to B-PAC internal memory and settings.
Process Data Format	Engineer	Standard	Selects a specific I/O data map, options are Standard, Compatible to 1.021, Compatible to 1.04, Test Pattern, Standard Profibus and Minimal #1. See MICS Fieldbus Manual for full details.

Hardware Wizard Settings - Node List (Typical for each ID)

Setting	Login	Default	Notes
Select ID	Engineer	ID 2	Network ID for I/O module to be configured
Model Number	Engineer	None	I/O module type (MIO-1122, MIO-3300, etc..)

Hardware Wizard Settings - Process Variable Input (Typical for each PVIN)

Setting	Login	Default	Notes
Select Process Variable Input	Engineer	PVIN 1	Select PVIN channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PVIN channel
Process Name	Engineer	None	Process name (differential pressure, particulate, header pressure…)
Engineering Units	Engineer	None	Unit (inWC, PSI, pA...)
Raw MINIMUM	Engineer	0	Minimum value of the I/O input (example 4.0mA)
Raw MAXIMUM	Engineer	0	Maximum value of the I/O input (example 20.0mA)
Scaled MINIMUM	Engineer	0	Minimum value of the scaled I/O input (example 0.0PSI)
Scaled MAXIMUM	Engineer	0	Maximum value of the scaled I/O input (example 150.0PSI)
Relative Factor	Engineer	1	Relative factor to be used as a multiplier of the scaled I/O input
Averaging Period	Engineer	6 Minutes	Period for the process variable input average
Averaging Buffer Clear	Engineer	NO	Clears the buffer used to calculate the process variable input average
Input Slave ID	Engineer	0	I/O module network ID to acquire data from
Input Channel	Engineer	AIN 1	I/O module channel to acquire data from (AIN1, AIN2, DIN1…)

Hardware Wizard Settings - Process Variable Output (Typical for each PVOUT)

Setting	Login	Default	Notes
Select Process Variable Output	Engineer	PVOUT 1	Select PVOUT channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PVOUT channel

Raw MINIMUM	Engineer	0	Minimum value of the process variable input (example 0.0PSI)
Raw MAXIMUM	Engineer	0	Maximum value of the process variable input (example 150.0PSI)
Scaled MINIMUM	Engineer	0	Minimum value of the process variable output which is typically 4.0mA
Scaled MAXIMUM	Engineer	0	Maximum value of the process variable output which is typically 20.0mA
Log Scale Decades	Engineer	0	Number of decades - Set to 0 for linear scale and 1 to 10 for logarithmic scale
Output Slave ID	Engineer	2	I/O module network ID to send output to
Output Channel	Engineer	AOUT1	I/O module channel to send output to (AOUT1, AOUT2...)

Hardware Wizard Settings - Discrete Input (Typical for each DIN)

Setting	Login	Default	Notes
Select Discrete Input	Engineer	DIN 1	Select DIN channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected DIN channel
Process Name	Engineer	None	Process name (cleaning override, hopper level, process run signal…)
Invert Logic	Engineer	0	Inverts I/O input when set to 1
Input Slave ID	Engineer	0	I/O module network ID to acquire data from
Input Channel	Engineer	DIN1	I/O module channel to acquire data from (example DIN1, DIN2...)

Hardware Wizard Settings - Discrete Output (Typical for each DOUT)

Setting	Login	Default	Notes
Select Discrete Output	Engineer	DOUT 1	Select DOUT channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected DOUT channel
Invert Logic	Engineer	0	Inverts discrete output when set to 1
Output Slave ID	Engineer	0	I/O module network ID to send output to
Output Channel	Engineer	DOUT1	I/O module channel to send output to (DOUT1, DOUT2…)

Hardware Wizard Settings - Process Run Signal (Typical for each Process Run Signal)

Setting	Login	Default	Notes
Select Process Run Signal	Engineer	PRS 1	Select PRS channel to be configured
Enabled	Engineer	Disabled	Enables or disables the selected PRS channel
PVIN Channel	Engineer	Disabled	PVIN channel to be used as a source of the process run signal (Disabled, PVIN 1, PVIN 2…)
PVIN Threshold	Engineer	0	Threshold for the selected PVIN channel
DIN Channel	Engineer	Disabled	DIN channel to be used as a source of the process run

signal (Disabled, DIN1, DIN2…)

16 Installation Documents

Refer to installation drawings supplied with your order and to the MICS Platform Hardware Manual.

17 Notes