Asco™

Particulate Monitoring System
P150 Basic

OPERATING MANUAL

www.emerson.com | V_10030 | Rev AA

Table of Contents

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 entirely. All instructions should be followed properly and any questions that arise should be discussed with ASCO.

Any use or distribution of this document 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, losing 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 P150 Basic Introduction

Featuring ASCO's renowned , virtually maintenance-free particulate flowing sensing technology and ASCO's MICS™ platform, the P150 Basic combines unmatched performance with state-of-art instrument modularity and functionality.

A particulate monitoring system consists of a control unit, a particulate sensor and a sensor coaxial cable. Applications include continuous emissions monitoring, baghouse filter leak detection and process particulate flow monitoring. Types of particulate include both solid particulates (dusts, powders, granulars and pellets) and liquid particulates (mists). The P150 Basic offers several levels of particulate monitoring performance

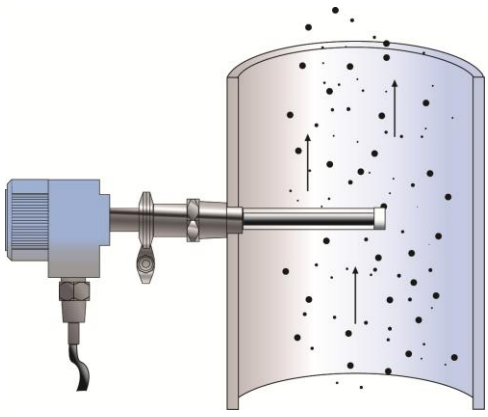
Standard particulate modules are available with varying detection levels and output resolution. This provides the option to conduct detailed continuous filter leak analysis, standard leak detection or gross filter failure alarming. For pulse jet filters with fixed cleaning patterns leak locating can be added. (For leak locating with varying cleaning times or patterns refer to ASCO P151 Controls).

For highest accuracy proportional monitoring and correlated mass monitoring a Plus Particulate Module with processing technology can be employed to provide the industry's most accurate electronics with EPA compliant automatic self-checks.

The P150 Basic is available in a single channel or multichannel configuration with a full range of fieldbus communications and a wide range of modular relay and analog I/O.

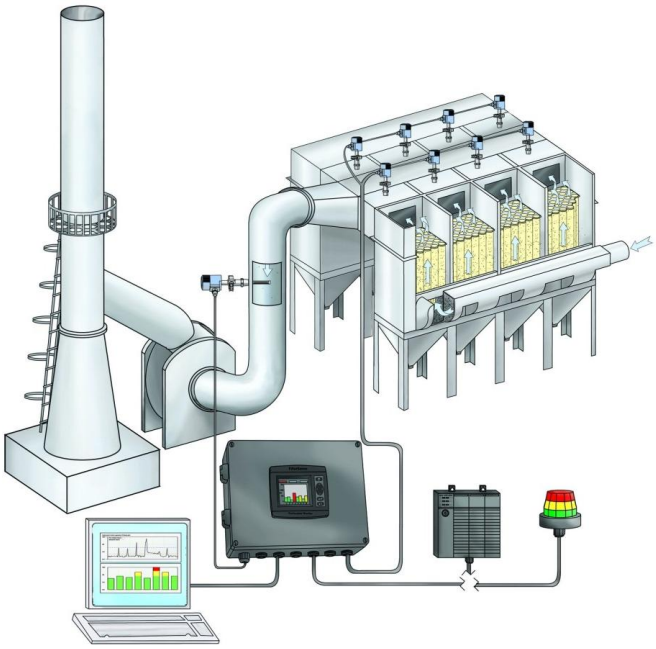
Principle of Operation

As particles flow near and around the probe, a minute current is induced. A DSP processes the signal into an absolute output relative to particulate flow. A protective layer over the probe works in combination with induction-sensing to ensure reliable operation with conductive particulate, moist powders, corrosive gases and particulate buildup.



Maintenance is minimal and there is no need for an air purge. For durability, the sensors are passive and free of electronics. For safe, easy access and to facilitate EPA QA checks, the control unit and electronics are remote.

P151 Basic Typical Baghouse Application, Monitoring & EPA Compliance



The P150 Basic integrates the following capabilities:

Capability	Detail
Single or Multiple Channel Configuration	Single or multiple channels of monitoring may be located in one centralized or several distributed control units.
Induction Sensing	Protected sensor probe technology that significantly reduces maintenance and increases reliability over time.
Basic Particulate Monitor	Basic particulate monitor modules available in single or high density/cost effective dual channel configurations. Suitable for basic leak detection and diagnostics.
Plus Particulate Monitor	Plus particulate monitor module for the most demanding process or compliance applications. Highest accuracy with multiple integrated self-test and signal analysis features to meet EPA and ASTM requirements.
Auxiliary Sensor Monitoring	Process sensors for auxiliary monitoring points available for direct connection, display, alarming and logging through the P150 Basic. • Differential pressure sensor, ASCO P850AD • Temperature sensor • Fan amp sensor • Airflow sensor • Other, consult factory
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, 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 P150 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

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.

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. The main menu allows access to detailed screens such as alarms, system information and 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

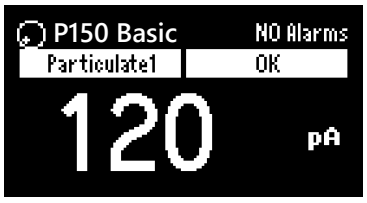
Keypad

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

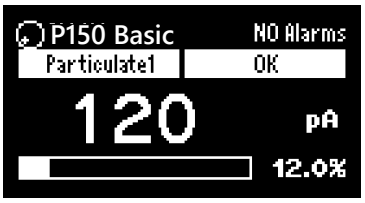
3.2 Home 

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. 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:

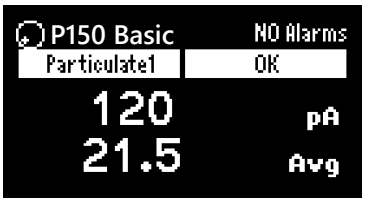
Process Screen – Basic



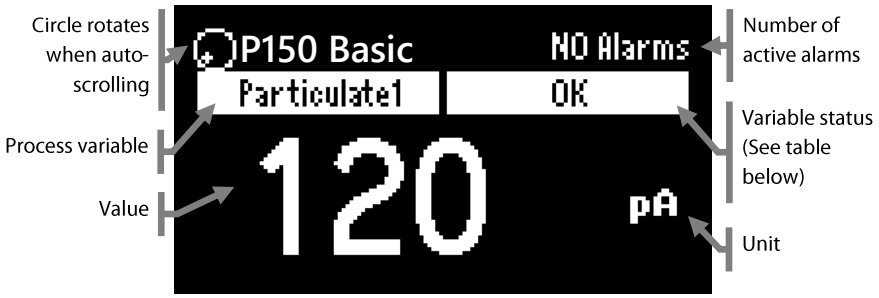
Process Screen with Percentage



Process Screen with Average



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

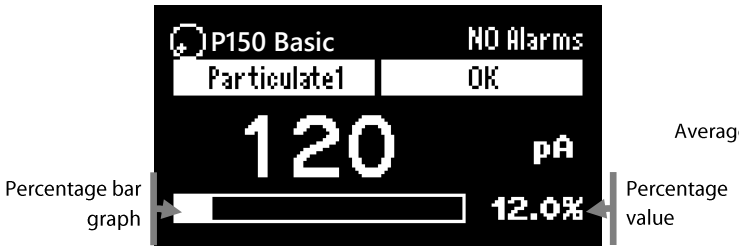


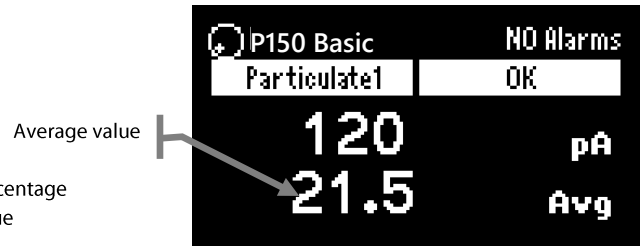
Process Variable Status Values

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.

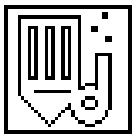
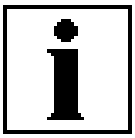
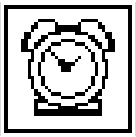
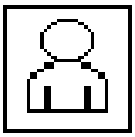
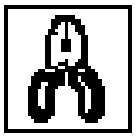
The average process reading screen displays the reading in both real-time and averaged formats. Adjustments to averaging parameters are available through the hardware wizard/process variable input setup.



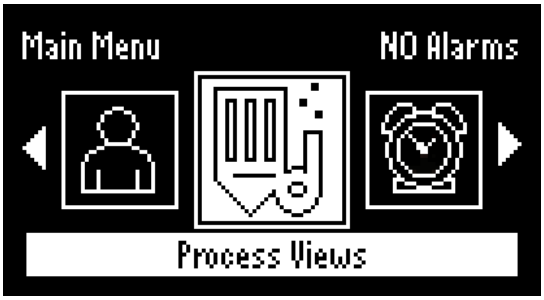


3.3 Main Menu

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		System Info
	Active Alarms		User Login
	Setup Wizards		

Main Menu



Display Process Screen

No Action

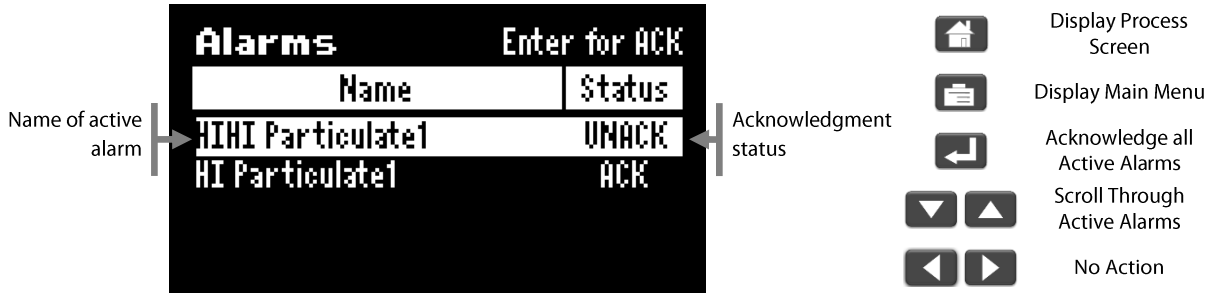
Display Menu Item

No Action

Select Option

3.3.1 Active Alarms

Selecting Active Alarms from the Main Menu will display the Active Alarms screen. Active alarms 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. Refer to "Alarms" section of this manual for further details.



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
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

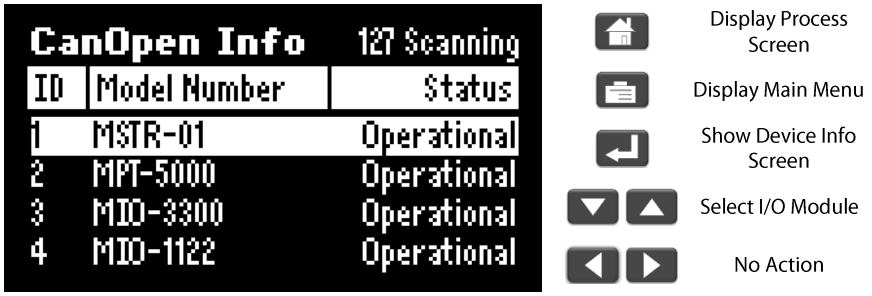
Modifying a Numeric Value

3.3.3 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.

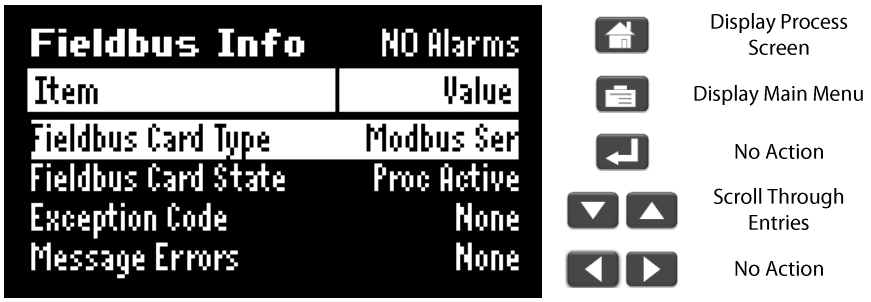
CanOpen Information Screen

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.



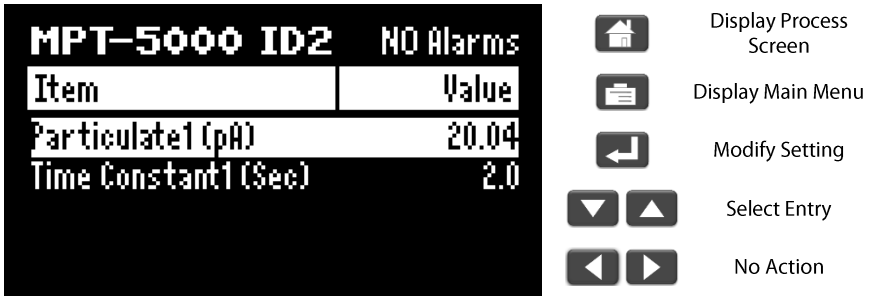
Fieldbus Information Screen

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):



3.3.4 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.

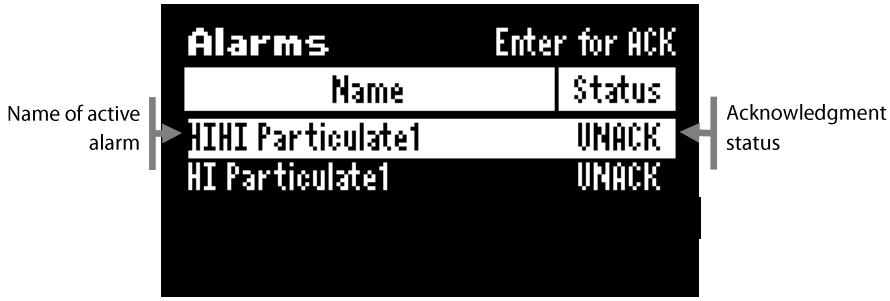
User Level	Displayed Status	Password Required	Default Password	Permissions
Operator	User:OPER	No	—	None
Supervisor	User:SUP	Yes	5	Change alarm set points Change Fieldbus set points
Engineer	User:ENG	Yes	55	Change alarm set points Change Fieldbus set points Change all hardware configuration set points

User Login Screen

4 Alarms

Two alarms are available for every active process variable input. An alarm will be activated when the process variable goes beyond the ***Alarm Setpoint*** continuously for a period longer than the ***Alarm Delay*** setting. 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
Particulate	HIHI	1	100	5	HIHI alarm of particulate reading
Particulate	HI	2	30	10	HI alarm of particulate reading
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)

4.1 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 Setpoint*** 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 Setpoint*** continuously for a period longer than the ***Alarm Delay***.

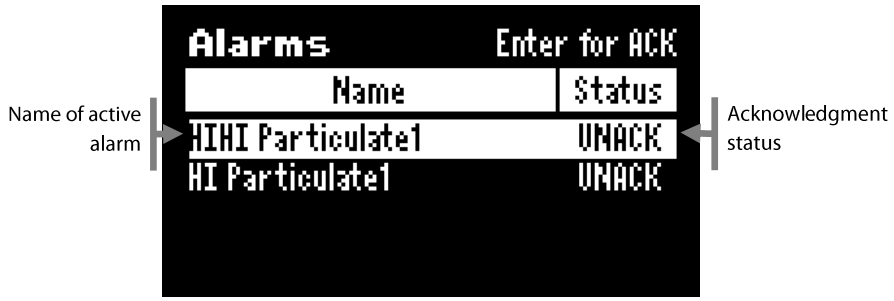
4.2 Alarm Groups

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 5.3 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 4.8 Master Alarm for further details.

4.3 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

4.4 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.

4.5 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

4.6 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 the "Discrete Output" section.

4.7 Alarm Inhibit

The alarm inhibit feature prevents new alarms from being activated when the process is off. Each alarm can be configured to use a specific process run signals to inhibit new alarms. New alarms that occur when the alarm inhibit is active will not be indicated in the alarming system. The process run signal can use a discrete input and/or a process variable input with a threshold to determine the process state. See the "Process Run Signal" section for more details about process run signal configuration.

4.8 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

5 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 such as EPA compliance software.
- 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 5.9 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 5.2 to prevent possible data corruption

5.1 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

5.2 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.

5.3 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

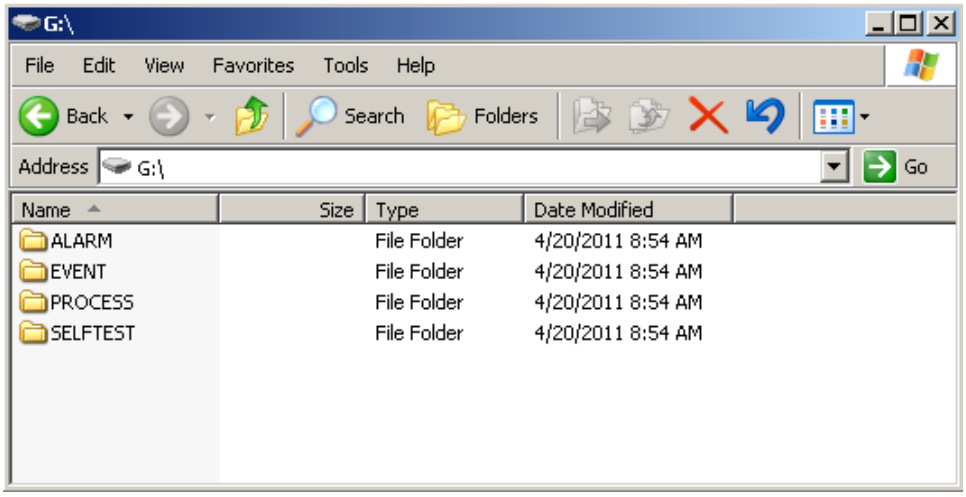
This alarm may be disabled if desired with the ***SD Card Alarm Enable/Disable*** setting in the System Wizard.

5.4 Files and Folders

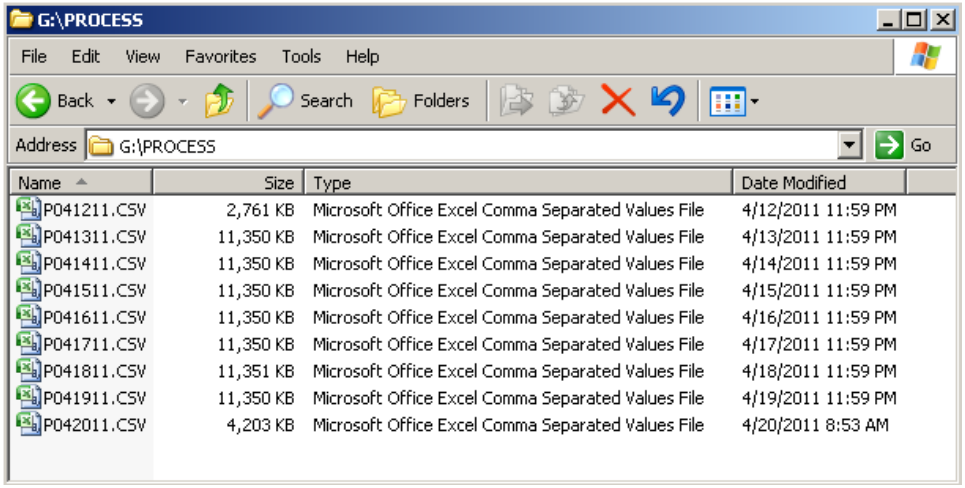
The data-logging system creates a folder for each log type such as process and alarm. Records are stored to data-log files in the created folders with a new file created each day. Files are stored in comma separated variable format which may be easily opened with any text editor, with Microsoft Excel, 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



5.5 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

5.6 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

5.7 Particulate 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

5.8 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

5.9 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

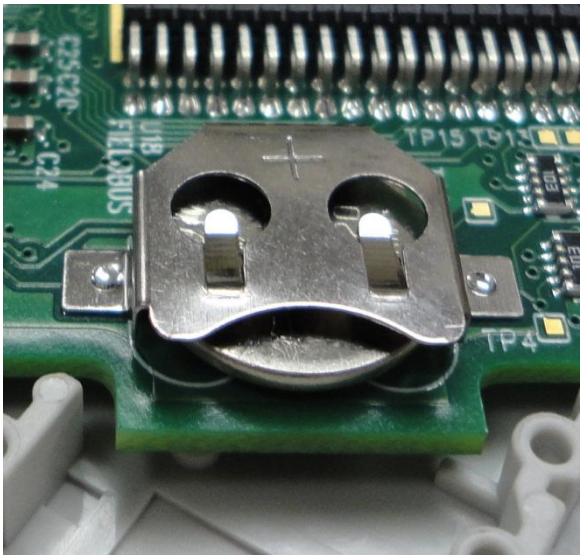
- Power controller off and remove from DIN rail bus.
- Locate the back of the controller.
- Remove the end-cap on the middle row of the last column away from the home key to locate the battery holder.
- Ensure that your body is grounded to prevent damaging the unit from electrostatic discharge (Such 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

6 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.

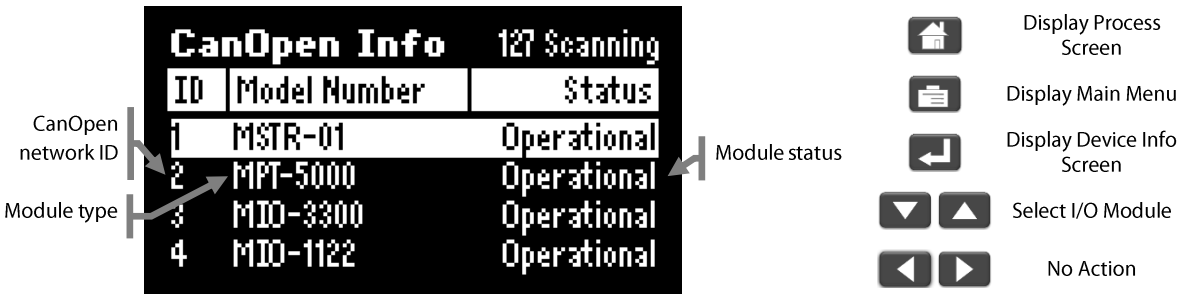
6.1 CanOpen

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.

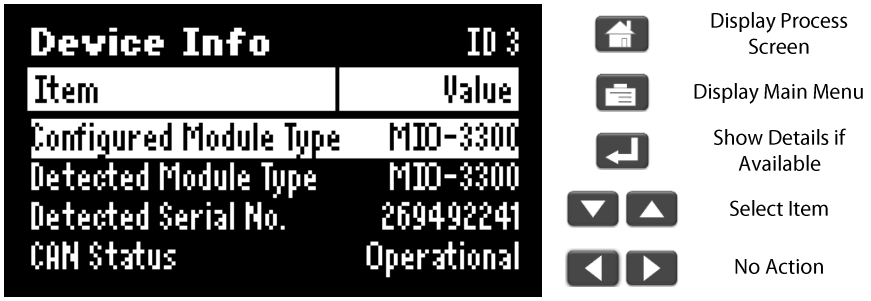
CanOpen Info Status Values

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

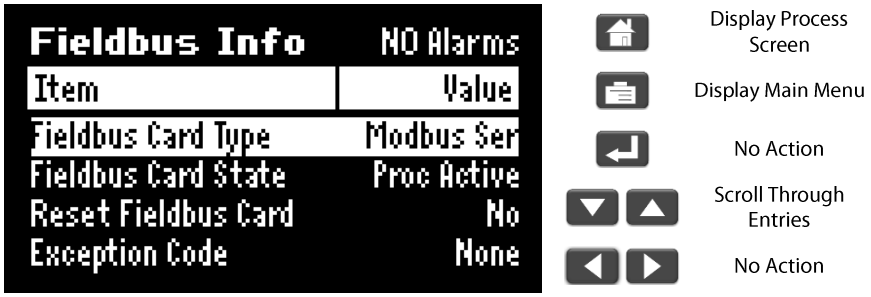
- Select the Reset Slave ID entry.
- Press the enter key to display the Confirm Change ID screen.
- Select Yes and press the enter key to display the Enter NEW ID screen.
- Select the new module ID and press the enter key.
- The CanOpen Info screen will be displayed when complete.
- Cycle power to the I/O Module to apply the new ID.

Confirm Change ID Screen

Enter NEW ID Screen

6.2 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.

6.3 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.

6.3.1 Forcing Outputs

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

IMPORTANT

I/O MODULE OUTPUT FORCING PROCEDURE

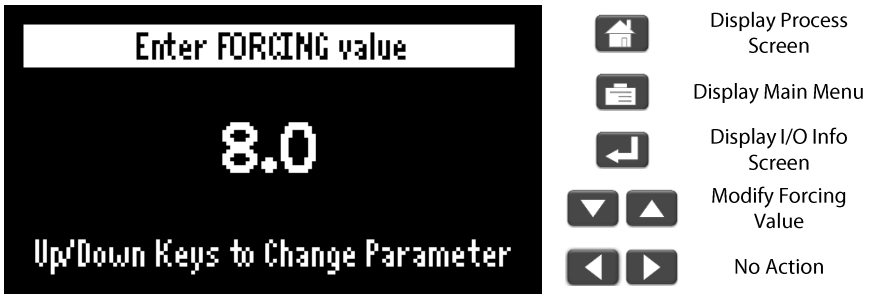
- Log on at Engineer user level.
- Select the process output entry and press the enter key to display the Enable Force Output screen.
- Select Forcing Enabled and press the enter key to display the Enter Forcing Value screen.
- Modify the forcing value.
- Press the enter key to display the I/O information 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:

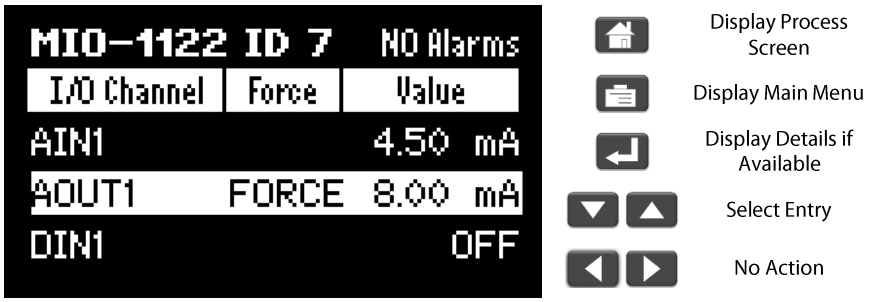
- Select the process output entry and press the enter key to display the Enable Force Output screen.
- Select Forcing Disabled and press the enter key.

Enable Force Output Screen

Enter Forcing Value Screen



MIO-1122 Information Screen with AOUT1 Forced



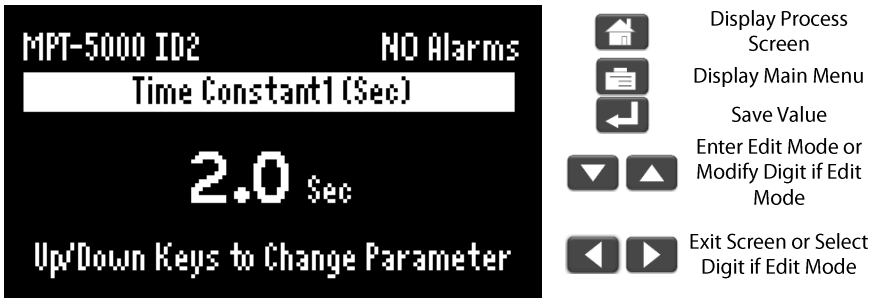
6.3.2 Modifying Settings

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



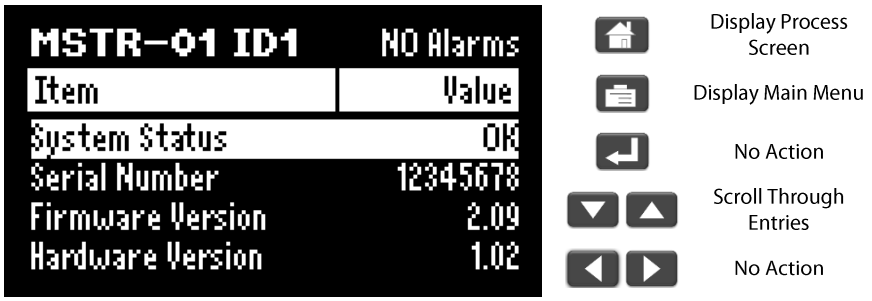
6.3.3 Module Type Master Controller MSTR-01

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

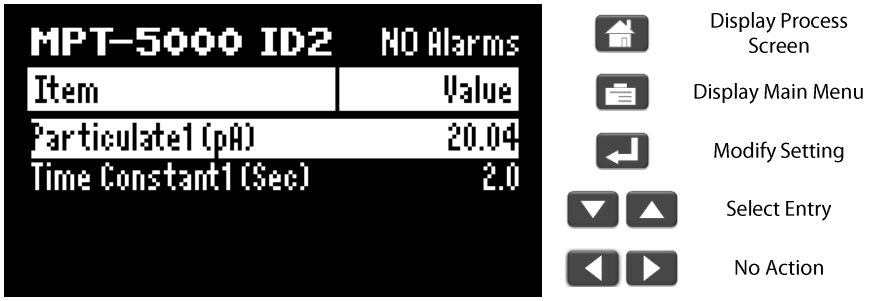
Error	Description
System Error SCU	Master processor clock system error
System Error FMI	Master processor memory error
System Error COPINIT	CanOpen network initialization error
System Error COPPROC	CanOpen network process startup error
System Error NV	Non-volatile memory CRC error
System Error NLIST	Node 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



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

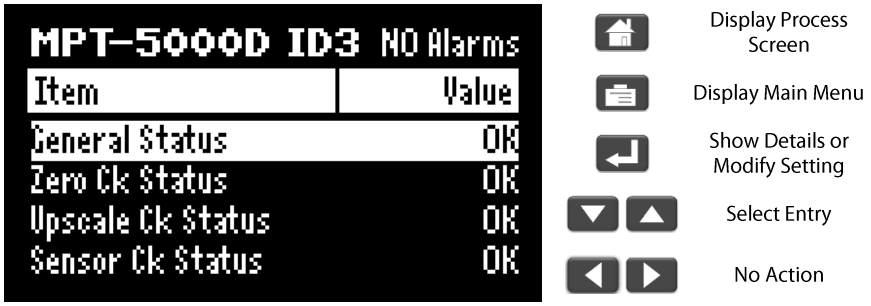
The MPT-5000 (single channel) or MPT-50002 (dual channel) information screen displays the process data and settings of the MPT-5000 or MPT-50002 particulate module. It shows the particulate reading and time constant setting for each channel. Engineer login is required to modify the time constant. Increasing the time constant makes the reading smoother.



6.3.5 Module Type Plus Particulate MPT-5000D

The MPT-5000D information screen displays the process data, settings, and status of the plus 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 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

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 to start the Periodic Self Ck wizard.
- 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.

Analog Output Self Check Indicator Options

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

Plus 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

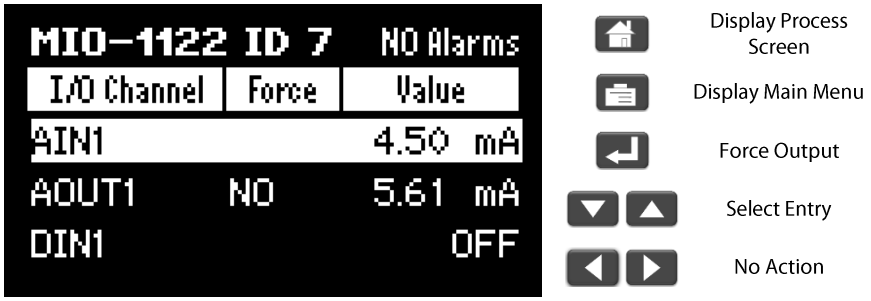
The data logging system logs particulate monitor self-check results and error events to the SD card.

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.

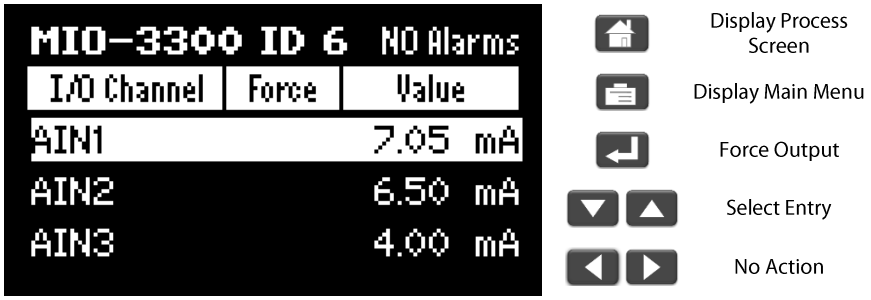
6.3.6 Module Type Mixed I/O MIO-1122

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.



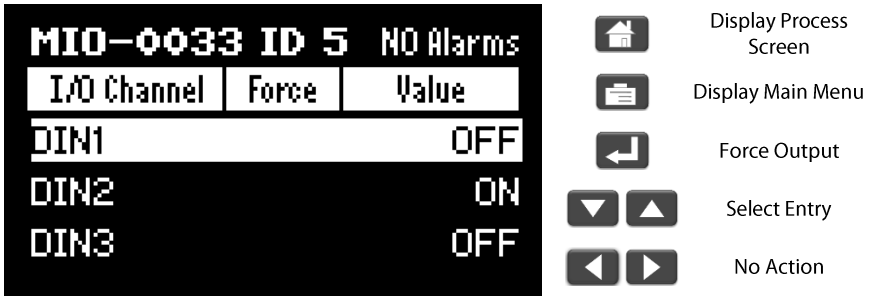
6.3.7 Module Type Analog I/O MIO-3300

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.



6.3.8 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.



7 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

7.1 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..)

7.2 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 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 (particulate1, particulate2, differential pressure…)
Engineering Units	Engineer	None	Unit (pA, inWC...)
Raw MINIMUM	Engineer	0	Minimum value of the raw I/O input (example 0pA or 4.0mA)
Raw MAXIMUM	Engineer	0	Maximum value of the raw I/O input (example 5000pA or 20.0mA)
Scaled MINIMUM	Engineer	0	Minimum value of the scaled I/O input (example 0pA)
Scaled MAXIMUM	Engineer	0	Maximum value of the scaled I/O input (example 5000pA)
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 particulate from the CH1 input of an MPT-5000 module with ID 2 as PVIN 1.

Setting	Value
Select Process Variable Input	PVIN 1
PVIN 1 Enabled	Enabled
PVIN 1 Process Name	Particulate
PVIN 1 Engineering Units	pA
PVIN 1 Raw MINIMUM	0
PVIN 1 Raw MAXIMUM	5000
PVIN 1 Scaled MINIMUM	0
PVIN 1 Scaled MAXIMUM	5000
PVIN 1 Anti-Log Decades	0
PVIN 1 Relative Factor	1
PVIN 1 Input Slave ID	2
PVIN 1 Input Channel	AIN 1

7.3 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

7.4 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 0pA)
Raw MAXIMUM	Engineer	0	Maximum value of the process variable input (example 5000pA)
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

7.5 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 (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...)

7.6 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 4.8 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…)

7.7 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 "Alarm Inhibit" section 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

8 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

8.1 Saving the Settings

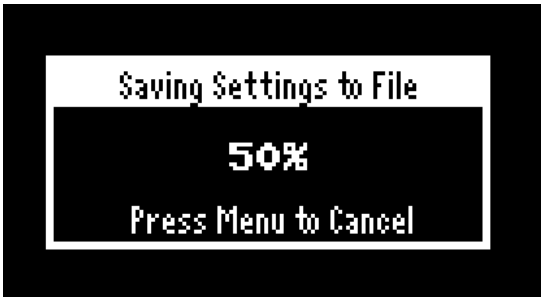
Saving settings to the SD card can be performed by following the steps below:

IMPORTANT SAVING SETTINGS TO SD CARD PROCEDURE

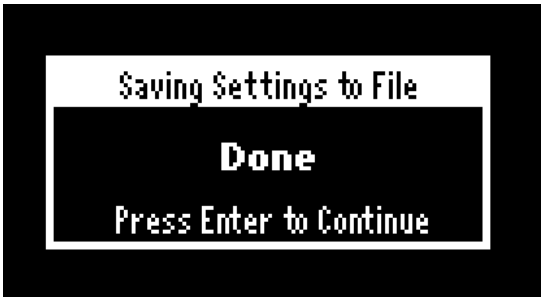
- Insert an SD card into the unit.
- Set the ***Save Settings to SD Card*** setting to Yes and press the enter key to initiate saving the settings.
- The progress screen is displayed.
- Wait for the progress screen to show Done then press the enter key.
- The settings file "NVBACKUP.CSV" should be in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



8.2 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:

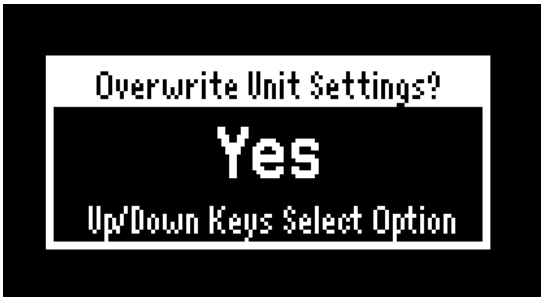
IMPORTANT LOADING SETTINGS FROM SD CARD PROCEDURE

- Save a backup of current settings to the SD card as described in section 8.1 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

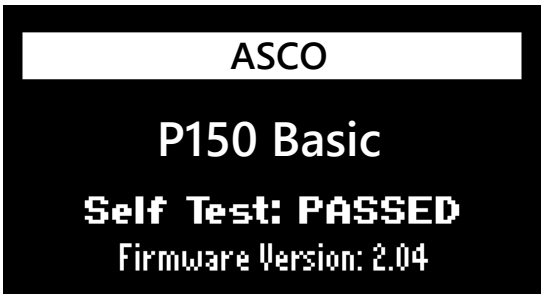
Step2 - Overwrite Settings Confirmation Screen



Step3 - Loading Settings in Progress

Step4 - Loading Settings Complete

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



9 Bootloader

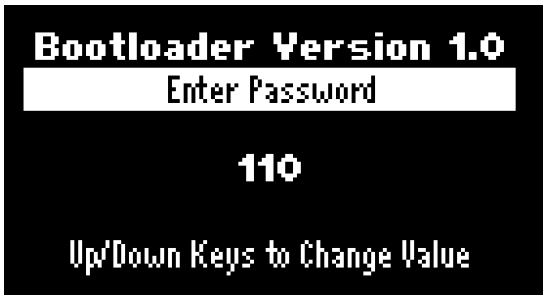
The P150 Basic includes a bootloader that can be used to update firmware in the field, saving an image of installed firmware or program a new firmware. System settings should be saved before programming firmware. The bootloader automatically starts installed firmware after 30 seconds of no user activity. The bootloader is only supported on firmware V2.01 and higher.

IMPORTANT INITIATING THE BOOTLOADER PROCEDURE

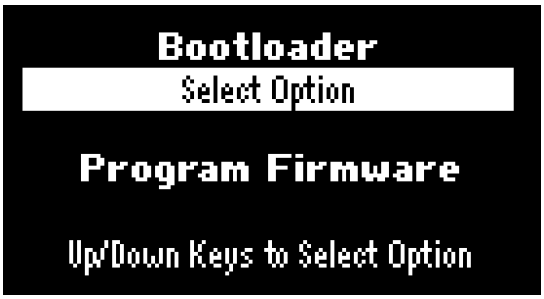
- Remove power from the unit.
- Apply power to the unit while holding the menu key to start the bootloader.
- Enter the password of 55 in the displayed Login screen.
- The Select Option screen is displayed after successful password login.

The following screens show an example of running the bootloader.

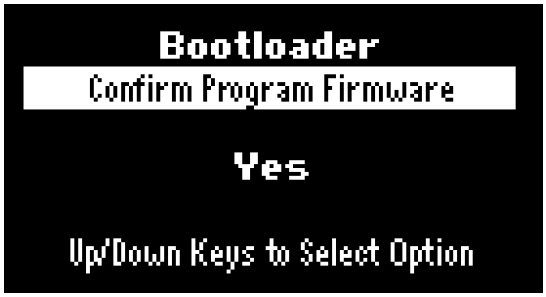
Step1 – Bootloader Login Screen



Step2 - Bootloader Select Option Screen



Step3 - Bootloader Confirm Selection Screen



9.1 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

9.2 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

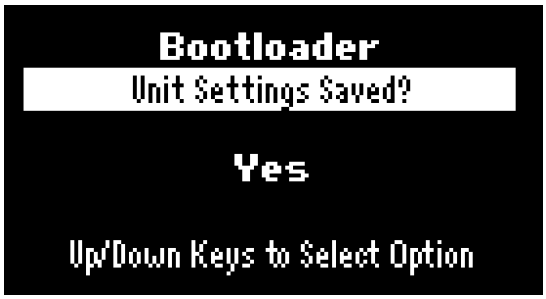
- Save a backup of current settings to the SD card as described in section 8.1 Saving the Settings.
- Place the binary image file in the SD card and rename it “firmware.bin” if needed.
- Insert the SD card into the unit.
- Enter the bootloader and select Program Firmware from the Select Option screen 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 8.2 Loading the Settings.
- Contact factory if any error message is displayed.

The following screens show an example of loading new firmware.

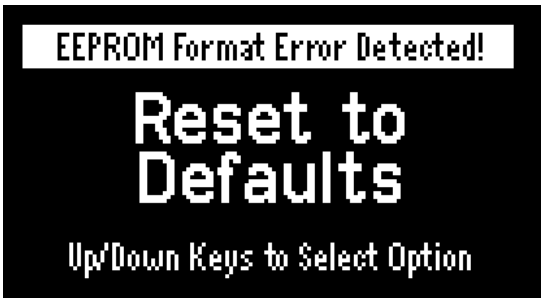
Step1 - Bootloader Unit Settings Saved Screen



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

10 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. Cycle 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.

10.1 Module Replacement

I/O and Sensor Module Replacement

The P150 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 read correctly as described in section 6.3 I/O Module Operation.
- Verify that all outputs are set correctly using the forcing feature as described in section 6.3 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 7.1 Node list.
- Configure the new module's analog and discrete input and output channels as described in section 7 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 6.3 I/O Module Operation.

- Verify that all outputs are set correctly using the forcing feature as described in section 6.3 I/O Module Operation.
- Configure alarms for the newly configured process variable inputs if needed.

10.2 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, those settings might be saved and loaded to the new controller using the save and load settings features. However, if the replacement involves adding new features or modifying the configuration, the controller might need to be configured in factory and application specific settings need to be recorded and applied manually to the new controller. 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 8.1 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 8.2 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.

10.3 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 to 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.

11 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.	P150 Basic § 6.3.3
Verify all process variable inputs are operating correctly and that readings are within expected range.	P150 Basic §7.2
Verify all discrete inputs are operating correctly when actuated from the remote device.	P150 Basic §7.5
Verify all process variable outputs are operating correctly and that readings are scaled correctly into remote plc/dcs.	P150 Basic §7.4
Verify all discrete alarm outputs are operating correctly and that remote indicators operate correctly.	P150 Basic §7.6

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

Alarms

Action	Reference
Determine appropriate alarm levels, delays and groups and adjust settings as required.	P150 Basic § 5.1, § 5.2
Determine how alarm acknowledgment will be handled and adjust local and remote alarm acknowledgment settings as required.	P150 Basic § 5.3, § 5.4
Determine how alarm relays should operate and adjust latching, cleaning and fail safe settings as required.	P150 Basic §5.4 - 5.6
Verify alarm operation by temporarily changing alarm levels or introducing a simulated signal.	P150 Basic §4.3.1

Data Logging

Action	Reference
Verify system clock is set to correct date and time including after a power cycle	P150 Basic §6.7
Verify SD card data logging is operating correctly if installed.	P150 Basic §6.3 - 6.6

12 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.

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
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	Supervisor	0	Fourth part of subnet mask for Ethernet Fieldbus types ---.---.---.XXX

of 4			
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 (particulate1, particulate2…)
Engineering Units	Engineer	None	Unit (pA, mg/m3...)
Raw MINIMUM	Engineer	0	Minimum value of the I/O input (example 0 pA)
Raw MAXIMUM	Engineer	0	Maximum value of the I/O input (example 5000 pA)
Scaled MINIMUM	Engineer	0	Minimum value of the scaled I/O input (example 0 pA)
Scaled MAXIMUM	Engineer	0	Maximum value of the scaled I/O input (example 5000 pA)
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 raw process variable input (example 0 pA)
Raw MAXIMUM	Engineer	0	Maximum value of the raw process variable input (example 5000 pA)
Scaled MINIMUM	Engineer	0	Minimum value of the scaled process variable output which is typically 4.0mA
Scaled MAXIMUM	Engineer	0	Maximum value of the scaled 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 (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…)

13 Installation Drawing

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

14 Notes