Instructions

Safety System Software (S^3)

User Guide

are designed for safety systems and the people who use them.

Doc-1011505

Contents

1 INTRODUCTION 11

1.1 Legal Notices 11

1.2 User Guide 12

1.3 What is S^3? 12

1.4 S^3 Features 13

1.5 HW Requirements 14

1.6 SW Architecture 15

1.6.1 Configuration Environment 15

1.6.2 Online Environment 16

1.6.3 DCD 16

1.7 Installation Options 17

1.7.1 Operations Installation Selection 17

1.7.2 Development 17

1.8 Installation Procedure 18

1.9 Hardware Keys 21

1.9.1 "Standard" Configuration/Runtime Key 21

2 CONFIGURATION 22

2.1 S^3 Shell (Main) Screen 22

3 PORTS 26

3.1 Basic Port Configuration 26

3.1.1 Alarm Printer Port 29

3.1.2 Serial Port Settings 29

3.1.3 Working with Ethernet 36

4 START MONITORING 41

4.1 Online Operation - DCD 41

4.1.1 Point Display 42

4.1.2 Acknowledge 42

4.1.3 Active Alarms 43

4.1.4 Disk Log 43

4.1.5 Log In / Log Out 44

4.1.6 Port Status 45

5 PRINTING 46

5.1 Overview of Features 46
5.2 Filtering Data to be Printed 47
5.2.1 Tagnames (All) 47
5.2.2 User Module Strings 47
5.2.3 User Miscellaneous Strings 47
5.2.4 Miscellaneous Preferences 47
5.2.5 User Configuration 47
5.2.6 Sounds 47
5.2.7 OPC Server Configuration 47
5.3 Selecting Ports to Document 48
5.3.1 Port 1 - 10 48
6 LOGS 50
6.1 Overview of Features 50
6.2 Alarm Logs (DCD Disk Log) 51
6.3 Configuration Logs 52
6.4 Calibration Logs 53
6.4.1 Calibration Log Reporter Filter Options 54
7 PREFERENCES 55
7.1 Project 55
7.2 Drawing (Deprecated Feature) 56
7.3 Clock 56
7.3.1 Time 56
7.3.2 Date 56
7.4 User Strings 57
7.4.1 Common Buttons 57
7.4.2 Detector Point to Point Modules 57
7.4.3 Eagle Quantum Premier 57
7.4.4 Miscellaneous 57
7.4.5 User String Examples 58
7.5 Graphics (Deprecated Feature) 61
7.5.1 User Strings 61
7.5.2 Cyrillic Font 62
7.5.3 Virtual Keyboard 62
7.5.4 Custom Overview 62
7.5.5 Visual Object Error Settings 63

7.5.6 Color Depth Settings 65
7.5.7 Screen Resolution 65
7.6 Logs 66
7.7 DCD 67
7.7.1 DCD Settings 67
7.7.2 Online Graphics 67
7.8 Screen Prints 68
7.8.1 Local Printing 68
7.8.2 Remote Printing 68
7.8.3 Specifying a Printer 68
7.9 Screen Saver 69
7.10 Button User Levels 70
7.11 Sounds 71
8 BACKUP AND RESTORE 73
8.1 Overview of Features 73
8.2 Backup 74
8.3 Restore 76
9 OPC SERVER 78
9.1 OPC in S³ 79
9.2 OPC Server Configuration 79
9.3 OPC Property Viewer 80
10 USER ACCOUNTS 83
10.1 Security 83
10.2 Administrator Privileges 84
10.3 Creating User Accounts 85
10.3.1 User Level 86
10.3.2 Configure system enabled 86
10.3.3 Quit “Online” operations enabled 86
10.3.4 Port Diagnostics viewing enabled 86
10.3.5 Restricted Access enabled 86
10.4 Passwords 87
10.4.1 Change Name 87
11 EQP CONFIGURATION 88

11.1 Configuration Screen 89
11.2 Button Bar Overview 89
11.3 Command Bar Overview 90
11.3.1 Command Definitions 90
11.4 Configuration Bar 114
11.4.1 Configuration Button Definitions 114
12 EAGLE QUANTUM PREMIER (EQP) DEVICE CONFIGURATION 122
12.1 Overview 122
12.2 EQP Controller 123
12.2.1 Tagname 123
12.2.2 Misc 123
12.2.3 Configuration Port 123
12.2.4 Redundancy 124
12.2.5 Serial Ports 124
12.2.6 Miscellaneous 125
12.2.7 Inputs/Relays 126
12.3 Multi-Spectrum Infrared Flame Detector X3301 / X3301 Enhanced 131
12.3.1 Tagname 131
12.3.2 Heater Optics 132
12.3.3 Temperature Setpoint 133
12.3.4 Automatic Oi 133
12.3.5 Oi Test Fault 133
12.3.6 Magnetic Oi / Manual Oi 134
12.3.7 Alarm Led Latch 134
12.3.8 Fault Led Latch 135
12.3.9 Detector Sensitivity 135
12.3.10 PV Deadband 137
12.3.11 Alarms 137
12.3.12 User Levels 138
12.3.13 Point Display 139
12.4 Multi-Spectrum Infrared Flame Detector X3302 / X3302 Enhanced 141
12.4.1 Tagname 141
12.4.2 Heater Optics 142
12.4.3 Temperature Setpoint 142
12.4.4 Automatic Oi 142
12.4.5 Oi Test Fault 143

12.4.6 Magnetic Oi / Manual Oi 143
12.4.7 Alarm LED Latch 144
12.4.8 Fault LED Latch 144
12.4.9 PV Deadband 144
12.4.10 Alarms 144
12.4.11 User Levels 145
12.4.12 Point Display 145
12.5 Infrared (IR) Flame Detector X9800 148
12.5.1 Tagname 148
12.5.2 Processing Mode 149
12.5.3 Automatic Oi 149
12.5.4 Magnetic Oi / Manual Oi 150
12.5.5 Oi Configuration 150
12.5.6 Sensitivity 151
12.5.7 Alarm Latching 151
12.5.8 Time Delay 151
12.5.9 PV Deadband 151
12.5.10 Heater 152
12.5.11 Alarms 152
12.5.12 User Levels 152
12.5.13 Point Display 153
12.6 Ultraviolet (UV) / Infrared (IR) Flame Detector X5200 155
12.6.1 Tagname 155
12.6.2 UV Flame Detector Options 156
12.6.3 IR Detector Options 157
12.7 Ultraviolet Flame Detector X2200 163
12.7.1 Tagname 163
12.7.2 Signal Processing Options 164
12.7.3 Oi Test Frequency 164
12.7.4 Oi Test Fault 165
12.7.5 Sensitivity and Arc Rejection 165
12.7.6 Combined settings 165
12.7.7 Alarms 166
12.7.8 User Levels 167
12.7.9 Point Display 167
12.8 Ultraviolet (UV) Flame Detector EQ2200UV 170
12.8.1 Tagname 170
12.8.2 Arc Rejection (Recommended Factory Setting) 170

12.8.3 Standard Signal Processing 170
12.8.4 Alarm Latching Mode 171
12.8.5 Oi Mode 171
12.8.6 Time Delay 171
12.8.7 PV Deadband 171
12.8.8 Alarms 172
12.8.9 User Levels 172
12.8.10 Point Display 173
12.9 Ultraviolet (UV) / Infrared (IR) Optical Flame Detector EQ2200UVIR 175
12.9.1 Tagname 175
12.9.2 Sensor Settings & Sensitivity 176
12.9.3 UV Specific Settings 176
12.9.4 UV and IR Sensor Sensitivity Settings 177
12.9.5 Combined Settings 178
12.9.6 Alarms 179
12.9.7 User Levels 179
12.9.8 Point Display 180
12.10 Point IR Gas Detector PIRECL 182
12.10.1 Gas Type 183
12.10.2 Calibration Gas: Type and Concentration 183
12.10.3 Alarm Setpoints 184
12.10.4 PV Deadband 184
12.10.5 Common Settings 184
12.10.6 Alarms 185
12.10.7 Point Display 186
12.11 Open Path Eclipse Gas Detectors OPECL/LS2000 188
12.11.1 Gas Type 189
12.11.2 Alarm Setpoints 190
12.11.3 PV Deadband 190
12.11.4 Common Settings 190
12.11.5 Point Display 192
12.12 Digital Communication Unit (UD10-DCU) 194
12.12.1 Overview 194
12.12.2 Common Settings 196
12.12.3 Point Display 197
12.13 Discrete IO (DCIO) / Enhanced Discrete IO SIL (EDIO) 198
12.13.1 Overview 198

12.13.2 Tagname 199
12.13.3 Static Logic Mode (Input) 200
12.13.4 Alarms 201
12.13.5 Point Display 202
12.14 Intelligent Protection Module (IPM) 204
12.14.1 Overview 204
12.15 Analog Input Module (AIM) 212
12.15.1 Overview 212
12.15.2 Channel Configuration 212
12.15.3 Common Settings 214
12.15.4 Point Display 215
12.16 Relay Module (8-Channel) 217
12.16.1 Overview 217
12.16.2 Tagname 217
12.16.3 Description 217
12.16.4 Com Fail Mode 218
12.16.5 Alarms 218
12.16.6 User Levels 219
12.17 EQ2500ARM Series Agent Release Module (ARM) 222
12.17.1 Overview 222
12.17.2 Mode Control 223
12.17.3 Alarms 223
12.17.4 User Level 223
12.17.5 Point Display 224
12.18 Initiating Device Circuit (IDC) Module (2-channel) 226
12.18.1 Overview 226
12.18.2 Tagname 226
12.18.3 Static Logic Mode (Input) 227
12.18.4 Alarms 227
12.18.5 User Levels 228
12.18.6 Point Display 229
12.18.7 Inhibit Buttons 229
12.19 EQ2500SAM Signal Audible Module (SAM) 231
12.19.1 Overview 231
12.19.2 Tagname 232
12.19.3 Alarms 232
12.19.4 User Level 233

12.19.5 Point Display 233
12.20 Addressable Smoke Module (ASM) 235
12.20.1 Overview 235
12.20.2 Supported Apollo Modules 235
12.20.3 Configuration 238
12.20.4 Alarms 242
12.20.5 User Levels 242
12.20.6 Completing Configuration 243
12.20.7 Point Display 244
12.21 High-Speed Deluge Model (HSDM) 246
12.21.1 Overview 246
12.21.2 Configuration 247
12.21.3 Point Display 251
12.22 Power Supply Module (PSM) 253
12.22.1 Overview 253
12.22.2 Editor Fields 253
12.22.3 Alarms 253
12.22.4 User Level 255
12.22.5 Point Display 255
13 EQP LOGIC EDITOR 257
13.1 Overview 257
13.2 File Menu 259
13.2.1 Print Reports 259
13.2.2 Quit 259
13.3 Edit Menu 260
13.3.1 Find 260
13.3.2 Preferences 261
13.4 Controller Menu 264
13.4.1 Global Memory 264
13.4.2 Local Memory 266
13.4.3 Memory Export/Import 266
13.4.4 AB Export/Import 266
13.4.5 AB Monitor 266
13.4.6 AB Moves 267
13.4.7 AB Table Settings 270
13.4.8 MODBUS Export/Import 270

13.4.9 MODBUS Monitor 270
13.4.10 MODBUS Moves 271
13.4.11 MODBUS Table Settings 274
13.5 Project Menu 275
13.5.1 Directory 275
13.5.2 Build 281
13.5.3 Compatibility 282
13.5.4 Cross Reference 282
13.5.5 Show Errors/Warnings 283
13.5.6 Check Function Block 284
13.5.7 Download 284
13.5.8 Simulate 285
13.6 Sheets Menu 287
13.6.1 Settings 288
13.6.2 Title Blocks 290
13.6.3 Next/Previous 291
13.6.4 Local Variable Editor 291
13.7 Toolbars Menu 293
13.7.1 Project Toolbar 293
13.7.2 Gates Toolbar 294
13.7.3 Sheet Toolbar 297
13.7.4 Control Panel Toolbar 298
13.8 Help Menu 299
13.8.1 Standard Functions 299
13.9 Logic Creation 303
13.9.1 Overview 303
13.9.2 Definitions 303
13.9.3 Creating a SIL 2 Project 313
13.10 Device Items Reference 320
13.10.1 Item Descriptions 321

1 Introduction

1.1 Legal Notices

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1.2 User Guide

Depending on the application or system, it is very unlikely that all the features offered in S^3 will be utilized, or some features may be used more than others. The S^3 User Guide has been developed to assist experienced operators in understanding the vast capabilities of this robust safety system software.

New users with no prior S^3 knowledge will have difficulty following this guide. It is strongly recommended that a new user attend the EQP Systems Advanced Technical Training class (Course 102). Further information is available through our website or contact us by telephone.

NOTES

This manual covers the features and functionality of S3 version 10.17.x.x, as released in Spring of 2022.

For technical questions that may arise from the use of this manual, please utilize our Tech Support Email contact at Techsupport.det-tronics@carrier.com.

1.3 What is S^3?

Safety System Software (S^3) is a complete, high-performance Human Machine Interface software package that is designed to work seamlessly with a variety of Safety Systems including all three generations of the Detector Electronics "Eagle" addressable systems. It allows data to be acquired from these systems for event and alarm tracking, display on custom graphics, and to be shared with other systems.

When used as an Operator Interface Station (OIS), it also allows commands to be sent to attached systems to perform a variety of functions.

S^3 also provides convenient and accurate device configuration, programming, and diagnostic tools.

There are no cumbersome keyboard commands for the operator to learn. The entire interface is graphical in nature. On-screen point and click icons allow convenient navigation through the application with easy access to the various features.

The S^3 database contains all the information needed to allow for easy and accurate configuration. All pertinent information for the device being configured including user selectable options is displayed on an easy to understand "point configuration screen". From this screen, the configuration can be viewed, and changes can be made as desired.

Pre-configured "Point Display Screens" present data for complex networked devices as well as conventional ones in a consolidated and easy to understand format. With Eagle Quantum Premier devices, each node on the network provides detailed status information, recent alarms, and calibration records.

S^3 also provides password protection for up to 64 different user accounts to keep unauthorized personnel from modifying system configurations, and thousands of user levels for accessing command and control functions.

In short, S^3 collects, tracks, displays and distributes your safety system information while allowing intuitive operator input for command-and-control functions of these safety systems.

1.4 S^3 Features

- User-friendly point and click navigation, with no special keyboard commands to learn.
- Menu-driven configuration ensures easy installation or modification.
- Configuration additions or changes can be made at any time with minimal interruption to system operation.
- Alarm and calibration data available online.
- Automatic diagnostics ensures reliable system operation.
- Up to 10 simultaneous active communication ports.
- Automatic serial port configuration: baud rate, data bits, stop bits, parity.
- OPC 2.03 Data Access Server option to share data with outside systems.
- Complete logic programming and simulation environment.
- SIL-2 compliant logics also available.
- Comprehensive “event tracking” for up to 250,000 unique tags.
- Event logging to screen, disk, and printer.
- Single-window view of data from a variety of sources.
- Bilingual support for online operations.
- Multi-level security for up to 64 unique accounts.
- Project based development environment for managing multiple projects.
- Printing of comprehensive project documentation.
- Integral project backup and restore utility.
- Complete configuration logging for tracking changes to setpoints, device configurations, downloads, etc.

1.5 HW Requirements

The minimum S^3 workstation hardware requirements are:

Computer. The S^3 Software Suite is designed to run on an Intel® based computer with at least a 1GHz Core i5 processor running Windows 10 or Windows 11. Computers operating on a 64-bit platform are fully supported. As with many modern programs, the faster the machine, the better the performance. While every endeavor has been taken to ensure the reliable operation of this software on MS Windows based PC's, Det-Tronics cannot predict issues when other software is loaded to the PC that may compete for resources and/or access to serial/USB communications. It is strongly recommended that other programs are shut down prior to starting S^3, to minimize such conflicts.

A hard drive with at least 50 MB of available space, a USB port, and internet access is also required for installation. The USB port is for the USB license key, which is required for operation of S^3.

Memory. S^3 Safety System Software is a high-performance Operator Interface System (OIS) environment and requires a minimum of 256 MB of physical memory. Det-Tronics typically provides a minimum of 512MB of physical RAM in its OIS installations.

Display. S^3 requires thousands of colors (16 bit) and a minimum display resolution of 1280 pixels wide by 768 pixels high (XGA). Font display settings must be 92dpi. Software support for touchscreens is included.

Serial Ports. S^3 is designed to utilize up to ten high speed serial ports, all running at up to 115.2 kbps simultaneously — typically this includes the two serial ports available on the motherboard of the computer, plus up to eight additional ports on an expansion card with a serial coprocessor. USB to serial converters is supported.

Ethernet. S^3 can communicate with some systems via a single or redundant Ethernet connection. Each network card must have a separate, fixed, TCP/IP address.

Printers. The system can utilize any properly installed printer for documentation purposes. For online alarm monitoring, a serial printer port must be configured through the “Ports” screen, and the appropriate printer attached. S^3 is designed to work with a serial version of the Okidata ML490 four-color, tractor feed, dot-matrix printer.

1.6 SW Architecture

The S^3 Software Suite is divided into two distinct environments: Configuration, and Online Monitoring.

The Configuration Environment revolves around device/database configuration, project management and documentation. The Online Environment involves utilizing these configurations to collect distribute and display the information to operations personnel.

These two environments are summarized below.

1.6.1 Configuration Environment

This environment is utilized to configure the system for operation. The following primary functions are accessible:

- Configuration of communication ports which allow data to be collected from attached systems. This includes port type selection, protocol selection, and the manipulation of any adjustable parameters.
- Configuration of supported addressable field devices.
- Programming and simulation of supported logic solvers.
- Creation and editing of the second language database.
- Tag name development, alarm, and event tracking configuration.
- Global operational parameter adjustments such as time & date format, touchscreen support, remote connection parameters, custom sound library management, etc.
- Project management tools to allow for multiple projects to be developed on one machine. This includes an integral project-based backup and restore utility
- Security administration allowing for the creation and maintenance of user accounts.
- The ability to print selectable detailed project documentation.

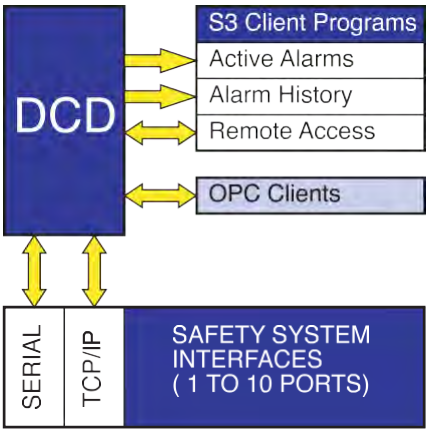
1.6.2 Online Environment

The S^3 Software Suite consists of several separate application programs that work together to collect, distribute, and display data from a variety of sources.

At the center of the suite is an application program called the “Data Collector and Distributor”, or “DCD” for short.

1.6.3 DCD

The DCD is the heart of all online operations. It handles all the OIS communication processes, including serial communications to attached systems, TCP/IP communication with attached systems, communication with OPC clients, and peer-to-peer communications with other S^3 application programs both local and remote.



The DCD can control up to ten communication ports, either individual serial ports or TCP/IP connections.

It collects data from these ports to update the tag database in accordance with the configurations of the individual attached systems.

Other S^3 application programs query the DCD to perform their individual functions such as, updating the active alarm list, generating the alarm history and daily log, and servicing remote access requests.

1.7 Installation Options

There are two installation options available depending on how the workstation is to be used, and they are Operations and Development.

1.7.1 Operations Installation Selection

This installation is designed for full time Operator Interface Station (OIS) operations where the system will be “online” around the clock and will be used by operations personnel as a window into the safety system.

If the “Operations” selection is used for installation, the system will be configured as a secure stand-alone OIS with tight security restrictions installed at the lowest levels of the operating system.

The user must be logged into Windows as the “Administrator” to install this option.

When the “Operations” installation is used S^3 takes complete control of the workstation and when “Online” access to the operating system will not be allowed. In addition, access to other application programs or Windows functions such as “CTL-ALT-DEL”, “ALT-TAB”, etc. will not be available.

The “Operations” installation also configures the system so that on a loss of power (or other event that causes a system restart) the OIS will automatically return to its previous state. S^3 will automatically restart and if online prior to the event will return online with the last valid user logged in as the current user. If not online, the station will return to the S^3 Main Screen.

1.7.2 Development

The “Development” installation does not install the low-level security features of the “Operations” version. User level security is still utilized but full access to the operating system is available in a manner consistent with the given operating system.

When S^3 software is ordered with the OIS computer, the software will come already loaded on the hard disk of the computer. If S^3 software is ordered separately, if re-installation of the original software becomes necessary, or if a software update is to be installed, use the following procedure.

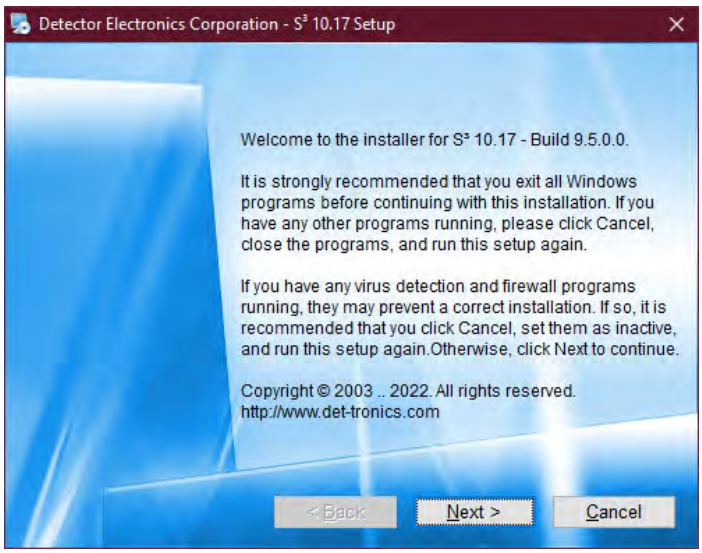
NOTE

If S^3 software is currently running, return to the System Overview screen and quit S^3 before installing the software. It is highly recommended to uninstall any previous versions of S^3 before installation.

1.8 Installation Procedure

Warning: Ensure that you have administrative rights to the PC before you start installation.

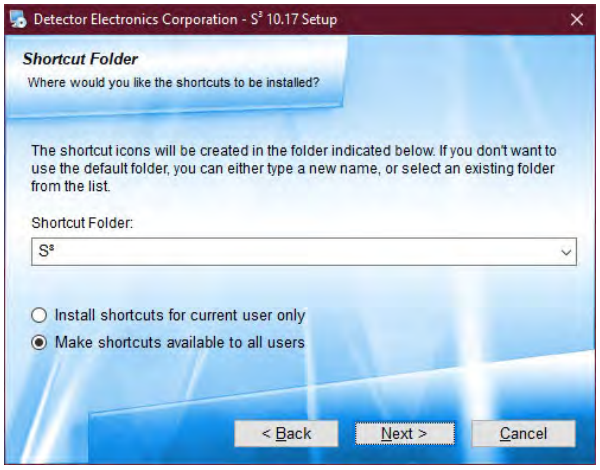
1. Insert the S³ CD into the CD-ROM drive. Open the CD drive icon and double click on "Install." This will open the "Setup" dialog box with important instructions on how to continue. Ensure that the instructions are completed before clicking "Next." Clicking on the "Next" button will advance to the license screen.

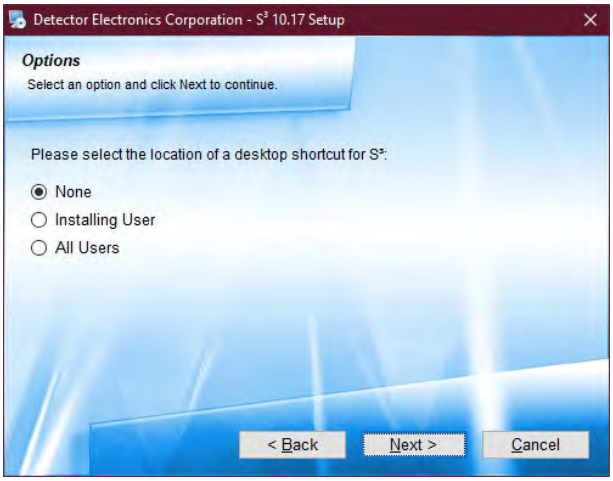


2. This step presents Det-Tronics' software license agreement. Read the agreement and choose the appropriate radio button. Use the "Next" button to continue.

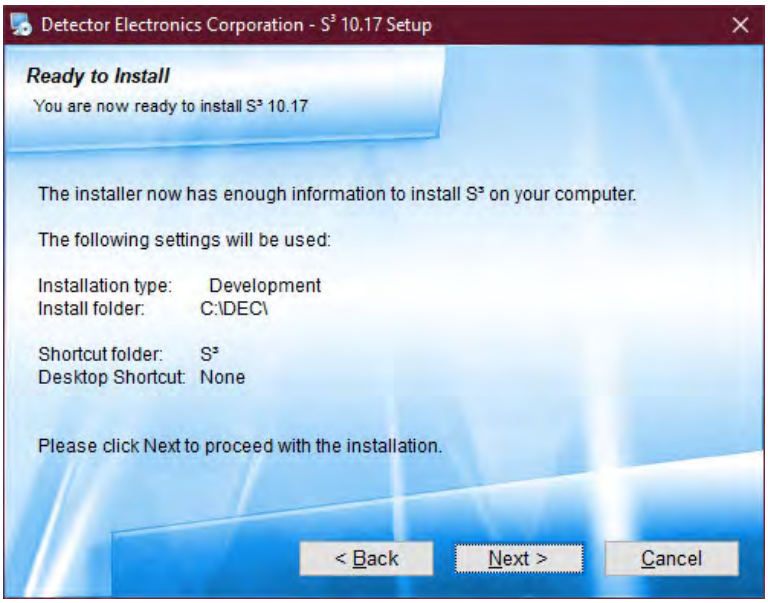
3. Choose one of the two types of installations and click the “Next” button. A “Development” installation is required when S^3 is being installed for the first time. An “Operations” installation would be performed after all logics and settings have been created in the Development mode. In Operations mode, no changes can be made to logics or settings—only monitoring occurs in this mode.

4. The next two windows are related to the S^3 desktop shortcut. Choose accordingly, then click “Next” to continue.

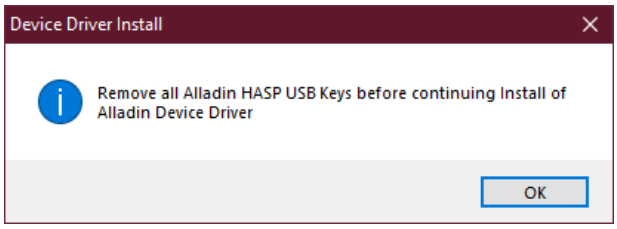




5. Verify that all options selected in previous windows are correct, use the “Back” button to make corrections, click “Next” to begin installation.

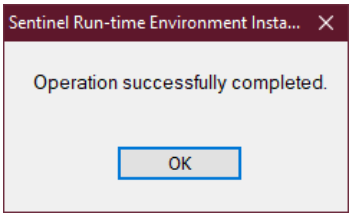


6. During installation there will be a prompt to remove all Alladin USB keys; do so at this time and click “OK” to continue.



7. The installer will now install all the necessary drivers.

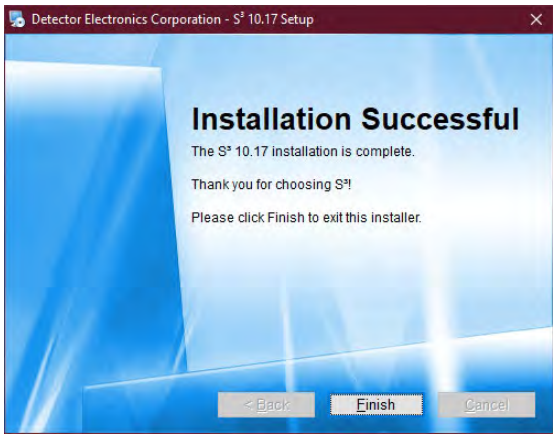
8. After the drivers are installed successfully, a confirmation window will appear, click “OK” to continue.



9. A successful installation window will appear, click “Finish.”

10. Plug the Aladdin key to a USB port on the computer.

11. The system will ask to be rebooted due to the newly installed drivers. Choose “Yes”, and “OK.”



Upon successful installation, S³ automatically creates a desktop shortcut and a folder titled “DEC”, where all necessary and related files are stored.

1.9 Hardware Keys

A hardware key, which attaches to the workstation, determines the options that will be enabled on the station.

The hardware key requires an unused USB port to enable the license.

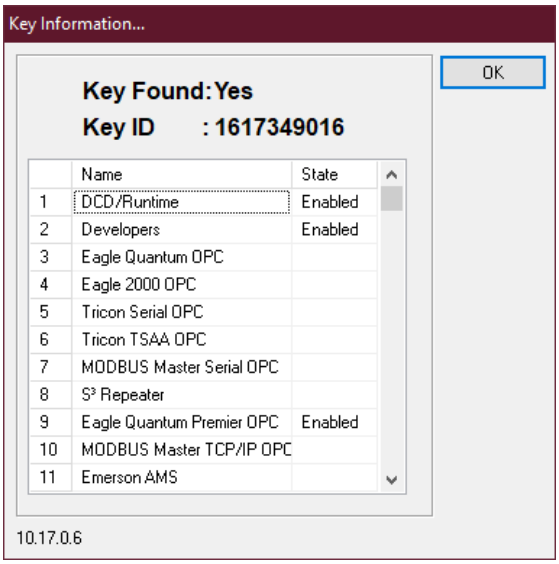
Please see catalog or consult your local sales representative for option in license keys for S^3.

1.9.1 "Standard" Configuration/Runtime Key

This key will allow communication with and the configuration of Detector Electronics Corporations "Eagle" addressable Fire & Gas systems. (Eagle Quantum Premier "EQP").

The Configuration/Runtime key enables the following features:

- The ability to utilize up to 10 serial ports to communicate with multiple Eagle systems.
- The ability to configure any of the field devices and download this configuration to them.
- The ability to program, simulate, monitor, and document logic for the supported controllers.
- The ability to look at the "real time status" of any attached Eagle field device through pre-built "point-displays".
- Enables the DCD program allowing it to run.
- The ability to utilize a configuration engineered with the developer's key to communicate via up to 10 ports.
- The ability to log to screen, disk, and printer any configured events for any of the attached systems.
- A variety of options are available and when purchased will be enabled by the key. These include the following:
- Expansion of EQP network from 60 to 250 nodes.
- Enabling additional communication ports. Up to 10 total ports can be enabled.
- Enabling the EQP OPC Data Access Server feature imbedded in the DCD.
- While on the main screen (see the next section) in S^3, the user can view a list of all enabled options available with a key by pressing "K" on the keyboard. The window should resemble the example to the right.

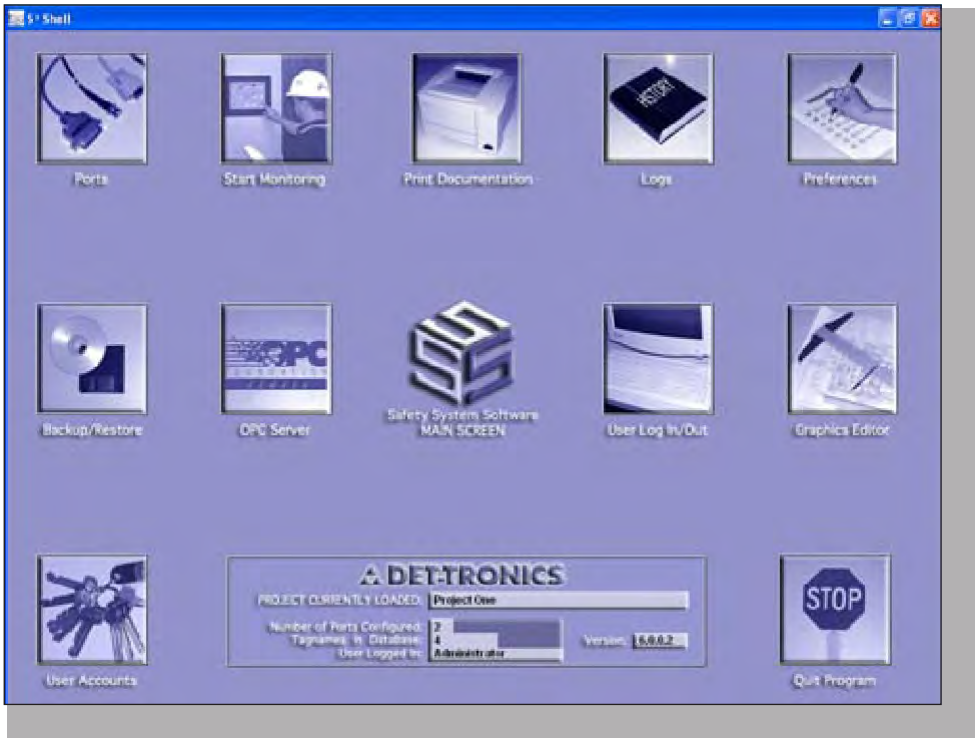


2 Configuration

2.1 S³ Shell (Main) Screen

When the S³ application program is started it will display its “S³ Shell” screen. From this screen, there is access to all the engineering, configuration and utility programs that make up the S³ Application Suite.

There are eleven buttons on this screen, each one provides access to a different area of the application suite.



Before any work can be performed, the user must “log in” to the system with a valid password utilizing the “Log In/ Out” button. The options available pre-login are Print Documentation, Logs, and Quit Program.

The access privileges for the users account will determine what features will be available for access and the buttons for these features will then be enabled.

Ports

Provides access to the “Port Configuration” screen. From that screen up to ten (10) ports can be configured for access to attached systems via serial connection or Ethernet.

Start Monitoring

Launches the main online monitoring application (DCD) which starts continuous polling of all enabled ports and begins event monitoring, logging, and printing. If graphics have been created from earlier versions of S^3, then these will start and show status of devices etc.

Print Documentation

Provides access to the project configuration documentation features of the system. Complete documentation of port, point, and event configurations for all attached devices can be selected for printing on the Windows default printer.

Logs

Allows access to both the configuration logs and daily log files. The configuration logs track all configuration changes made to the system while the daily logs store events monitored online and are stored by day.

Preferences

Provides access to a wide range of global preferences including the ability to select the currently active project, second language support, sound library configuration, day/date/time options, screensaver options, and more.

Backups

Provides access to the project backup and restore utility. This automated utility allows a selected project to be backed up or restored. Built-in compression routines allow even large projects to be backed up.

Log In/Out

Provides access to the user "Log In" screen. Up to 64 unique password protected user accounts can be configured, each having different rights and privileges.

Passwords

Provides the system administrator with the tools for setting up and managing the individual user accounts. Individual users with valid accounts may also change their password from this utility.

OPC Server

Allows the user to browse the tag name database and view the OPC properties of tags, to activate or deactivate either individual tags or groups of tags, and to document (print) the server configuration.

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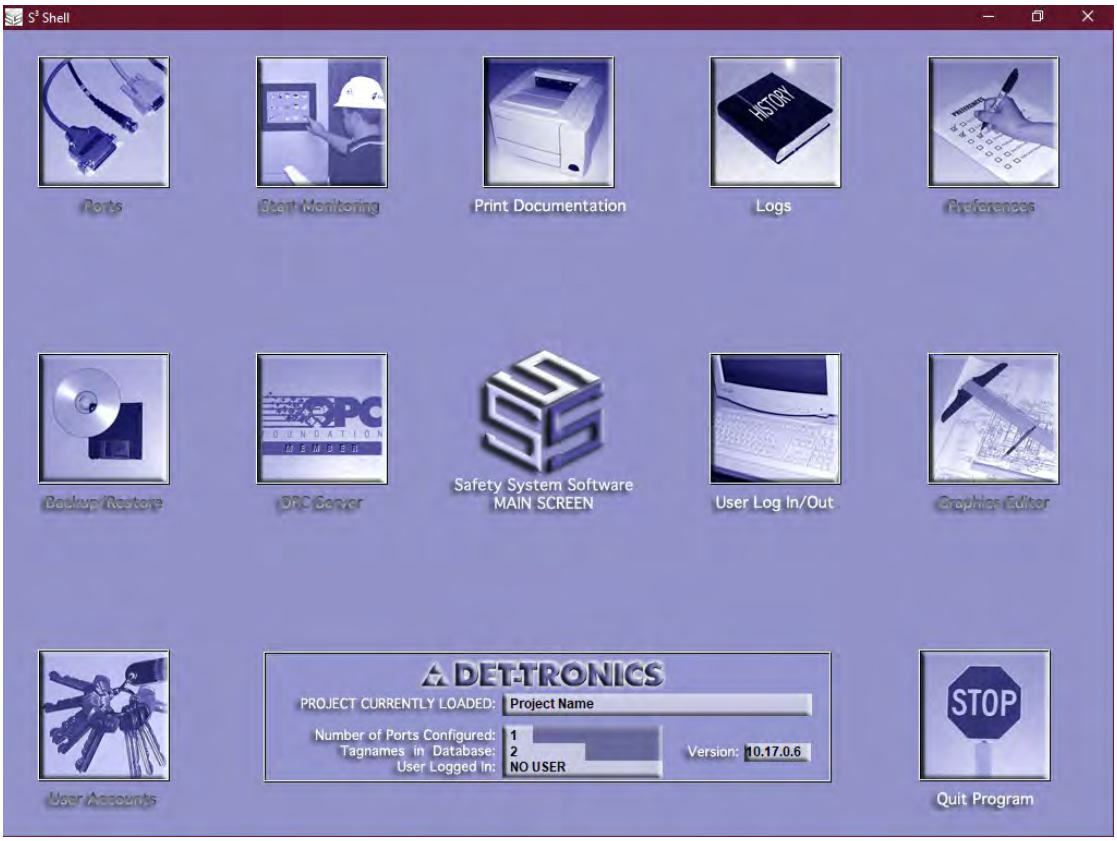
3 Ports

3.1 Basic Port Configuration

Clicking on the “Ports” button from the S³ Navigation screen of the S³ software brings up the “Port Configurations” dialog box.

NOTE

The user needs to be logged into S³ with the appropriate access level to be able to operate this button.

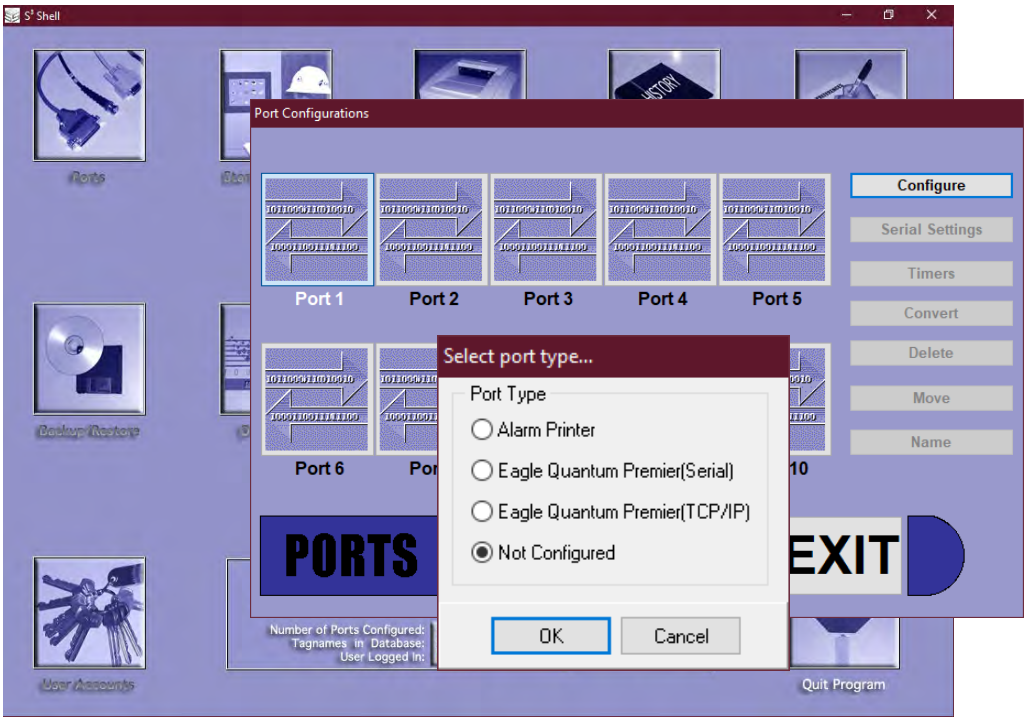


S³ offers ten ports, each of which can be configured to a specific type of system or device.

By default, when the Port Configurations dialog box first appears, Port 1 is selected.

Clicking the “Configure” button from the Port Configurations dialog box, the “Select port type” dialog box appears (this is true only when an unused port is selected).

The available choices are based on the S³ hardware key plugged into the computer, and only supported systems or devices are darkened.



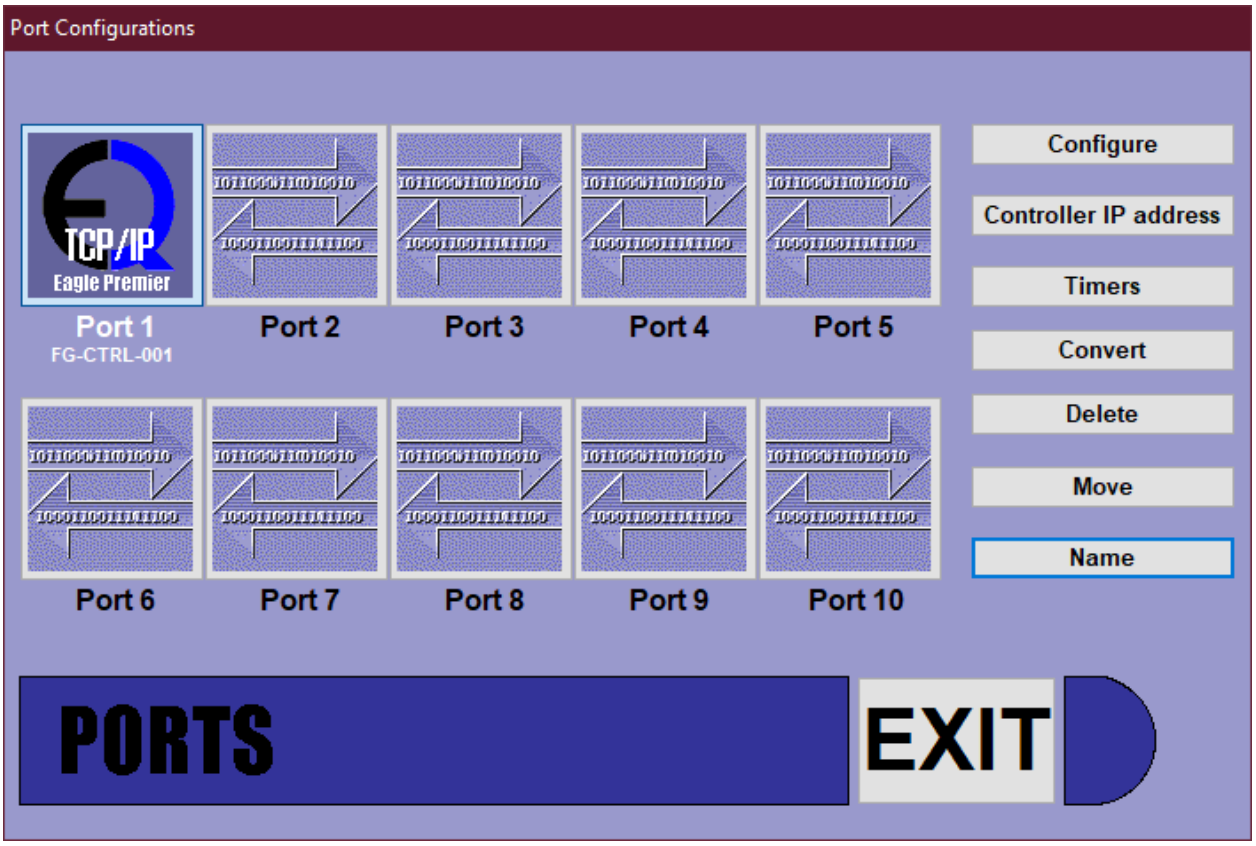
"Not Configured" is the default selection. Simply select the radio button for the type of port to be created and click "OK". This will open the main configuration screen for the selected port type. Clicking "Cancel" will return to the Port Configurations dialog box without any change. Selecting either of the Eagle Quantum options and clicking "OK" will open the LON overview screen as below.

If EXIT is pressed, the user will be returned to the PORTS screen.

NOTE

Refer to the appropriate section of this manual for details on specific port type configurations.

From the main configuration screen for the selected port type, choose “Exit” to return to the Port Configuration screen.

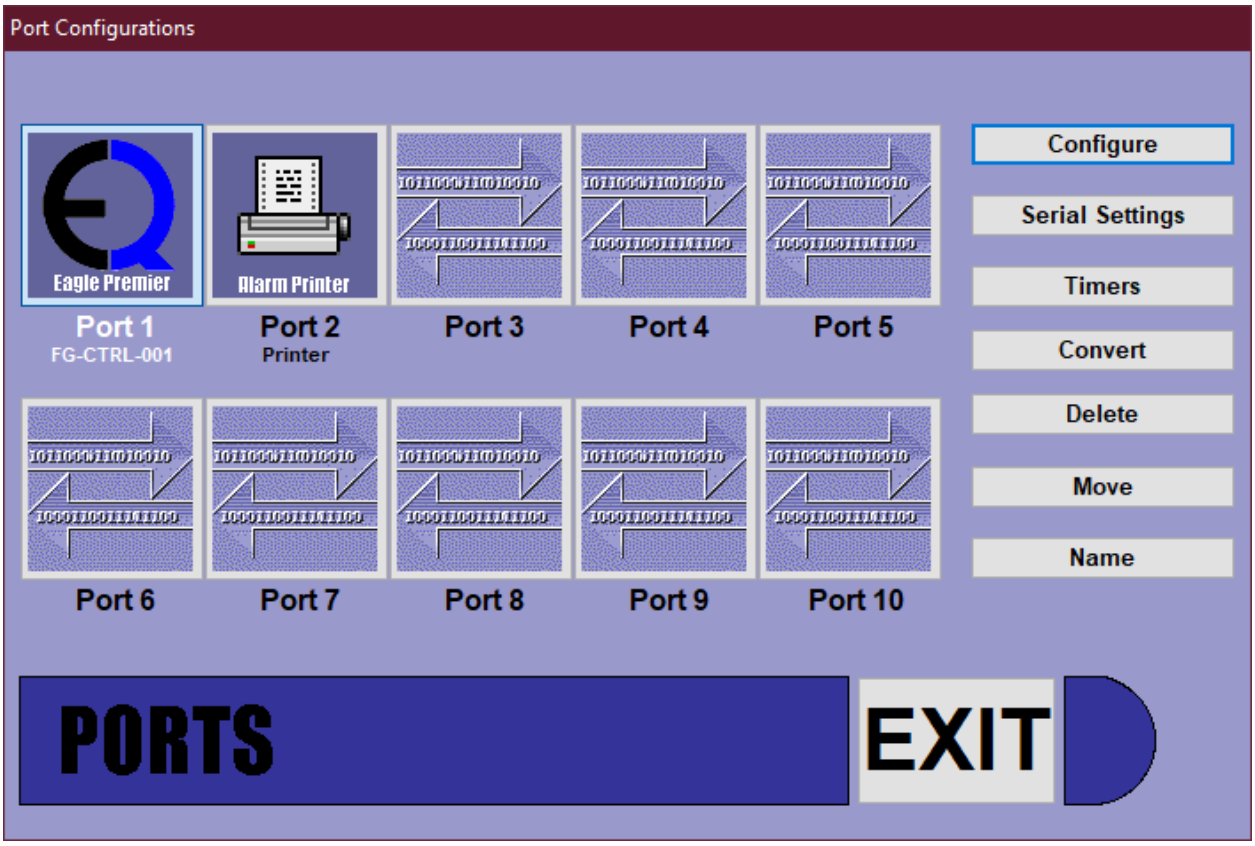


NOTE

Information on the latest S³ updates can be obtained through the Detector Electronics website at www.det-tronics.com.

3.1.1 Alarm Printer Port

The Alarm Printer Port allows the connection of a serial port printer to your computer to print alarm logs.



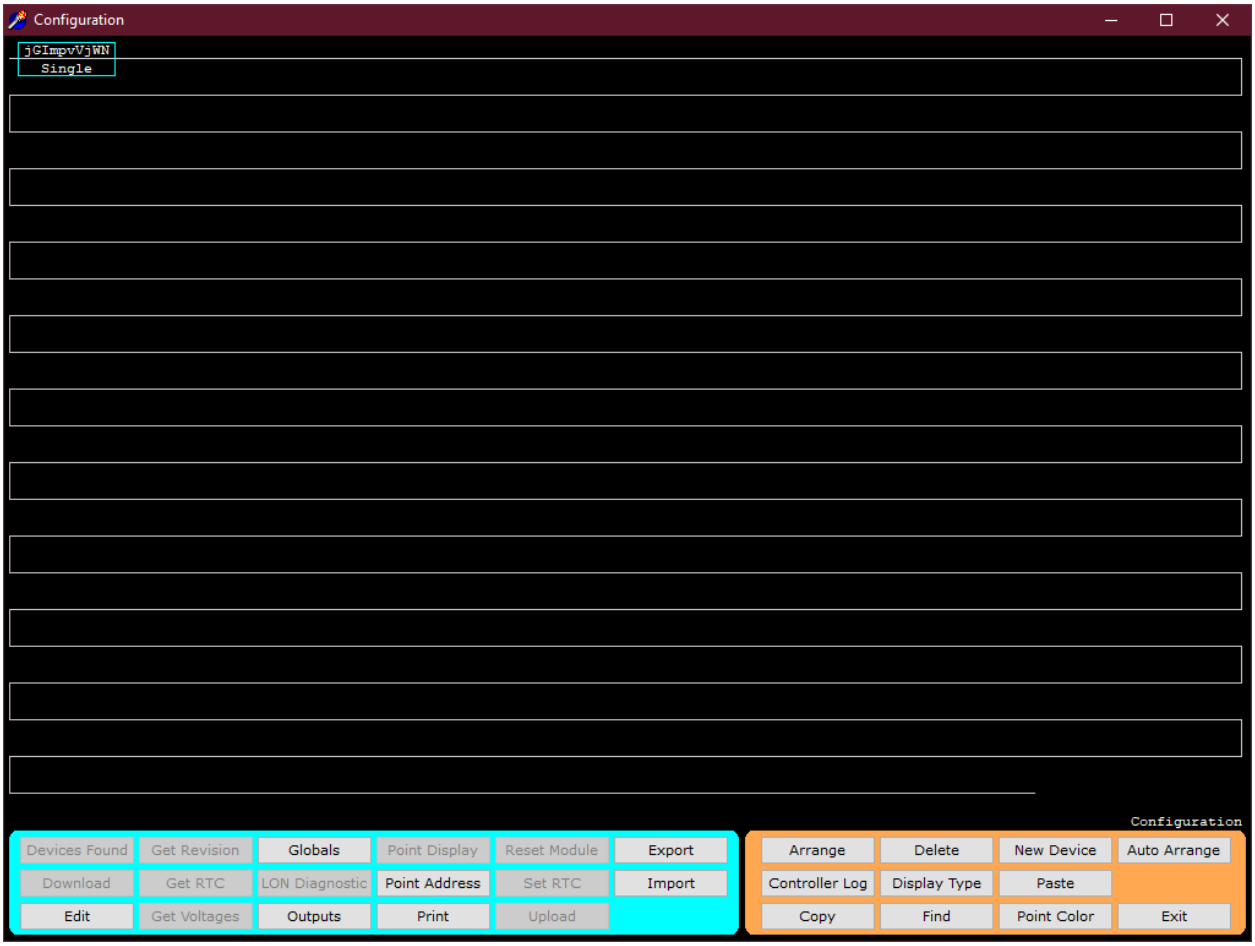
3.1.2 Serial Port Settings

Once the port type has been selected, the button face will change to match the selection. In addition, six buttons on the right-hand side of the window will be enabled. These buttons allow various parameters to be adjusted for any configured port.

Configuration of the device(s) attached to a port, data table reads, etc. are accessed by double-clicking on the port button, or selecting the “Configure” button.

3.1.2.1 LON Overview

This is a specialized diagnostic screen which displays a schematic representation of the addressable Eagle Quantum Premier.



New LON with a Controller with made up name “jGImpvVjWN”.

Press ‘EXIT’ to return to S^3 Shell.

Each device on the loop is represented by a rectangle containing the device tag and other information. The color of the rectangle represents the status of the device.

There are five possible conditions/statuses: Normal, Fault, Alarm, New Fault, or New Alarm.

Additional viewing options that can display more information are accessed through a group of buttons in the lower right of the display.

Acknowledge

Either silences an activated alarm while being in the LON overview screen or silences an activated alarm from the Port Diagnostics screen.

Display Type

Displays devices by device name.

Point Display

Clicking on this button or double clicking on the rectangle representing a particular point will display the “Point Display” for that unit. From the “Point Display”, all available status and diagnostic details on a node can be viewed.

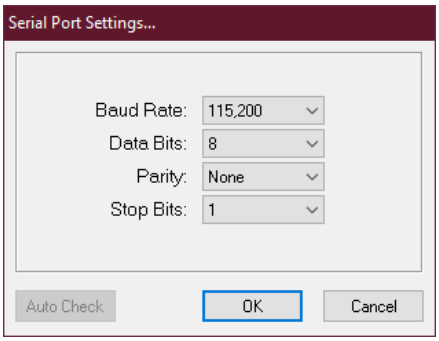
Exit

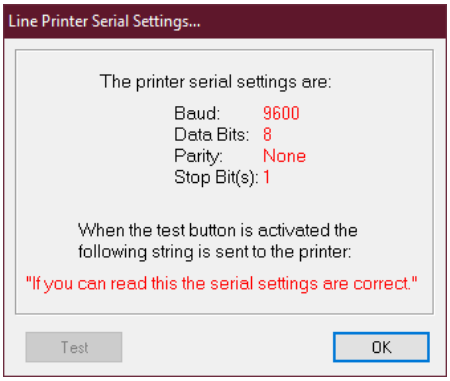
Takes the user out of the LON overview screen.

Physical serial port configuration parameters like baud rate, the number of data bits, etc., can be accessed using the “Serial Settings” button. This will open a dialog box allowing the adjustment of the port parameters. This button changes to "Controller IP address" if Port is configured as TCP/IP.

The port parameters can be set manually from the pull-down menus.

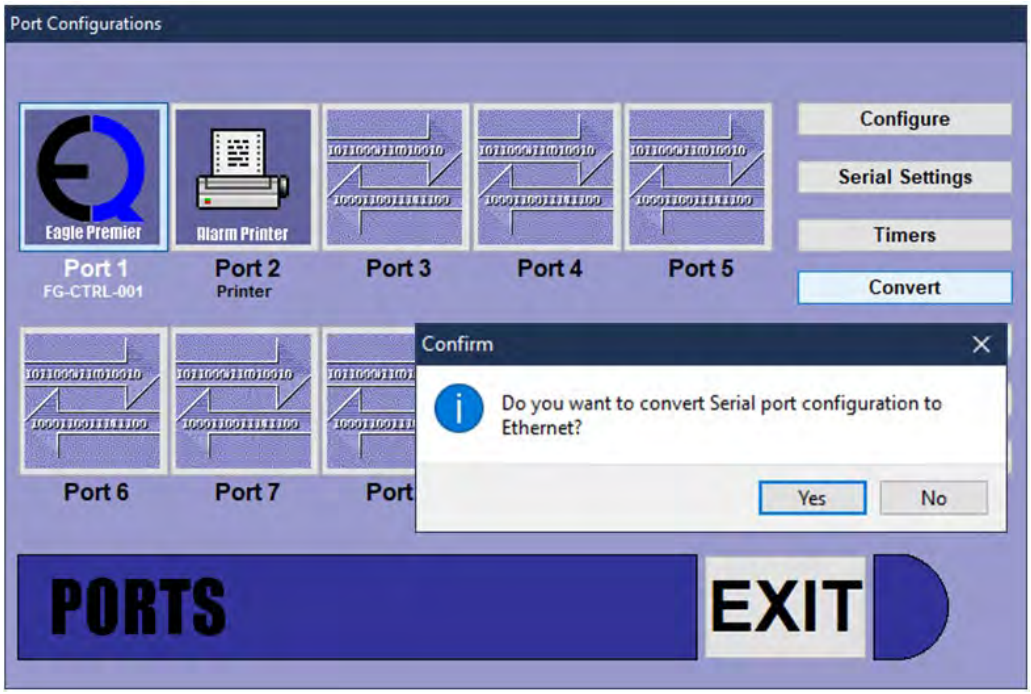
Selecting the “Auto Check” button will cause the software to cycle through all combinations until it can connect. It will then display the successful settings.

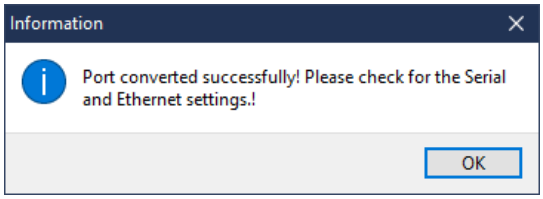




3.1.2.2 Converting Serial Ports to Ethernet Ports

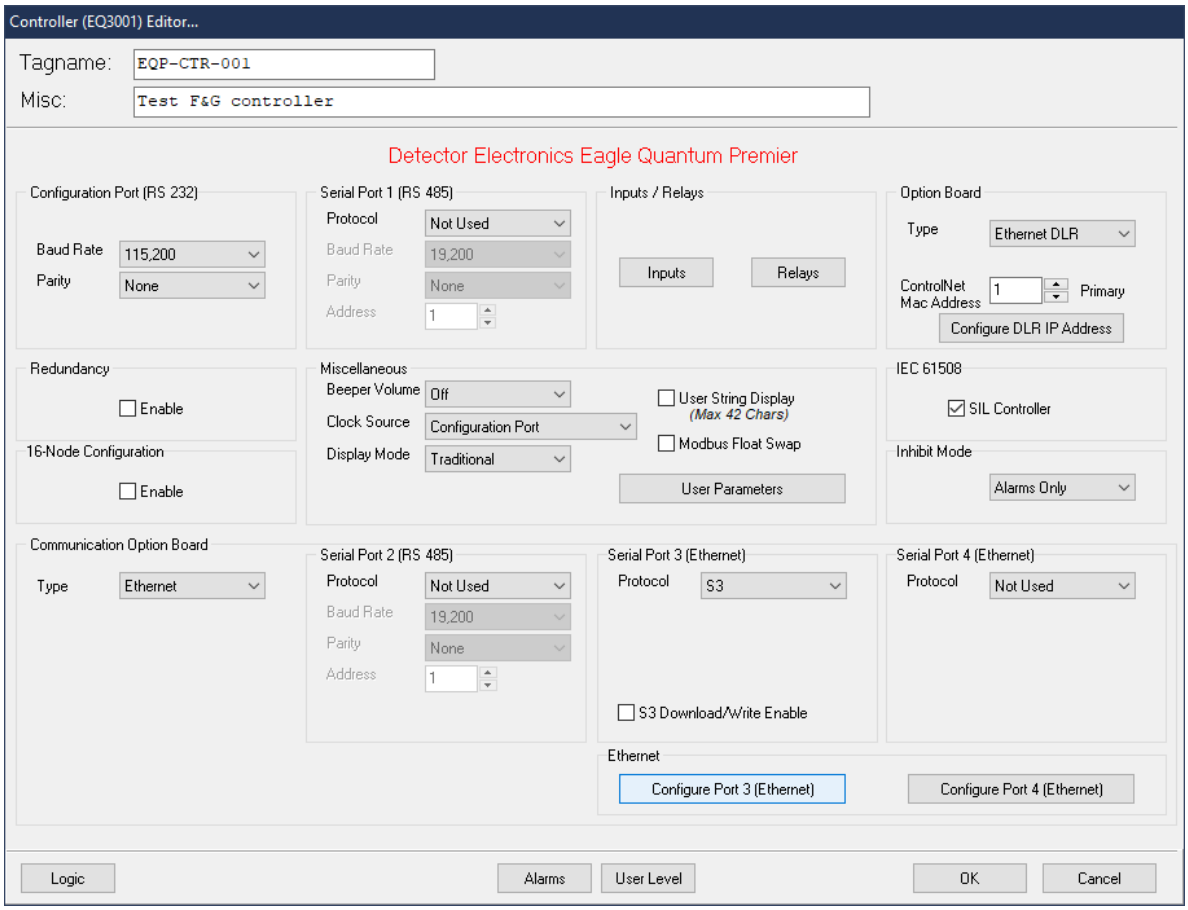
Pressing the “Convert” button will open a prompt (as below) to confirm that you want to convert the S3 communications link from the serial port to Ethernet (or vice versa).





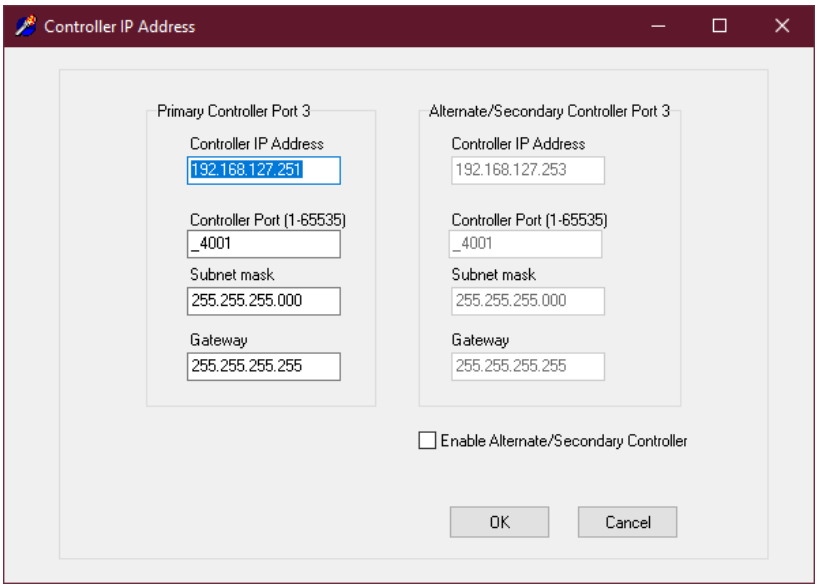
The dialog at left appears when the user has confirmed the action to convert the serial port to Ethernet port (3).

The user should then go to the LON Overview Screen and select the controller (or double-click) to open the controller configuration screen.

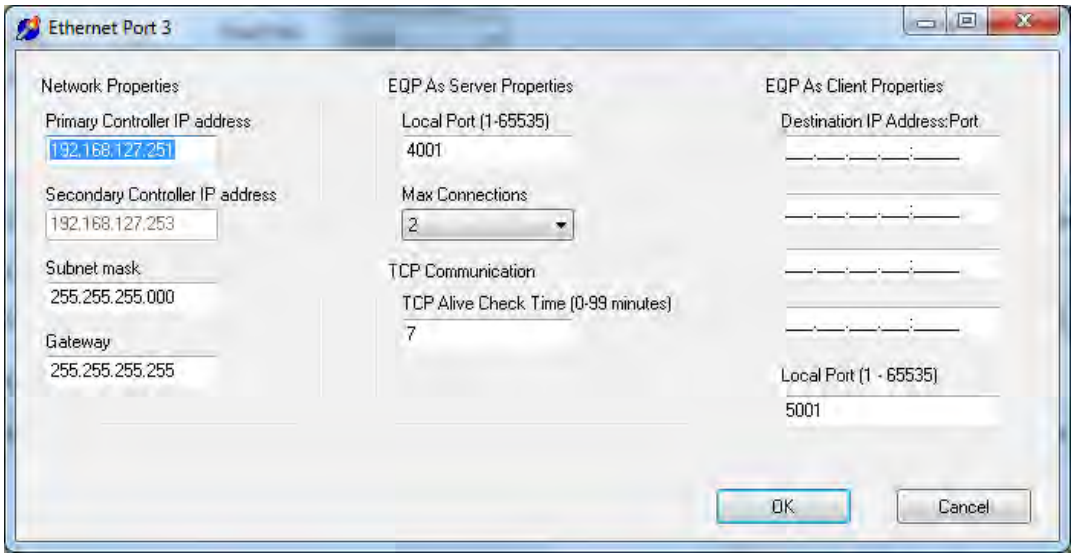


Then select “Configure Port 3 Ethernet”, which will open the screen below.

The Controller IP Address Configuration Screen allows the user to set the IP Address, Controller Port, Subnet mask and Gateway. These values must match the Ethernet Port 3 settings that are saved in the controller. S^3 may be set up with a second controller, where if communication is not established with the primary controller, S^3 will attempt to connect with a second controller. The second controller may be part of a redundant pair or a simplex alternate controller.



Insert the network assigned IP address(es) per the ports that are utilized, along with the subnet mask and Gateway IP address.



EQP As a Server (S³ or Modbus Slave)

The default value for the local port is 4001. When a client is configured to connect with an EQP Controller, the Local Port value is used as part of the address definition.

When the EQP Controller is used as a Server, up to 4 clients may be connected. Selecting a value from the Max Connections drop-down limits how many clients may be connected.

The TCP Alive Check Time is the amount of idle time before the TCP connection is closed. If 0 is selected, the TCP connection will not close.

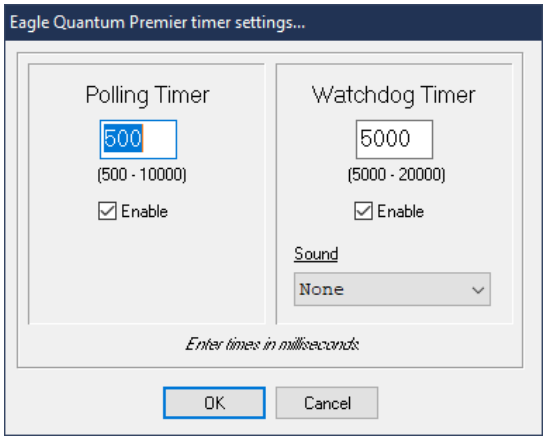
EQP As a Client (Modbus Master)

When the EQP Controller is used as a Client, a message packet may be sent to up to 4 destinations. The Destination IP Address includes an entry for a port number, which is part of the complete destination address. The default value for the local port is 5001.

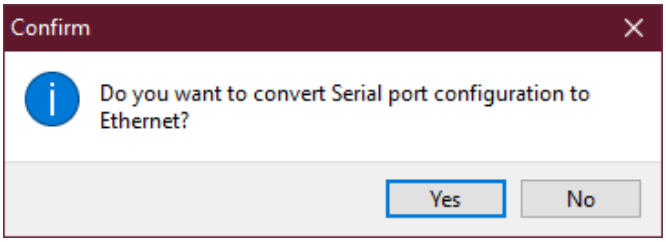
The “Timers” button will open a dialog box allowing the “Polling” and “Watchdog” timers for the port to be set. There are also checkboxes to enable each of these timers.

The Polling Timer determines how quickly the port will poll the attached slave.

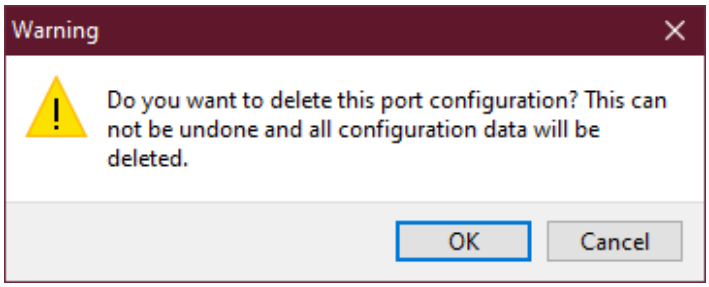
The Watchdog Timer determines how long to wait for a response from the slave before logging a watchdog fault. A sound can be tied to this fault from a pulldown menu.



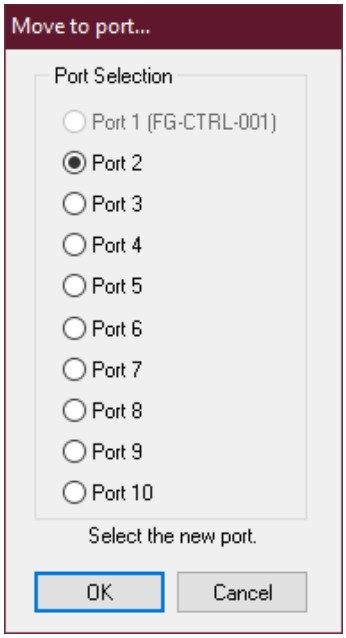
This button will convert the selected Port EQP type from Serial to Ethernet or vise-versa and maintain existing configuration data for that port.



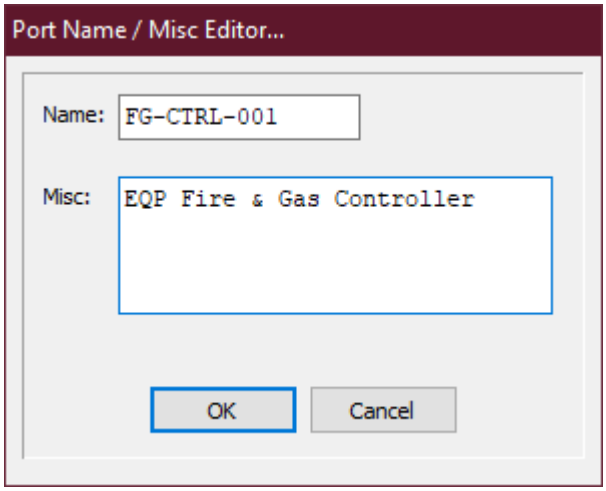
The “Delete” button allows the removal of a port from the system configuration. **Port deletions are final.** There is no “undo”, so use with care. Upon pressing "Delete" a second screen will ask are you sure, for confirmation before deleting this port.



The “Move” button allows a fully configured port to be relocated to a different port while preserving its configuration.

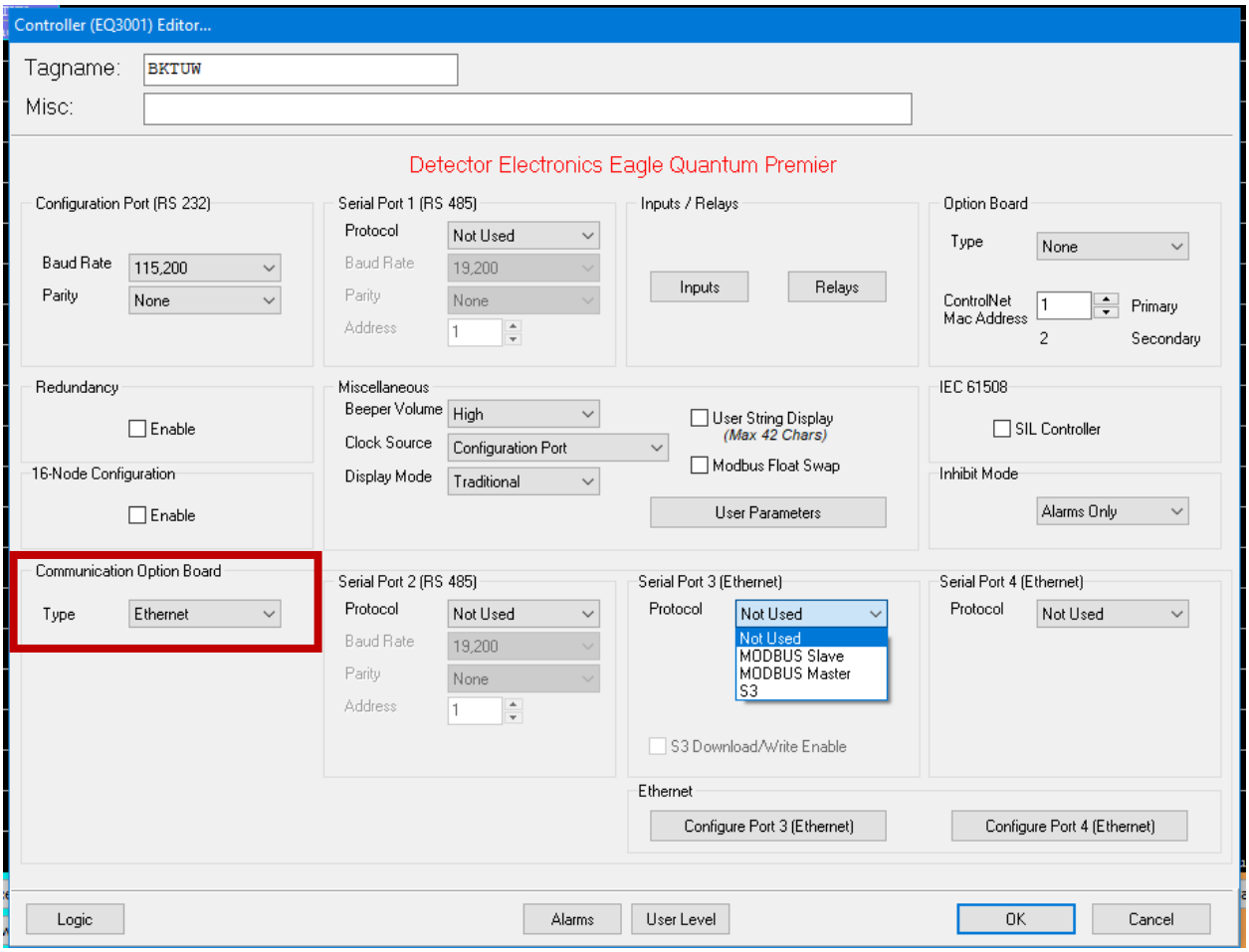


The “Name” button allows a name to be associated with a port. This name will then show in the printed documentation for the port. It has no other purpose except for the printed documentation. The PORT name will appear on the PORT screen under the port number.



3.1.3 Working with Ethernet

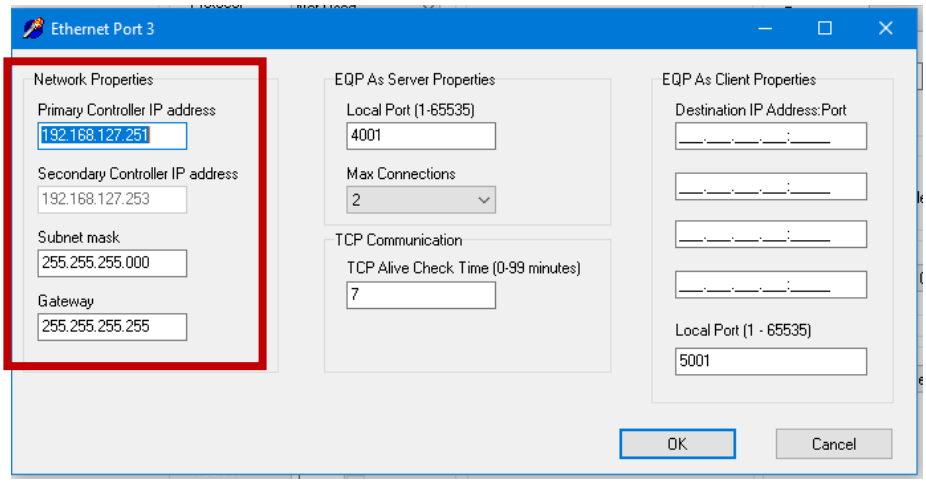
When the EQP is equipped with Ethernet, the Communications Option Board must be set to Type “Ethernet”. Serial ports 3 and 4 will be available to configure the Ethernet.



Port 3 can be a Modbus port or an S3 configuration port.

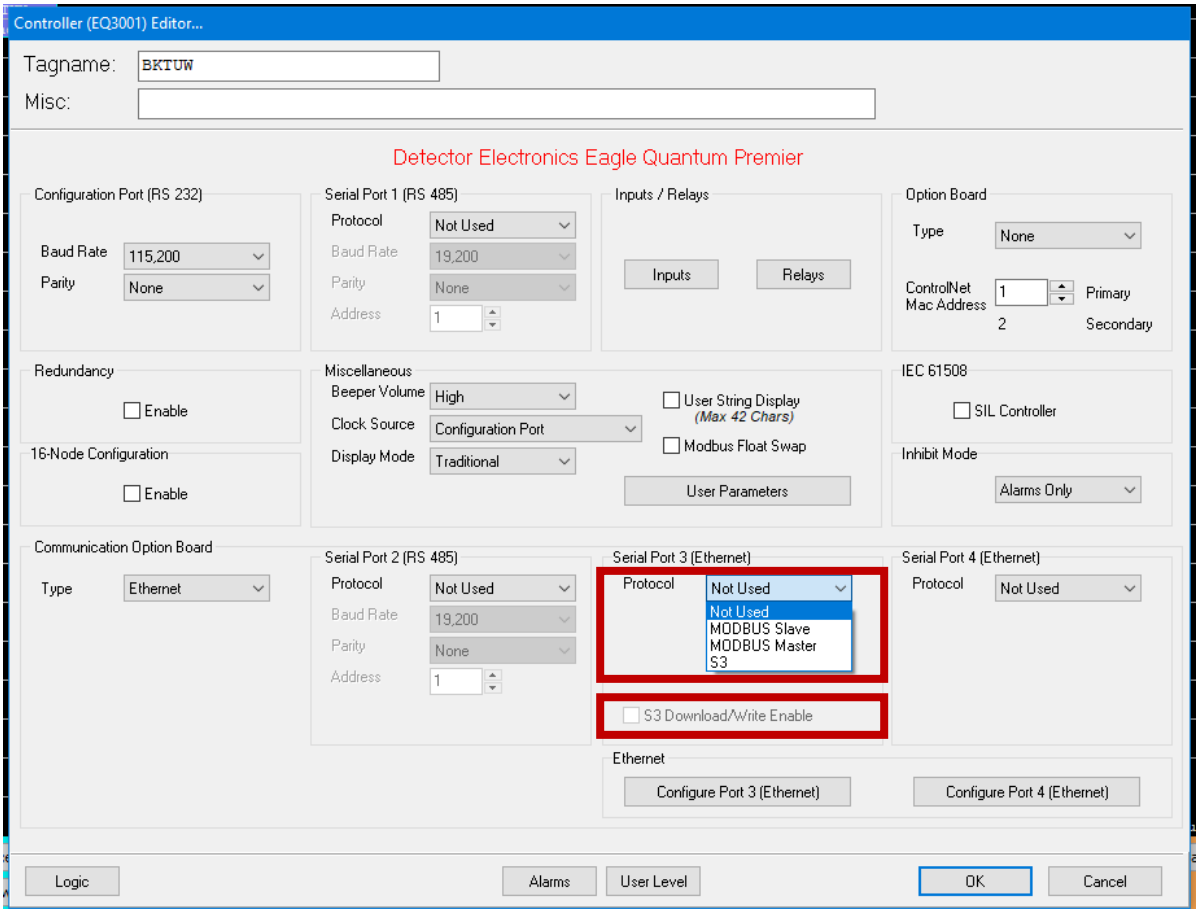
3.1.3.1 Port 3 as an S3 Configuration Port

Selecting “S3” in the Protocol drop-down box enables the port to function as another S3 configuration port. The RS232 Configuration Port will still be functional. For security purposes the port will not allow downloads unless the “Enter” button is press on the faceplate. The download must begin within 5 seconds of the “Enter” button press. The “S3 Download/Write enable” allows the user to download without a button press but opens the port for malicious downloads. The controllers IP address, subnet mask and Gateway can be set using the “Configure Port 3 (Ethernet)” button which will display the following screen.



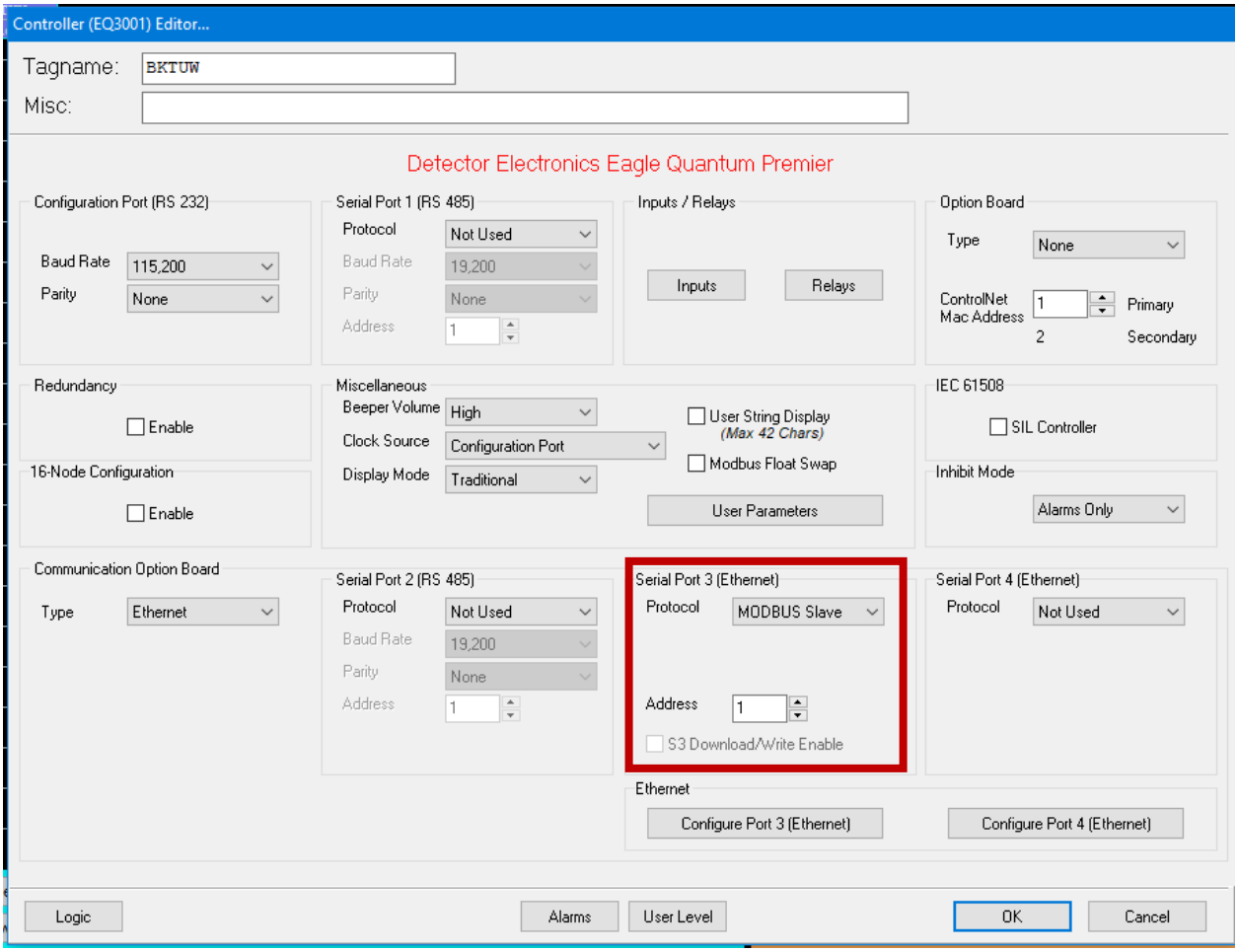
NOTE

All IP address must contain 3 numbers for each octet. Therefore, if 3 is the intended octet, then 003 must be entered.



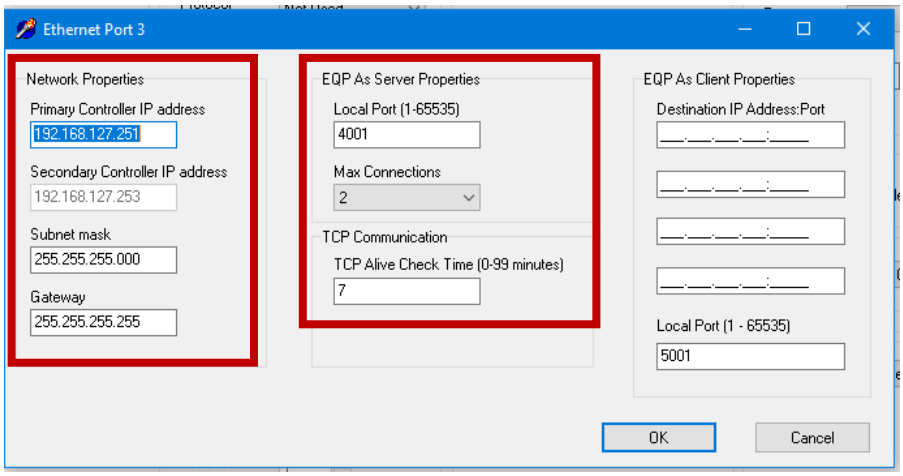
3.1.3.2 Port 3 or Port 4 as a Modbus Slave / Server Port

Select “MODBUS Slave” in the Protocol drop-down box to enable to MODBUS slave functionality. When “MODBUS Slave” is selected a text box is displayed for entering the Modbus Address.



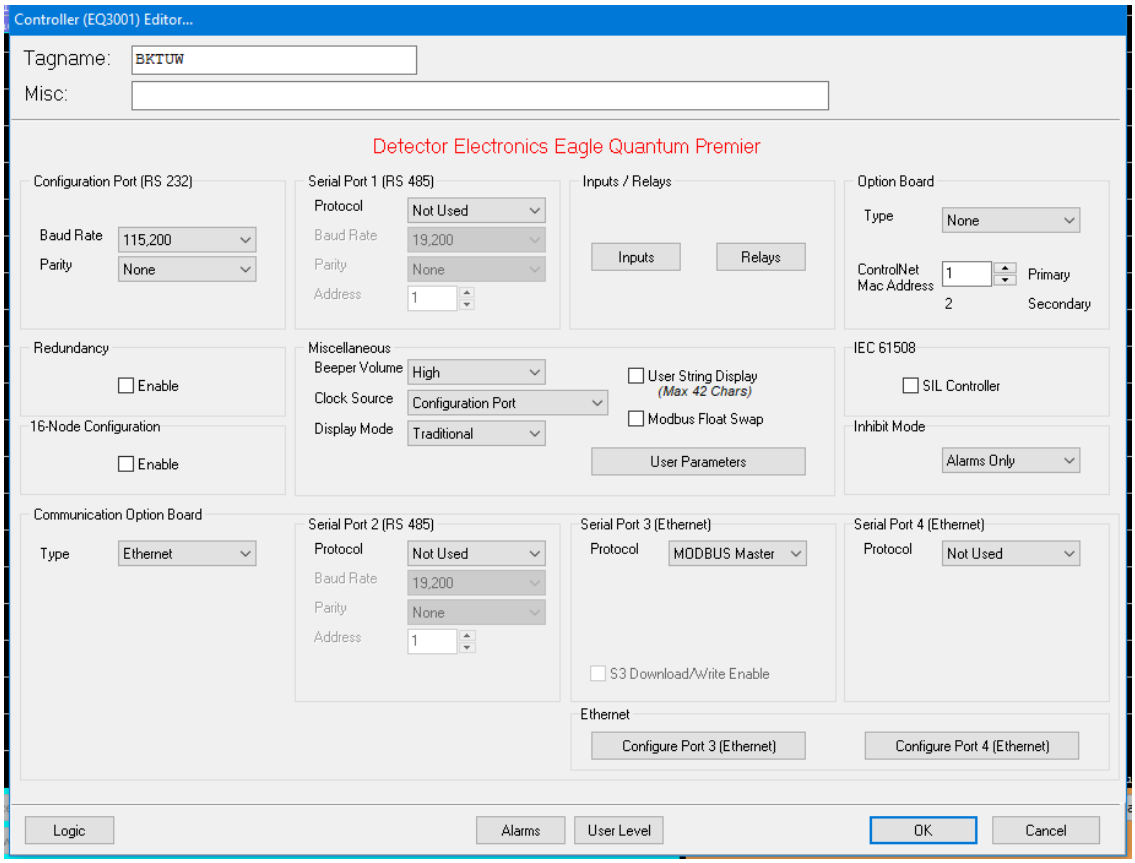
Pressing the “configure Port 3/4 (Ethernet)” button displays the following dialog box to enter the remaining Modbus port settings. Enter the IP network properties for the specific Modbus network. Enter the local port to match the Master/Client’s Local Port (502 is commonly used if it is not specified in the Master/Client). The “Max Connection” dropdown text box allow up to 4 Masters/Clients to connect this EQP port.

The “TCP Communications” text box determines how long the port will wait for the network to respond to the TCP Alive message response from the client.



3.1.3.3 Port 3 or Port 4 as a Modbus Master / Client Port

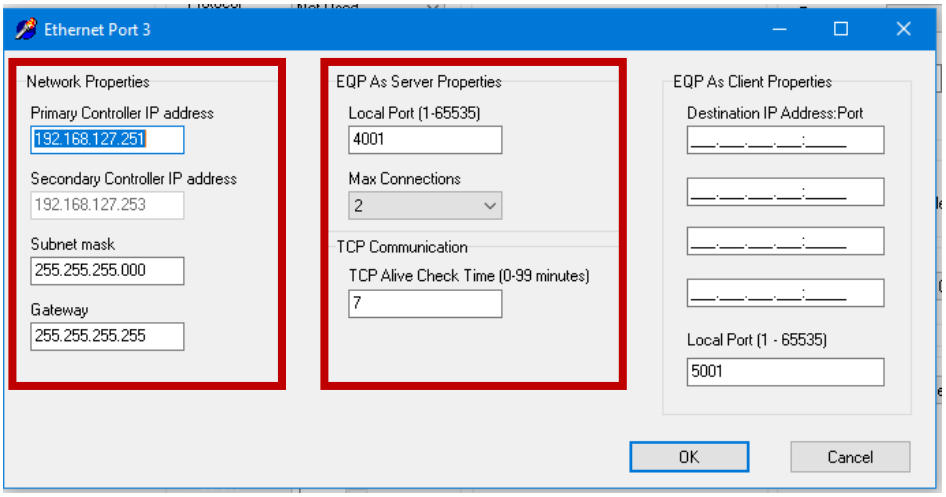
Select “MODBUS Master” in the Protocol drop-down box to enable to MODBUS Master functionality.



Pressing the “Configure Port 3/4 (Ethernet)” button displays the following dialog box to enter the remaining Modbus port settings. Enter the IP network properties for the specific Modbus network. Enter the local port to match the Master/Client’s Local Port (502 is commonly used if it is not specified in the Master/Client). The EQP master/client can communicate with up to 4 Slave/Servers to connect this EQP port. Enter the Destination IP Address and port (Modbus address) in the EQP As Client Properties.

NOTE

Additional S3 code will be require in logic to specify the registers and types to be read or written from/to the Slave/Servers. In addition, a MODBUS table will need to be created in the Logic Editor.



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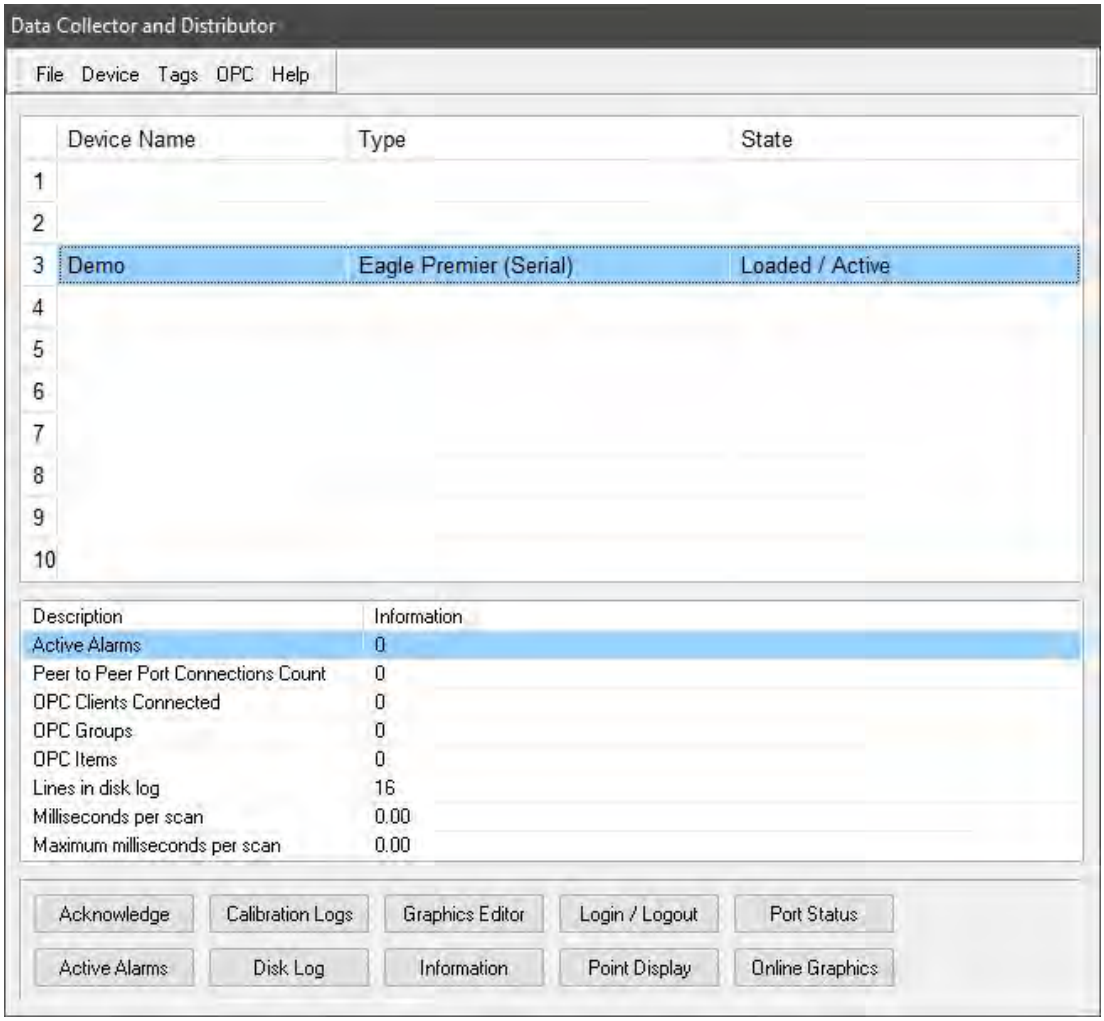
4 Start Monitoring

4.1 Online Operation - DCD

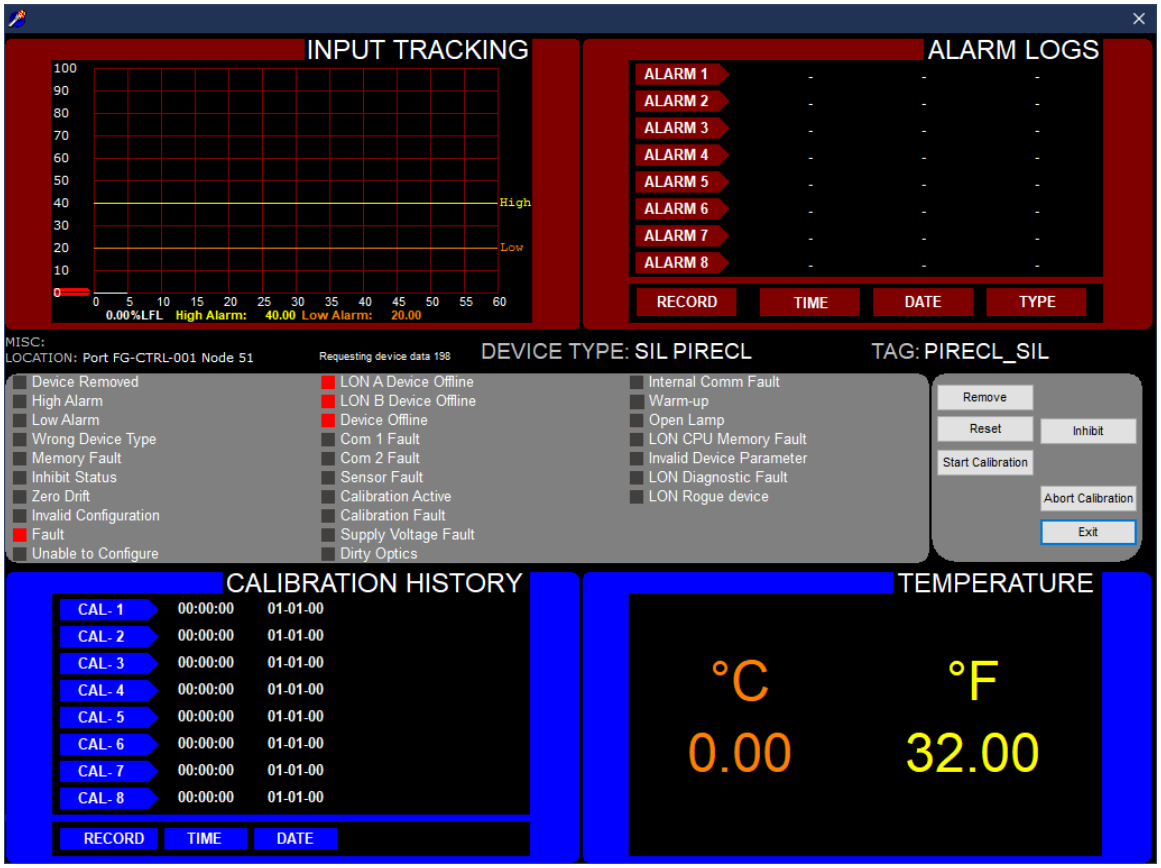
The “Start Monitoring” button launches the DCD, which allows the user to access “Online Mode”. Online Mode provides the operator with continuously updated information about the attached systems.



This DCD dialog shows the user detailed information about the TAG object. Each type of device (digital inputs, analog inputs, fire detectors, gas detectors, etc.) has a different type of point display, tailored to the type and amount of data available for that specific device.

4.1.1 Point Display

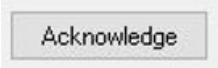
Pressing the 'Point Display' button opens the LON overview as below. The user can then select a node and click on 'Point Display'.



The sample point display above is for an addressable combustible gas detector.

4.1.2 Acknowledge

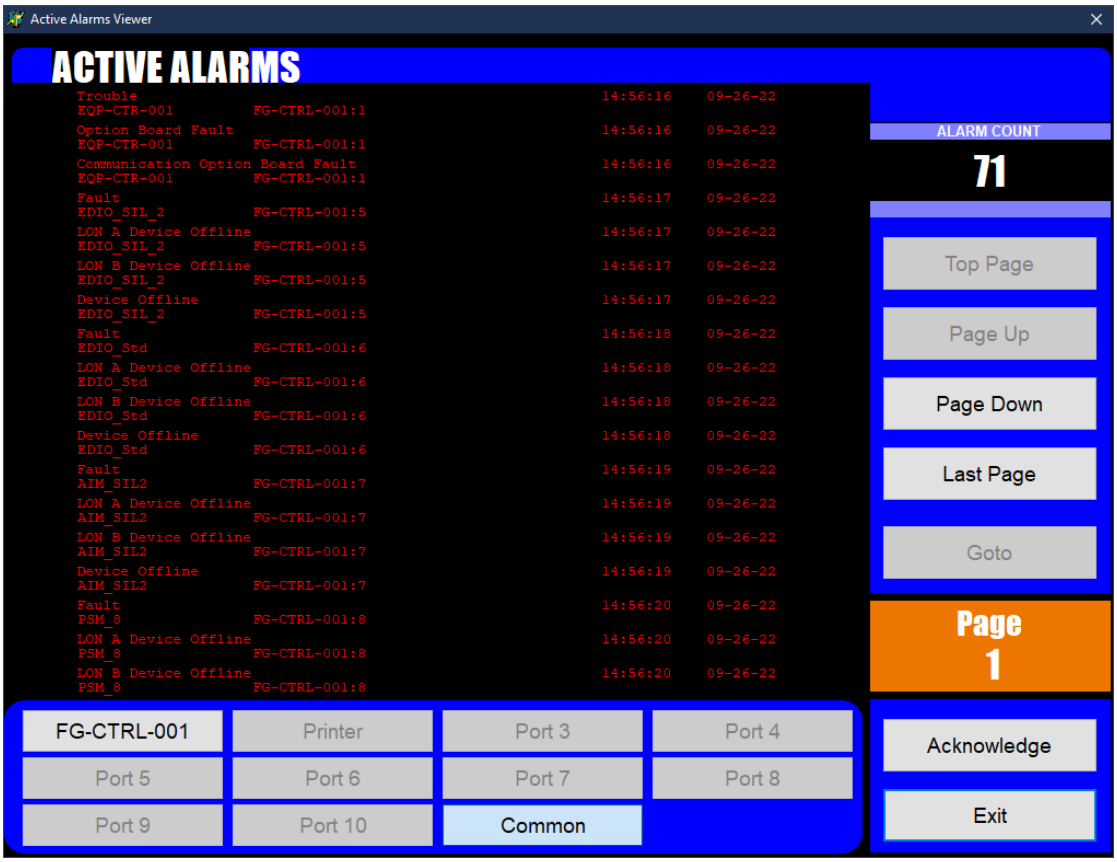
Silences audible alarms, causes all TAG objects in a “New Alarm” state on the graphics to go to their “Acknowledged Alarm” state, and can also be configured to activate a user-programmed button.



4.1.3 Active Alarms

Opens the “Active Alarms” screen that shows any “out-of-tolerance” conditions. Using the buttons at the bottom of the screen, these conditions can be sorted by communication port or viewed all together.

In the example below, there is one active port, Port 1 (named FG-CTRL-001). On the right side of the screen are self-explanatory buttons for navigating the list, none are shown highlighted due to the shortness of the list in the example.



There is a counter at the top right indicating the current number of active alarms. In the lower right, there is a page indicator and buttons for acknowledging alarms or exiting the display.

4.1.4 Disk Log

Opens the “Alarm History” screen and displays the current days log. This daily log shows date and time stamped events for a 24-hour period.

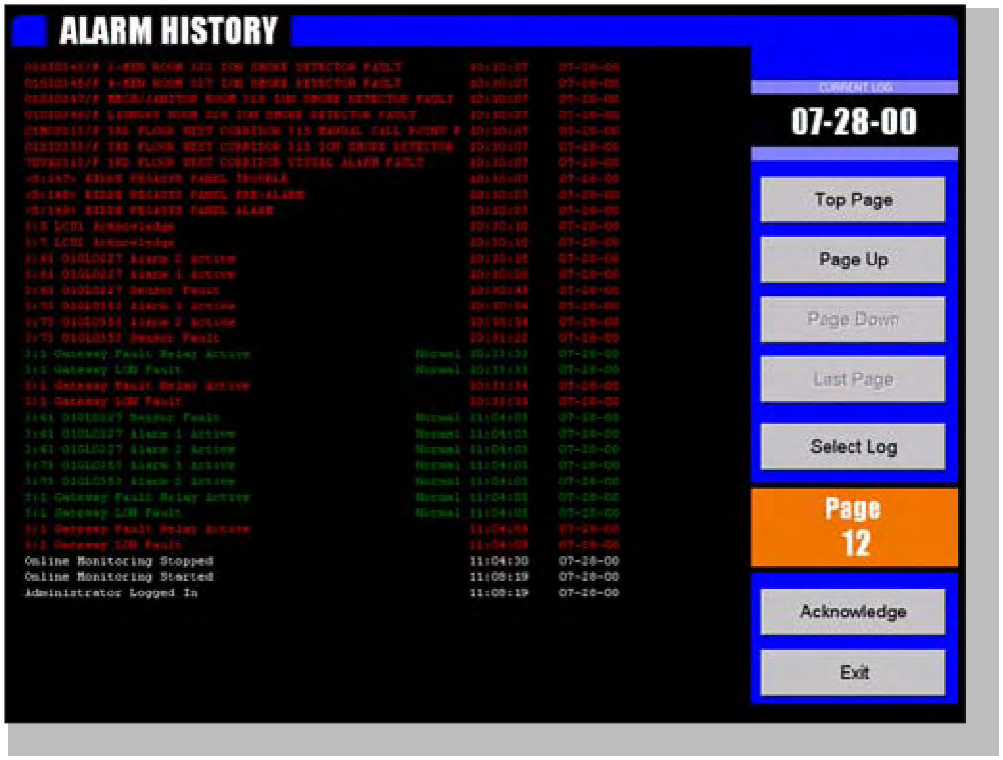
It has two main areas, the historical display in the center and the navigation buttons running down the right side of the screen. In addition to viewing the current days log, the user can use the “Select Log” button to choose a log from another day.

The date of the log being displayed is shown at the top right of the display.

An acknowledge button is provided to acknowledge alarms without leaving the Alarm History screen.

4.1.5 Log In / Log Out

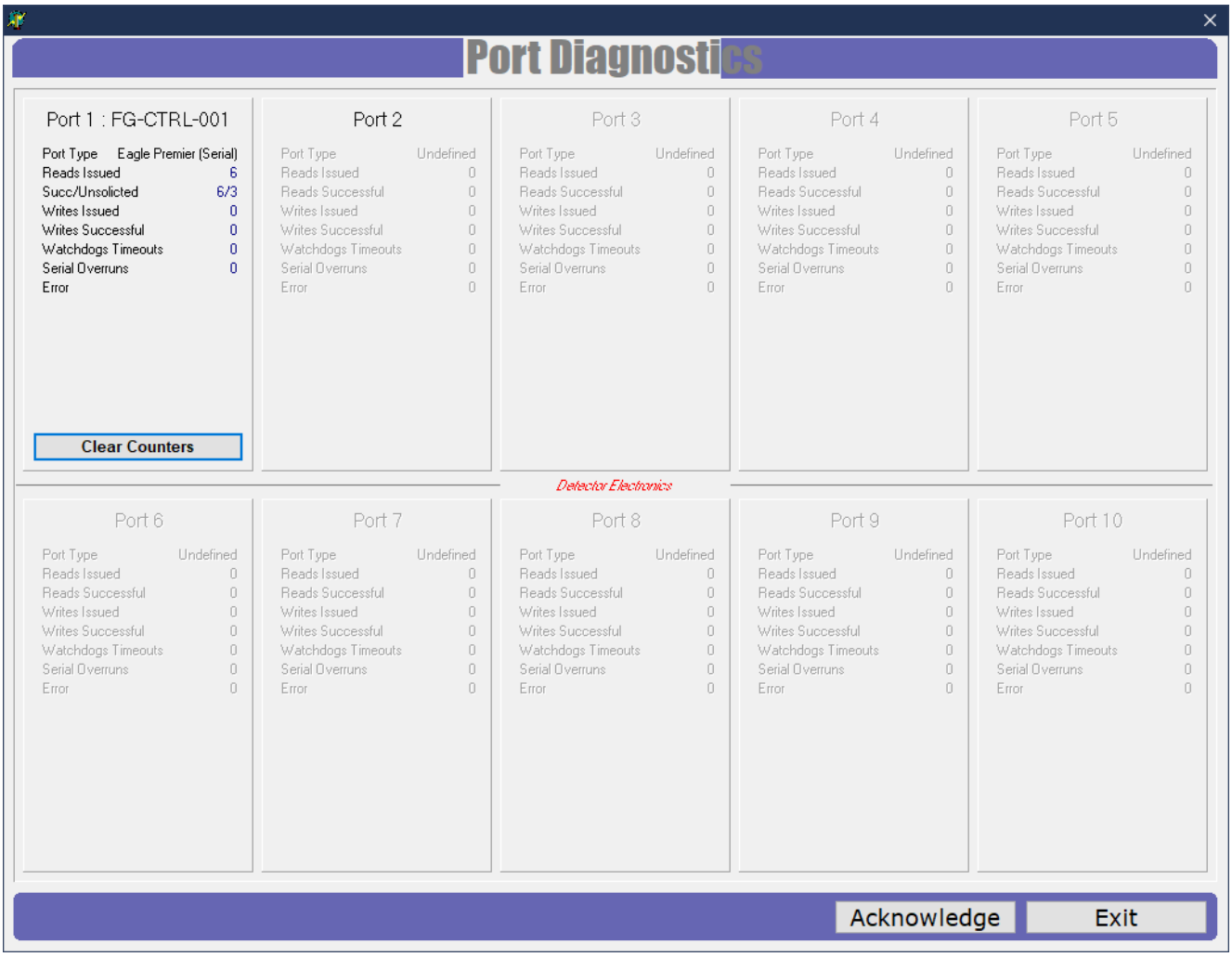
Up to 64 unique users can be configured, each having their own access privileges. This feature allows the current user to “log out”, or a new user to “log in” to the system. This action will be recorded in the Disk Log.



4.1.6 Port Status

Opens the “Port Diagnostics” screen which displays the status of all ten communication ports.

Dynamic counters display information on data reads issued and successful, writes issued and successful, and failures in communication between S^3 and the attached systems.



Each port type has buttons for accessing applicable features. These include a way to display the ports data tables, a LON Overview for Eagle Premier type ports, and a way to clear the counters.

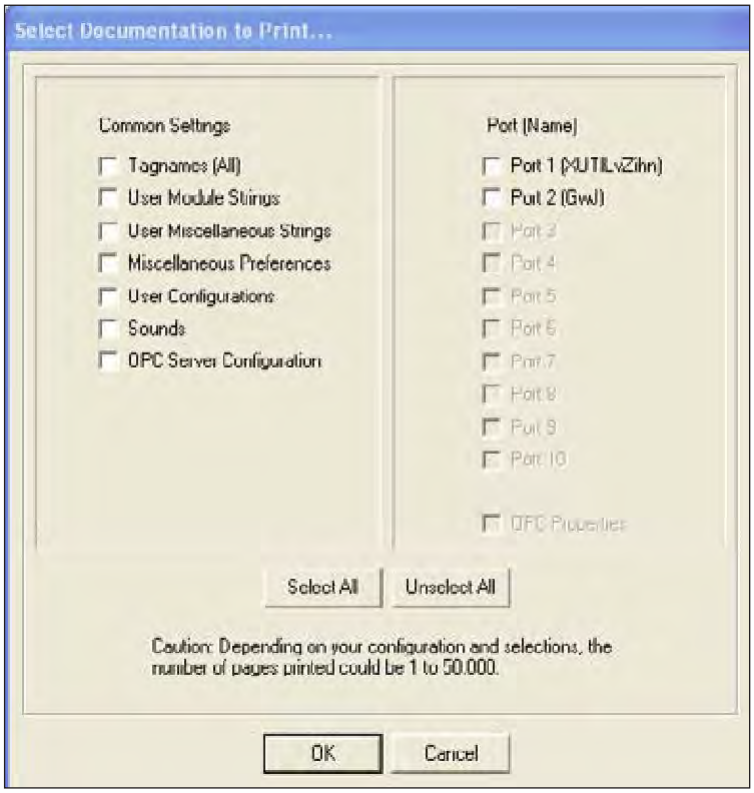
The “Printer” port type allows for printer control and maintenance. A “soft reset” of the printer can be performed as well as setting the top of form and initiating form feeds. In addition, the printer event queue can be cleared.

5 Printing

5.1 Overview of Features

Using the Windows default local or network printer, S^3 can be print comprehensive documentation of port, point, and event configurations for all attached devices.

Selecting the “Print Documentation” button from the main screen will open a dialog box which allows the user to configure which portions of the documentation to print.

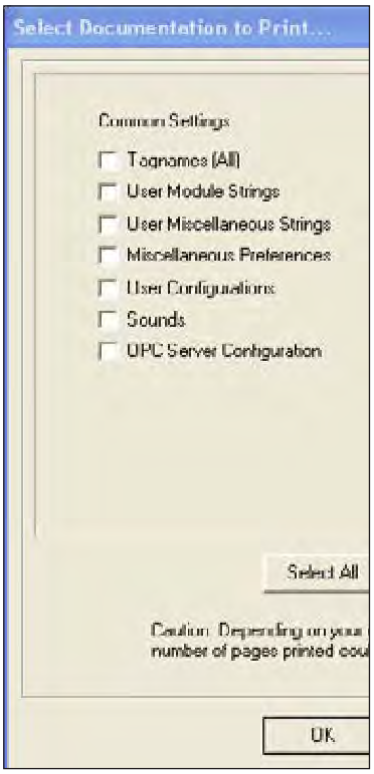


Choices are made using check boxes for both the type of documentation and the ports to be included. Using the select all button will provide total documentation of the system configuration. This could easily reach into hundreds of pages of printed documentation depending on the number of ports configured and their point configurations.

5.2 Filtering Data to be Printed

5.2.1 Tagnames (All)

This selection prints a list of all tagnames used in the system.



5.2.2 User Module Strings

This selection prints the factory default and user configured "event descriptions" associated with the individual points.

5.2.3 User Miscellaneous Strings

This selection prints the factory default and user configured substitutes for the descriptions of buttons and text used by the system in the "Online" mode. Examples of miscellaneous strings include the navigation button descriptions, function key list, and user configured buttons.

5.2.4 Miscellaneous Preferences

This selection prints certain configuration parameters in the graphic editor and online applications. In the graphic editor this includes the graphic grid spacing and polygon tool settings. In the online application, it includes whether the acknowledge button silences custom sounds first, how many days alarm logs will be kept, whether the alternate language dictionary is configured to be used, and whether to use a 12-hour or 24-hour clock.

5.2.5 User Configuration

S^3 supports up to sixty-four (64) unique user accounts, this selection prints all user account information except passwords. This includes whether the user can access the configuration programs, initiate send commands to attached devices, access port diagnostics and quit online operations.

5.2.6 Sounds

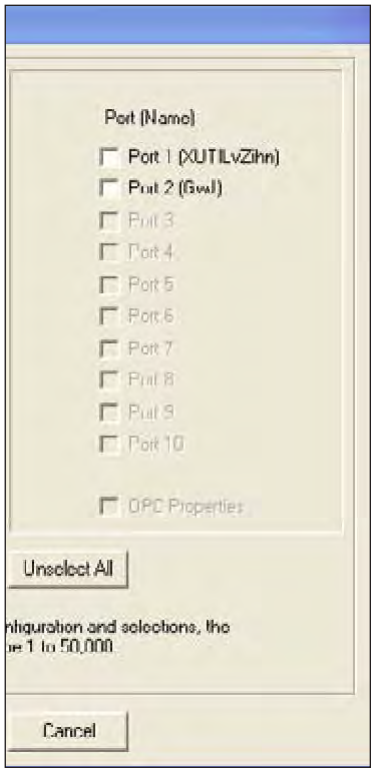
This selection prints a list of the custom sound library. Up to 64 custom sounds can be recorded and used by the system.

5.2.7 OPC Server Configuration

Prints a list of "Active" tags available to OPC Clients.

5.3 Selecting Ports to Document

5.3.1 Port 1 - 10



S^3 supports up to ten ports. Each port is a physical serial port.

In the example to the right, ports one and two are configured and therefore selectable. The ports not configured are grayed out.

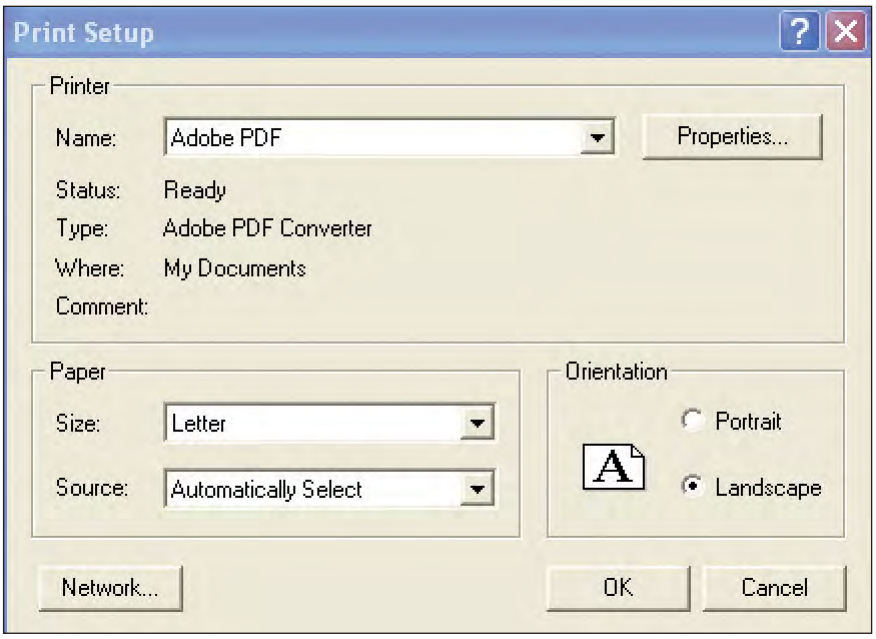
Each selected port will have its documentation printed.

Port documentation includes all aspects of the configuration including the communication parameters and any configured points, events, alarms, setpoints, custom event names, etc. Each configured point has one page of printed configuration data.

Once all the selections for the documentation and ports to print have been made, select the “OK” button to access the “Print Setup” dialog box for the Windows default printer and continue the printing process.

Once the print configuration is set, selecting OK will display the “Print Setup” dialog box for the Windows default printer.

Depending on the default printer installed the dialog box and choices available will vary. In the example below, the ports are being directed to print to pdf.



NOTE

The event and alarm printer can be configured as the Windows default printer and used for documentation. However, due to the volume of paper and printer speed, it is not recommended.

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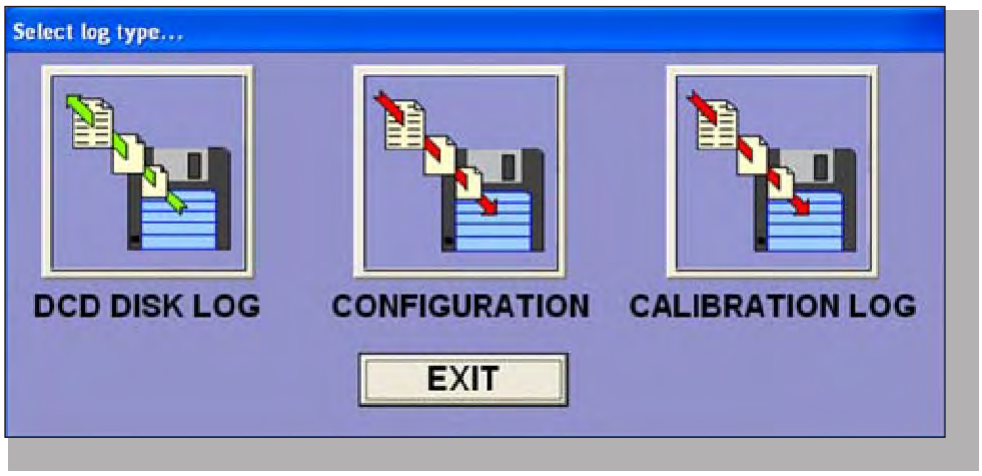
6 Logs

6.1 Overview of Features

S^3 maintains three different types of logs: Disk, Configuration, and Calibration. All can be viewed and printed from this utility.

Selecting the “Logs” button will display the “Select Log Type” window to choose which type of logs are to be accessed.



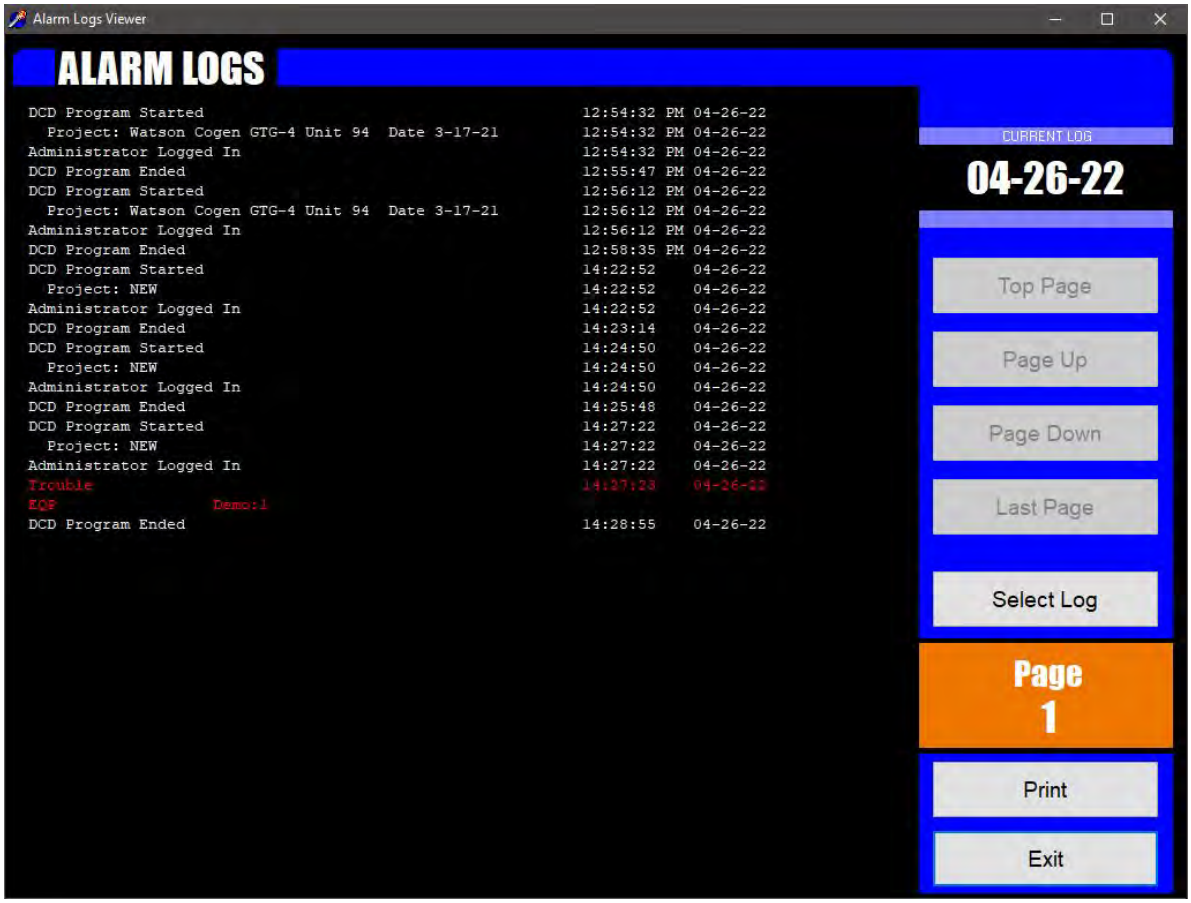
DCD Disk Logs are a chronological list of alarms and events that have occurred during a 24-hour period while the DCD was online. Each log runs from midnight to midnight and each day’s log is stored by date.

Configuration logs track many configuration changes made to the system, but do not track changes made to channel supervision, static logic functions, or descriptive changes, etc.

Calibration logs are the collation of data from queries of the distributed calibration histories of field devices on the network. The user determines what port, what type of device, a time frame and S^3 will retrieve the data from the field devices and put it into a report. The daily disk, configuration log and any previous logs from this utility can be viewed or printed.

6.2 Alarm Logs (DCD Disk Log)

Below is a sample alarm log. Running down the right-hand side is the log name (which is the date), navigation buttons, a button to select a different log for viewing, the page indicator for the currently viewed log, a print button, and an exit button.



The purpose for the alarm log is to provide a chronological history of events related to the system. These recorded “events” can indicate alarms, diagnostic information, or just out of tolerance conditions as defined by the user.

During the detailed port configuration process events are configured and their destinations determined. One of these destinations is the daily alarm or disk log.

Events can appear in any of four colors:

- Red = Alarm
- Yellow = Fault
- Green = Alarm/Fault; Return to normal
- White = Non-critical event

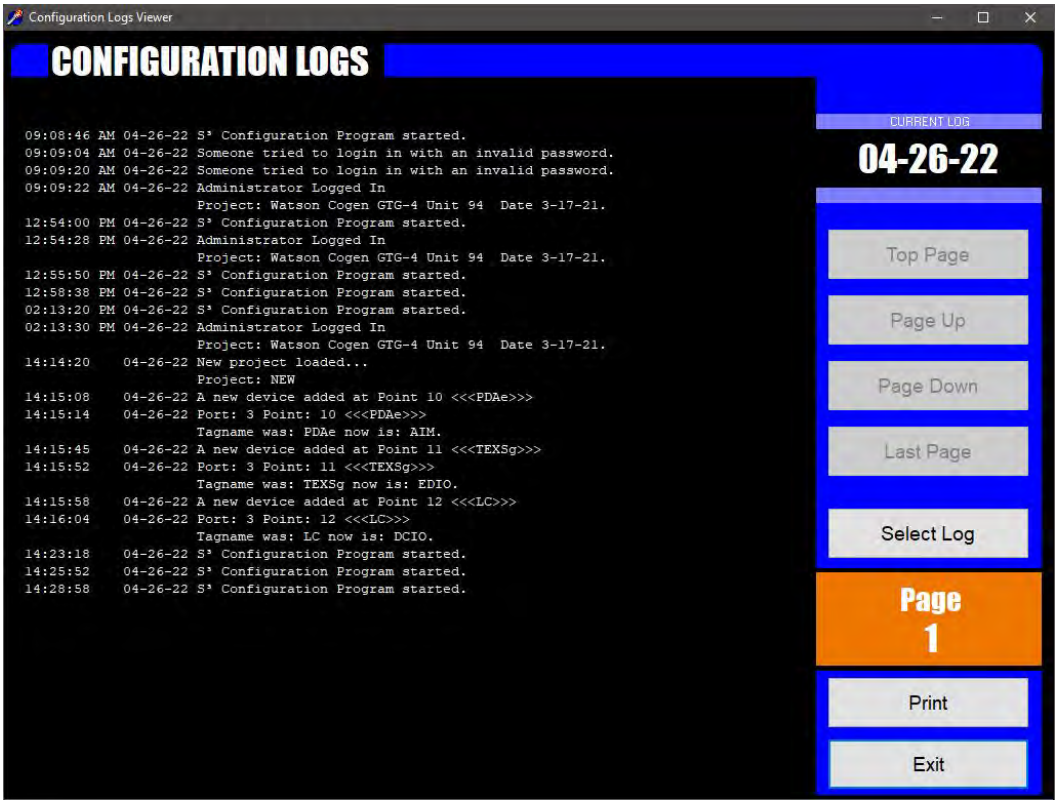
NOTE

Events configured as “white” that also go to the alarm printer will print in “black”.

The log is formatted in three columns, the first contains the event name, the second indicates the time, and date is displayed in column three.

6.3 Configuration Logs

Below is a sample configuration log. Running down the right-hand side is the log name (which is the date), navigation buttons, a button to select a different log for viewing, the page indicator for the currently viewed log, a print button, and an exit button.



The purpose for the configuration log is to provide an audit trail for safety related changes to the system. By examining the configuration log, it can be determined if tagnames were changed, if alarm setpoints were changed in the detector configurations, and if these changes were downloaded to the system or not.

The log is formatted in three columns, the first contains the time, the second the date and the third a description of the change.

The change column may use two lines to log the change. In these cases, the first line contains the port number, point number, and tag name. The second line contains the description of the change.

NOTE

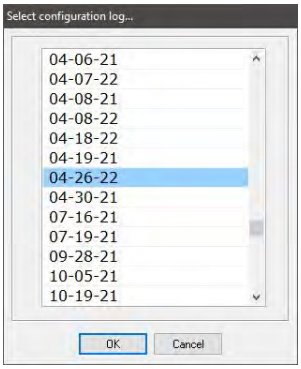
The configuration log tracks changes related to operation and safety only. Graphics creation is no longer supported.

The Configuration and Alarm logs can be opened or viewed, and previous logs can be printed by using the "Select Log" button.

This will display a standard Windows file navigation dialog box showing the content of the configuration or alarm log sub-directory, whichever is applicable.

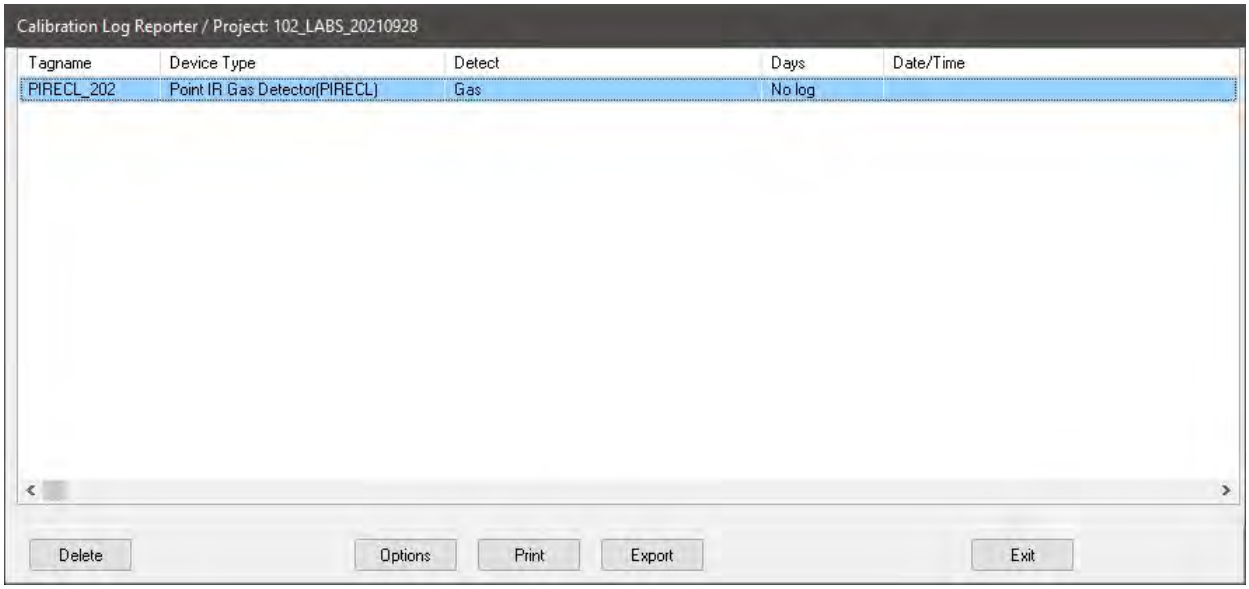
The logs are listed using the month, the day and year, with the date as their name. Select the date of interest and OK to open the log for viewing and / or printing.

The "Print" button will display the standard Windows printer dialog box for the default printer.



6.4 Calibration Logs

Below is a sample calibration log. The Calibration Log Reporter is a configurable database query tool designed to allow a user to quickly determine if periodic calibration of field devices is being conducted.



The log displays the Tagname, Device Type, Detector type, Days since the last calibration and the Date/Time of the last calibration. If the device has never been calibrated, the Date/Time will show the time the Calibration Log Reporter was accessed, and the “Days” field will have the maximum integer value of 2147483647.

Whenever a calibration log is collected from a field device, online or in configuration, it is stored in a database. This database is currently viewable only on the computer where the database file is located. It is viewable from the “Logs” button on the main screen, and the DCD.

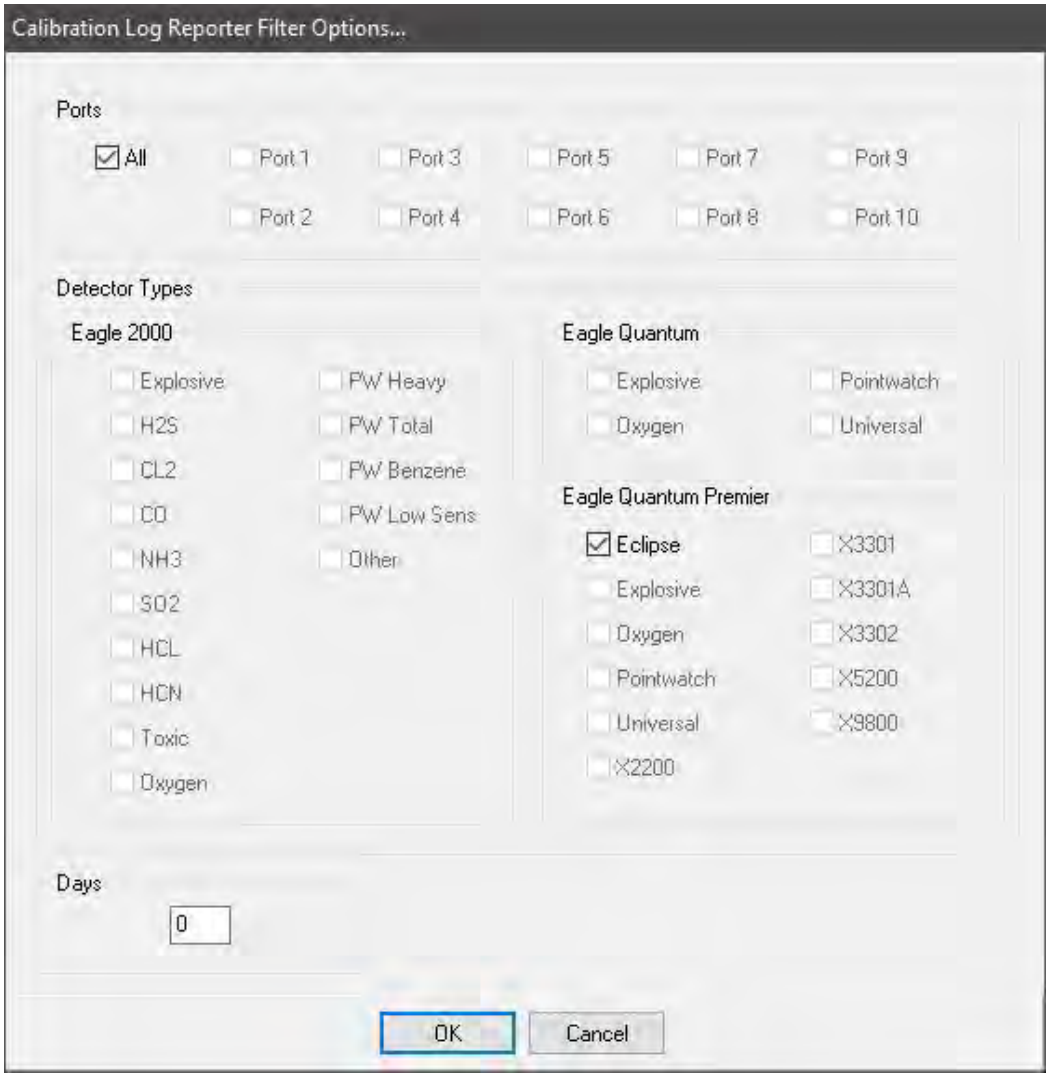
If viewed from the “Logs” button, a choice of project/database is available. If viewed via the DCD, it is the current active project.

Printing is supported by any “Windows” configured printer. If preferred, the logs can be exported as a text document and opened with text editing software, such as Notepad.

6.4.1 Calibration Log Reporter Filter Options

The options button opens the “Filter Options...” dialog box, allowing for the S^3 database query to be configured. This allows the user to configure a report that provides just the specific information required.

The top section, labeled “Ports” provides check boxes for the ten potential ports. “All” is the default, de-selecting it will highlight all available ports for which logs exist.



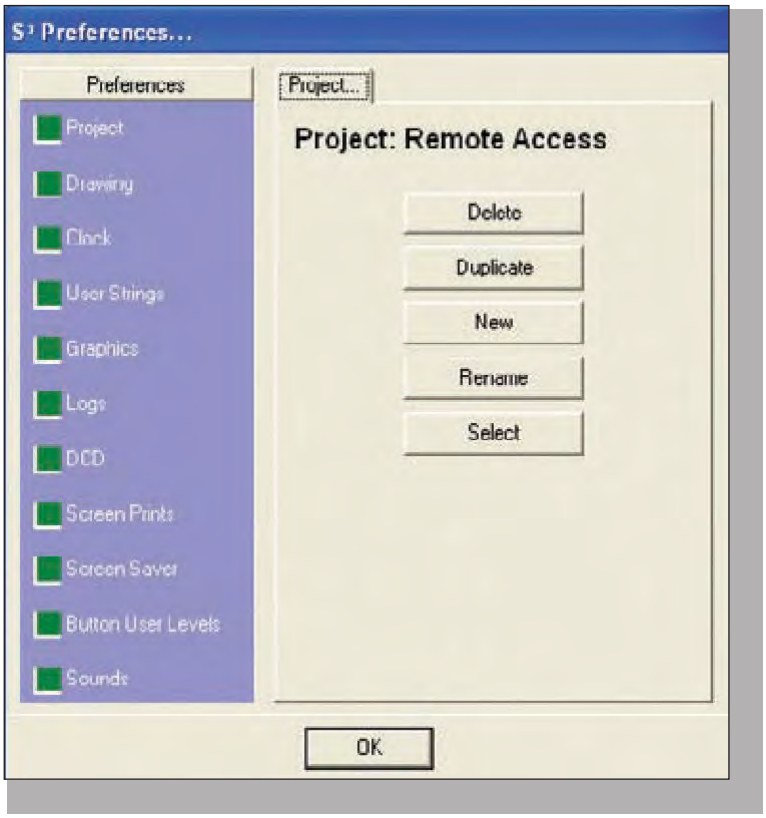
Eagle Quantum Premier devices store their calibration histories in local non-volatile memory. Whenever S^3 accesses this data, it stores it in a database, thus creating a “Log” linked to the port of origin. This happens whenever a point display is accessed, from the configuration environment, or by the DCD when running.

7 Preferences

The preferences button provides access to a variety of project management and global attributes and settings. They are accessed from a dialog box called “S³ Preferences”. Arranged down the left side are eleven categories, starting with “Project”. Once the project is selected, the other ten categories apply only to that project.

7.1 Project

Shown below, the project category allows for the top-level selection and manipulation of the project to be worked on. The currently active project is displayed at the top right, in this example “Remote Access”.



Multiple projects can be in development on the same machine and this tab provides resources for deleting projects, duplicating projects, creating new projects, renaming existing projects, and selecting an existing project.

7.2 Drawing (Deprecated Feature)

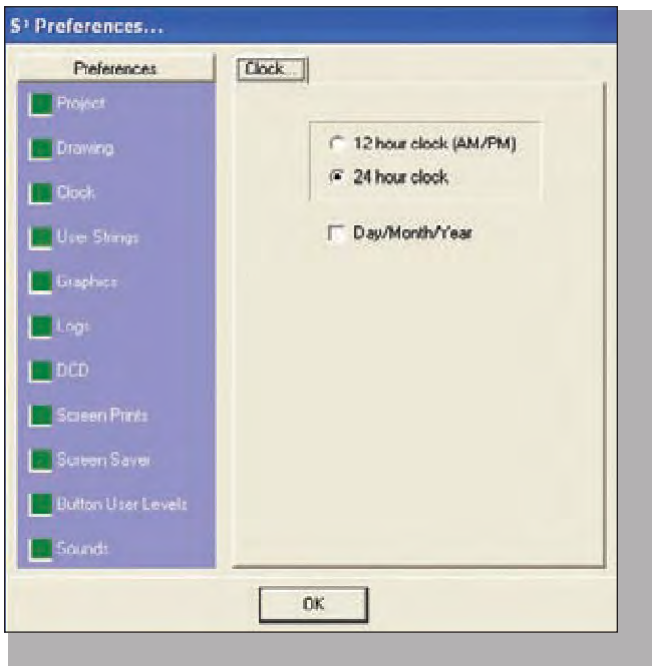
Please refer to S³ Manual v6.0, Section 7, page 7-8.

7.3 Clock

This option allows the user to select a 24-hour or 12-hour format when displaying time.

7.3.1 Time

A radio button is provided to choose between a 12-hour clock (with AM and PM suffix) and a 24-hour clock.

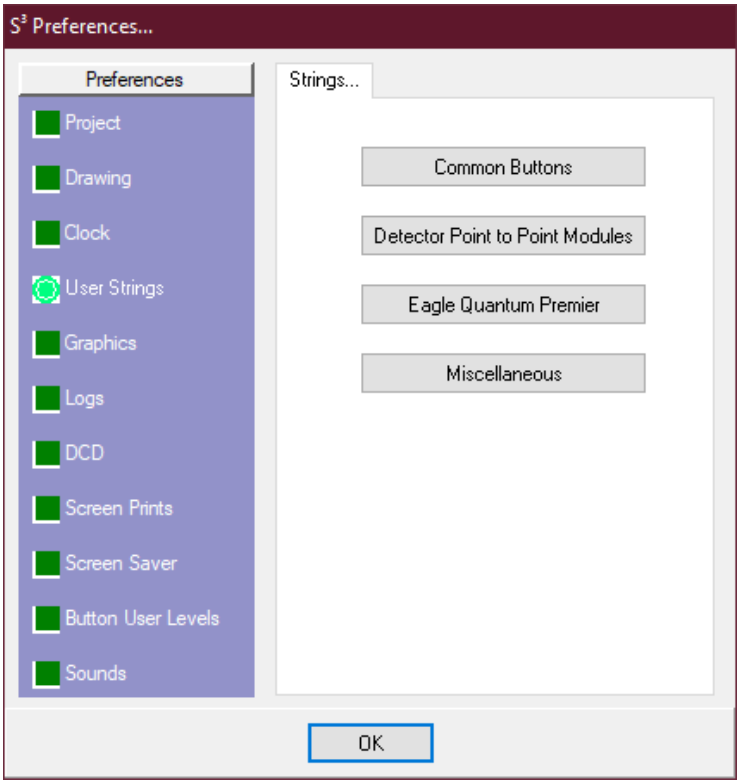


7.3.2 Date

A check box is provided to format the date using the “Day/Month/Year” method. The default is “Month/Day/Year”. These time and date settings apply to all logs and printouts created by S³.

7.4 User Strings

The “User Strings” preference selection provides access to a very powerful feature, the Second Language Dictionary (SLD). The SLD is used to provide second language support to the “Online” aspects of the S^3 operation.



The four databases in the SLD are accessed through the buttons on the preferences dialog box. Each database provides the factory default, in English, with a field to substitute a second language equivalent.

7.4.1 Common Buttons

Substitutes for all operator interface buttons found in the online application of S^3.

7.4.2 Detector Point to Point Modules

Supports a variety of commonly used Detector Electronics Corporation conventional gas detectors and optical flame detectors.

7.4.3 Eagle Quantum Premier

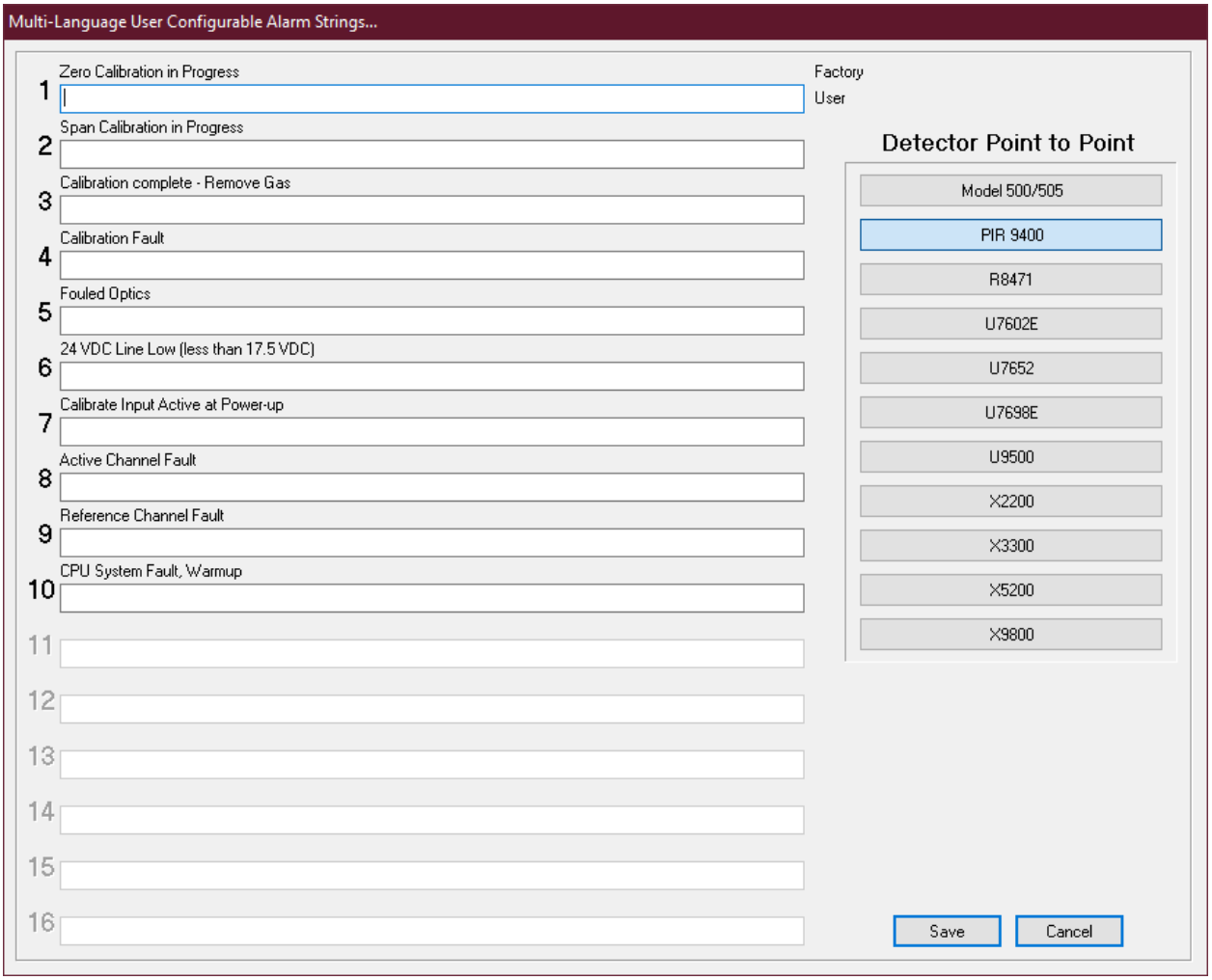
Factory names for each item may be configured by creating or importing a replacement name.

7.4.4 Miscellaneous

Substitutes for a variety of text descriptions found throughout the S^3 online application.

7.4.5 User String Examples

Below is an example of EAGLE Quantum Premier SLD configuration. On the right-hand side of the dialog box are a series of buttons for the different products.



In this example, the PIR 9400 is selected. That causes a list of the available events for that device that can be configured for tracking. The English factory default description is displayed above a field where a substitute description can be entered. In this example, it is a Spanish description, but it could be any Roman character language.

NOTE

Cyrillic font support is included for Russian speaking countries.

Once the appropriate substitute descriptions have been entered, selecting the “Save” button will record the new descriptions.

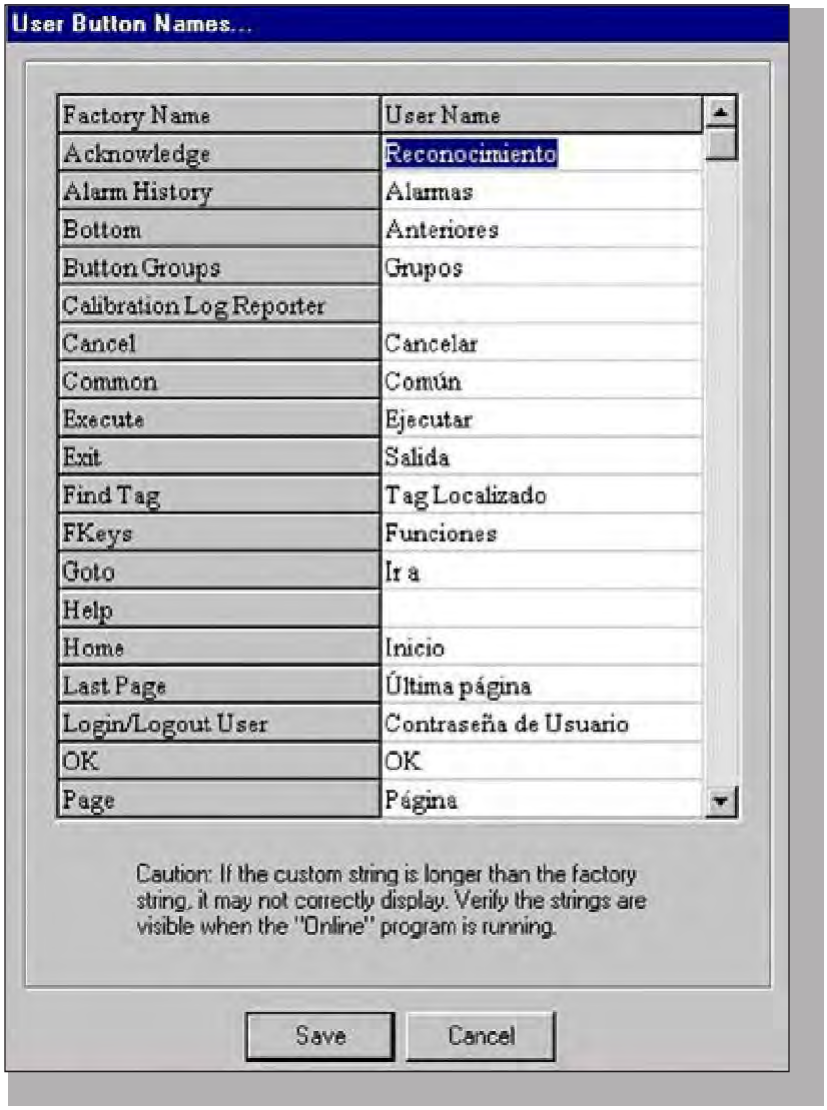
The descriptions entered in the SLD’s will be made available for use when points are configured in the “Ports” configuration area.

SLD descriptions for the user interface buttons used by the online application are presented in the “Factory Name” column of the “User Button Names...” dialog box.

Substitutes are entered in the “User Name” column. In the example below the configuration is incomplete, some buttons do not yet have a substitute string.

CAUTION:

If “User Name” is left blank, these buttons will have no name when online.



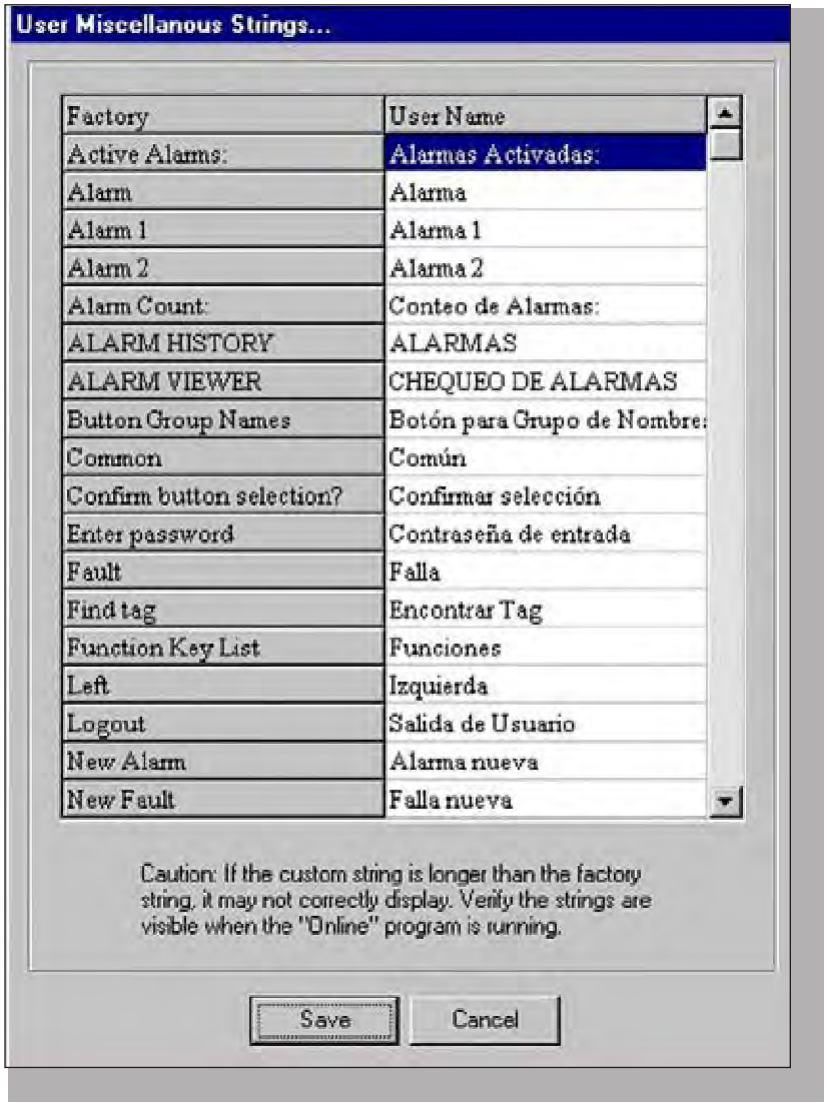
“Miscellaneous Strings” are pieces of descriptive text used in a variety of online locations like dialog boxes, window names and data entry fields.

Substitutes are entered in the “User Name” column.

Like the user buttons, all fields must be filled out or blank spaces will appear at these locations when online.

When translating button names or miscellaneous strings into other languages the text may be too long for the button or space causing problems.

Take care to test thoroughly to ensure a proper fit for substitute strings.



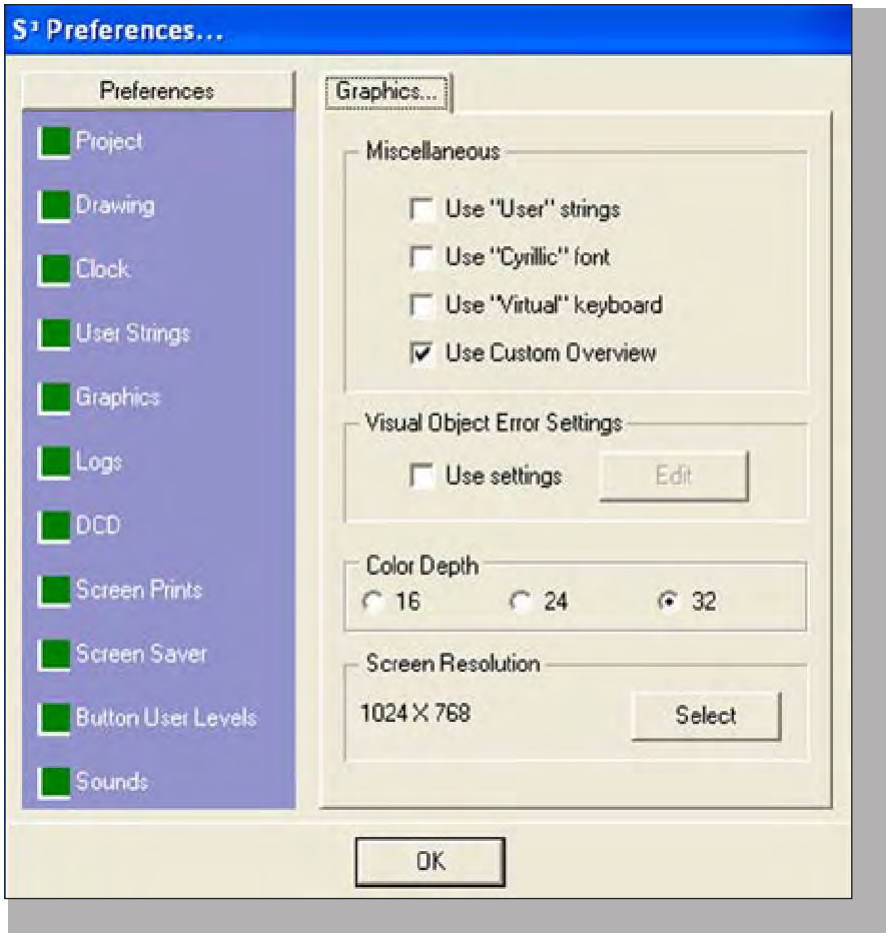
7.5 Graphics (Deprecated Feature)

This category pertains to the operation of the “Online” application. This application displays custom graphics with an overlay of dynamic information from various attached systems. This is the main operational mode used by plant operators and other personnel monitoring the safety systems.

There are four global attributes that are configured by check box selections in the Miscellaneous portion of the dialog box and two other settings pertaining to the online color selections.

7.5.1 User Strings

When this check box is selected, the Online application will substitute the factory defaults for button descriptions, miscellaneous text, and device alarm and event data with user configured Second Language Dictionary (SLD) data.



To revert to the English factory default values, stop the online application and de-select this checkbox. This provides an easy means of switching back and forth between the defaults and SLD.

7.5.2 Cyrillic Font

S³ supports the use of Cyrillic in the SLD for both display and printing purposes when used with the recommended alarm printer.

7.5.3 Virtual Keyboard

When this option is selected, S³ provides an onscreen keyboard whenever data entry is required, such as for user login, password entry, etc., when S³ does not detect a connected keyboard.

This is primarily to provide user input on systems equipped with a touchscreen as the operator's primary interface.

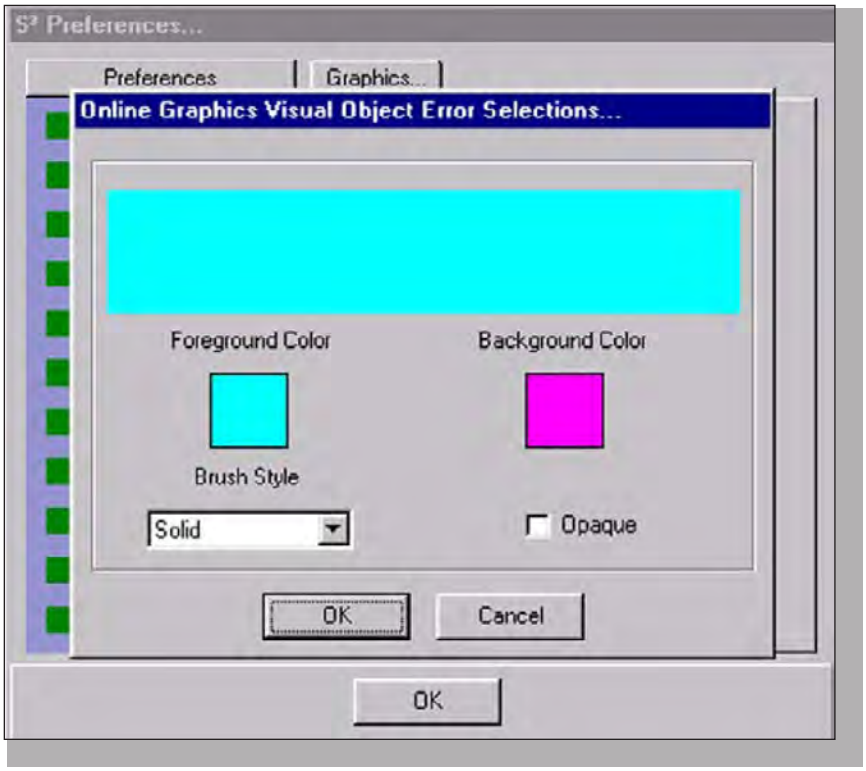
7.5.4 Custom Overview

When this option is selected a custom full-screen overview is substituted for the automatically generated scaled composite of custom screens. This custom overview must be created in the graphic editor and can be generated using the editor's tools, from imported graphics, or a combination of the two.

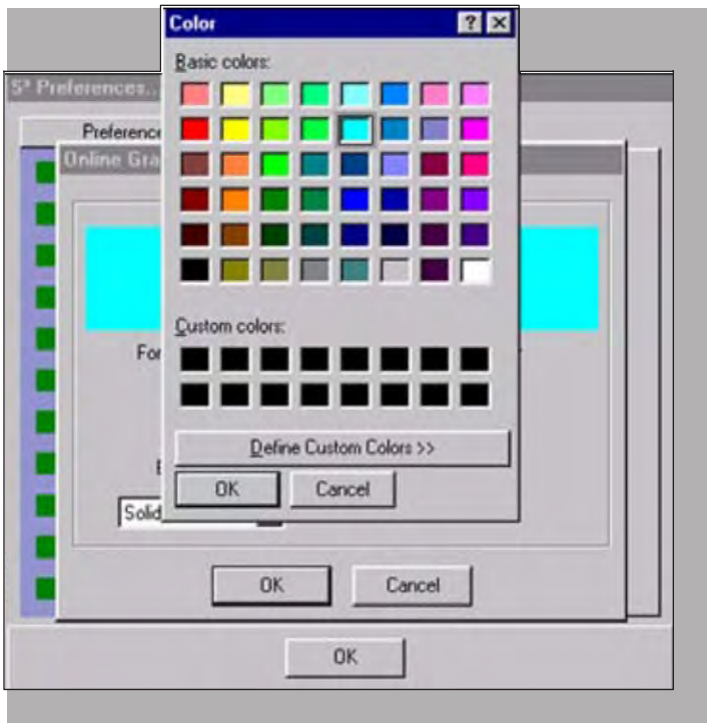
7.5.5 Visual Object Error Settings

This checkbox selection enables an online feature that changes the color of any dynamic object that is tied to data that has been flagged as invalid by S^3.

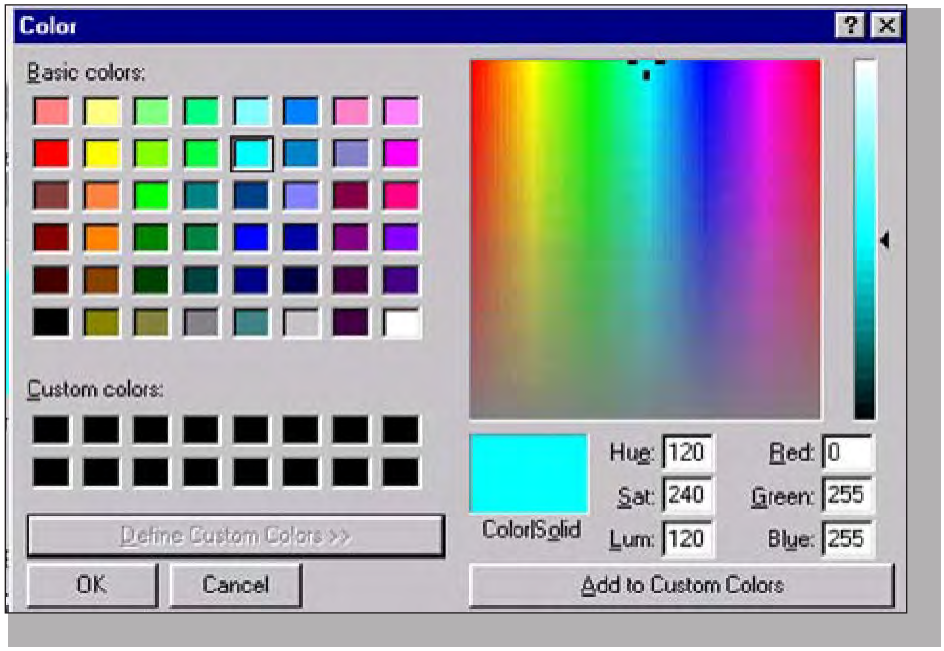
To change the “error” color select the “Edit” button and S^3 will display the color selection dialog box. The default error colors will initially be selected with Aqua for the foreground, Magenta for the background, and a solid brush. To change these selections, click on the sample block for the color to be changed and a color picker will be displayed.



Choose from any of the 48 standard color definitions displayed, or from the 16 custom colors.



Select the “Define Custom Colors” button to display an expanded color picker dialog box that allows any desired color to be added to the “Custom Colors” selections. Up to 16 can be configured.



NOTE

Custom colors will not be saved.

7.5.6 Color Depth Settings

There are three choices for the displayed color depth, 16, 24 and 32. This corresponds to the maximum number of colors used by the operating system and the computers video card to display graphics.

16 bit = 65,636 colors

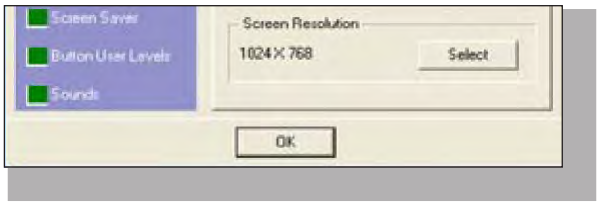
24 bit = 16, 777, 216 colors

32 bit = True color

16 bit is the default and minimum requirement.

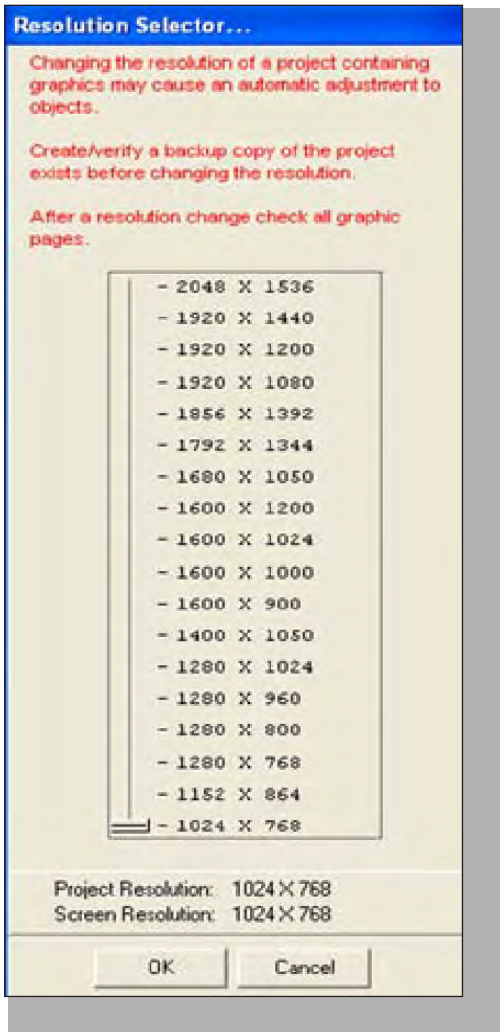
7.5.7 Screen Resolution

The selected screen resolution for the custom graphics on the active project is displayed and a "Select" button to open the "Resolution Selector" dialog box where the screen resolution can be set.



7.5.7.1 Resolution Selector

This dialog box has an adjustable slider where the screen resolution for the online custom graphics can be set for the project.



At the bottom of the dialog box the project resolution is displayed along with the screen resolution of the computer S^3 is currently running on.

In some cases, the graphic development may be done on a computer with a different resolution than the "target" machine for the project.

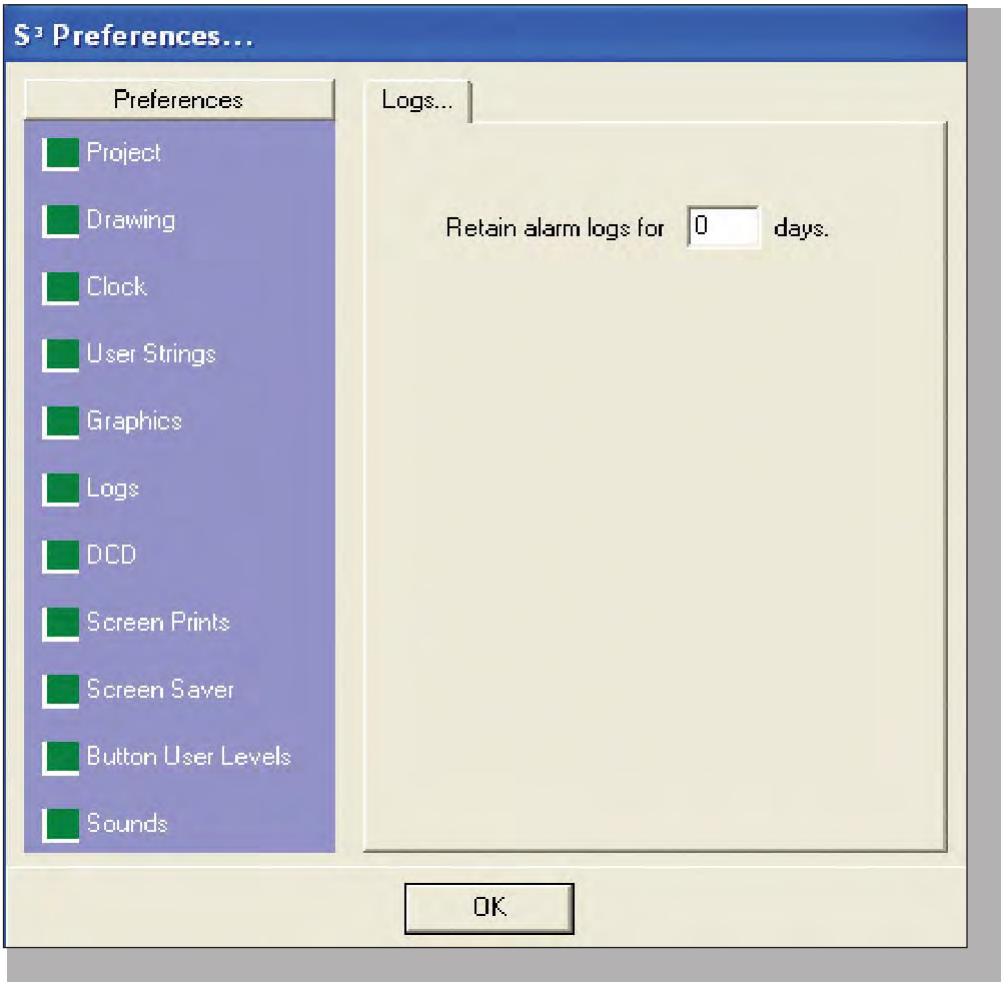
The minimum resolution is XGA or 1024 X 768 pixels. At XGA resolution the task bar must be configured to "Auto Hide" otherwise buttons in certain areas of the configuration environment will be hidden.

NOTE

The list of supported resolutions to the left may have grown since this issue of the manual as PC vendors are constantly adding support for additional screen sizes.

7.6 Logs

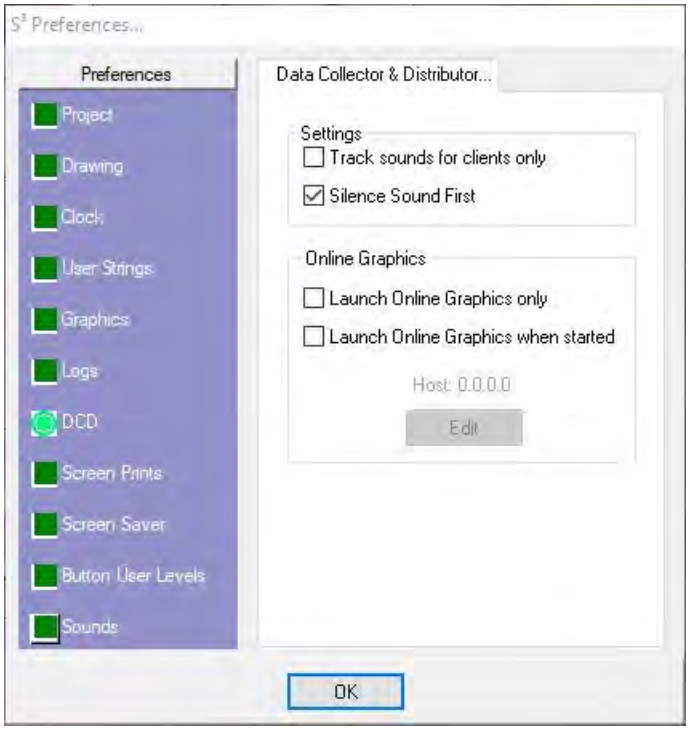
This preference selection allows the setting of the log retention time. This adjustment determines how long the system will keep daily log files.



When set to zero (the default) all files will be kept indefinitely, and the user must ensure the hard disk does not fill up. If a number is entered in the field, the system will save that number of log files and then delete the oldest when that number is exceeded.

7.7 DCD

The Data Collector and Distributor application program has four configurable parameters that can be used to modify its behavior.



7.7.1 DCD Settings

There are two settings relating to how sounds are handled.

The first one, “Track sounds for clients only” is used in configurations where the local machines DCD is unattended and is used primarily to send data to other S^3 client machines. In this situation the configured sounds play and are acknowledged by the remote clients and the local machine does not play sounds.

The second setting “Silence Sound First” configures the DCD to silence the active sound(s) prior to any additional functions that may be configured to be executed when the “Acknowledge” button is activated.

Both settings can be used concurrently.

7.7.2 Online Graphics

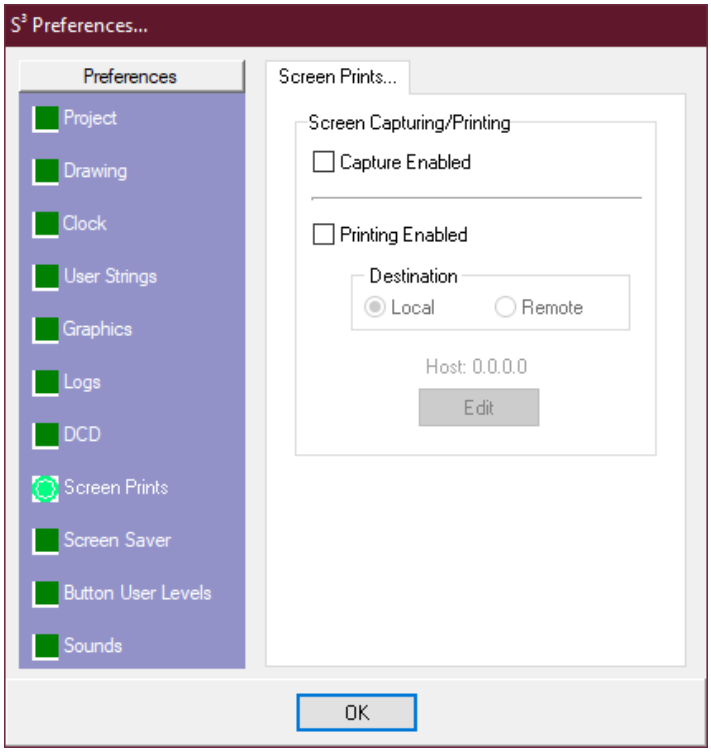
Provides the user the option to either launch the user graphics at start, or manually from the DCD when started.

7.8 Screen Prints

In addition to capturing screens in S³, the captured screens can be sent to either a local or remote printer for output.

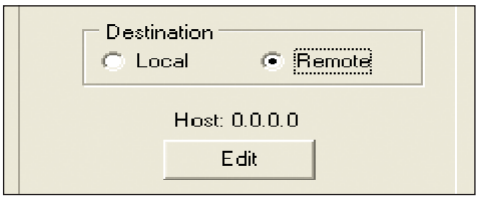
7.8.1 Local Printing

With “Local” selected as the destination, the screen will print on the default Windows printer.



7.8.2 Remote Printing

If “Remote” is selected as the destination, a “Host Address” for another S³ workstation that is running the DCD must be specified by its TCP/ IP address.



7.8.3 Specifying a Printer

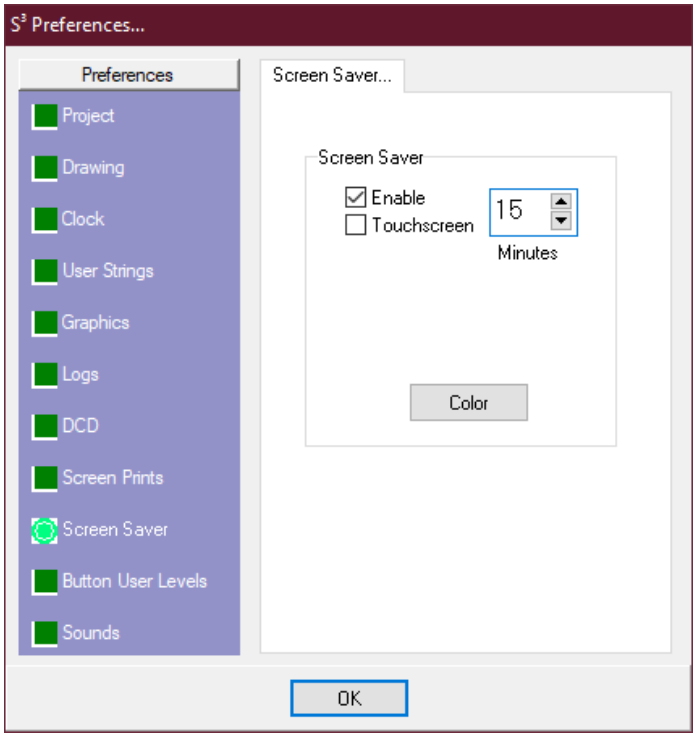
Clicking the “Edit” button will allow the TCP/IP address to be entered.

NOTE

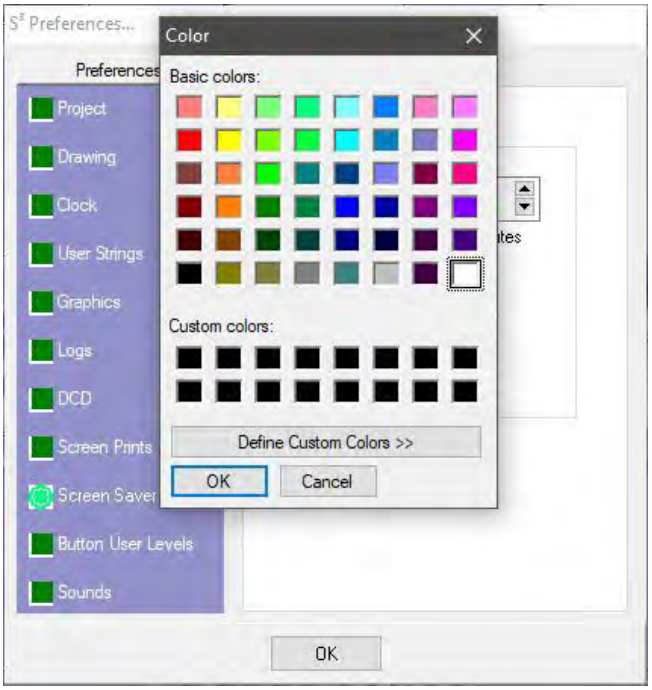
Local and remote computers must all be on the same side of firewalls.

7.9 Screen Saver

S³ provides a screen saver feature that will display the current time on a black background after a user configurable time has elapsed without any activity.



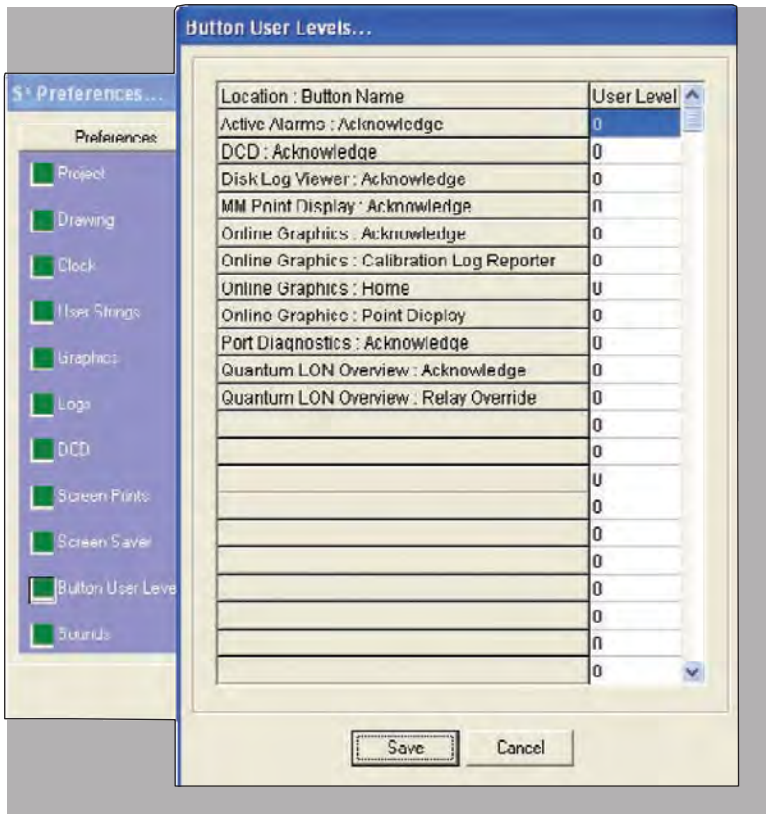
There is also a “Touchscreen” checkbox to allow the user to exit the screen saver by touching anywhere on the screen, without causing any screen navigation response.



The color of the displayed time can be changed by clicking on the “Color” button. This will open the standard “color picker” dialog box that allows the selection of any of the 48 pre-set colors.

7.10 Button User Levels

This feature allows the DCD application program's user interface buttons to be assigned a "User Level" for security or operational control purposes.

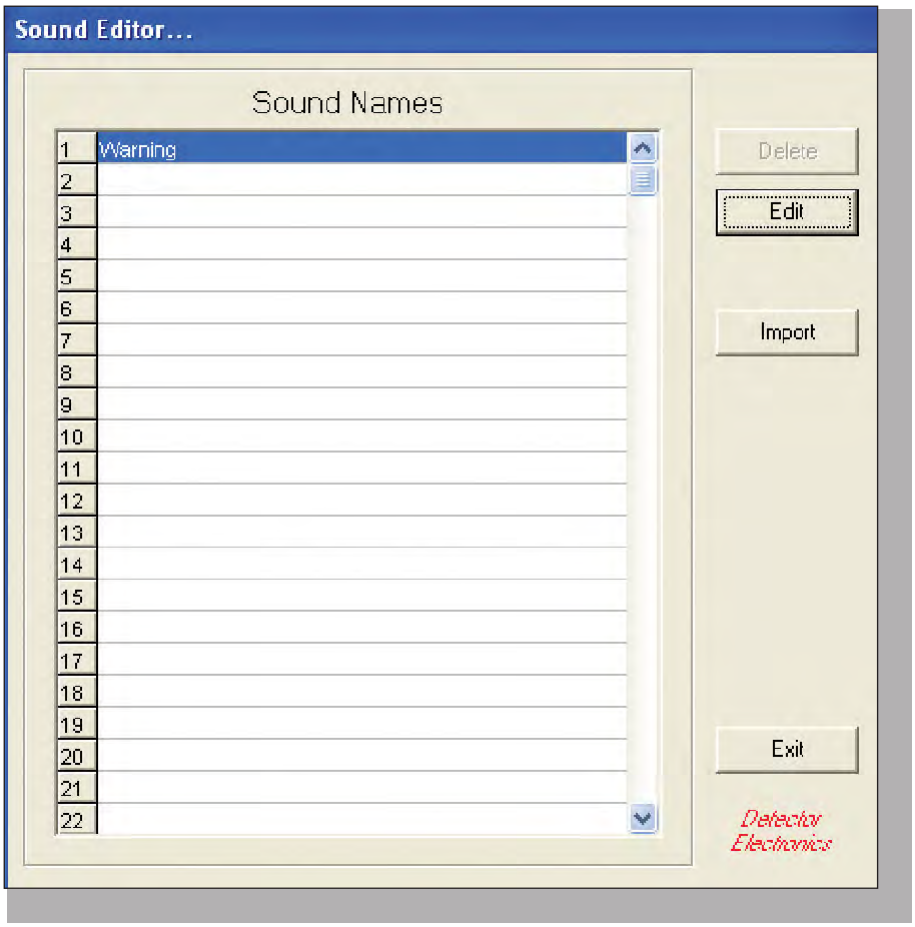


The default value is "0" and has a range of 0-65535. The user level is set in the "Passwords" configuration section of S³.

If the user logged in has a user level greater than or equal to the setting of the button, the button will be available. Otherwise, it will be grayed out.

7.11 Sounds

The Sounds Tab allows access to the custom sounds database and integrated sound editor.



Selecting the “Edit” button will open the “Sound Editor” dialog box.

S^3 supports up to 64 sounds that can be attached to events in the system. One sound named “Warning” is included with S^3 and cannot be deleted. The other 63 slots can be used to build a project-specific sound library.

To access the editor, select a sound database slot, numbered 1 through 64 on the left side of the “Sound Names” scrolling list, and then select the “Edit” button.

This will launch the “Sound Editor”.

The sound editor makes use of the standard Windows based sound card and microphone to allow for the recording and playback of custom sounds.

Custom sounds are limited to a maximum recording time of five seconds. This is to accommodate the fact that more than one sound may be in the queue at any given time.

The recording time is displayed in the horizontal bar graph at the top of the dialog box.

Use the “Record” button to begin recording. The horizontal bar graph will display the elapsed time. Press the “Stop” button to end the recording. Use the “Play” button to play back the recorded sound.

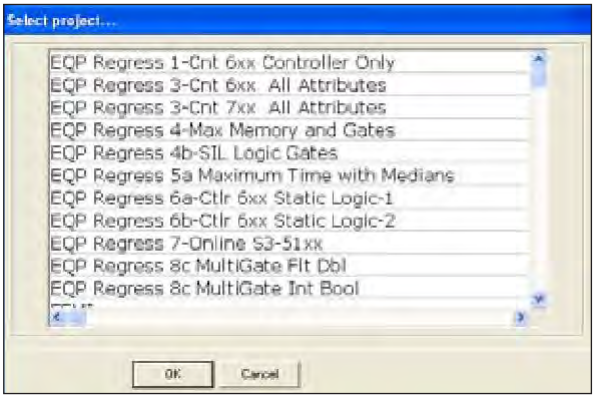
Sounds from this library are then attached to events in the system during point configuration in the “Ports” area of the system.

8 Backup and Restore

8.1 Overview of Features

This button provides access to S³'s built-in project Backup and Restore utilities. These utilities allow whole projects to be archived or restored for backup purposes, or to be moved to another workstation.

Selecting the "BACKUP" button will open the "Select Project" dialog box prompting for a selection.



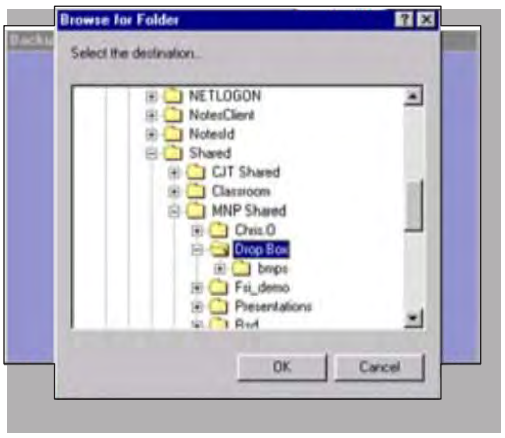
Select the appropriate project from the scrolling list and the select "OK" to begin the process.

8.2 Backup

Once the project is selected, a dialog box will be displayed, allowing for browsing of the file system to select a destination for the backup.

NOTE

We suggest storing the backup elsewhere than on the S³ computer.



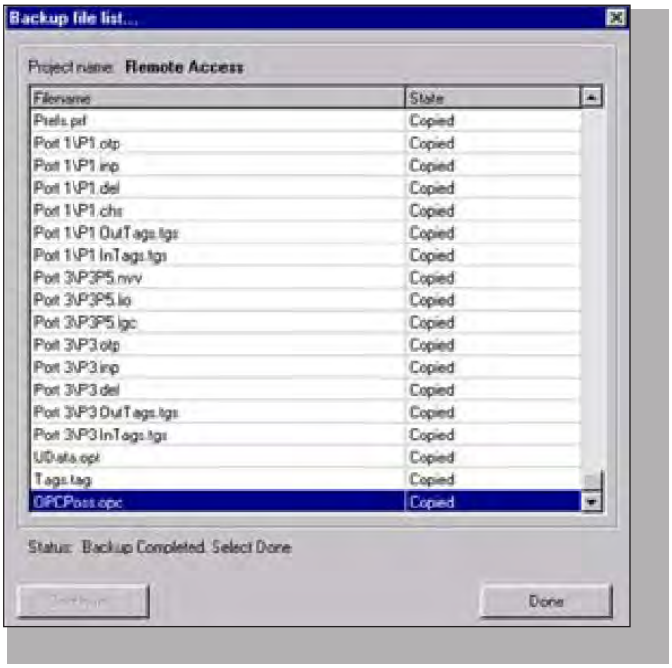
Once the destination is chosen for backup, the system will display the “Backup File List” dialog box which displays the files to backup and the status of the procedure.

The dialog box is formatted with two columns, the left one containing the file name, the right one displaying the status of the file.

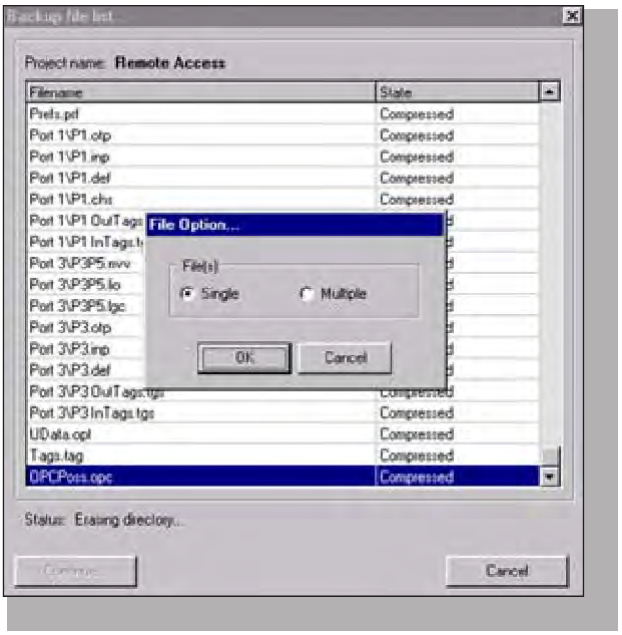
S³ will begin the backup process automatically by compressing all files to reduce disk space requirements. This highly efficient compression algorithm allows even large projects to be backed up to a hard disk, or flash drive.

After the files have been compressed, they will be copied to the destination volume, the status will indicate “Backup Completed Select Done”.

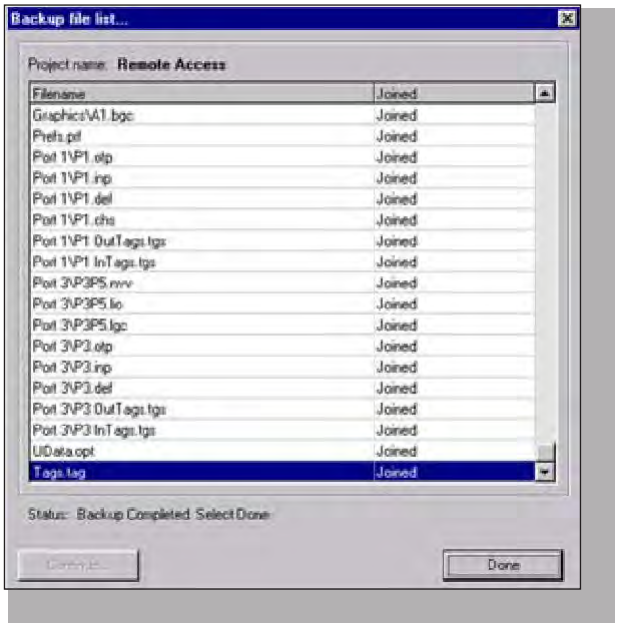
Click on the “Done” button to return to the Backup/Restore main dialog box.



Once the disk is in place, choose the desired file option, either “Single” or “Multiple”. The default is “Single” and will combine all compressed project files into a single project backup file and copy it to the selected destination. This option is significantly faster when backing up to a floppy disk. The “Multiple Files” option is available when access to the individual files might be preferred.



Once the file option selection is made, select the “Continue” button and the utility will copy the files to the floppy. If the project is too large to be backed up to a single floppy, the program will prompt for additional disks as required.



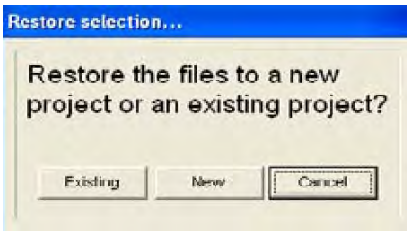
When all files have been successfully backed up, the “Cancel” button will change to a “Done” button, which when selected, will exit the backup utility.

8.3 Restore

To restore an archived project, select the “Restore” button from the Backup/Restore Utility dialog box.

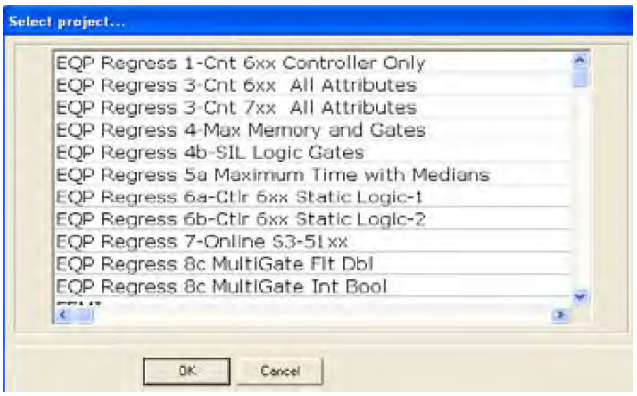
Once the “Restore” button is selected the “Restore Selection” dialog box is displayed.

Select either “Existing” or “New” to begin the process.



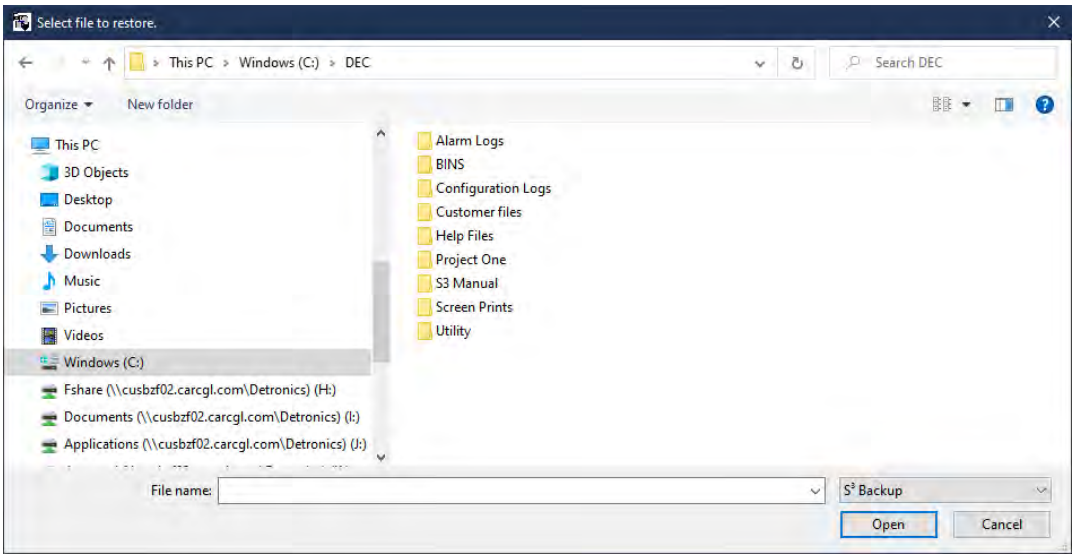
NOTE

If “existing” is selected, the restore function will overwrite the existing project with the “Restored” information. The existing project information will be deleted.



If “Existing” is selected, the “Select Project” dialog box is displayed. Select the appropriate project from the scrolling list and the select “OK” to begin the process.

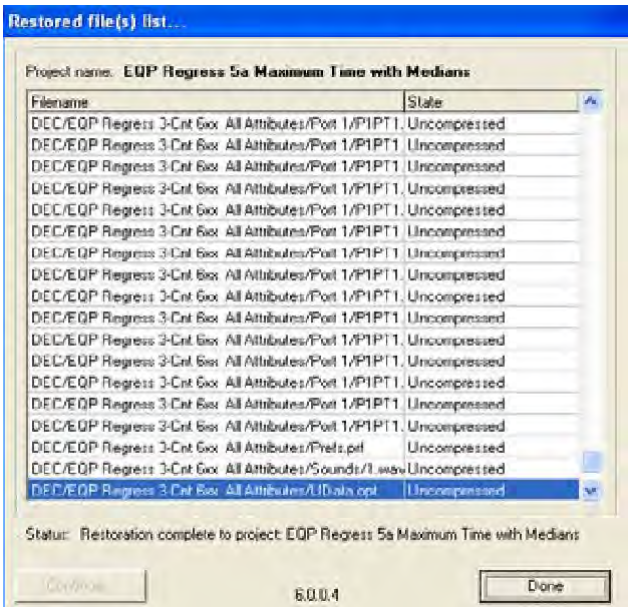
If “New” is selected, the file system browser dialog box is displayed prompting for the selection of the project source.



When the source has been chosen, select the “Save” button to begin the restoration procedure. A dialog box prompting the entry of the project name is displayed.

As files are restored, they will show up in the “Filename” column of the dialog box with their state displayed to the right.

When the process is complete, the “Done” button will highlight. Select “Done” to exit the restoration utility.



NOTE

Use the “Restore” feature for situations where an S³ project created on one workstation must be opened on a secondary workstation.

9 OPC Server

S^3 is designed to simply and efficiently "integrate" data from a variety of multi-vendor safety solutions into a common Operator Interface Station (OIS) where it can be viewed, tracked, and presented to the operator.

Traditionally, each software or application developer was required to write a custom interface, or server/driver, to exchange data with hardware field devices. OPC eliminates this requirement by defining a common, high-performance interface that permits this work to be done once, and then easily reused by HMI, SCADA, Control, and custom applications.

What is OPC? OPC (Open Platform Communications) is a series of specifications developed by industry vendors, end-users, and software developers. These specifications define the interface between Clients and Servers, as well as Servers and Servers, including access to real-time data, monitoring of alarms and events, access to historical data, and other applications. Initially, the OPC standard was restricted to the Windows operating system. As such, the acronym OPC was borne from OLE (object linking and embedding) for Process Control. These specifications, which are now known as "OPC Classic", have enjoyed widespread adoption across multiple industries, including manufacturing, building automation, oil and gas, renewable energy, and utilities, among others.

We have chosen "OPC Classic" as the mechanism for sharing this concentrated safety system data with other systems throughout the facility. The OPC Classic specifications are based on Microsoft Windows technology using the COM/DCOM (Distributed Component Object Model) for the exchange of data between software components. The specifications provide separate definitions for accessing process data, alarms, and historical data:

OPC Data Access (OPC DA)
The OPC DA specification defines the exchange of data including values, time, and quality information.

OPC Alarms & Events (OPC AE)
The OPC A&E specification defines the exchange of alarm and event type message information, as well as variable states and state management.

OPC Historical Data Access (OPC HDA)
The OPC HDA specification defines query methods and analytics that may be applied to historical, time-stamped data.

The organization that manages this standard is the OPC Foundation. The Foundation has over 850 members from around the world, including nearly all the world's major providers of control systems, instrumentation, and process control systems.

OPC Defined: OPC is based on Microsoft's OLE (now Active X), COM (Component Object Model) and DCOM (Distributed Component Object Model) technologies. It consists of a standard set of interfaces, properties, and methods for use in process-control and manufacturing-automation applications.

The Active X/COM technologies define how individual software components can interact

and share data. OPC provides a common interface for communicating with diverse process-control devices, regardless of the controlling software or devices in the process.

9.1 OPC in S³

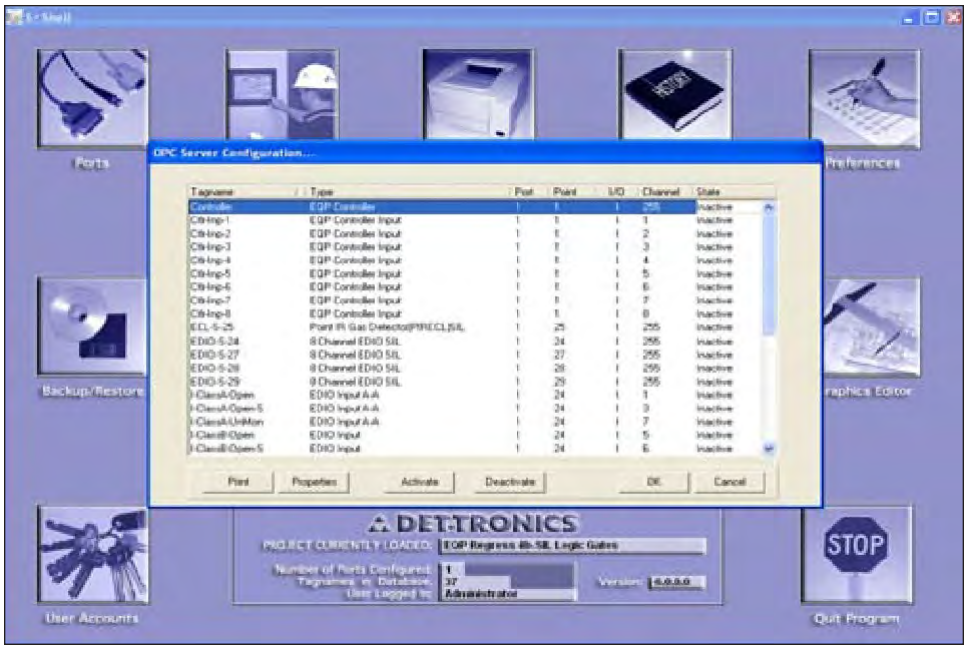
The OPC option for S³ is one of the easiest ways to provide safety system data from many sources to the distributed control system or other OPC compliant system.

With the OPC option S³ becomes a “Version 2.03 Data Access Server” to make available, under user configuration, any information being tracked by the S³ event handling database.

The S³ server setup is a model of simplicity. The user is presented with a tag list showing all the points being tracked by the system and the user can then choose what to “activate” for OPC clients to access. Using this simple tag-based method, it is possible to share complex data knowing little more than the tag name. Other than the tag name, OPC clients don’t need to know anything about the port type, serial or Ethernet settings, memory register locations, addresses, or any number of technical details.

9.2 OPC Server Configuration

To configure OPC data points, select the OPC Server button from the S³ Main Screen. This will display the OPC Server Configuration dialog box which lists all tags available for activation by the server.

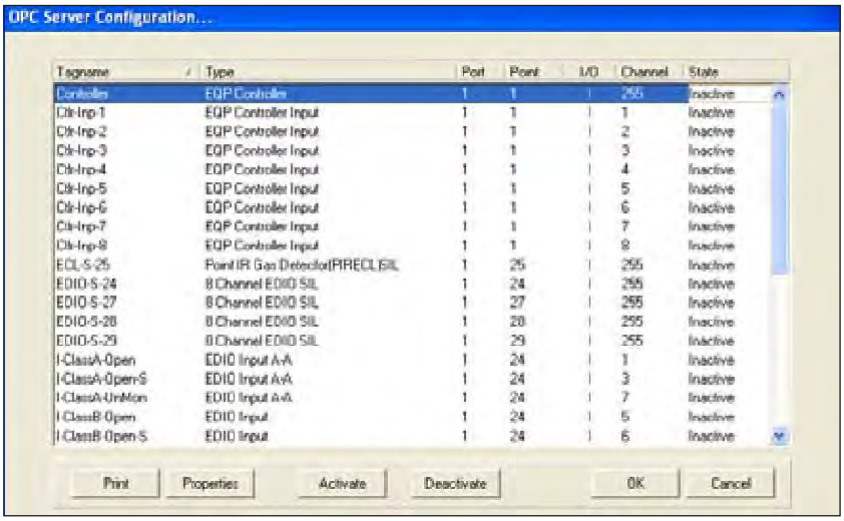


NOTE

For the S³ server to function, the S³ hardware key must have the OPC server function enabled.

The available tags shown, were created during the port configuration process. When a Modbus, Triconex, Eagle, or other device is configured it is added to the S³ tag name database. All points in this tag name database are automatically set up by S³ for use by the OPC server. This greatly simplifies OPC tag management.

The OPC Server Configuration dialog box displays the tagname, type and origin information along with its OPC status, either Active or Inactive. To make a tagname available to OPC Clients, select the tagname and click on the “Activate” button.



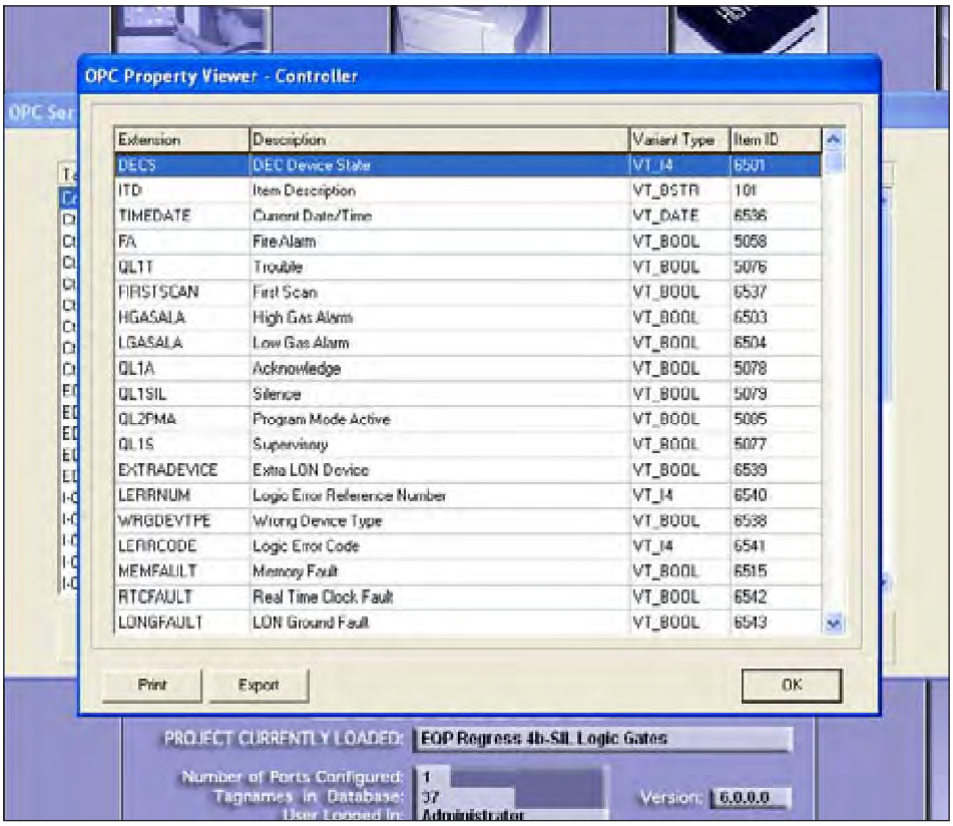
In the example to the left, the EQP Controller is selected. Its tagname is “Controller”, it originates at S^3 port 1 point 1, is an “I” (input), and has an OPC State of “Inactive”.

This is a “top level” view of the devices and their status. In the above example this single point “Controller” is a compound point with a variety of subordinate data available to the OPC client.

To view this data, select the “Properties” button.

9.3 OPC Property Viewer

The properties button at the bottom of the OPC Server Configuration dialog box will open the “OPC Property Viewer” and display the properties for the selected point.



The individual property extension, description and variant type are displayed.

These properties were configured automatically by S^3 for inclusion by the OPC server when the point was created within the Port Configuration process.

In the previous example, because it was an intelligent addressable device, it has a great deal of data indexed to it.

Simple analog or discrete devices will have far less available data.

NOTE

Individual properties of an "Active" device cannot be made inactive.

NOTE

OPC Clients: For OPC clients to be able to connect to the S^3 OPC Server, S^3 must be installed on the client machine.

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10 User Accounts

10.1 Security

These buttons are part of the S^3 security system. The “Log In/Out” button is used to log in or change users, the “User Accounts” button allows the system administrator to create or modify user accounts. User accounts are specific to each project and multiple users can have access to one project.

S^3 supports up to sixty-three unique user accounts, each capable of having a different password and access privileges. These user accounts are controlled by the S^3 system administrator.

Selecting the “User Log In/Out” button will display the user selection screen. The administrator account is automatically created by the system and cannot be deleted.

10.2 Administrator Privileges

The person logged in as the Administrator is the only one who can create, modify, or delete user accounts. In addition, the Administrator may also change the password for his/her own account.

NOTE
The default password for the Administrator is "DEC".

CAUTION
If the Administrator changes his/her password and loses it, there is no way to restore the account.

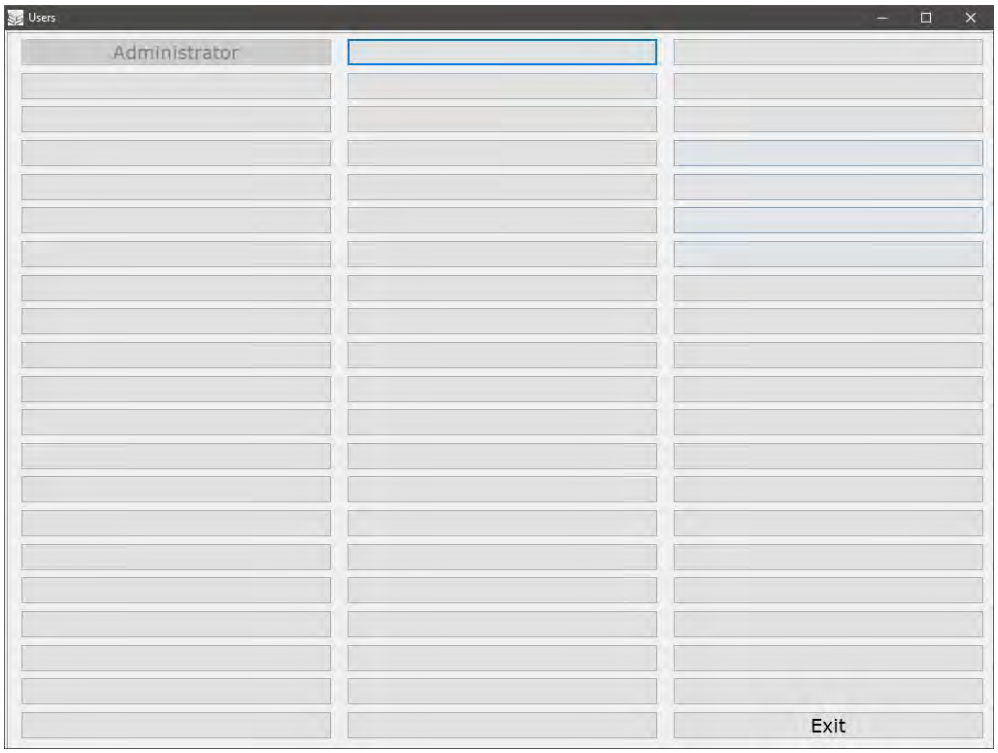
To set up or modify user account parameters, click on the "User Accounts" button on the main screen. This will open the "User settings..." dialog box. Five buttons allow for selecting, creating, renaming, and deleting user accounts, one button is for entering or changing an accounts password.

Above the buttons are four check boxes and a "User Level" field that determine the rights the user is allocated. These rights include the user level and whether they can access diagnostics or configuration utilities and a "restricted access" mode for viewing but not changing configuration data.

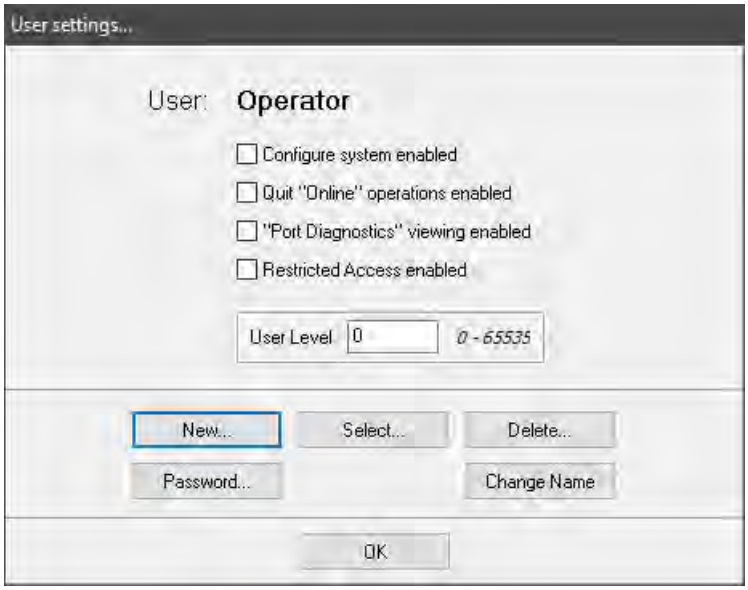
10.3 Creating User Accounts

To create a new user, select the “New” button from the “User Settings” dialog box (see previous page). The user selection screen will appear, then select any blank button to be configured as a new user.

This will display a dialog box for entering the new user’s name. Enter the name of the new user, in the example below “Operator” was chosen.



After entering the new users name, select “OK” to accept the name and display the “User settings...” dialog box.



There are four check boxes and one field that are used to configure the user’s account.

10.3.1 User Level

A user level between 0 and 65535 is used to determine what a user can do. Each command or button which a user can interact with in S^3 has a user level assigned to it. The higher the number, the higher the “privileges” for that user. A user level of “0” would allow “browsing” only with no command capability.

10.3.2 Configure system enabled

When selected, this option allows the user access to the engineering and configuration aspects of the S^3 software suite. This includes the ability to make, move, configure, and delete ports. The ability to create or modify points like fire detectors, gas detectors, analog transmitters, digital inputs, etc. attached to one or more of the available ports.

10.3.3 Quit “Online” operations enabled

When selected, the user can quit online operations and return to the S^3 main screen for access to the various engineering and maintenance utilities.

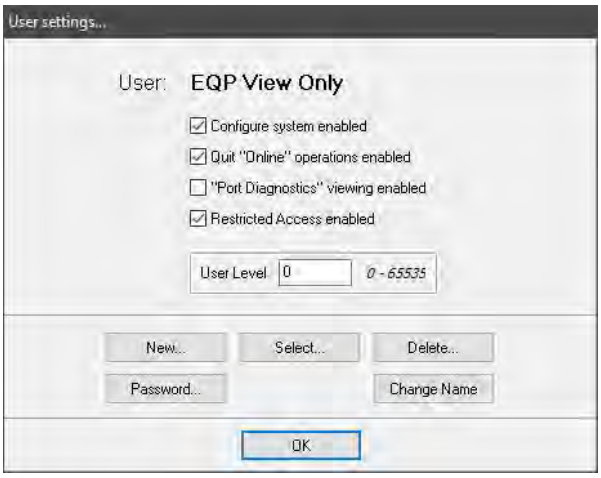
10.3.4 Port Diagnostics viewing enabled

When selected, when online the user can access the port diagnostics screen (F11). This screen allows the user to view details about the operation of all active communication ports, whether serial or Ethernet. This would typically be used by a technician responsible for troubleshooting connectivity between the S^3 station and any attached systems.

10.3.5 Restricted Access enabled

This feature applies only to Det-Tronics Eagle Quantum Premier systems and is intended to give limited access of the EQP port configurations for viewing and documentation purposes.

User accounts can be created with only the “restricted access” checkbox selected, or combined with the other checkboxes; configure system, quit online, port diagnostics.



When a user account is created using only the restricted access checkbox, the user can log in and view the configuration and calibration logs, as well as configure and initiate the print-out of system documentation but cannot access any other S^3 features.

If “restricted access” is combined with “configure system” the user can also create project backups using the “Backup/Restore” utility and view the LON configuration of an EQP port but cannot edit or view the LON devices details.

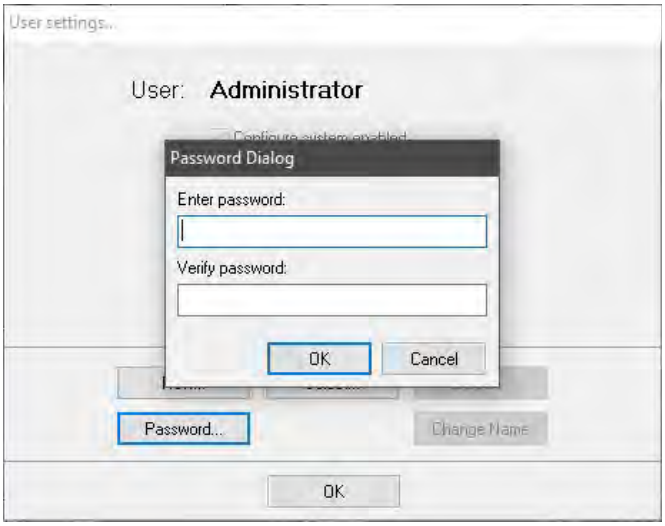
If combined with “Quit Online operations” a restricted access user could:

- log in while the graphics environment was online
- navigate the graphics
- quit the graphics environment, returning to the configuration environment
- view and document the project as described above but not be able to make changes or return online

10.4 Passwords

After the selection of the options assigned to the user, a user password must be created. This password is used to log on to the system at startup or when online during shift changes etc.

Select the “Password” pushbutton to access the “Password” dialog box. The password must first be entered into the “Enter password:” field and then again into the “Verify password:” field to validate the entry.



NOTE

Only the Administrator may change passwords.

If a password is lost, it cannot be retrieved, and the user account must be deleted and then recreated as a new user.

10.4.1 Change Name

This button allows a user’s login name to be changed without effecting the account configuration. For instance, “Operator” could be changed to “John Doe” while retaining the password and privileges previously configured.

11 EQP Configuration

One of the supported communication port types is for the Detector Electronics Corporation “Eagle Quantum Premier” Fire and Gas System.

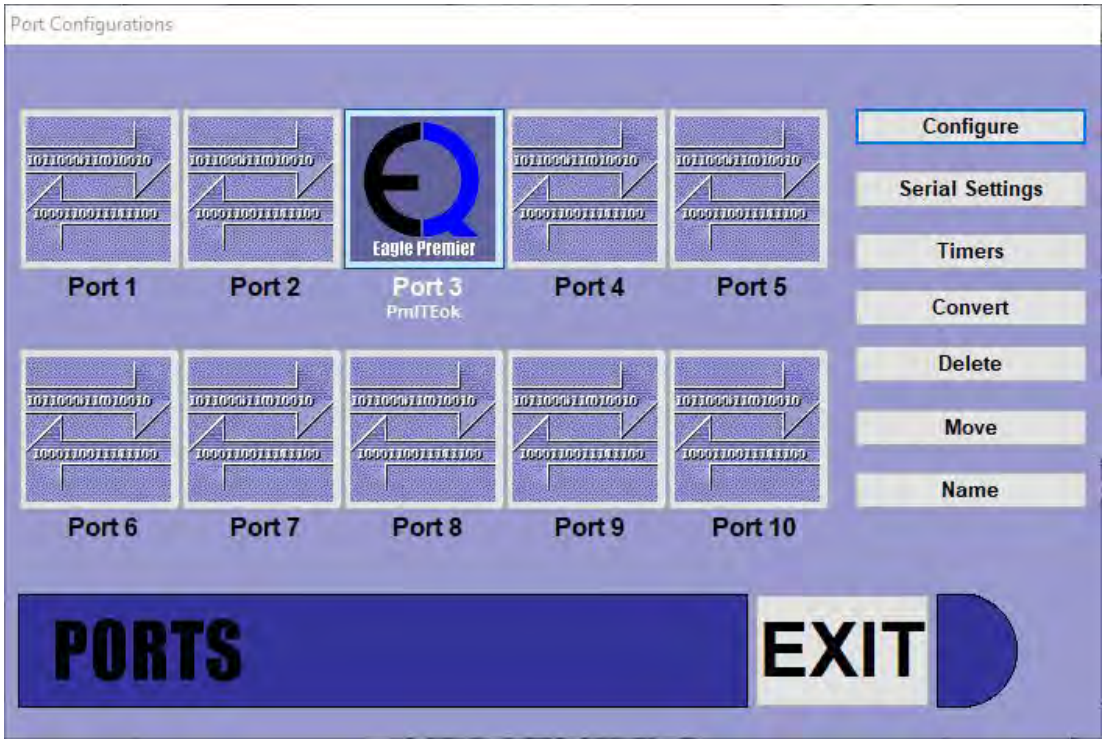
System configuration consists of three major phases:

- Identifying all devices on the network.
- Configuring the operating parameters of each of these devices.
- Downloading the configuration data over the network to the devices.

NOTE

Prior to configuration, ensure communication with the Eagle Quantum Premier controller is established.

Reference “Ports” (Section 3) of this user guide on establishing serial communications.



Enter the Eagle Quantum Premier configuration screen by either double-clicking on the port button or by selecting the port and then choosing “Configure” from the buttons on the right of the Ports Screen.

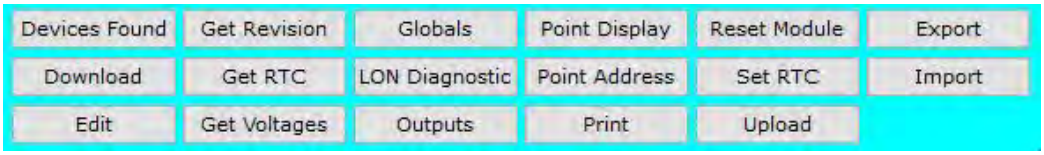
11.1 Configuration Screen

The main configuration screen is divided into two functional areas. The top area, which has a schematic representation of the Local Operating Network (LON™) on which all field devices reside, and the lower area, which contains context sensitive buttons for accessing features and performing functions.

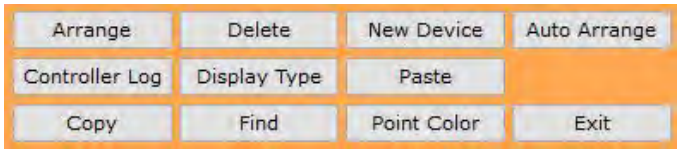
On a new loop, as represented in the sample above (in blue), the LON schematic has a single device, the controller, shown at the upper left corner and addressed as “Node 1”. This node is automatically placed on the LON because without it, no further configuration or monitoring can take place.

11.2 Button Bar Overview

There are two button bars located at the bottom of the screen, the “Command Bar” and the “Configuration Bar”. The Command Bar is used to create, query, or directly manipulate LON devices.



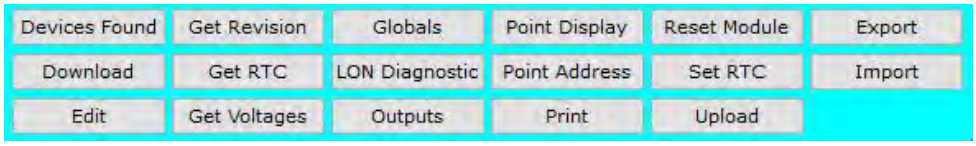
The Configuration Bar is used to create, duplicate, or delete devices and to reconcile their physical and logical LON addresses.



The functionality of each button is described on the following pages.

11.3 Command Bar Overview

The command bar has 17 buttons, most of which initiate a command to a field device to perform a certain function, return a value, or feed “real-time” information to S³ to be displayed.

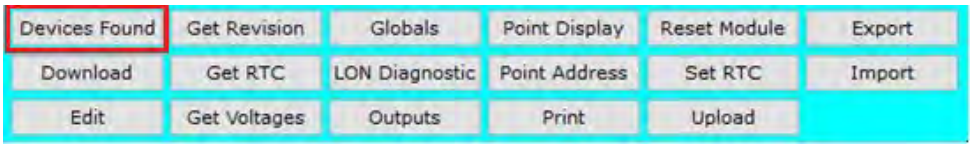


The command issued is specific to the node selected in the upper section. In some cases, multiple nodes may be selected using either the shift-click or drag methods and the command can be sent to all applicable nodes in the selected set.

To initiate a command using the command bar, select either a single node or a group of nodes, then click on the desired command button. In most cases, a progress monitor will appear and display text messages tracking the execution of the command.

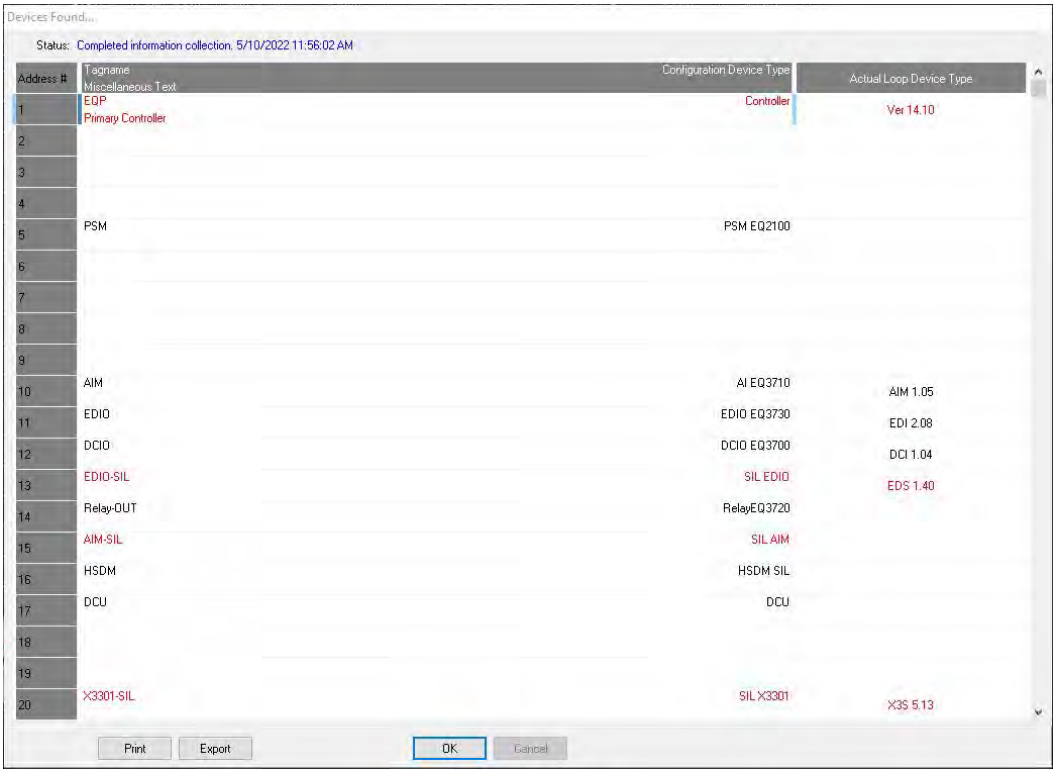
11.3.1 Command Definitions

11.3.1.1 Devices Found

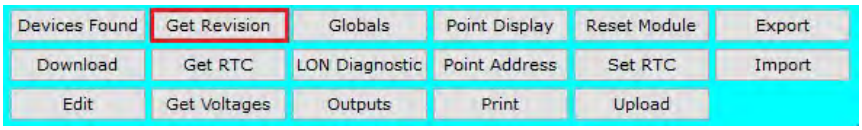


The controller returns this information to S³, which displays a table listing the devices by node number (address on the LON), along with the device type and the firmware revision number of each device.

The “Devices Found” dialog box also provides a “Print” button which can be used to output a hardcopy of the current LON configuration, both hardware and firmware.

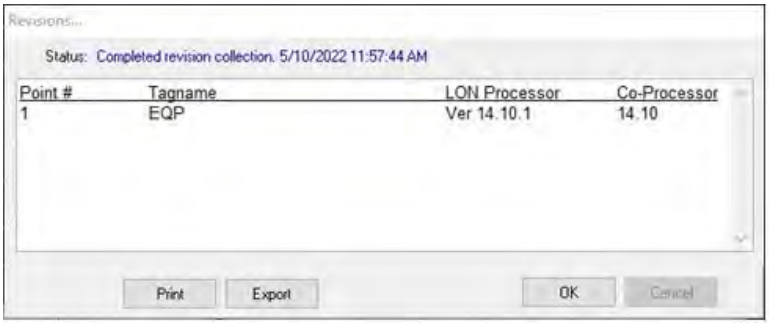


11.3.1.2 Get Revision



Returns the selected devices revision and firmware version information.

Over time, features and fixes are added to various products. The “Get Revision” feature provides a convenient way of determining if the devices in the system have these features and/or fixes, or if they need to be updated.

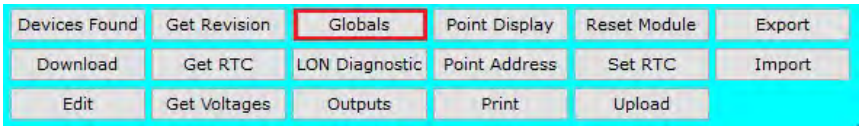


In the example above, the controller was selected prior to initiating the “Get Revision” command. The “Revisions...” dialog box displays the controller’s information.

NOTE

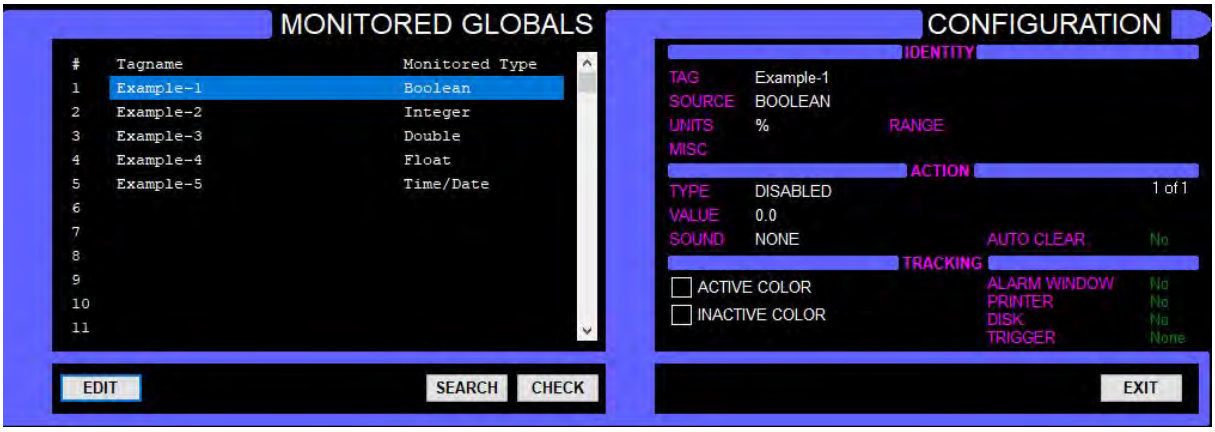
All devices have revision values, but not all devices will have version values.

11.3.1.3 Globals



Provides access to configuration services allowing defined global memory values to be set up for tracking by the DCD.

Once configured, these Globals can be logged and/or printed by the event monitor.



NOTE

Global memory points cannot be configured from this location. Global memory point creation and configuration is done within the controller’s logic editor.

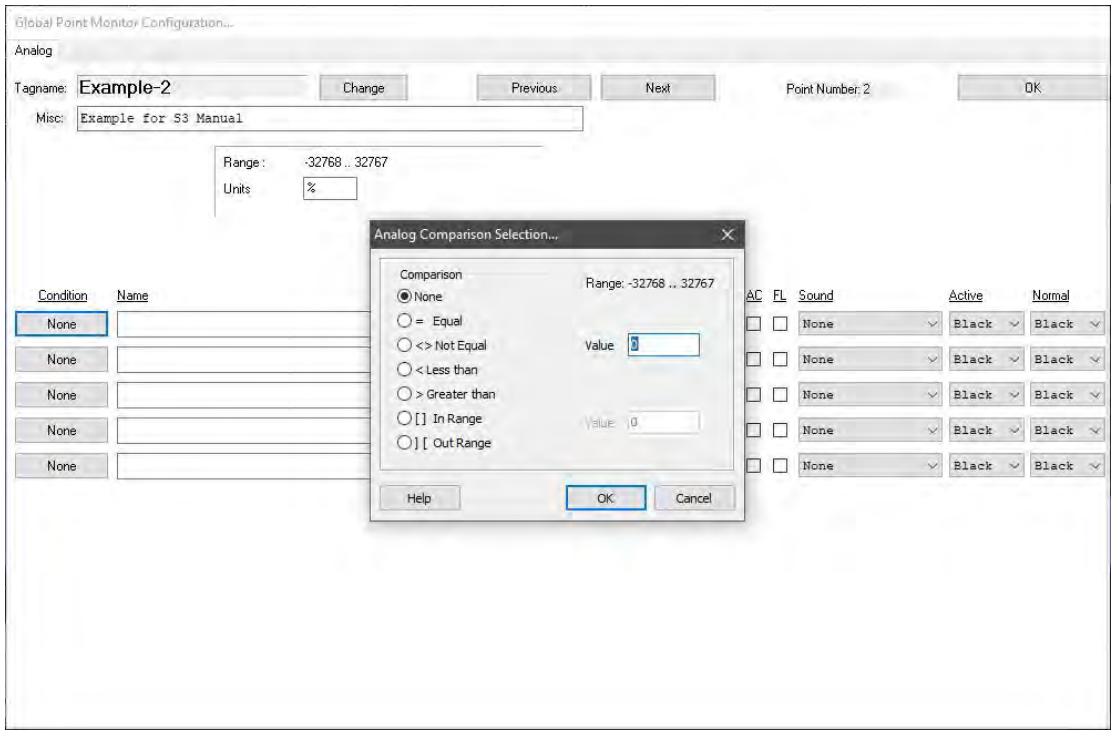
To configure a global memory point for monitoring, select a configured “slot” from the “Monitored Globals” pane on the left side of the dialog box and then select the “Edit” button.

This will open a dialog box displaying all configured global memory points that are available for monitoring.

Choose the desired point and select “OK” to access the configuration dialog box for the point.

A dialog box labeled “Global Point Monitor Configuration...” that is specific to the type (digital, analog, etc.) will be displayed, allowing the monitoring of the point to be configured.

The selected example point above is a “Digital” ON/OFF point type that can be configured to log to the printer, disk, and alarm window. In the example below, an “Analog” point type is selected and can be configured for multiple conditional events to be tracked.



11.3.1.3.1 Discrete Points

Globals tied to “discrete” ON/OFF type events can be set to alarm when the event transitions either High (ON) or Low (OFF) with the “Alarm Condition” radio button. They can also be disabled, which removes them from tracking but leaves the event configured in case it is desired to activate it later without the need for knowing the configuration details.

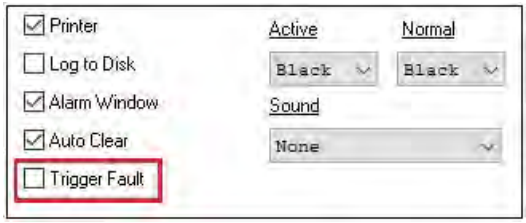
11.3.1.3.2 Transition On

When the tracked event transitions from the *off* state to the *on* state, the alarm will be activated as configured.

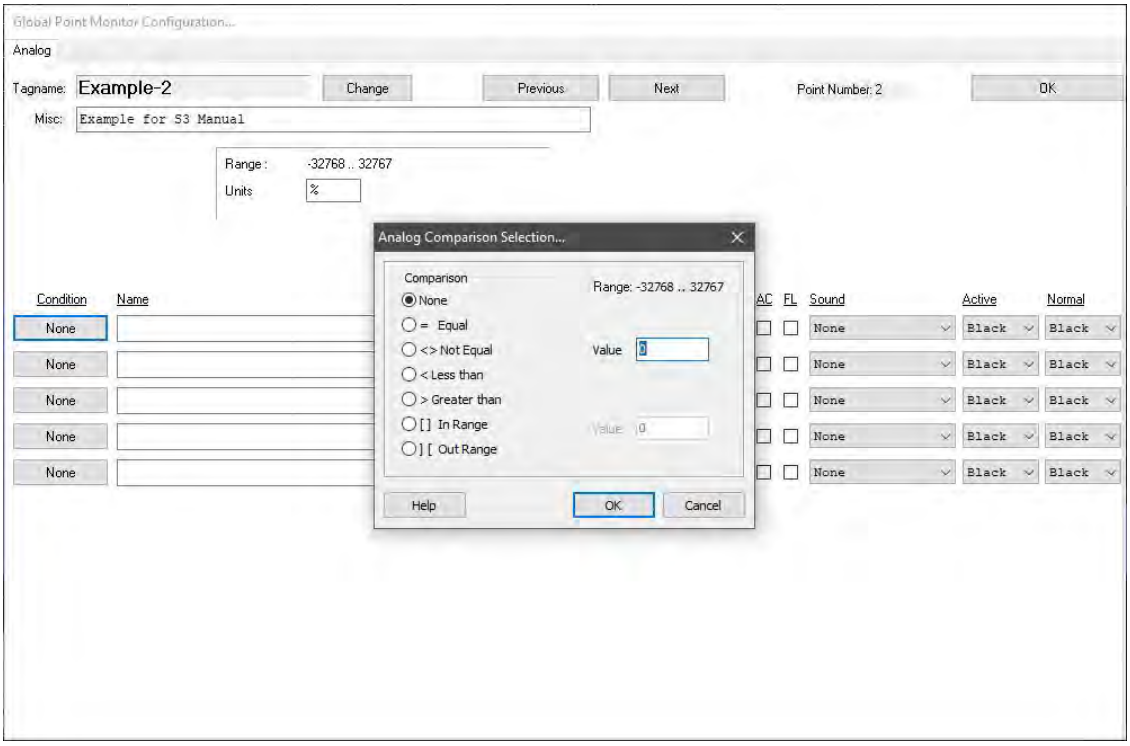
11.3.1.3.3 Transition Off

When the tracked event transitions from the *on* state to the *off* state, the alarm will be activated as configured.

The event configuration consists of selecting where the event is to be tracked (Printer, Disk, Alarm Window), whether it will automatically clear when the event returns to its normal condition, what colors will be used for the events normal and active states, and whether a recorded sound will be triggered when the event occurs. There is also an option to allow the event to "trigger a fault".



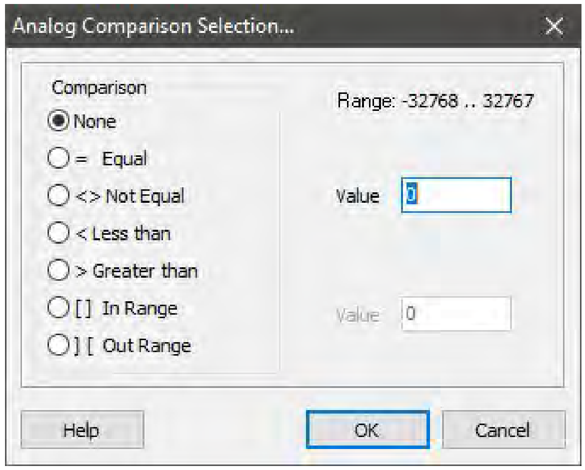
Globals tied to "analog" type events can be set to alarm in accordance with "conditional arguments" chosen from the "Analog Comparison Selection..." dialog box.



Up to five conditions can be named and configured with each one using one of the available comparisons. The analog signal is compared using the selected logical operator against the values entered. When the condition is true the event will be activated and tracked as configured.

The logical operators for comparison are self-explanatory and selected by radio button. Most have a single value entry field.

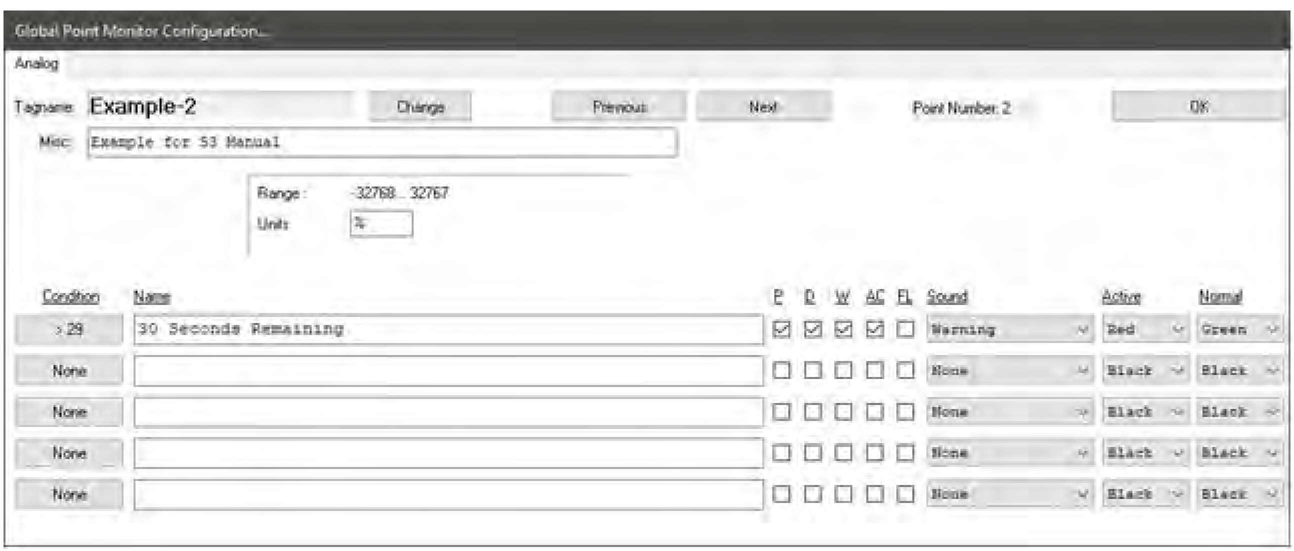
The “In Range” and “Out Range” operators have two value entry fields to define the desired range.



Once the event name is entered and the comparison configured, the event tracking configuration is set up using the check boxes and menus to the right of the event name.

The five checkbox selections are defined below:

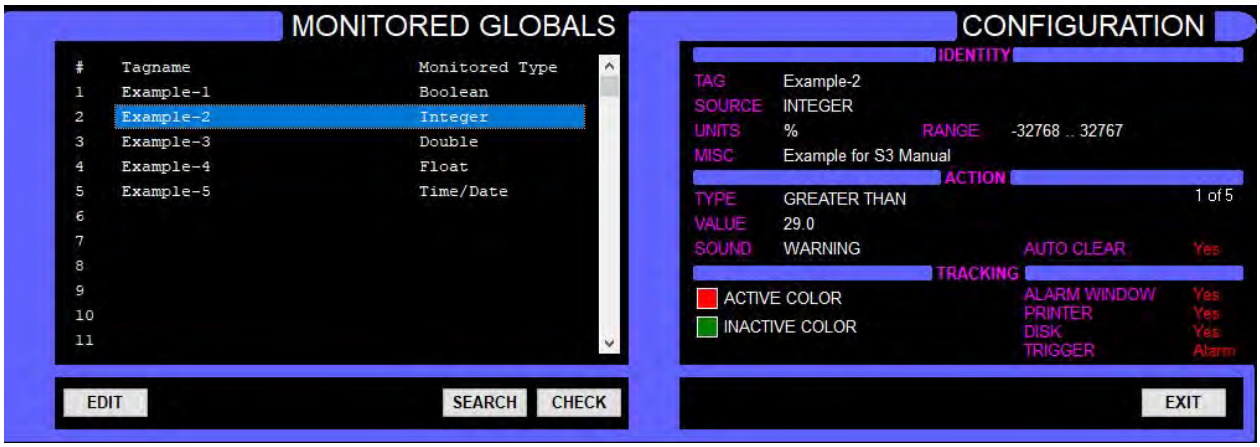
- P: Printer (Tractor feed event printer)
- D: Disk (Daily log file)
- W: Window (One line FIFO display)
- AC: Auto Clear (Event directly tracks the “raw” data state and doesn’t require operator acknowledgement)
- FL: Fault (Designates the event to be considered a fault instead of an alarm)



In the completed sample above, when the analog value exceeds 29, the event “30 Seconds Remaining” will be logged to the printer (in red), daily log file, event window, and the OIS will play the “Warning” sound.

When the value drops below 29, the event will automatically clear.

Selecting a “Monitored Global” displays its associated configuration data in the “Configuration” pane to the right of the globals list.

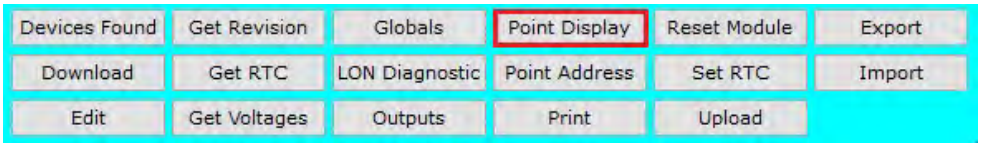


This provides an at-a-glance, complete configuration overview of the selected global.

Since hundreds of monitored global points can be created, a “Search” button is provided to quickly locate a specific point by the user entering all or part of the text from the point’s tagname.

A “Check” button ensures that the monitored global is indexed to a valid tag in the controller. If the tag has been deleted after the creation of the monitored global, an error will be generated.

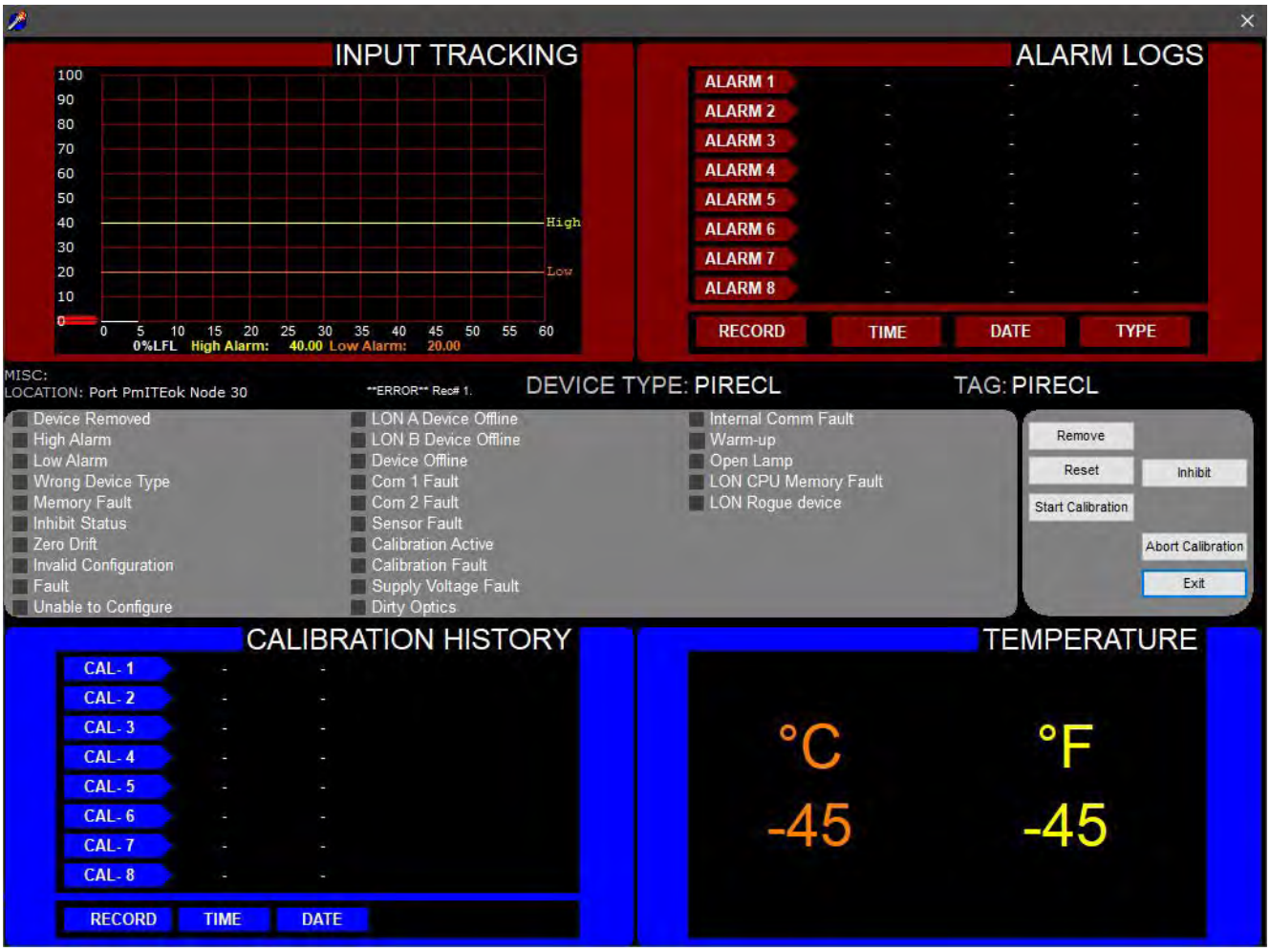
11.3.1.4 Point Display



Shows detailed information about a selected node including status and diagnostics, alarm history, calibration history and trend, and if applicable the current analog value. To access a device point display, select the device from the LON schematic by single clicking on it. It will highlight as shown below.

Select the “Point Display” button and the appropriate display will open.

Each device type has a point display that is specific to the information available for its type of field device. In the following example, a Point IR Gas Detector (PIRECL) is selected.

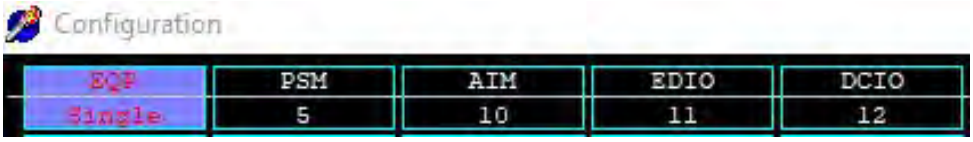


Both configuration and dynamic information for the device are arranged in a logical manner and presented on a full screen template. If the controller is not currently connected and communicating with the S^3 station, then no "watchdog timeout" will be displayed for the selected point. Only simulated data is displayed.

From this PIRECL point display, a user can perform the following:

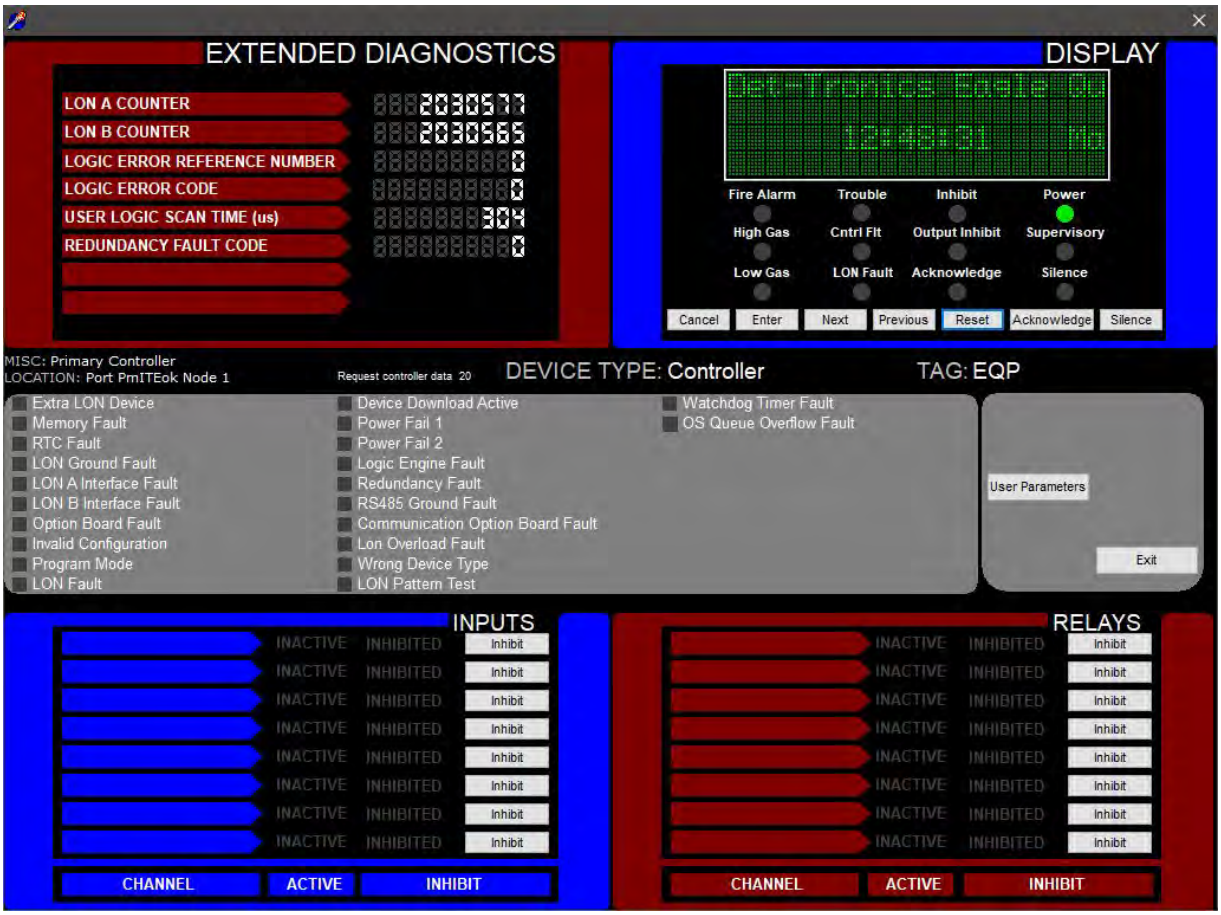
- Initiate calibration
- Reset alarms (latches)
- Inhibit the device

In the example below, Node 1, the EQP Controller is selected.



When the “Point Display” button in the command bar is selected, a point display template specific to the controller is brought up.

Point displays are very useful in determining the status of the device, for resetting faults, inhibiting functions, checking calibration and alarm histories, and in the case of the controller, the faceplate’s scrolling text display is simulated.



Using the Controller Point Display, the user has the following options:

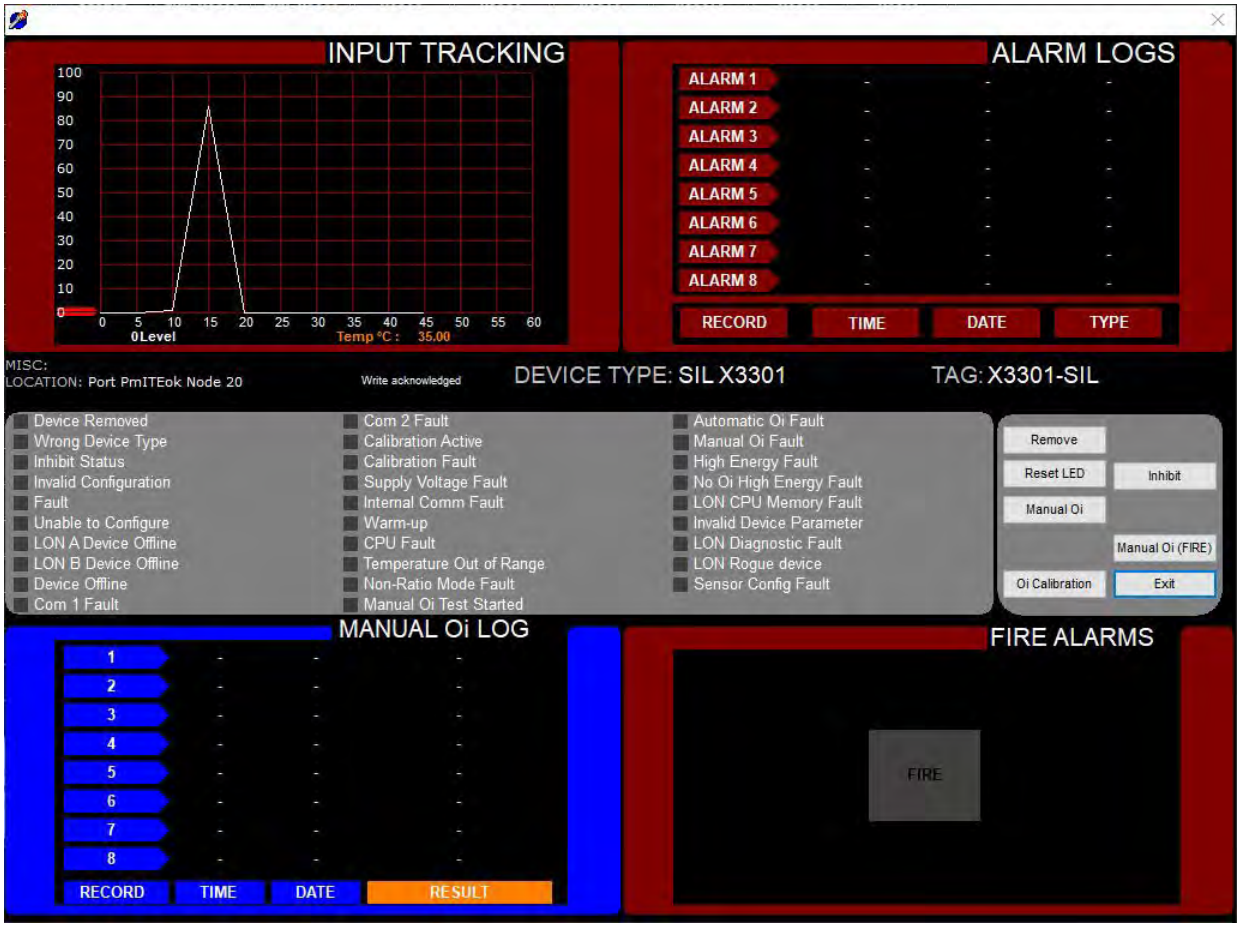
- Cancel
- Enter
- Next
- Previous
- Reset
- Acknowledge
- Silence the controller
- Inhibit the Inputs or Relays

11.3.1.4.1 X3301 Point Display

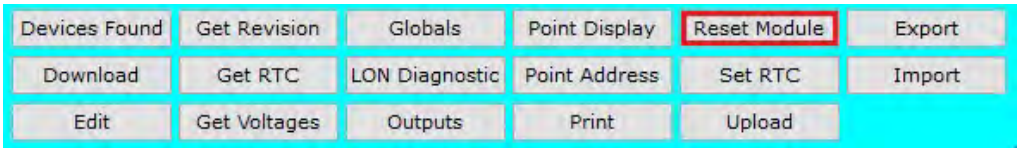
Provides the user with the ability to initiate an Oi calibration.

NOTE

The face of the detector should be covered with IR absorbing material, such as the shipping cover, prior to commencing an Oi calibration.



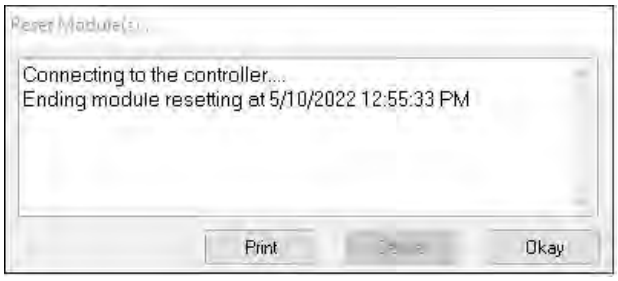
11.3.1.5 Reset Module



This command forces a selected field device to perform a “soft restart” effectively “rebooting” the field device. This will also reset any latched alarms, faults, outputs, etc.

The reset command can be sent to a single selected device or a group of devices. In the example to the right, a group of nodes 1-125 was selected from the LON schematic and the reset command issued.

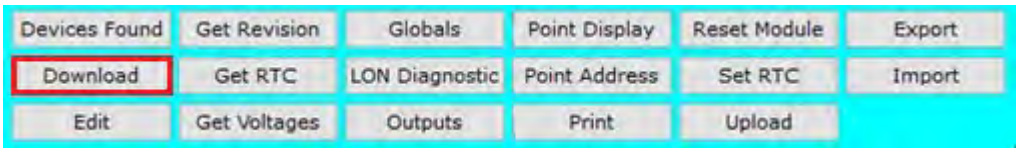
The controller then sent the reset command to the appropriate devices and logged the activity to the “Reset Module(s)” dialog box to provide feedback to the user.



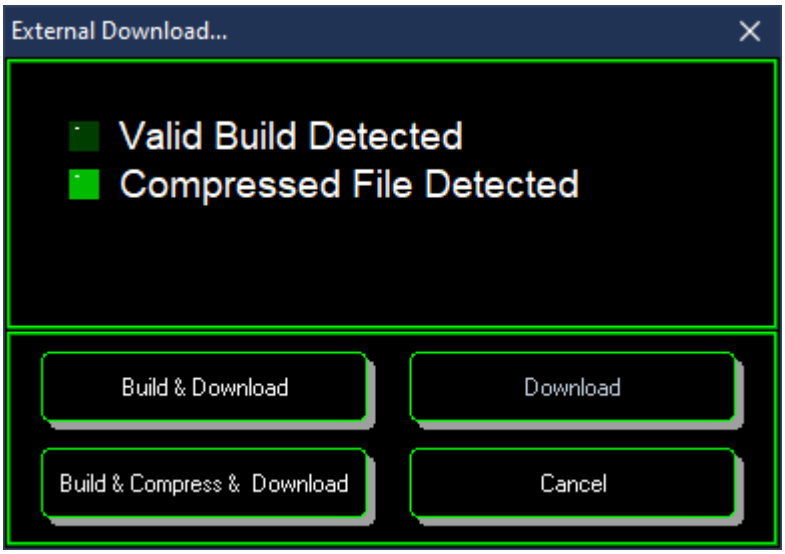
11.3.1.6 Download

Sends all configuration data from S³ LON configuration database to the controller. This command must be used after changing the configuration of a node, group of nodes, or controller logic.

To send configuration data to the devices on the LON, choose “Download”. This will cause S³ to sequentially download the configuration of all nodes, starting with LON address 1 and ending with the last configured node.



When the Download button is pressed the user will be presented with the following screen (options):

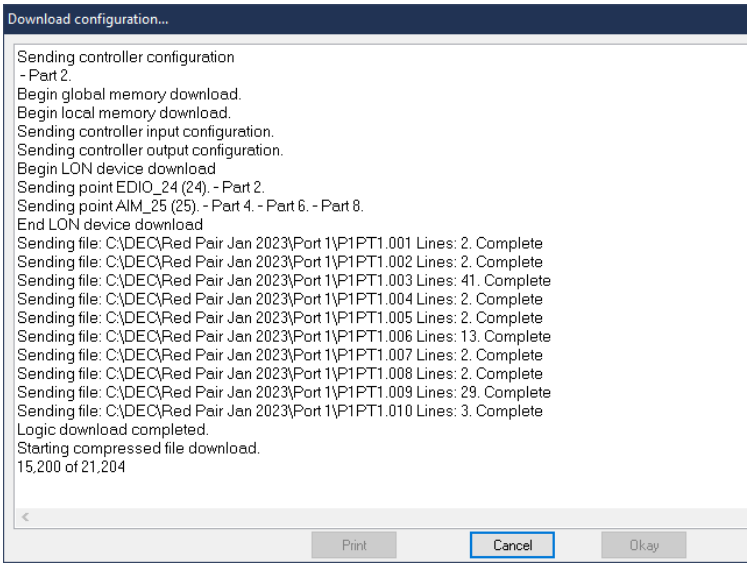


‘Build & Download’ will check for errors and then download to the controller, without storing a copy meaning the file cannot be uploaded/retrieved in the future.

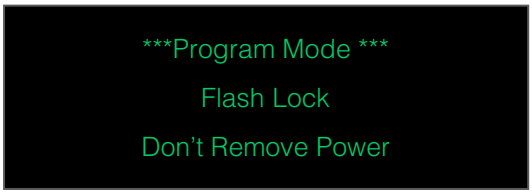
‘Download’ will download the current file/configuration, without storing a copy.

‘Build & Compress and Download’ will also create a compressed file that is then stored in the controller for future retrieval (this would be good practice).

When one of the above options is selected, another screen will open showing the progress of the download:



When the download is active, the controller display will display, as shown:

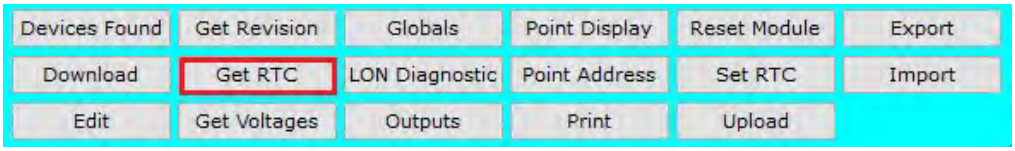


If the controller is a redundant pair a download will cause a redundancy switch while the download is active.

Once the download is complete the user can select 'Okay' to close the status screen, and the controller will resume as normal and reflect the current system status.

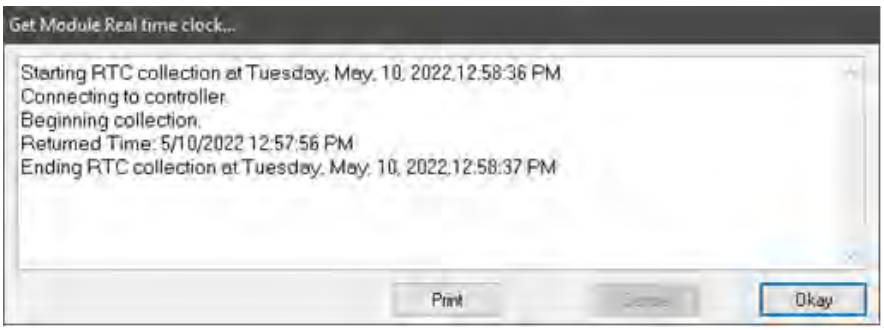
An event will be created in the user log to record that a download was performed.

11.3.1.7 Get RTC



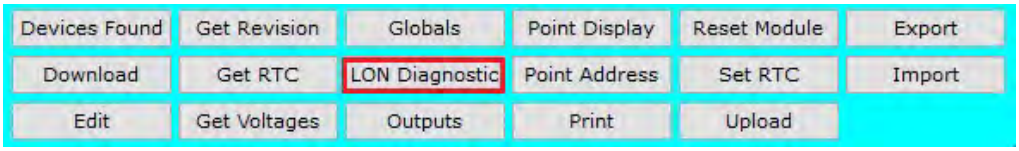
Get RTC reads the current date and time in the attached controller.

The gateway will return the current date and time, according to its internal clock. Verify this date and time against that of the S^3 station for accuracy. If it is not the same as the S^3 station, use the Set RTC command (described later) to correct the discrepancy.



Since the field devices all use the controller's date and time pulse when storing their own alarm and calibration data, it is important to verify the proper time on the PC and then match the clock used by S^3 station for event monitoring and tracking.

11.3.1.8 LON Diagnostic



Displays a graphic "LON Schematic" displaying dynamic information about the LON and the devices residing on it.

The schematic begins with Node 1, the controller, in the upper left corner and a line representing the communication network (LON) running back and forth across and down the screen.

The LON is typically wired as a loop starting and ending at the controller although the schematic does not show this for aesthetic reasons. The end of the LON at the lower right is assumed to connect back to the controller at the top left of the screen.

The default display is in numerical order, which may not reflect the actual connection order in the field. The nodes can be moved manually to reflect the actual connection order.

Each configured device is represented by a rectangle bisected longitudinally with the tag name displayed in the upper section and the node number (LON address) displayed in the lower section.

Diagnostic data is displayed to two ways on the display, through the color of the rectangle defining each node, and through indicators and counters at the bottom of the screen.

On an intact LON, each of these transceivers receives information from all the field devices at roughly the same time.

The LON is typically wired as a loop, starting and ending at the controller, which has two physical interfaces (transceivers), labeled "A" and "B".

A node's proximity to one or the other transceiver along with the propagation delay of long wiring distances and/or network extenders will induce a small time differential. This differential will cause an individual nodes message to be read by either the A or B transceiver first and processed by the controller.

If the last message processed by the controller for a node comes through the "A" transceiver the rectangle representing that node will have a green outline on the diagnostic LON schematic. If it comes through the "B" transceiver its rectangle will be outlined in yellow.

11.3.1.8.1 Normal LON

On a healthy LON with good network integrity, message traffic will appear random and each node's outline color will constantly change without any pattern.

11.3.1.8.2 Faulted LON

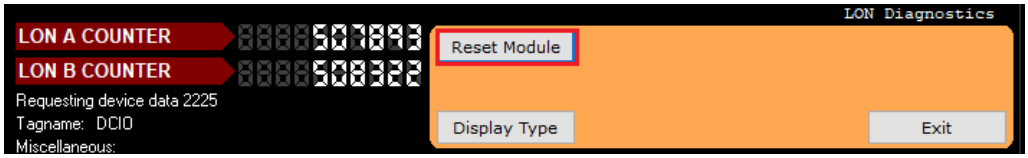
On a faulty LON with a break in the wiring or other abnormal condition, message traffic may have only one path to the controller. This would be indicated graphically by all nodes before the problem changing to one color (green or yellow) and the nodes after the problem changing to the other color. The area where the color transition occurs is most likely the problem area.

In this way the LON diagnostic display can be used to localize LON wiring problems. In addition to the graphic representation of message traffic on the display, quantitative data is available for diagnostics through indicators and counters.

If a node on the schematic is selected (by single-clicking on its rectangle) the five indicators in the lower left of the screen will show the diagnostic data from the selected node.

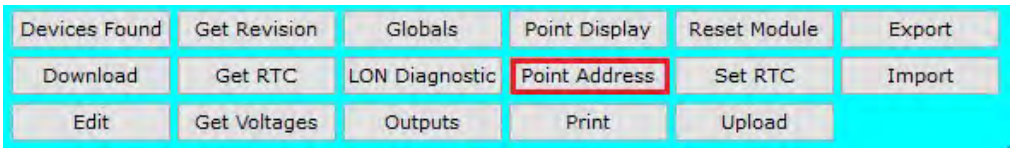
To the right of these indicators are LON counters that show message processing by the controller. On a healthy system the counters should be close to equal. On a system with a degraded network, there may be a significant offset showing either the "A" or "B" transceiver getting most of the traffic.

11.3.1.8.3 Reset Module



To the right of the LON counters is the “Reset Module” button. This command forces a selected field device to perform a “soft restart” effectively “rebooting” the field device. This will also reset any latched alarms, faults, outputs, etc.

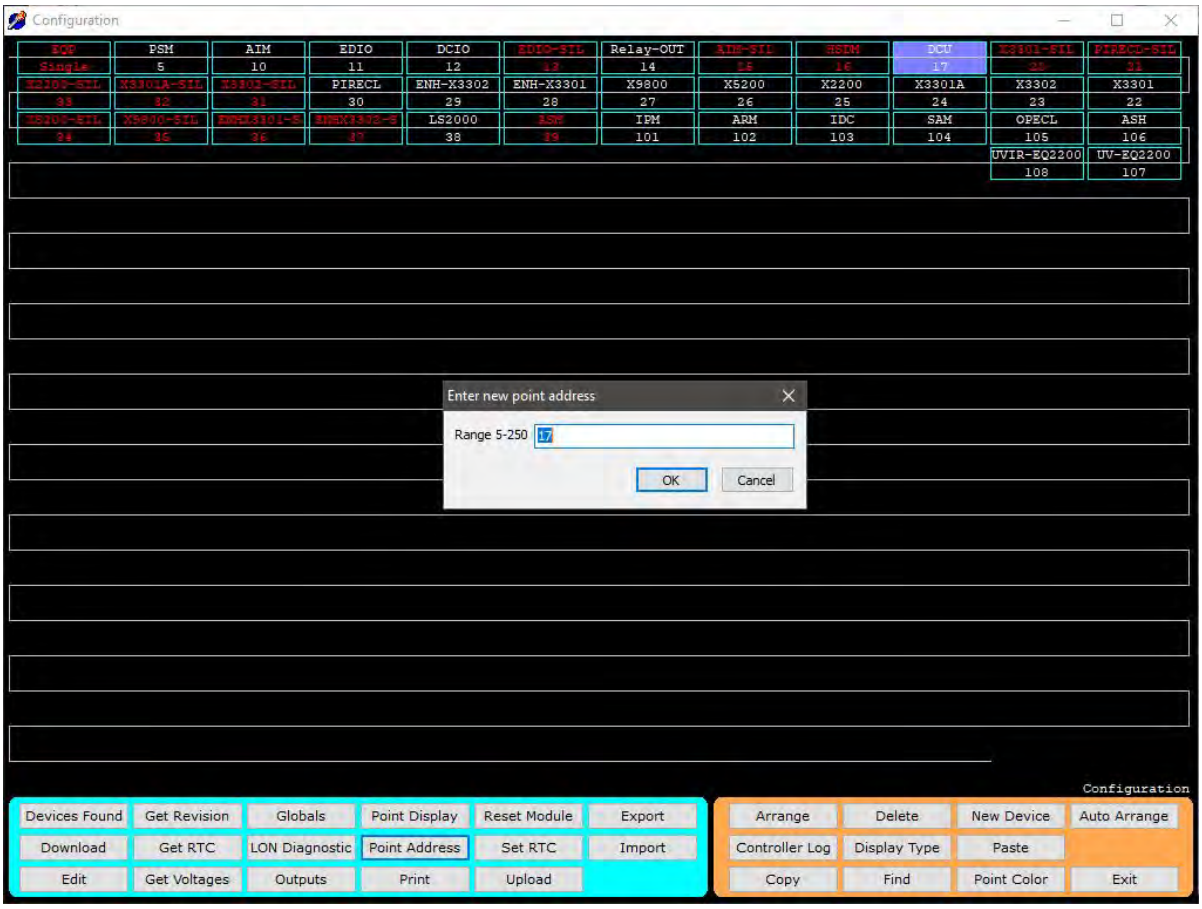
11.3.1.9 Point Address



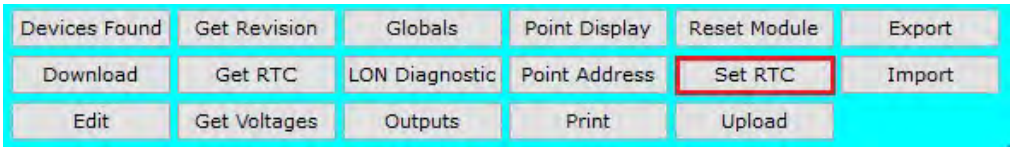
Allows a node on the LON schematic to be given a different address.

This is typically used when similar nodes are copied and pasted to preserve a particular set of configuration parameters. After the paste function, the “new” node may have an incorrect address and it must then be changed.

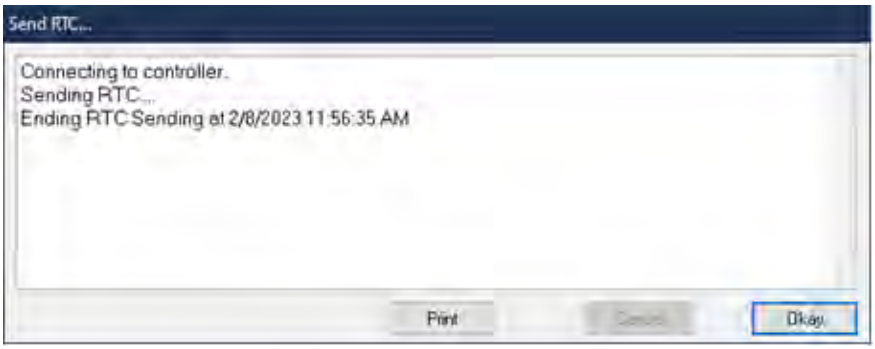
To use this function, select a node by single-clicking on its rectangle. Once the node is highlighted, click on the “Point Address” button and the “Enter new point address” dialog box will appear. Enter the desired new node number and the click on the “OK” button.



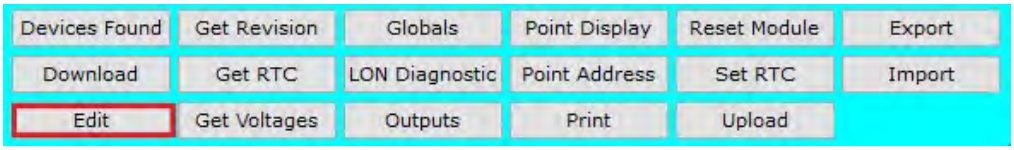
11.3.1.10 Set RTC



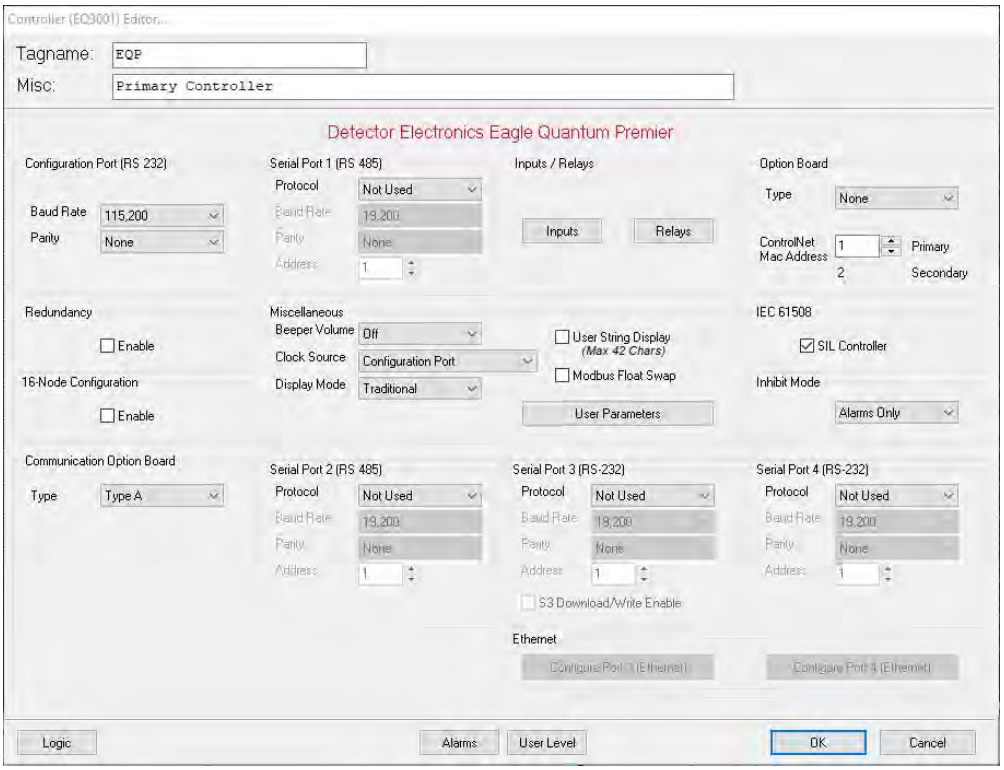
This button will set the EQP controller RTC with the current PC's date and time. A status window will open to show process and it can be closed with “Okay”.



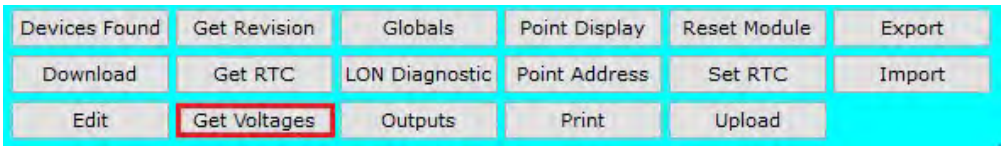
11.3.1.11 Edit



Below is an example of the controller configuration screen. Detailed examples of node editing, for each device, will be shown in the Premier Device Configuration section of this document.



11.3.1.12 Get Voltages



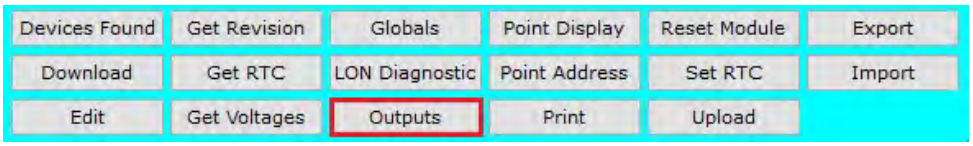
Displays 24 Vdc supply voltage information for uses such as troubleshooting power distribution problems.

Selecting the “Get Voltages” button will display a graphic LON Schematic upon which S^3 will overlay dynamic 24 Vdc power supply data from each compatible field device.

Certain previous generation Eagle Quantum field devices may not be compatible with this command.

In the example below, nodes 12, 14, 15 and 16 are compatible and display the node address in the lower left with the supply voltage in the lower right. Nodes 13 and 22 are older styles, and therefore, a UVIR or UV optical flame detector cannot support this feature and only displays its node number.

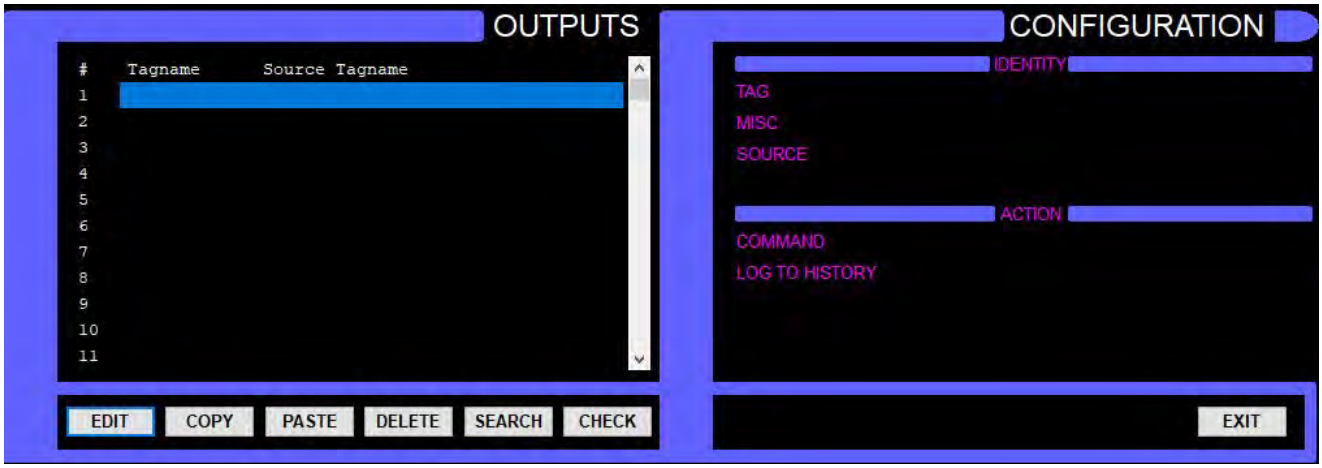
11.3.1.13 Outputs



Tags linked to commands to be sent to the controller or field devices on the LON are configured here.

Each “output” is a tag in the DCD database that references a command or controls a memory location within the Premier controller.

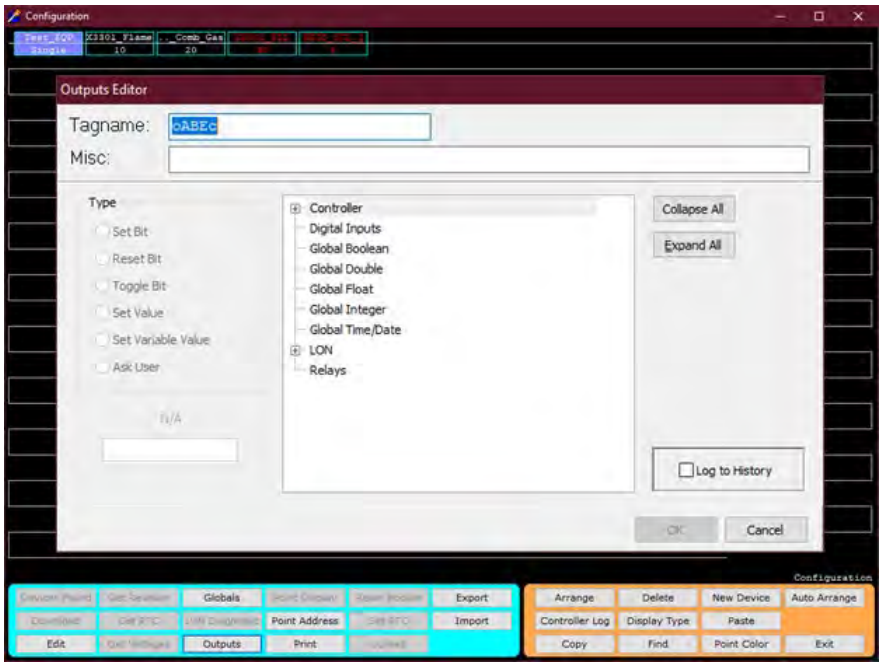
Select the “Outputs” button from the command bar to access the configuration screen.



The screen is divided into two sections, Outputs and Configuration. On the left side, the Outputs Pane consists of a scrolling list showing all configured output tags in the database. Below the list are buttons for creating and maintaining the tag list.

On the right side is the Configuration Pane, which will show the details of any selected output from the list.

To create an output, double click on one of the “slots” in the scrolling list or select a slot and click on the “Edit” button below the list. This will display the “Outputs Editor” dialog box.



The Outputs Editor provides two data entry fields, the first for entering the tagname desired for the configured output, the second provides for a “long description” of the tagname function.

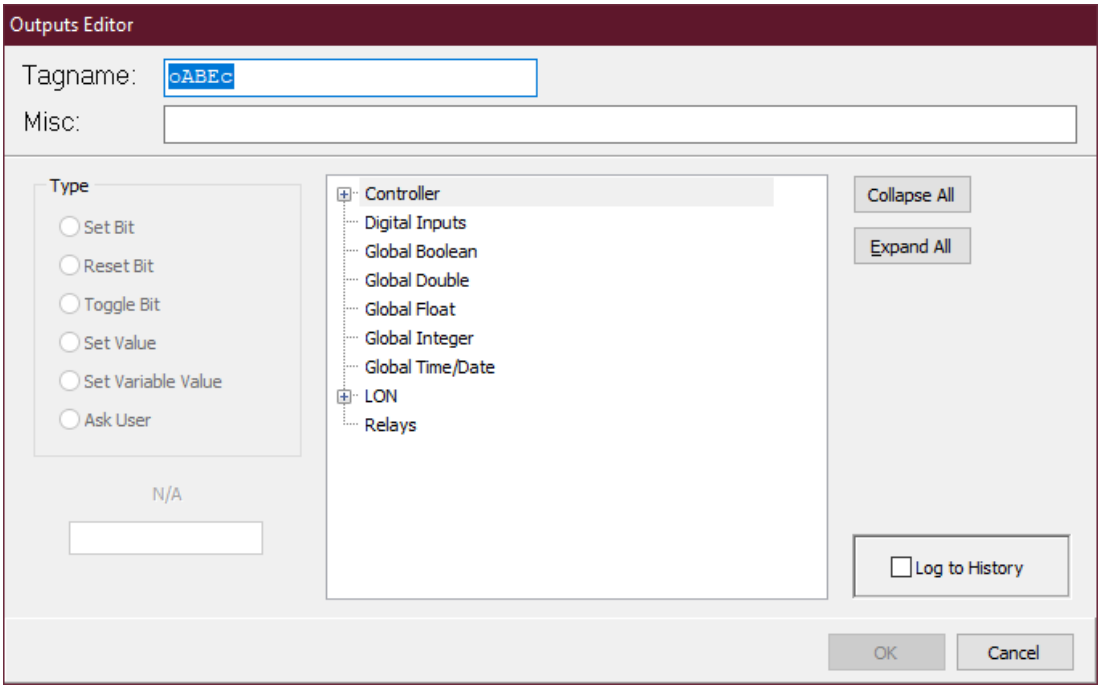
Below these two fields is a hierarchal list of “destinations” to tie the output to the database.

Any item on the list that has a “+” before it has subordinate items and clicking on the “+” will expand the list showing all items that make up that category.

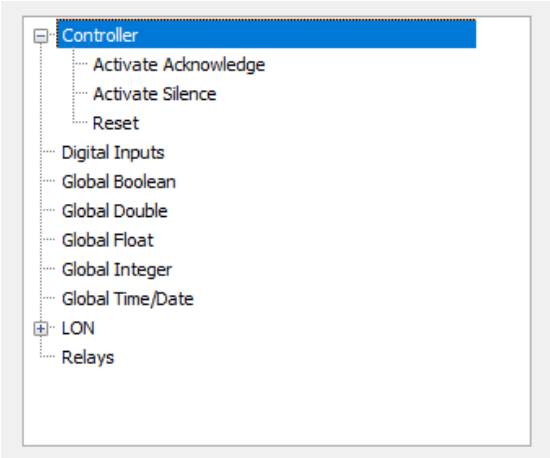
To the right of the list are two buttons that can “Expand” or “Collapse” all subordinate items in the list for easy viewing.

A checkbox in the lower left of the Outputs Editor dialog box determines whether the configured output will be logged to the history file upon execution.

Below is the Output Editor dialog box just after opening. A random, unique tagname is generated by default by S^3.



The firsts twelve items on the list provide access to controller commands and the global database. The “LON” item will allow access to all field device command functions, the “Relays” item is for accessing the controller’s onboard relays.



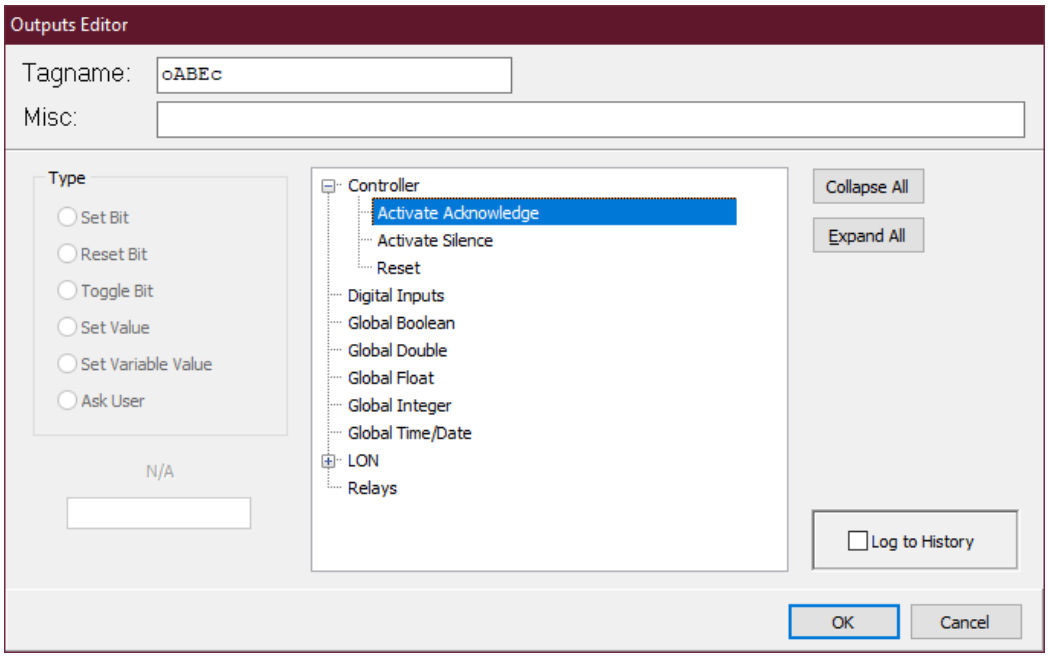
In the example to the right, the “Controller” item has been expanded by clicking on the “+” sign and now shows three subordinate items, Activate Acknowledge, Activate Silence and Reset.

As these additional items are revealed, the list extends beyond the bottom and becomes scrolling.

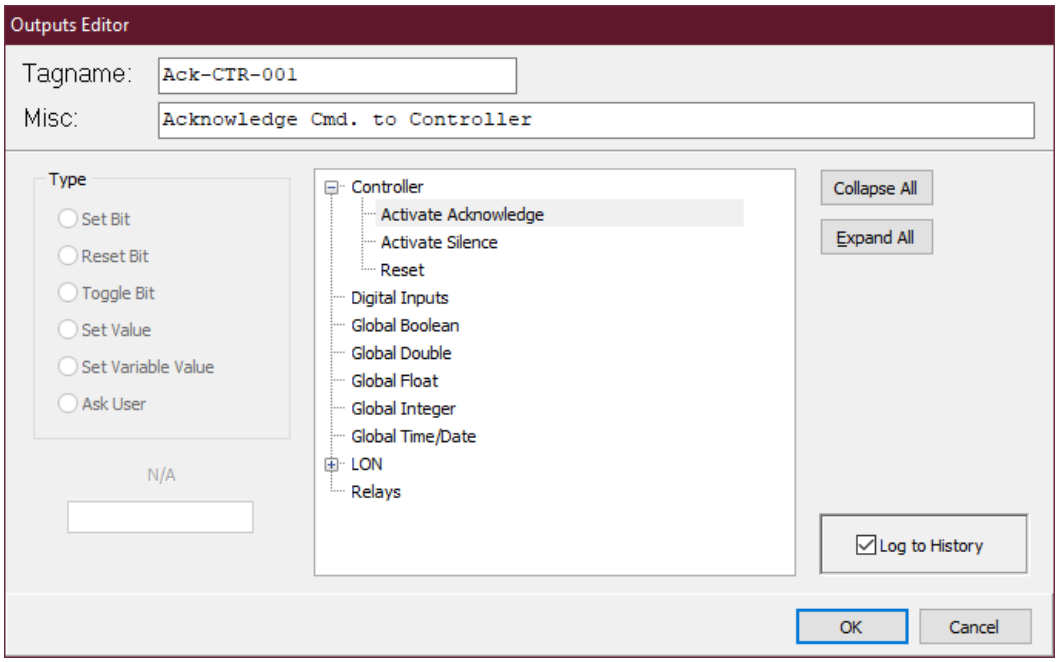
The hierarchal arrangement of items provides an easy and logical method of accessing the thousands of potential items that could be configured as outputs on a large premier system.

11.3.1.13.1 Sample Output Configurations

Example 1 involves an output to acknowledge an alarm on the controller. With the controller selected and its item list expanded select the “Activate Acknowledge” item.

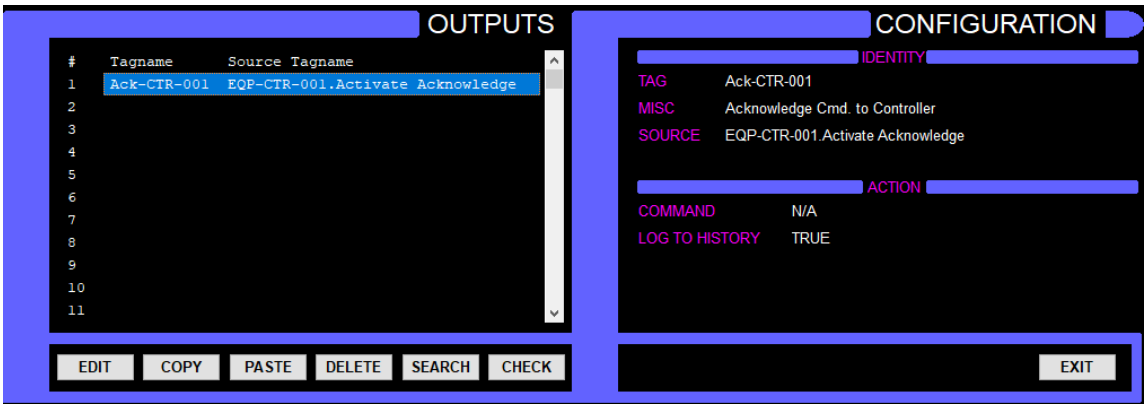


Next, create the tagname and miscellaneous comments and select “Log to History” to complete the configuration.

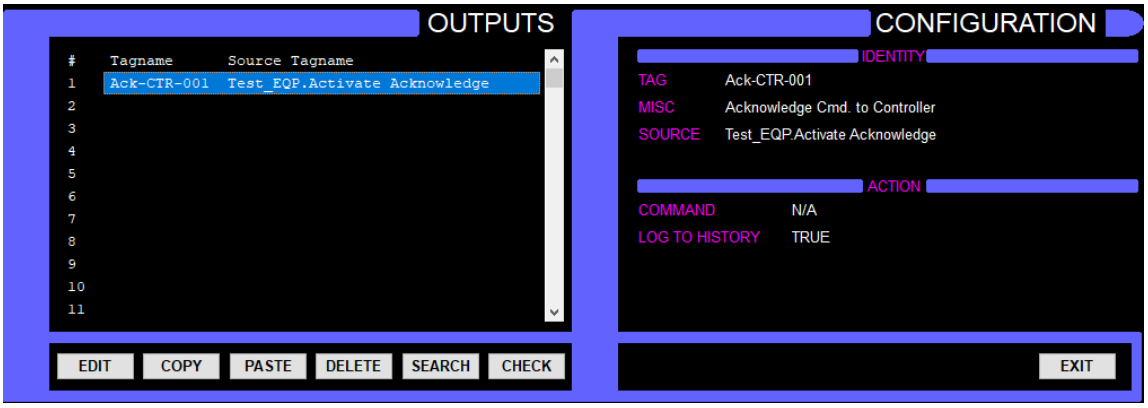


When the configuration is complete, click the “OK” button in the lower right of the dialog box.

The configured output #1 is now displayed both in the output list on the left along with its details displayed in the configuration pane on the right.

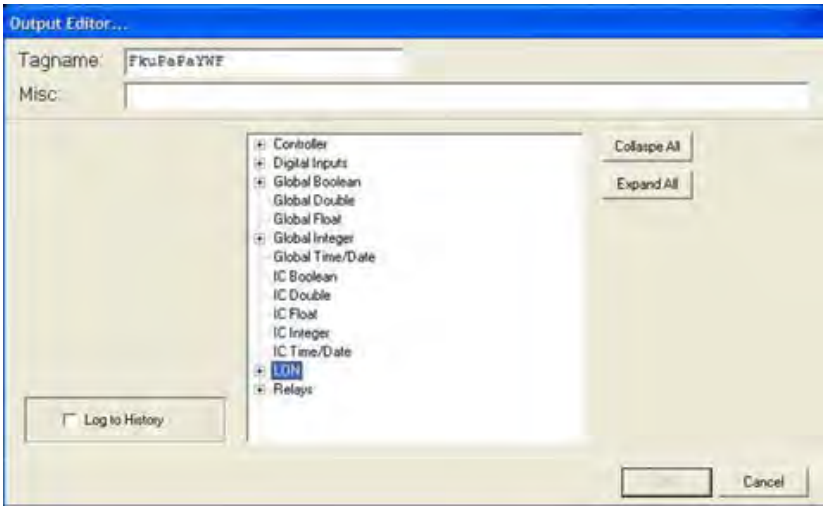


Example 2 involves creating an output to reset an Agent Release Module (ARM) on the LON. This output will be configured in output slot #2.



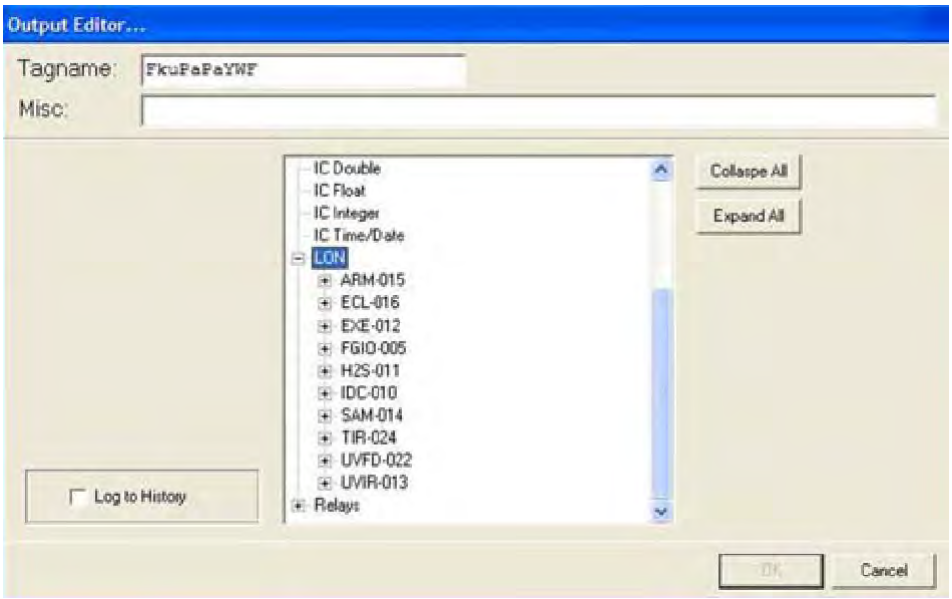
Double click on the second slot, or single click the slot and select the “Edit” button in the bottom left of the output pane to open the “Output Editor” dialog box.

Notice that a random tagname has been entered automatically. Next select the “LON” item. All field devices will be listed under this item.

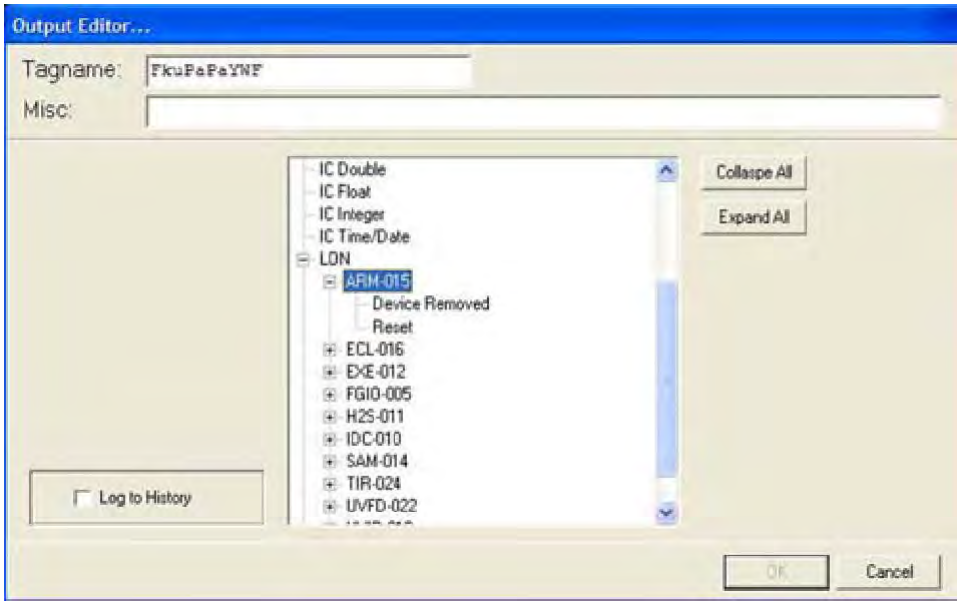


Clicking on the “+” sign left of the “LON” item will expand it revealing the devices on the LON. In this sample program, there are only 10 field devices, but in typical systems there could be dozens.

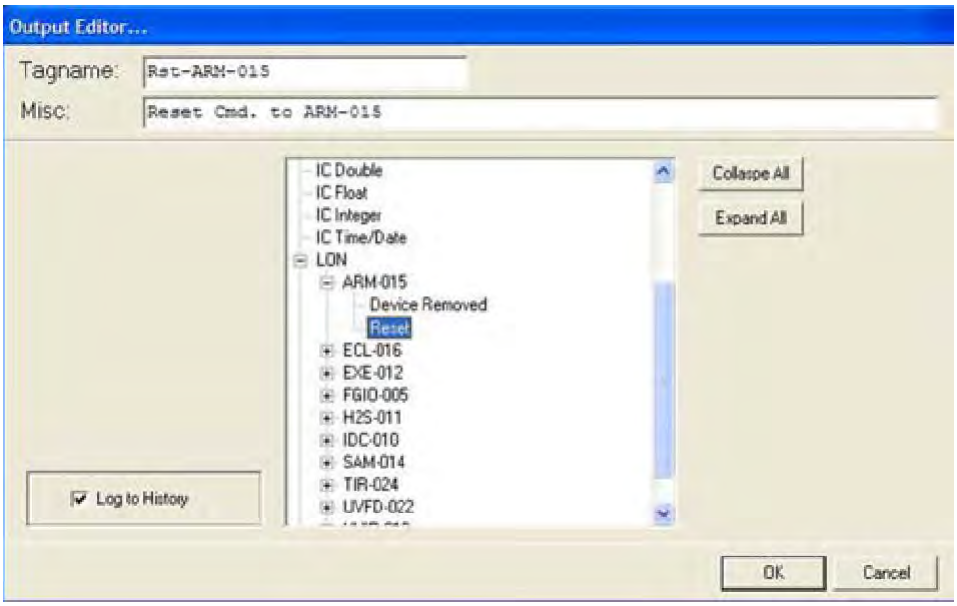
Notice that each LON field device has the "+" sign to its left, signifying that there are subordinate items associated with them. The number of subordinate items will vary by device type.



Expand the "ARM-015" item to display its subordinate items. An ARM has only two selections; "Device Removed" and "Reset".



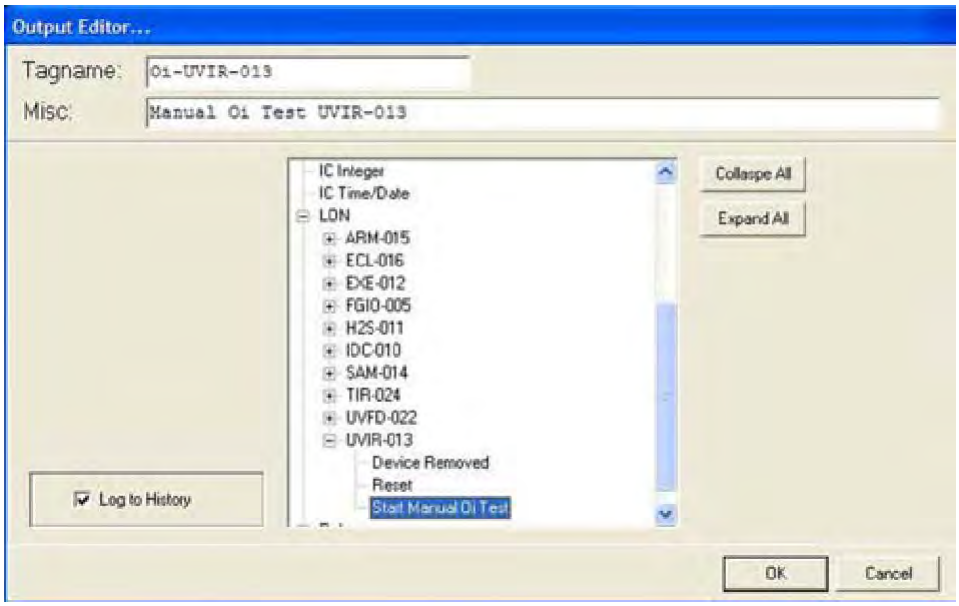
Select the “Reset” item from the ARM-015 list, fill in the tagname and miscellaneous fields, and then select “Log to History” to complete the configuration.



Then select the “OK” button in the lower right of the dialog box to complete the configurations entry into the database.

This completes the configuration of the first two output “slots”.

Example 3 involves creating an output to initiate a manual Optical Integrity (Oi) test on a UVIR optical fire detector. This output will be configured in output slot #3.



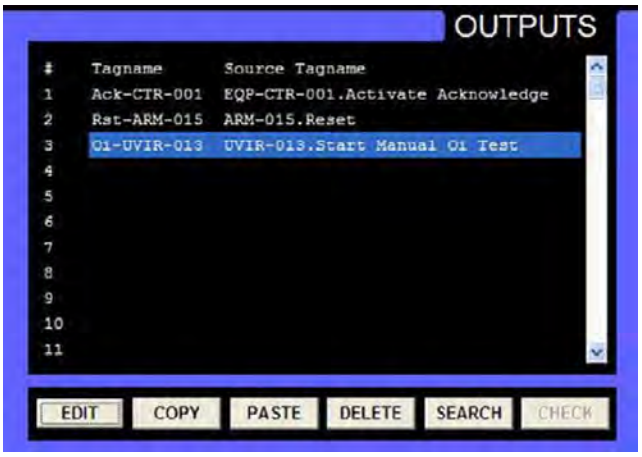
Above is the output editor dialog box with “UVIR-013” expanded, “Start Manual Oi Test” selected, and the tagname and miscellaneous fields filled out.

Notice that the UVIR detector has three subordinate items instead of two as in example 2 with the ARM module.

The three examples for output tags are now complete and the configuration information is displayed on the “Outputs Configuration” screen.

11.3.1.13.2 Output Configuration Screen Details

The left-hand pane uses a scrolling list with three columns to display the configured outputs and allow for their editing.

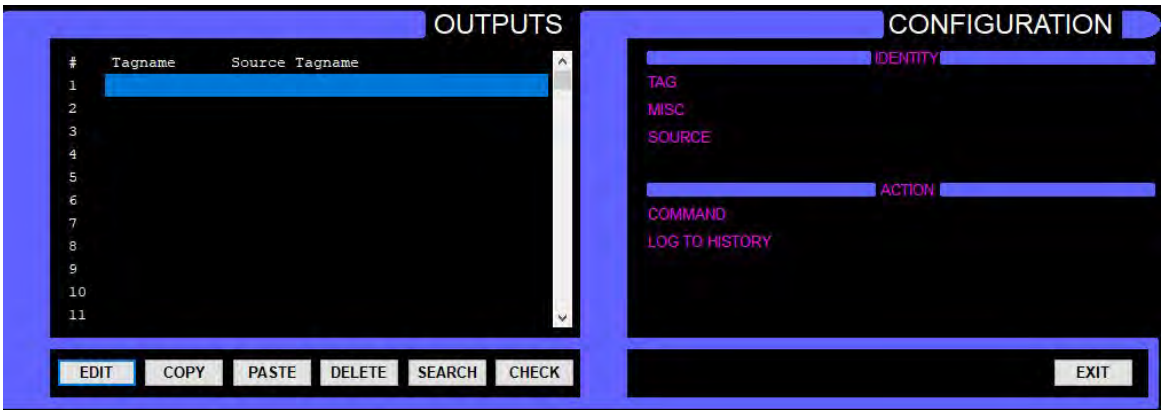


The first column "#" contains the slot number for the outputs in the database. In the example above, the first three slots are configured.

The second column contains the "Tagname" that is used within the database to identify the item. This tagname will be used throughout the S^3 environment, and specifically within the graphic editor when assigning these outputs to user configured buttons.

The third column "Source Tagname" displays the tagname of the device that the output is associated with followed by the command function. In the highlighted example of slot 3 above, the source is UVIR-013 and the command function is "Start Manual Oi Test".

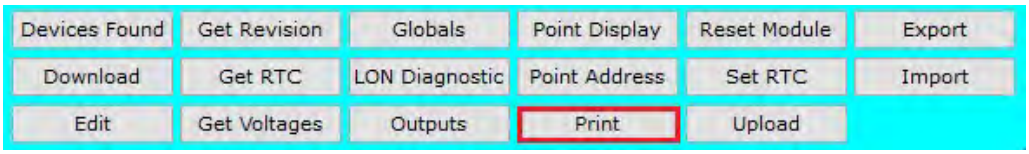
This is then represented in the output list as *UVIR-013.Start Manual Oi Test*.



The six buttons at the bottom of the Outputs pane perform the following functions:

- **Edit** opens the "Output Editor" dialog box to allow an output to be configured for slot selected.
- **Copy** allows a selected slots' configuration to be copied for pasting into another slot to speed up the configuration of similar outputs.
- **Paste** used with "Copy" above, allows a copied slots configuration to be pasted into the selected slot to speed up the configuration of similar outputs.
- **Delete** immediately and permanently erases a slots configuration. This function is not reversible, so use with caution.
- **Search** allows for locating matching text strings to quickly find a desired slot for viewing or editing, since thousands of outputs can be configured.
- **Check** is primarily used following editing of the LON configuration to verify that all configured outputs are still linked to valid items in the database.

11.3.1.14 Print

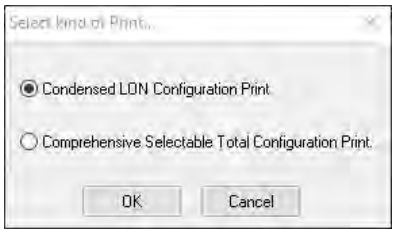


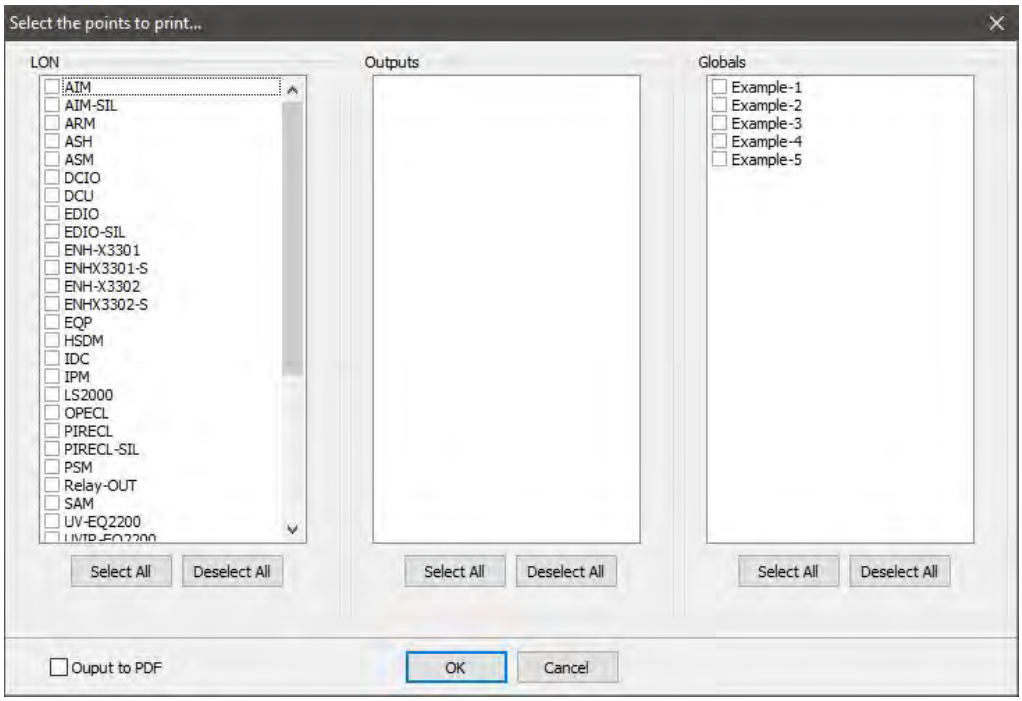
Allows for the select printing of configuration information for the controller, field devices and database for documentation purposes.

NOTE

This command will send the selected configuration data to the default Windows printer, not the alarm and event printer.

Once the “Print” button on the command bar is selected, the print selection dialog box will open, asking to select between "Condensed LON Configuration Print" or "Comprehensive Selectable Total Configuration Print".



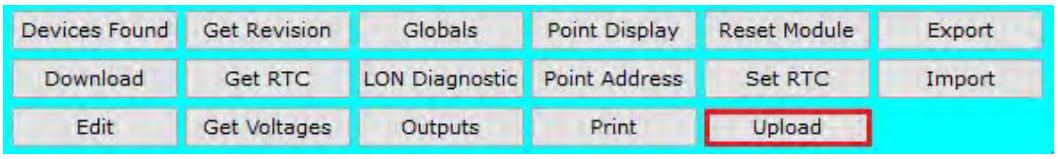


The dialog box is divided into three main selection areas, LON, Outputs, and Globals. All configured items for each category are displayed along with a checkbox to select the items data for printing.

At the bottom of each column are “Select All” and “Deselect All” buttons to aid in the rapid selection of data to print.

Optionally, the data can be output to “PDF” format by using the checkbox in the lower left of the dialog box.

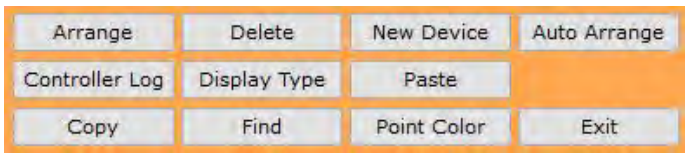
11.3.1.15 Upload



Queries the controller for its configuration, and if a complete configuration was properly stored, it will be uploaded and saved to a newly created project (refer to Section 8-5 for creating a new project). The current project will not be changed.

The "Upload" command is typically used when attaching an S^3 station to an existing system for which there is no existing database on the S^3 station. When upload is complete, the user will be asked where to save the file on their device.

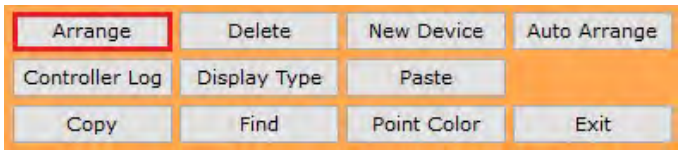
11.4 Configuration Bar



The configuration bar has eleven buttons, each of which is used in the configuration of the LON and creation of LON devices.

11.4.1 Configuration Button Definitions

11.4.1.1 Arrange



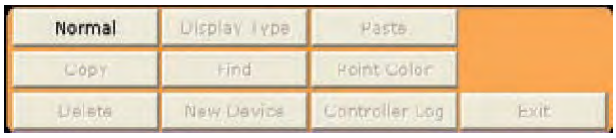
This button allows the re-arrangement of the nodes on the LON schematic for the purpose of matching the physical and logical order of the network.

This must be done to optimize the functionality of the LON diagnostic screen. On the example network schematic shown below, the node order is shown numerically. Node 1 being the controller, followed sequentially by nodes 5, 10, 11, 12 ... etc. In the plant, it's entirely possible that "Node 5" may wire to "Node 20" and the overall order could be 1, 5, 20, 21, 23 ... etc.

The “Arrange” button allows movement of the location of the nodes on the schematic representing the LON to match the actual way the LON is wired in the field. This is an important step for ease of future LON troubleshooting.

To use the “Arrange” function, click on the “Arrange” button and drag the nodes into their desired locations. To move a node, click and drag it over the node to be displaced to the right, then release the mouse button. The node will then be moved to this location but retain its original address.

When the physical and logical addresses have been reconciled, select the “Normal” button to return to the standard LON configuration screen.

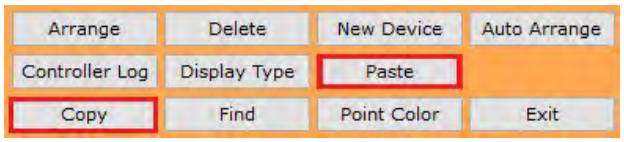


11.4.1.2 Display Type

A “toggle button” that allows either the default Node Number to be displayed on the LON schematic, as shown in the example below, or the device type.

When the “Display Type” button is selected, the LON schematic will substitute the device type for the node number, as shown below. When the device type is being displayed, the button on the configuration bar will toggle to say, “Display Address”, and when selected, shifts the LON schematic display back to the default Node Number view.

11.4.1.3 Copy/Paste

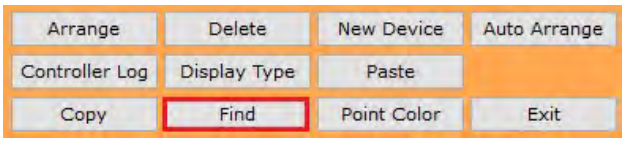


Used in conjunction with the “Paste” command, “Copy” allows a nodes configuration to be duplicated elsewhere on the LON while retaining the configuration data.

This is very useful when there are to be many nodes of the same type and configuration on a LON. The detailed configuration only needs to be done once, then copy and paste as many as needed with only the new nodes tag name and address needing to be manually entered.

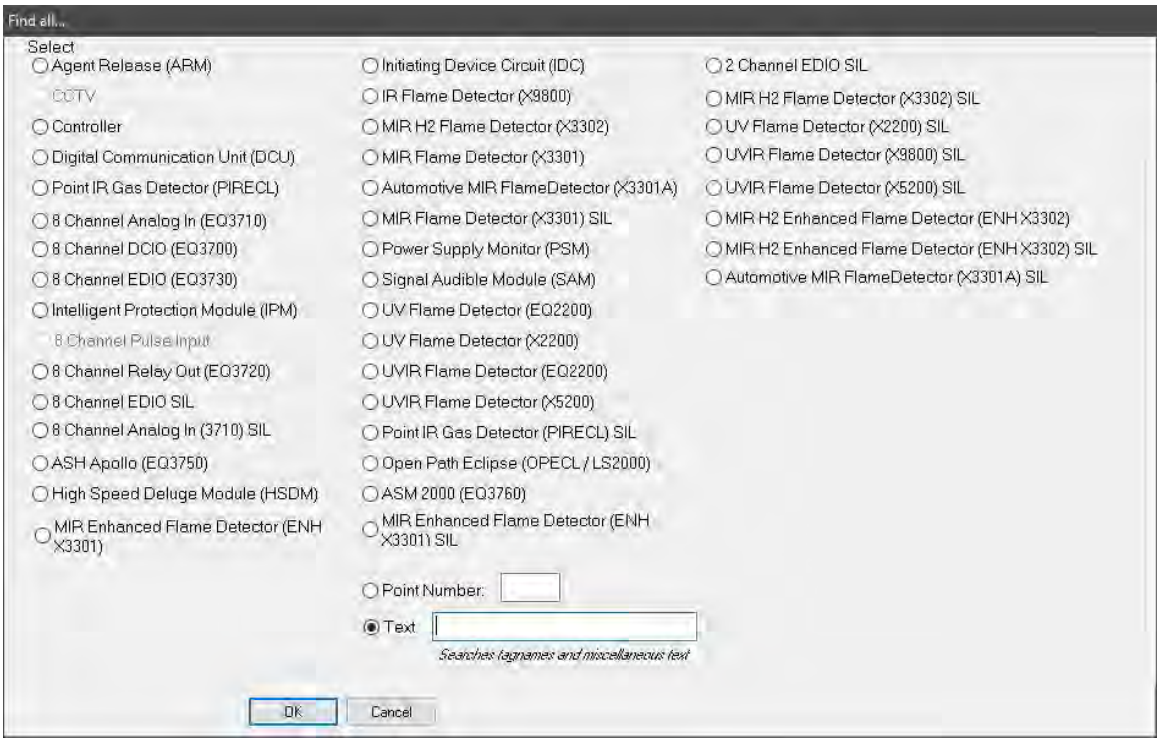
To copy a node, select it by single-clicking on the device, then selecting the “Copy” button. The “Paste” button will produce a new device with all the configuration from the copied node. Simply enter the new tag name and miscellaneous text.

11.4.1.4 Find



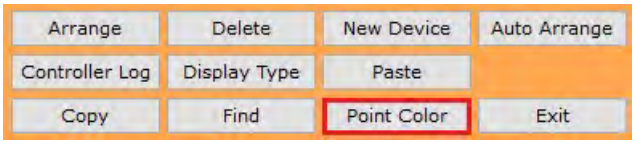
Displays a dialog box that allows the configuration database to be searched for specific types of field devices, a specific node address, or specific text.

The “Find” button will open the “Find all...” dialog box, which provides radio buttons for selecting a device type, and fields for either a LON address or text from either the tagname or miscellaneous text.

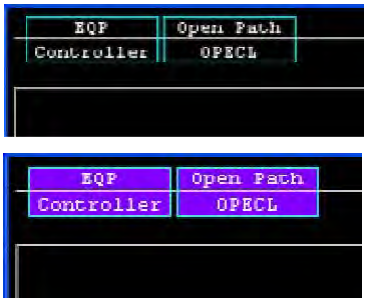


Items found matching the search criteria are highlighted in blue on the LON schematic. This is particularly useful when trying to find a specific tag name on very large systems with hundreds of points.

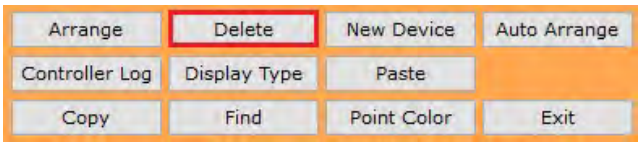
11.4.1.5 Point Color



If at any time a field device becomes difficult to view above the black background, the “Point Color” button enables the user to choose a new background color to help the device stand out for better viewing.

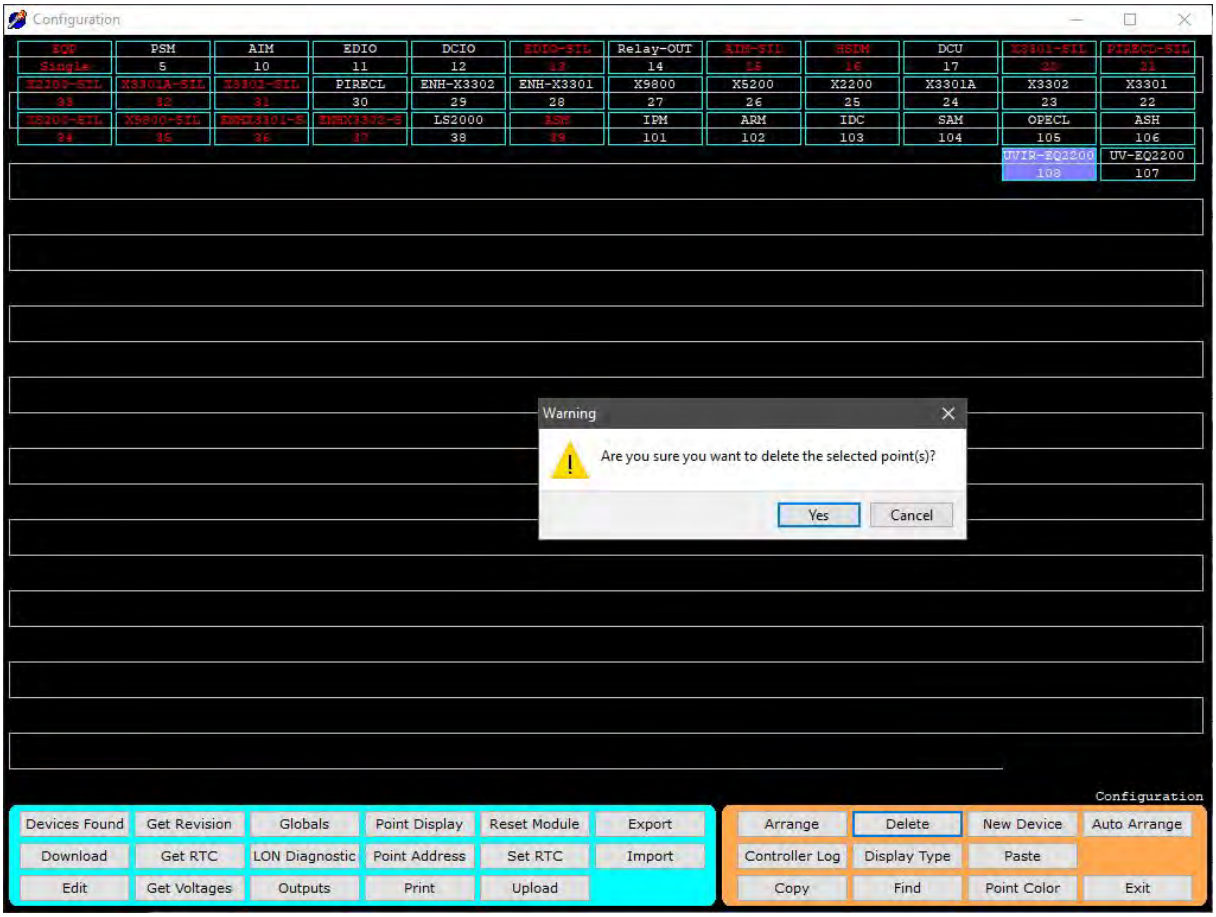


11.4.1.6 Delete



Removes a selected node from the LON configuration.

Select a node or multiple nodes on the LON Schematic and then select the “Delete” button to remove them from the database.

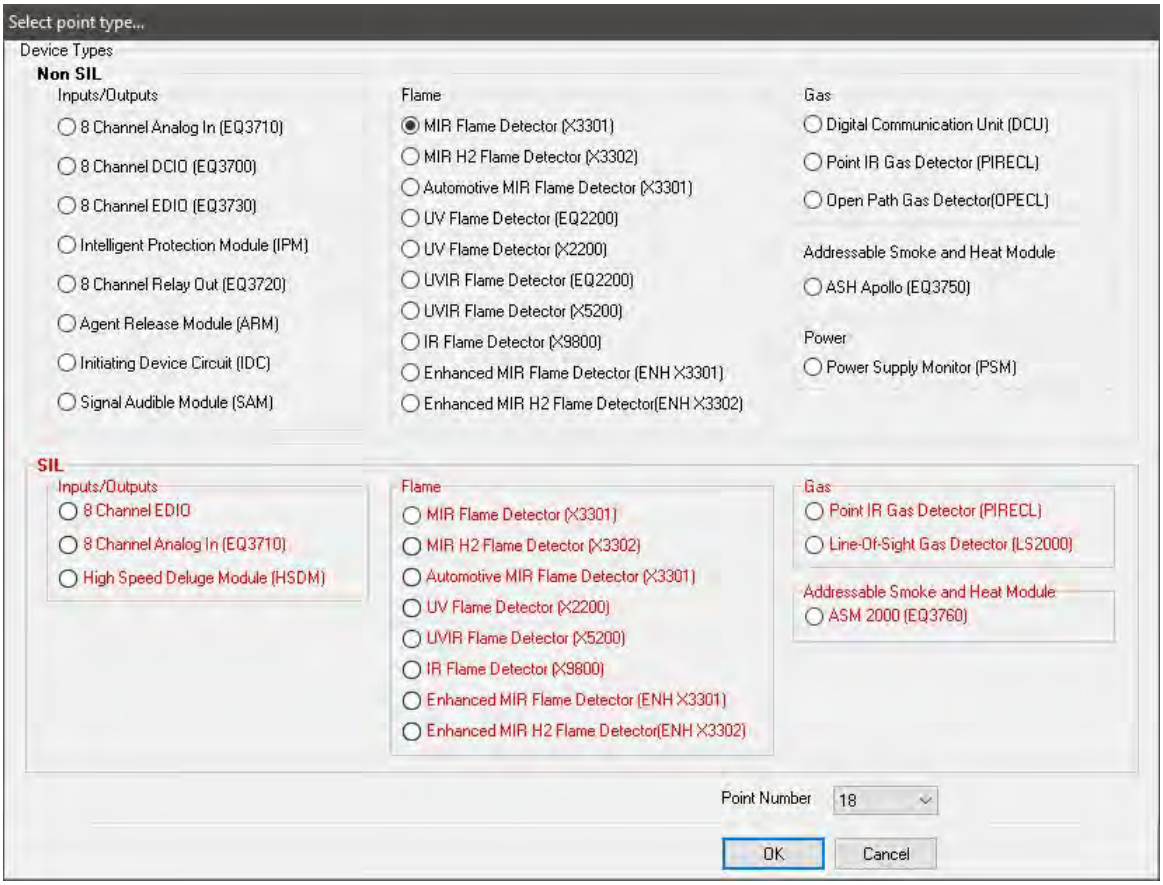


Use this function with caution as it does not have an “undo”.

11.4.1.7 New Device

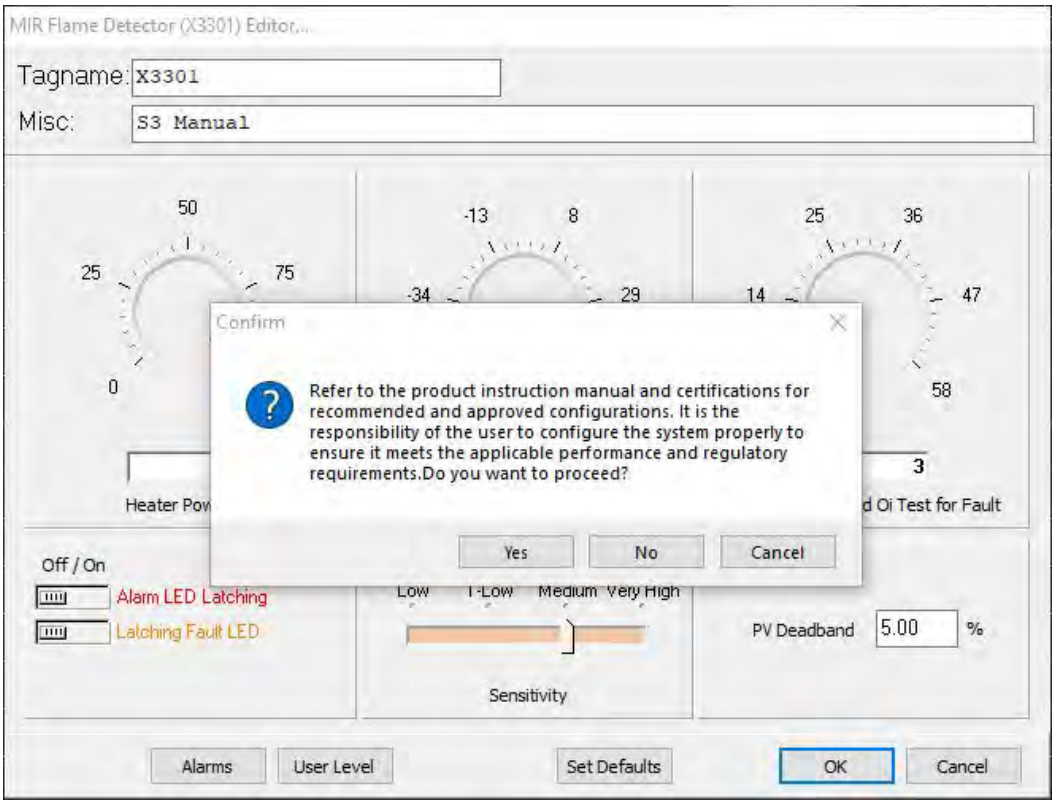
Opens the “Select Point Type” dialog box from which a new device can be added to the LON.

In the example below, “MIR Flame Detector (X3301)” has been selected.



Selecting the “OK” button would add an X3301 Flame Detector to the LON, just after the last configured device.

At this point, the configuration dialog box for the selected point type is displayed.

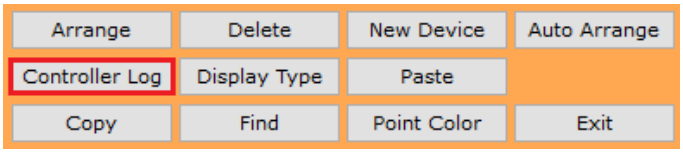


This dialog box provides access to all the programmable parameters for the selected device type. The detailed configuration instructions for each device type are covered in Section 12.

NOTE

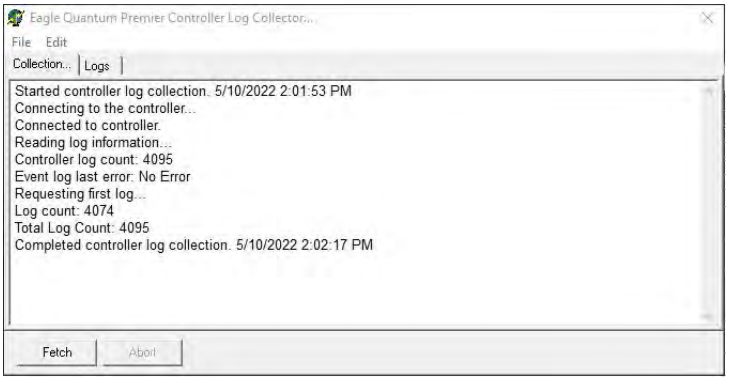
Verify the proper LON address for the new device is shown in the "point number" window; correct if not.

11.4.1.8 Controller Log

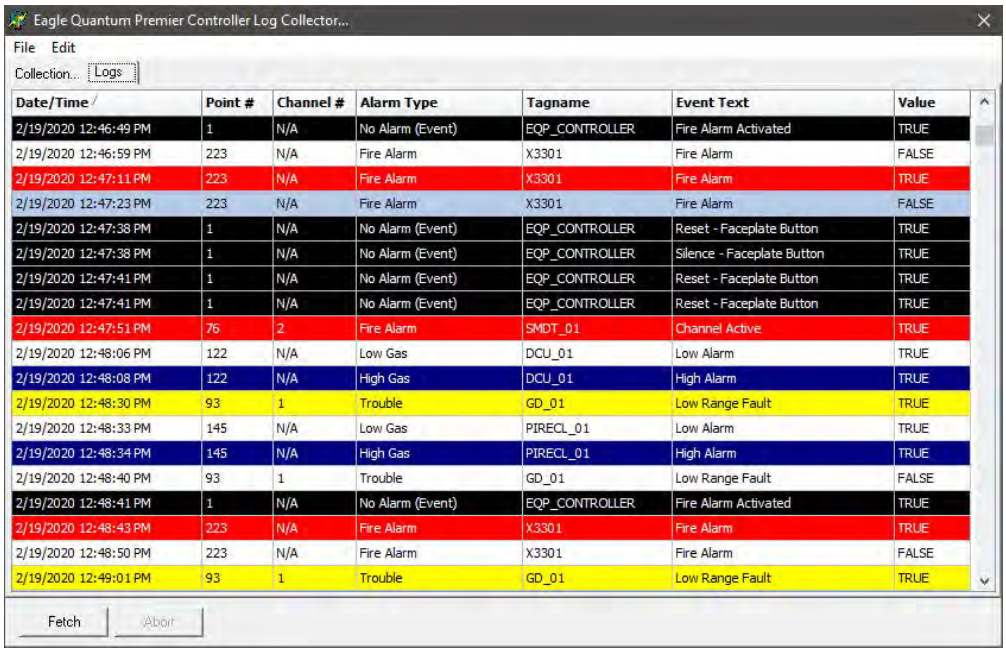


S³ keeps a log of every event ever executed by the controller. These logs which cannot be edited or deleted.

Once the "Controller Log" button is selected, a new window will appear, requiring the "Fetch" button to be selected, for the logs to populate the screen.



Clicking the “Logs” tab displays the controller logs with more detailed information that the user can export to Excel or PDF formats. This is done by going to the File menu and choosing “Export”.



Date/Time	Point #	Channel #	Alarm Type	Tagname	Event Text	Value
2/19/2020 12:46:49 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Fire Alarm Activated	TRUE
2/19/2020 12:46:59 PM	223	N/A	Fire Alarm	X3301	Fire Alarm	FALSE
2/19/2020 12:47:11 PM	223	N/A	Fire Alarm	X3301	Fire Alarm	TRUE
2/19/2020 12:47:23 PM	223	N/A	Fire Alarm	X3301	Fire Alarm	FALSE
2/19/2020 12:47:38 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Reset - Faceplate Button	TRUE
2/19/2020 12:47:38 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Silence - Faceplate Button	TRUE
2/19/2020 12:47:41 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Reset - Faceplate Button	TRUE
2/19/2020 12:47:41 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Reset - Faceplate Button	TRUE
2/19/2020 12:47:51 PM	76	2	Fire Alarm	SMDT_01	Channel Active	TRUE
2/19/2020 12:48:06 PM	122	N/A	Low Gas	DCU_01	Low Alarm	TRUE
2/19/2020 12:48:08 PM	122	N/A	High Gas	DCU_01	High Alarm	TRUE
2/19/2020 12:48:30 PM	93	1	Trouble	GD_01	Low Range Fault	TRUE
2/19/2020 12:48:33 PM	145	N/A	Low Gas	PIRECL_01	Low Alarm	TRUE
2/19/2020 12:48:34 PM	145	N/A	High Gas	PIRECL_01	High Alarm	TRUE
2/19/2020 12:48:40 PM	93	1	Trouble	GD_01	Low Range Fault	FALSE
2/19/2020 12:48:41 PM	1	N/A	No Alarm (Event)	EQP_CONTROLLER	Fire Alarm Activated	TRUE
2/19/2020 12:48:43 PM	223	N/A	Fire Alarm	X3301	Fire Alarm	TRUE
2/19/2020 12:48:50 PM	223	N/A	Fire Alarm	X3301	Fire Alarm	FALSE
2/19/2020 12:49:01 PM	93	1	Trouble	GD_01	Low Range Fault	TRUE

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12 Eagle Quantum Premier (EQP) Device Configuration

NOTE

This section is dedicated to configuration of the EQP controller and key field devices it supports. Please be aware that the controller will encounter compatibility issues with some field devices if it's firmware is not up to date and does not match the correct version of the S_3 software. Refer to Marketing Bulletin 78-1006 for more information.

12.1 Overview

The "EQP Controller" is the first device on any Eagle Quantum Premier Local Operating Network (LON). This device is used to perform the user logic, it provides the NFPA-72 required operator interface elements and provides a communication interface to the S^3 Operator Interface Station (OIS) and/or other intelligent systems for monitoring purposes.

Both the user logic and the configuration for all LON devices is first created and stored in the S^3 configuration database, then downloaded to the Controller, which in turn downloads this information to the field devices where it is stored in their non-volatile memory. A copy of the configuration data is also stored in the Controllers own non-volatile memory.

When an Eagle Quantum Premier port is first created, the LON schematic is empty except for a "node rectangle" representing the Controller, as shown in the example to the right.

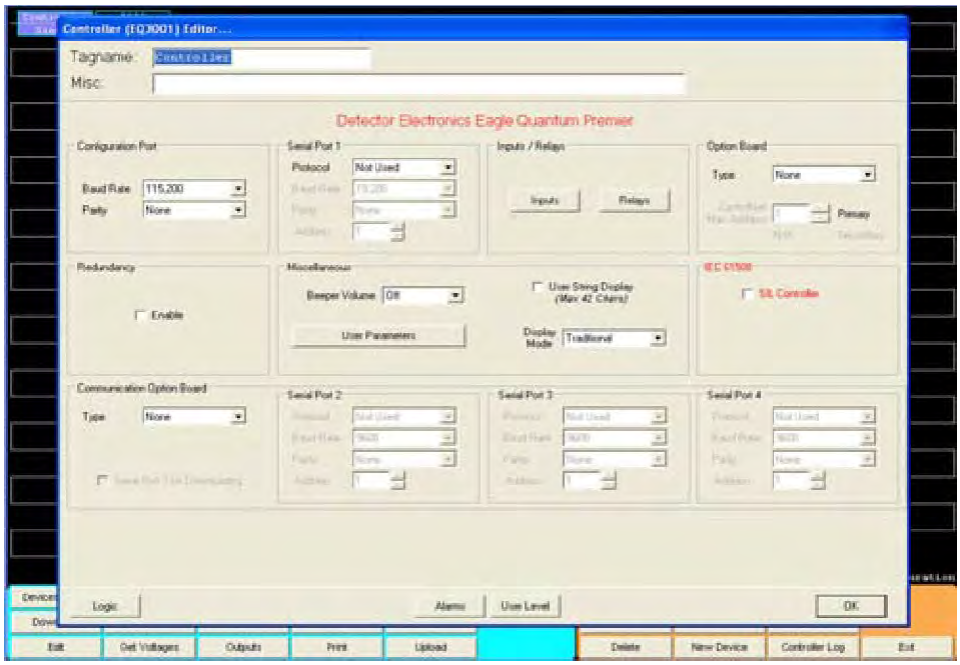
The node rectangle is divided in half horizontally with the tag name in the top and controller configuration in the bottom. In the example to the right, S^3 has assigned "T1" as a temporary tag name. This tag name is randomly generated and can be replaced by the user assigned tag name. The bottom half will contain the controller configuration default of "Single" signifying a single "non-redundant" arrangement.

12.2 EQP Controller

To begin controller configuration, double-click on its selection rectangle or single-click on the selection rectangle and choose the “Edit” button in the lower left position of the command bar. This opens the “Configure a controller...” dialog box which provides access to all user-configurable features of the controller, including access to the logic editor.

NOTE

This section of the user guide deals with the hardware configuration of the controller only.



12.2.1 Tagname

This field provides room for a 24-character tagname, which will be used to reference the controller throughout the S³ global database. This tagname is used in the logic editor, OPC server, and all printed documentation. Upon device creation in the database, S³ assigns a randomly generated tagname.

12.2.2 Misc

The “Miscellaneous” field provides room for an optional 42-character description to be used as desired.

12.2.3 Configuration Port

This motherboard port is used to connect to an S³ workstation to perform configuration, diagnostics, and troubleshooting. It utilizes a proprietary protocol unique to the EQP controller and S³ Software Package and cannot be used by other devices. The configuration port uses the RS-232 standard and has two configurable parameters: Baud Rate and Parity.

12.2.3.1 Port Baud Rate

The port speed can be adjusted in standard intervals between a high speed of 115,200 baud (which is both the default setting and the recommended setting) and a low speed of 2,400 baud. Lower speeds are not recommended but sometimes required if the controller's location is too far from the S^3 workstation to support the recommended speed.

12.2.3.2 Parity

The parity setting for the controller's configuration port defaults to "None", but it can also be adjusted to either "Even" or "Odd". There are no other adjustable parameters for the configuration port.

12.2.4 Redundancy

The EQP system supports either a simplex (Single) or redundant (Dual) configuration. This selection is displayed in the lower half of the rectangle representing the controller.

If a redundant arrangement is to be used, two identical controllers are hooked up in parallel. On a failure of the primary, the "Hot-Standby" unit would take over without interruption.

12.2.4.1 Redundancy Configuration

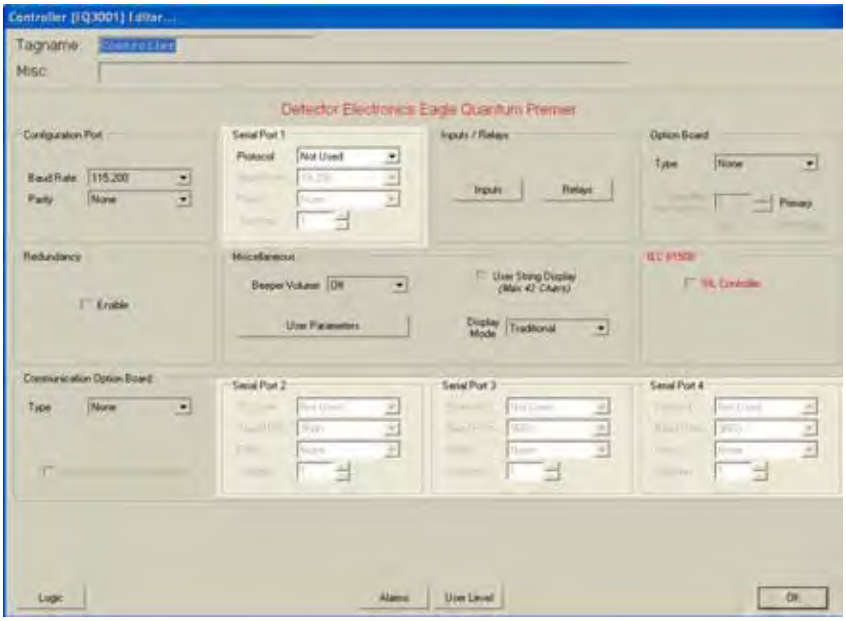
If redundancy is to be used, "Enable" this feature with the redundancy checkbox, and then select "Type-A" from the pull-down menu for "Communication Option Board". The "Type-A" option board is required to support redundancy and provides three additional serial ports for user configuration.

12.2.5 Serial Ports

The Eagle Quantum Premier Controller supports up to six serial ports. Two on the motherboard; one for configuration and a second for Modbus communications. Four on the option board; one for redundancy and three for Modbus.

NOTE

Port 3 can be used for configuration.



12.2.5.1 Serial Ports 1-4

These ports can be used for communication with a host device, such as a user's Distributed Control System (DCS), Programmable Logic Controller (PLC), or Human Machine Interface (HMI).

Ports 1 and 2 use the RS-485 standard, 3 and 4 use the RS-232 standard. Each have four configurable parameters: protocol, baud rate, parity, and address.

12.2.5.1.1 Protocol

This serial port currently supports the Modbus RTU slave protocol, and the drop-down menu allows the selection of either "Not Used", "MODBUS Slave" and "MODBUS Master". Port 3 can also be set as a configuration port, or a second S_3 monitoring port.

12.2.5.1.2 Option Board Baud Rate

The motherboard ports speed can be adjusted in standard intervals between a high speed of 115,200 baud and a low speed of 2,400 baud. 19,200 baud is both the default setting and the most used setting for connection to Modbus compliant devices. Ports 2-4 on the Type-A expansion board have a speed range of 9,600 to 230,400 bps.

12.2.5.1.3 Address

The address field is for entering the desired Modbus station address. The default value is "1" and it can be changed by using the "up/down" arrows or direct entry of a value. The Modbus station address must be in a range from 1 to 247. Addresses above 1 are typically used in multidrop systems.

12.2.5.2 ASCII Printer

The EQP Controller has the capability to directly drive a local printer. The printer port provides a hard copy of all alarm and event status messages currently saved in the EQP event log. The local printer is supported only on RS-485 Serial Port 1.

To use Serial Port 1 as an ASCII printer port, select "ASCII Printer" from the Protocol drop-down list. The Baud Rate options are 2400, 4800, and 9600. The Parity options are None, Even, and Odd. The Address Selection is not applicable.

The output format follows the EQP local display and contains the following:

- Line 1: Tag name and Status (ex: Fire Alarm and On/Off)
- Line 2: Device Name
- Line 3: Tagname description
- Line 4: Date and Time in the format hh:mm:ss mm/dd/yy.

At the end of each line of characters, a Carriage Return and Line Feed are sent.

This had been tested with the Keltron LC series model LC244/5B line printer.

12.2.6 Miscellaneous

This section of the "Configure a controller..." dialog box has three adjustable parameters: setting of the controller's built-in "beeper" volume, LON point disabling, and access to the user parameter editor.

12.2.6.1 Beeper Volume

The Eagle Quantum Premier Controller has an integral "Beeper" to annunciate a variety of conditions and to meet regulatory requirements.

To accommodate the controller being mounted in areas with different amounts of ambient noise the beeper can be adjusted to any of three settings: Low, Medium, and High, via a pop-up menu. The default value is "Low", which is suitable for installations where the controller is not in a separate enclosure and is in a control room/office type environment.

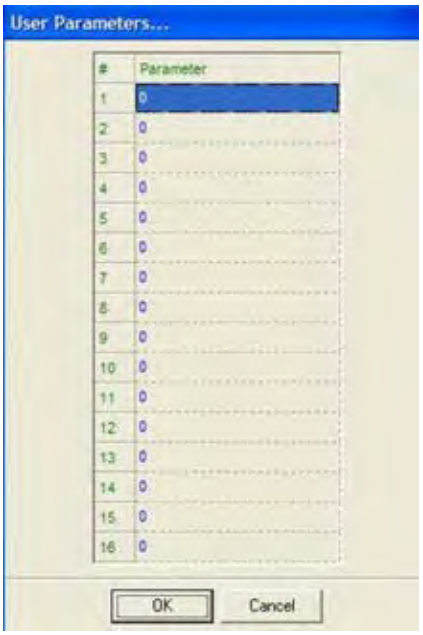
12.2.6.2 User String Display

Check the “User String Display” to allow the descriptor entered in the “Misc” field to be displayed on the controller.

12.2.6.2.1 User Parameters

This button opens the “User Parameters...” dialog box allowing for their values to be set. These parameters are intended for use in special applications utilizing the Allen-Bradley ControlNet interface option.

The use of these parameters is described in the user’s guide for the ControlNet Option Module. In general applications, these parameters should be “0”.



CAUTION

Do not adjust the settings of these parameters without having detailed knowledge of their operation.

WARNING

Inappropriate use of these parameters could cause unintended results in controller operation.

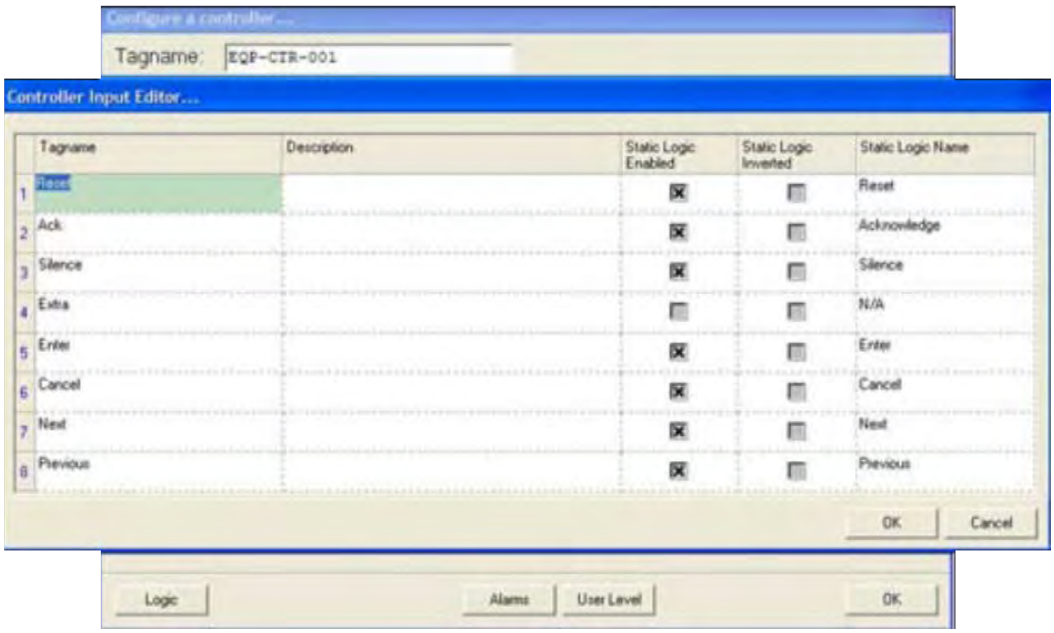
12.2.7 Inputs/Relays

The Eagle Quantum Premier controller provides eight unsupervised digital inputs and eight unsupervised relay outputs. This I/O can be configured to perform pre-assigned “Static Logic” functions, or they can be configured at the user’s discretion for any desired purpose. All sixteen of these I/O points are accessible by the controller’s user-programmable logic.

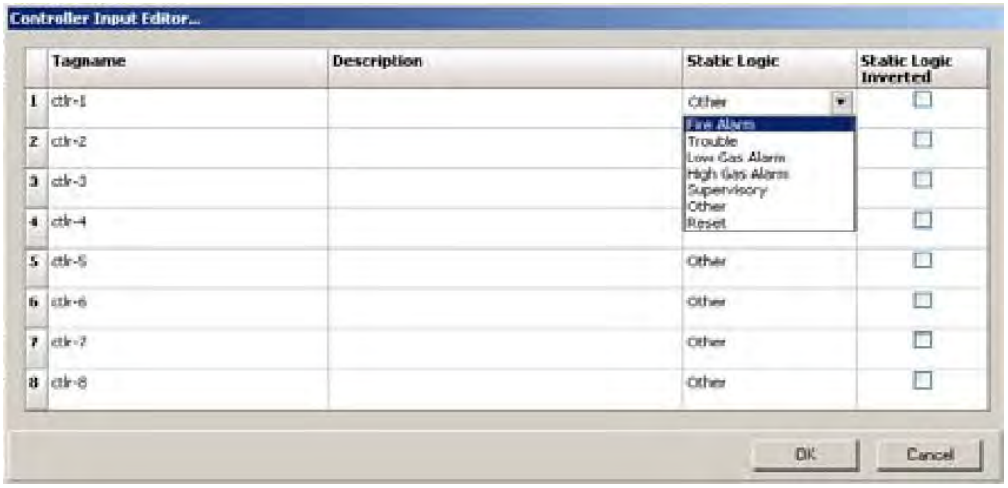
12.2.7.1 Inputs

Selecting the “Inputs” button will open the “Controller Input Editor...” dialog box. By default, the “Static Logic” functions for each point is disabled and each point is unnamed.

The functions of the static logic functions are self-explanatory and mirror the functionality of the controller’s faceplate buttons.



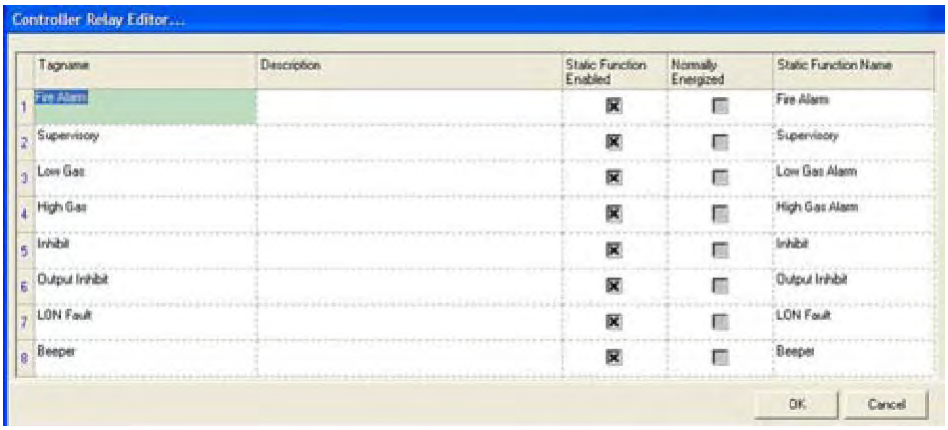
The primary reason for this feature is to accommodate instances where the controller must be mounted inside another enclosure and the faceplate buttons are brought through the door to allow operation while inside. Typically, a window allows viewing of the controller's faceplate.



Each point can be logically "inverted" by using the checkbox in the "Static Logic Inverted" column. If the use of "Static Logic" is required, use the appropriate checkbox to enable this feature on a point-by-point basis and enter a tagname and description appropriate to the desired function(s).

12.2.7.2 Relays

Selecting the "Relays" button will open the "Controller Relay Editor..." dialog box. By default, the "Static Logic" functions for each point is disabled and each point is unnamed.



The functions of the static logic functions are self-explanatory and mirror the functionality of the controller's faceplate LEDs and beeper. If the use of "Static Logic" is not required, use the appropriate checkbox to enable this feature on a point-by-point basis and rename the function(s).

12.2.7.3 Option Board

The Eagle Quantum Premier controller is designed to be expandable and is provided with a slot for an add on circuit board.

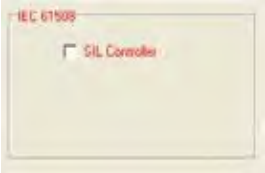
Selecting the "Type" drop down menu will display the available options. If no expansion board is installed, select "None".

If the "ControlNet" expansion board is selected the "ControlNet Mac Address" field will activate allowing data entry.

The ControlNet option provides redundant communications with Allen-Bradley (or compatible) products that support this ControlNet.

The ControlNet Mac address can be set in a range from 1 to 99.

12.2.7.4 IEC 61508



The Eagle Quantum Premier Controller fully supports IEC 61508 SIL 2. Do not check unless the EQP has SIL 2 Firmware.

12.2.7.5 Logic / Alarms / User Level

Across the bottom of the Controller Editor dialog box there are four buttons: Logic, Alarms, User Level and OK.

12.2.7.5.1 Logic

This button launches the S^3 Logic Editor for the Eagle Quantum Premier Controller. See section 13 for more details.

12.2.7.5.2 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box. This scrolling list displays the alarms and events related to the controller that can be configured to be monitored by S^3. The controller has 75 alarms and events that can be monitored, some of which are disabled by default.

Every field device on the LON, as well as the controller, has a device specific set of alarms and events that can be configured for the S^3 DCD to track. This data is made available by the DCD to the OPC Server.

Although the number and type of events vary from device to device, the methodology for the configuration of these items is the same and will be covered in detail only once.

The dialog box is a scrolling list with eleven attribute columns. In the descriptions for configuring each type of field device, any unique attributes pertaining to that device's event tracking will be presented.

12.2.7.5.2.1 Alarms to Monitor Dialog Column Definitions

Enabled: Turns an event on or off. If disabled, no other settings do anything.

Name: This 48-character field is used to describe the event or alarm. This is the text that will be used and recorded throughout the S^3 applications suite when the event occurs.

Printer: When selected, sends the event to the S^3 event printer.

File: When selected, sends the event to the "Alarm History" module of S^3 for storage in the daily log.

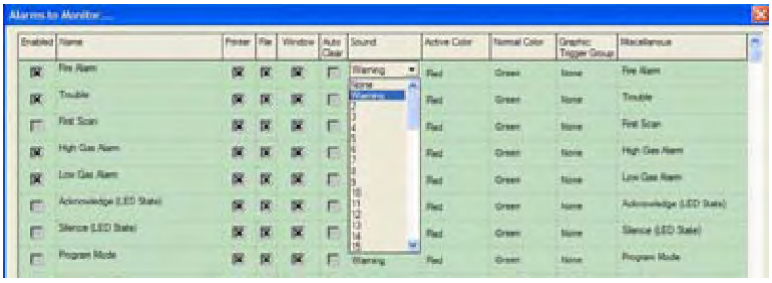
Window: When selected, sends the event to the "Active Alarms" module of S^3. This module is accessed via the F6 key when online. It will also be displayed in the single line FIFO display at the bottom of the screen when in the Online mode. Refer to Section 4.

Auto Clear (AC): This selection determines whether the logged event will track the real time occurrence of the event or when the operator acknowledgement is factored in.

If the AC checkbox is <u>not</u> selected, which is the default, when an event occurs it will be logged to the appropriate locations, as configured by the Printer, File, Window selections, with the date and time of occurrence. When the event returns to its normal state, nothing will happen until the operator activates the "Acknowledge" button. The system will then log the date and time of the event returning to "Normal". In reality, it's logging the first time the operator activates the Acknowledge button <u>after</u> the event has returned to normal.

If the AC checkbox is selected, when an event occurs it will be logged to the appropriate locations, as configured by the Printer, File, Window selections, with the date and time of occurrence. When the event returns to its normal state, the system will then log the date and time of the event returning to "Normal".

Sound: Each event may have a sound attached to it which plays when the event occurs, until the Acknowledge button is actuated.



The sound can be the default “Warning” or any of sixty-three custom sounds. Use the pull-down menu to select the desired sound.

Active Color / Normal Color: Selects one of four different colors for recording when events become “Active” or return to “Normal”.

These color selections are made from the pull-down menu located to the right of the event name. The color selections apply to both printed and screen presentations of the event. In the example above, the event will be shown in Red when active and Green when it returns to normal.

Miscellaneous: This field always shows the factory default description for the event. This is helpful in checking custom settings to ensure translation or assignment accuracy.

12.2.7.5.2.2 Alarms to Monitor Dialog Buttons

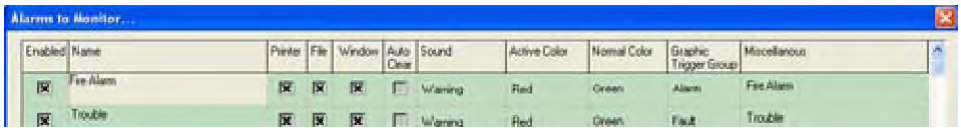
There are four buttons running horizontally across the bottom of the window; Custom, Factory, OK and Cancel.

Custom: Selecting this button will replace all the names with those in the second language database. Refer to “User Strings” in the preferences section (Section 7) of this user’s guide.

Factory: Restores the factory default values for **all** fields and settings.

OK: Closes the dialog box and stores changes in the configuration to the database.

Cancel: Closes the dialog box without storing changes. In addition to these buttons, eight columns have a “M” button at the bottom of the column. This will “Match” every row in that column to the value or setting in the top row.



12.2.7.5.3 User Level

Allows user levels to be set on a variety of controller features for security. Assign an appropriate user level to each item in the list. Refer to section 10 of this User’s guide for details on user level settings.

12.3 Multi-Spectrum Infrared Flame Detector X3301 / X3301 Enhanced

NOTE

*The X3301 Automotive model is separately described in document **76-1079-1.0**.*

The MIR X3301 is located on the LON/SLC and provides Multi-Spectrum Infrared Optical Flame detection capability for the Eagle Quantum Premier system.

It provides unsurpassed detection of fires from light to heavy hydrocarbon fuels combined with the highest degree of false alarm rejection.

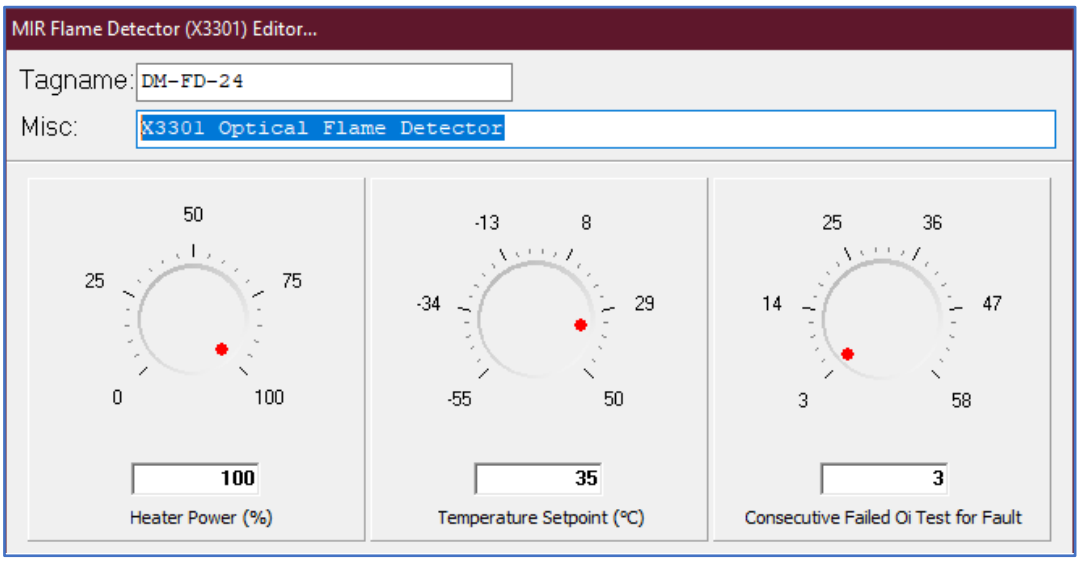
The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

The MIR X3301 contains three IR sensors with their associated signal processing circuitry. A multi-color LED on the detector faceplate indicates detector status condition. Microprocessor-controlled, heated optics increase resistance to moisture and ice.

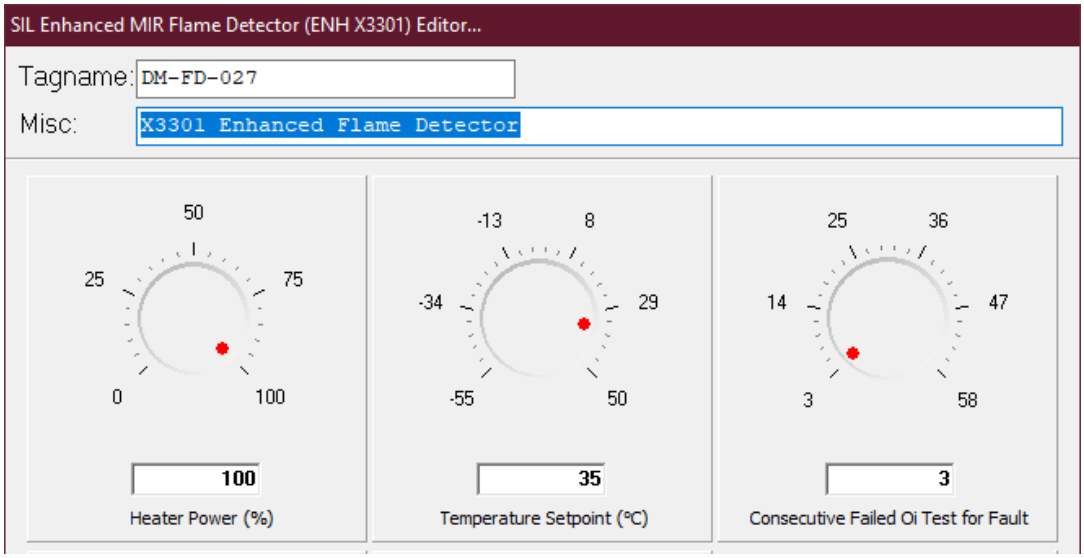
12.3.1 Tagname

The tagname at the top of the dialog box refers to the flame detector. Until a tagname is entered, the detector is not available in the S^3 database for programming, monitoring, or dynamic, graphic purposes.

X3301



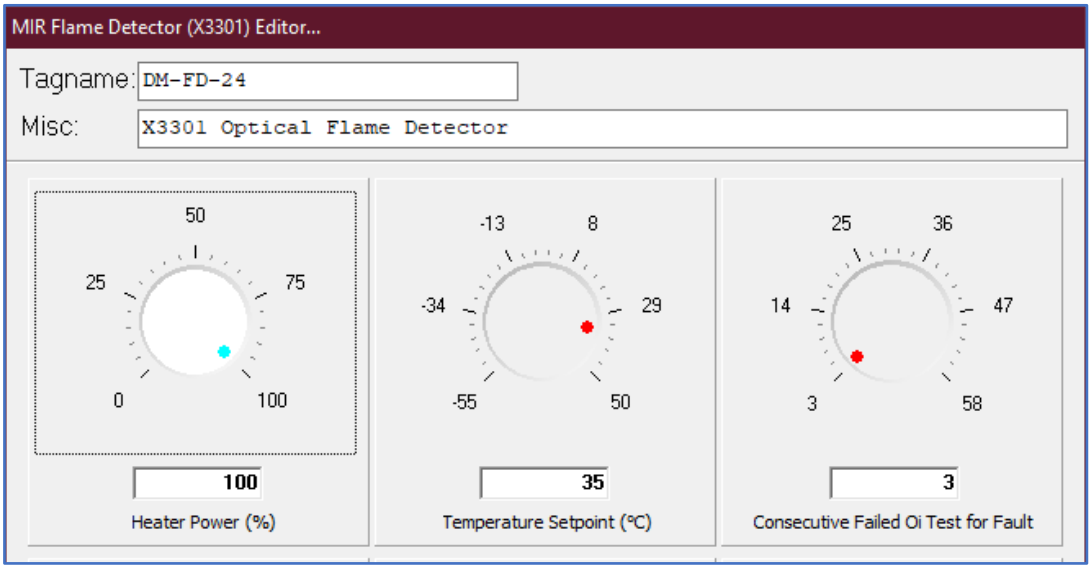
X3301 Enhanced



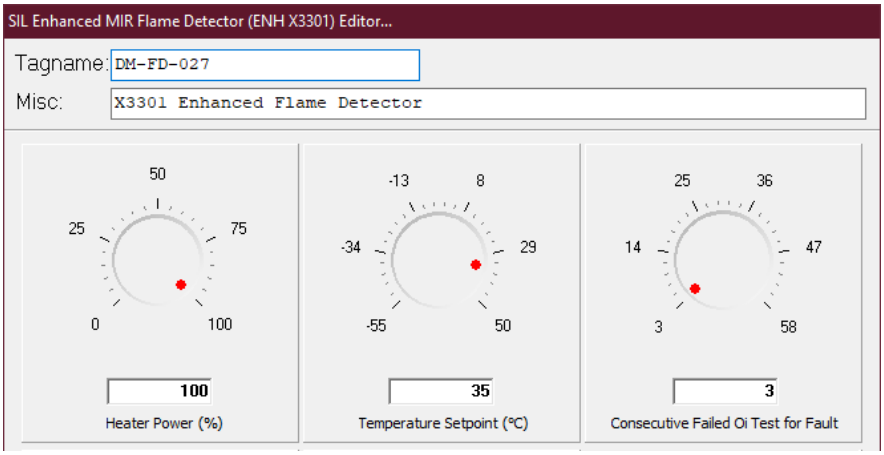
12.3.2 Heater Optics

Up to 8 watts of power can be utilized to provide heat to the optical sensing elements. The "Heater Power" adjustment allows the user to determine the maximum amount of power to use in trying to achieve the temperature setpoint. This can be an important adjustment in situations where the power budget is limited or in installations with large quantities of detectors.

X3301



X3301 Enhanced



12.3.3 Temperature Setpoint

The default temperature setpoint for the heated optics is 35°C but can be adjusted utilizing the rotary dial or by entering a value in the setpoint field.

12.3.4 Automatic Oi

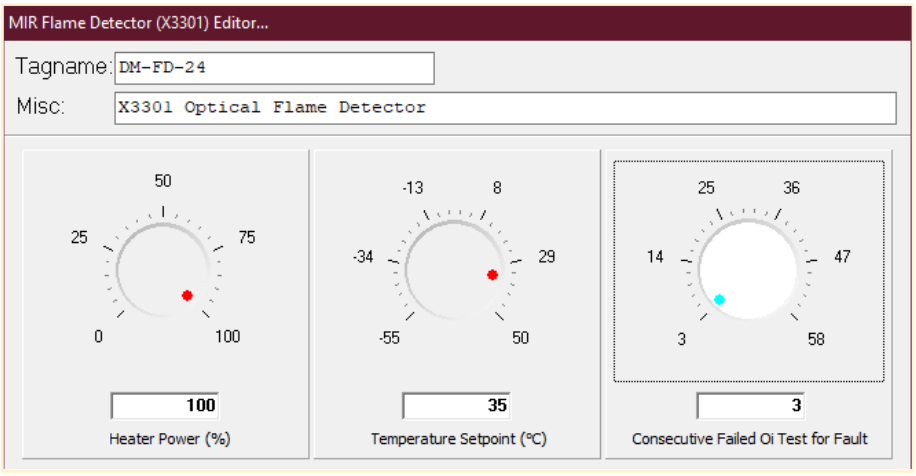
The MIR X3301 includes an Automatic Optical Integrity (Oi) feature — a calibrated performance test that is automatically performed once per minute to verify complete detector operation capabilities. No testing with an external test lamp is required.

The detector automatically performs the same test that a maintenance person with a test lamp would perform — once every minute, 60 times per hour. However, a successful automatic Oi Test does not produce an alarm condition. The X3301 signals a fault condition when less than half of the detection range remains. This is indicated remotely on the S^3 Point Display and is evident locally by the yellow color of the LED on the face of the detector.

12.3.5 Oi Test Fault

The detector automatically conducts Oi tests to check the integrity of the optical sensing systems. Three consecutive failed Oi tests will generate a fault condition, which will be indicated by the LED on the face of the detector turning yellow. The EQP Controller and S^3 software will also annunciate this fault.

X3301 / X3301 Enhanced



In certain environmental conditions like very heavy rain, Oi test failures can occur even though the hardware is not faulty. To compensate for this, the number of failed Oi tests required to generate the fault can be adjusted upward to a maximum of 30.

12.3.6 Magnetic Oi / Manual Oi

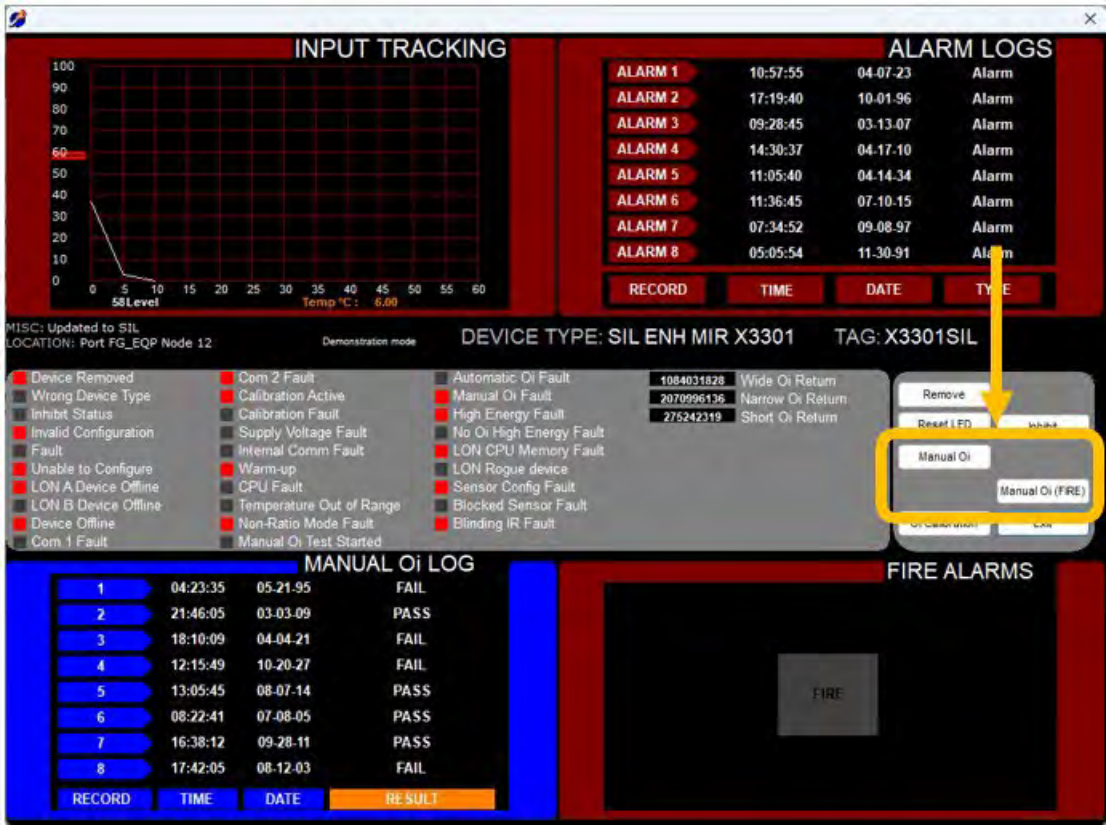
The detector also incorporates both magnetic Oi and manual Oi features that provide the same calibrated test as the automatic Oi, and in addition actuates the Alarm to verify output operation for preventive maintenance requirements. These features can be performed at any time and eliminate the need for testing with a non-calibrated external test lamp.

The magnetic Oi test is performed by placing a magnet by the marked location (mag Oi) on the outside of the detector. The manual Oi test is accomplished by selecting the Oi Test button on the Point Display in the S^3 software. The magnet must be held in place for a minimum of 6 seconds to complete the test.

Either of these test methods activates the calibrated IR emitters. If the resulting signal meets the test criteria, indicating that greater than half of the detection range remains, the alarm status message to the EQP controller changes state. The indicating LED will change to red, and the analog signal displayed in the tracking area of the S^3 point display goes to maximum.

This condition remains until the magnet is removed or the software test is complete. If the alarm LED is configured for non-latching operation, it will change states, and the red LED will turn to green. If the unit has latching LED's, the detector's operating software will automatically reset the relays with no operator action required.

If less than half of the detection range remains, no alarm is produced, and a fault is generated. The fault indication can be reset by momentarily applying the magnet or via S^3 software command.



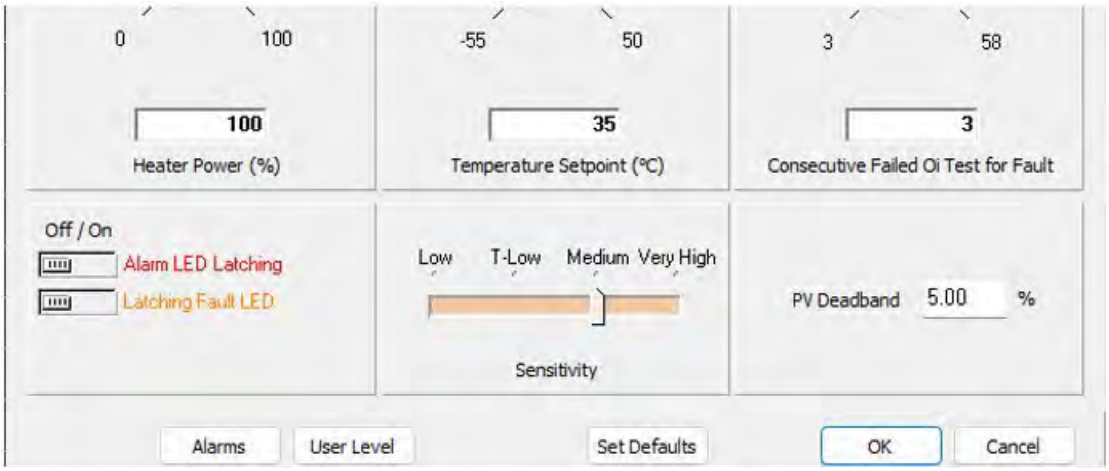
12.3.7 Alarm Led Latch

The tri-color LED on the face of the detector turns red when in alarm and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.

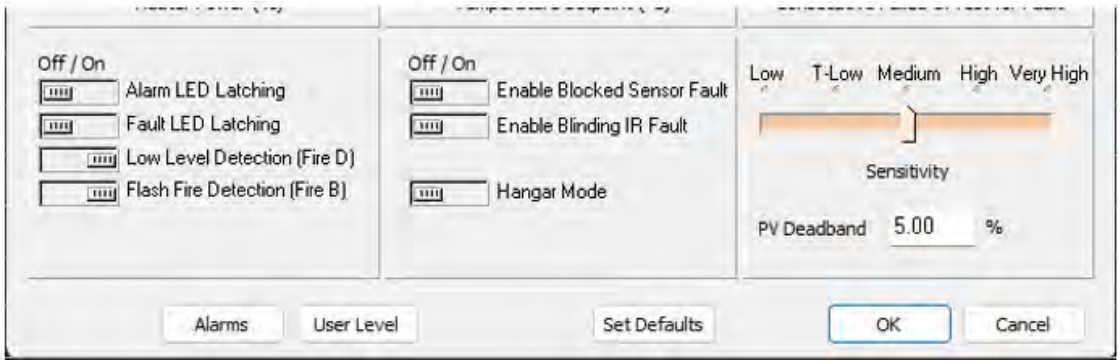
12.3.8 Fault Led Latch

The tri-color LED on the face of the detector turns yellow when a fault is present (fire over-rides fault) and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non- latching. Shown below are the X3301 and X3301 Enhanced screens.

X3301



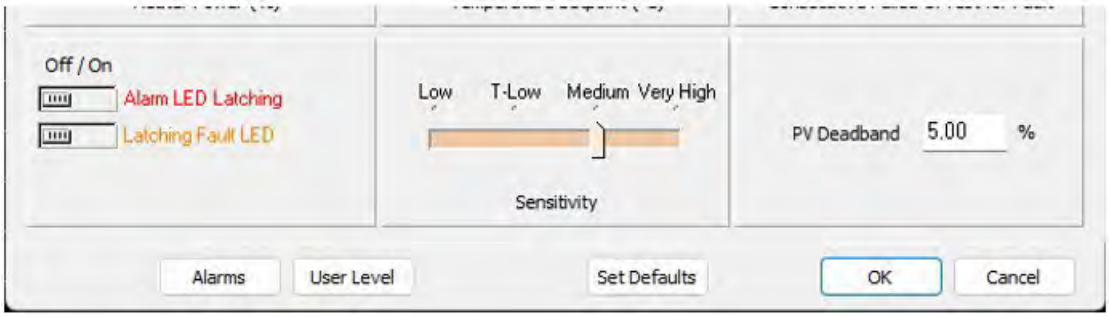
X3301 Enhanced



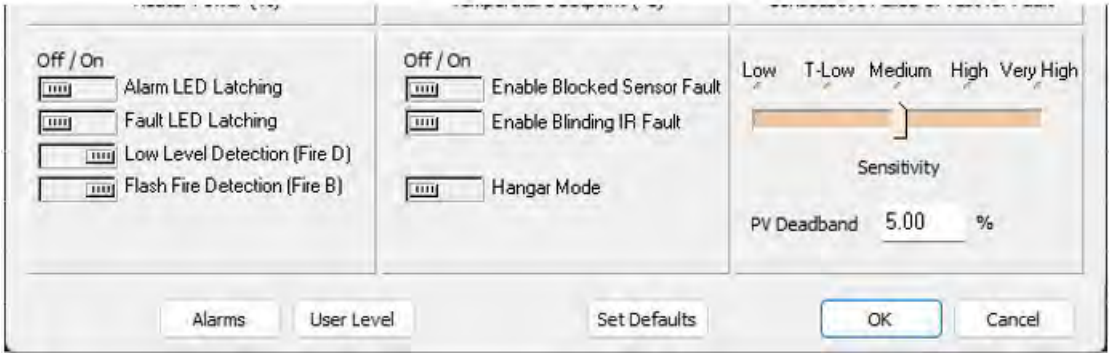
12.3.9 Detector Sensitivity

The sensitivity of the detector can be adjusted between Low to Very High using the Sensitivity slider control in the center bottom area of the configuration dialog box. Shown below are the X3301 and X3301 Enhanced screens.

X3301



X3301 Enhanced



Low Level Detection (Fire D) (Default is Enabled, On)

The Low-Level Detection (Fire D) algorithm is used for detecting very small fires or fires at the limit of the maximum effective detection range of the unit. Based on the signal analysis the detector performs, the minimum response time to a fire for this algorithm is approximately 6 to 9 seconds.

The Low-Level Detection (Fire D) algorithm can only be enabled (On) or disabled (Off) when the Sensitivity slider is set to Very High. Enabled (On) is the default. With all the other sensitivity levels, the function is fixed automatically to Disabled (Off) but the selector is not automatically positioned to Off. Therefore, it is recommended to select Off to have the selector visually match the actual automatically defined state.

Flash Fire Detection (Fire B) (Default is Enabled, On)

The Flash Fire Detection (Fire B) algorithm can be disabled. Disabling this algorithm can help reduce false alarms in some situations but can also reduce fire detection capabilities. Temporary fires lasting less than 3 seconds may not be detected if Flash Fire Detection (Fire B) is disabled. The time to alarm to a sustained fire may also increase by 3 seconds compared to the FM performance data.

When Hangar Mode is not selected Flash Fire Detection (Fire B) can be disabled (Off) in all sensitivity settings except Low. In Low sensitivity Flash Fire Detection (Fire B) is automatically disabled (Off) and cannot be enabled. Therefore, it is recommended to select Off to have the selector visually match the actual automatically defined state.

Hangar Mode (Default = Off)

The advantage of Hangar Mode is to maximize short duration event false alarm rejection by requiring multiple checks, which results in response times between 6 to 10 seconds depending on various factors such as sensitivity setting, fire size, and distance. As a result, Hangar Mode can ignore intentional short-duration (flash) fires such as from an auxiliary power unit starting ignition, a gas heater starting ignition, or an engine's backfire. Enabling Hangar Mode has no effect on detection ranges or the field-of-view.

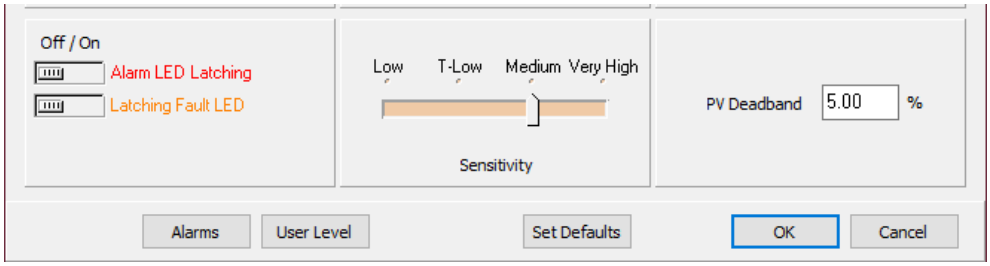
Note: Product Bulletin 31-1049 contains additional helpful information. Contact your Account Manager if you would like to receive this document (PDF).

12.3.10 PV Deadband

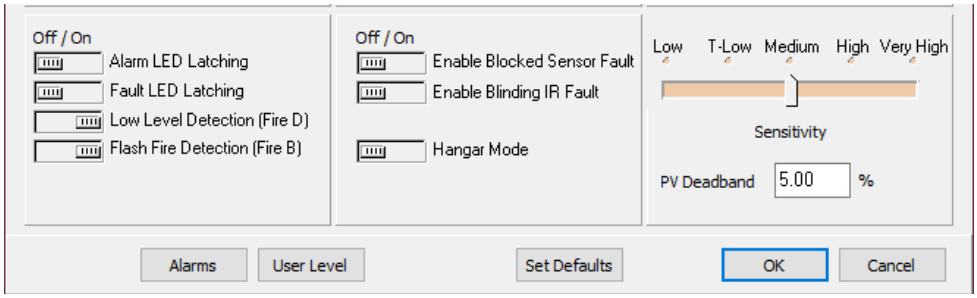
A field is provided to enter the desired PV (Process Variable) Deadband.

Normally all values are transmitted to the controller every five seconds. If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

X3301



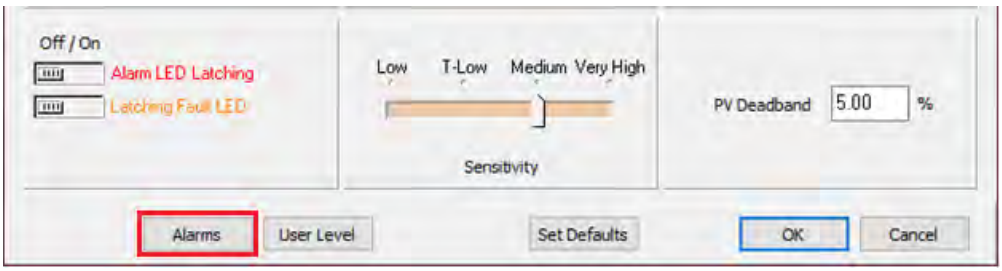
X3301 Enhanced



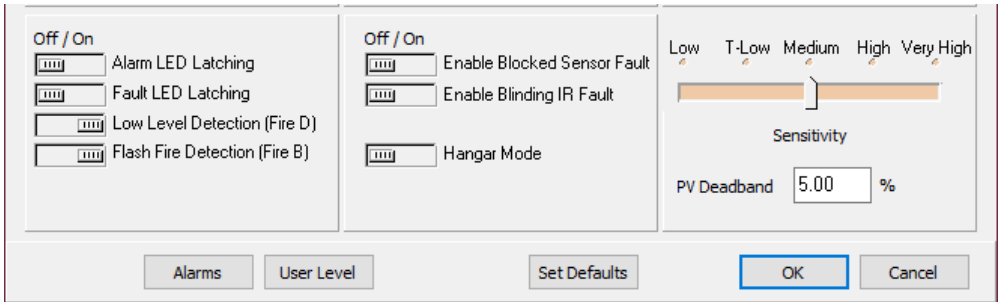
12.3.11 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3.

X3301

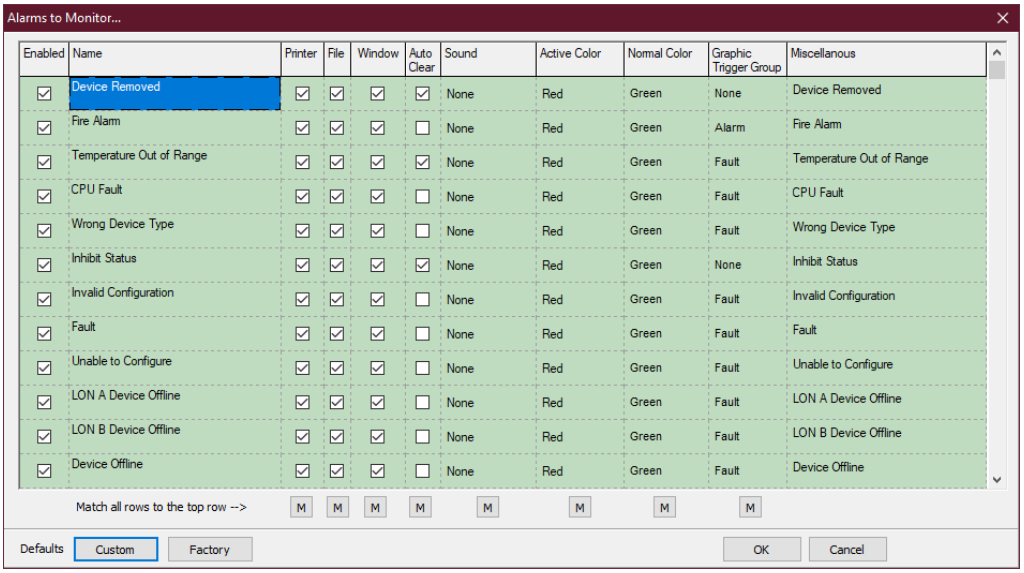


X3301 Enhanced



There are 31 alarms and events that pertain to the status and diagnostics for the MIR X3301.

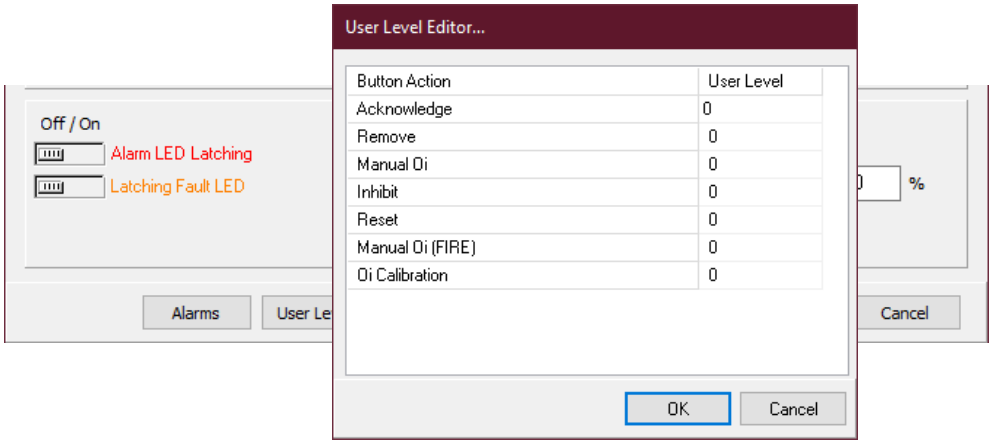
X3301 / X3301 Enhanced



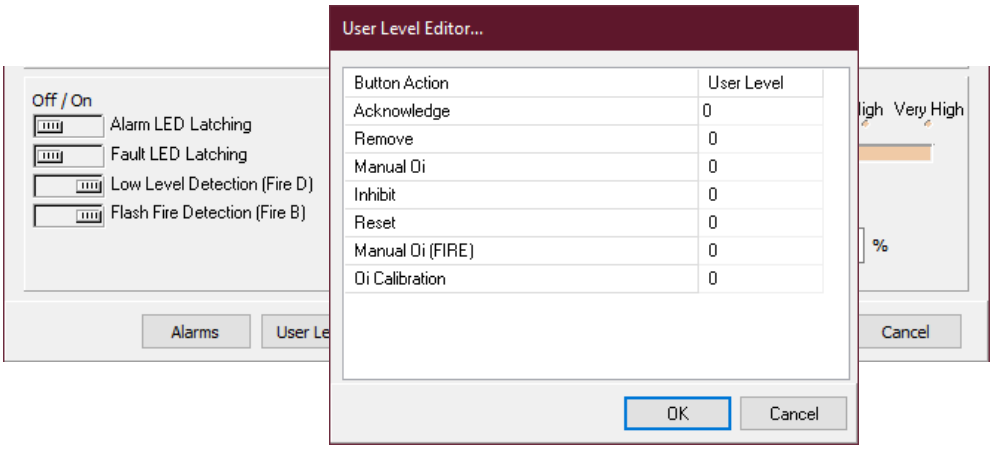
12.3.12 User Levels

The "User Level Editor..." provides a means for limiting access to the "Acknowledge", "Remove", "Manual Oi", "Inhibit", "IR Calibration", "Manual Oi (FIRE)" and "Reset" buttons for the module, which are accessible from the devices point display. The default value is "0" and provides access to all users. Change these values to match a user account configuration and security needs.

X3301



X3301 Enhanced

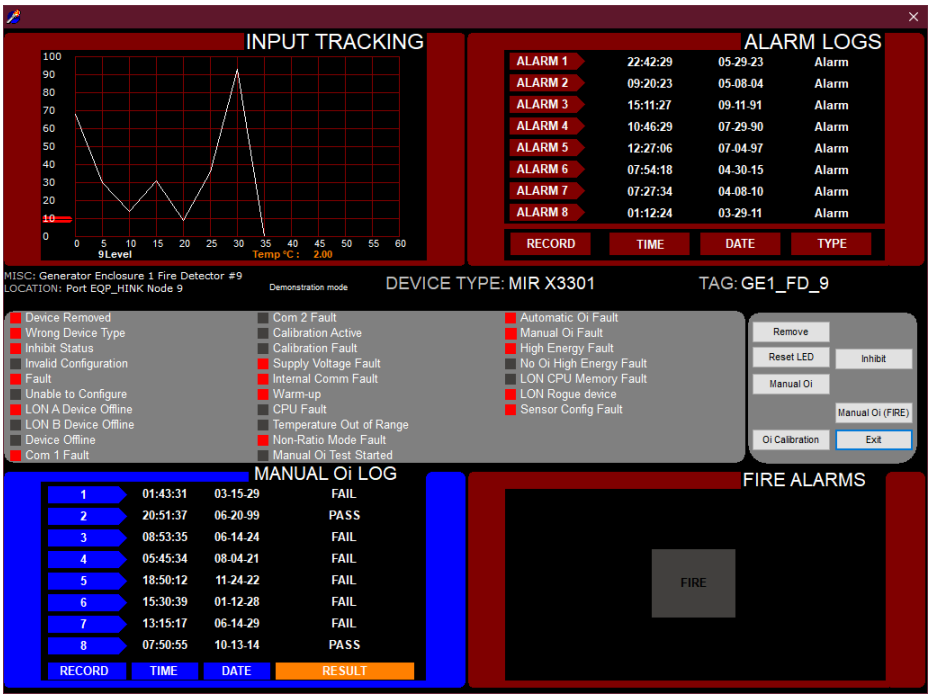


12.3.13 Point Display

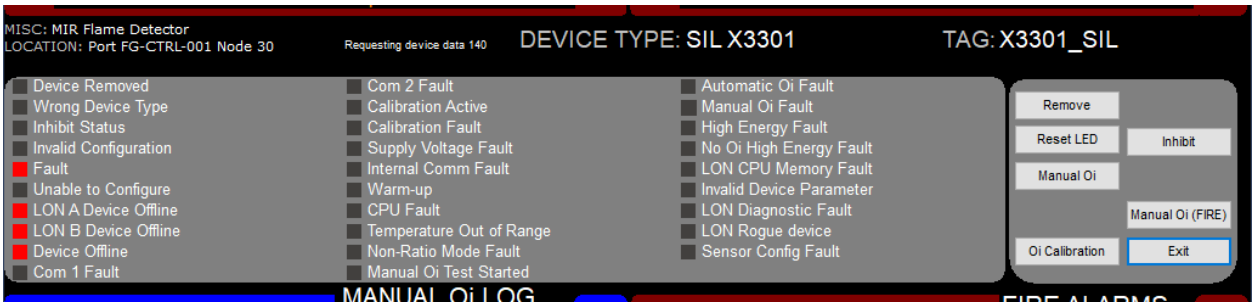
The MIR X3301 has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device.

X3301



X3301 SIL



NOTE

For more information on the X3301 SIL variant, refer to Multispectrum IR Flame Detector Safety Manual 95-8582.

12.3.13.1 Analog Input Track

The top left quadrant shows a dynamic 60-second history of the measured variable (IR counts) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.3.13.2 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.3.13.3 Manual Oi Log

The bottom left quadrant of the point display shows the detectors manual Optical Integrity (Oi) log. The last eight manual tests are shown with the date, time, and a PASS/FAIL indicator.

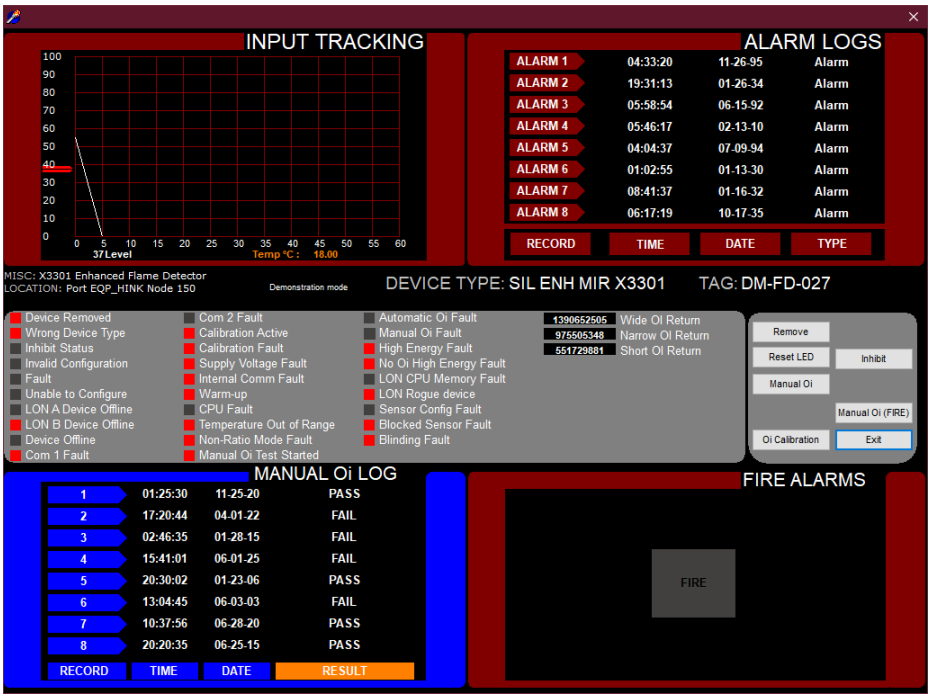
12.3.13.4 Status and Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.3.13.5 Buttons

There are six buttons that can send commands to the detector, including: Remove, Inhibit, Reset LED, Manual Oi, Manual Oi (FIRE), and Oi Calibration.

X3301 Enhanced, X3301 Enhanced SIL



12.4 Multi-Spectrum Infrared Flame Detector X3302 / X3302 Enhanced

The MIR H2 X3302 is located on the LON/SLC and provides Multi-Spectrum Infrared Optical Flame detection capability for the Eagle Quantum Premier System.

It provides unsurpassed detection of invisible hydrogen flames and hazardous materials that produce mostly water vapor, and little or no CO2 in the combustion process. The detection capability of the X3302 is double that of traditional UV and UVIR detectors. At the same time, it attains complete solar resistance and insensitivity to artificial lights, lightning, and “blackbody” radiation, which still plague other detection technologies.

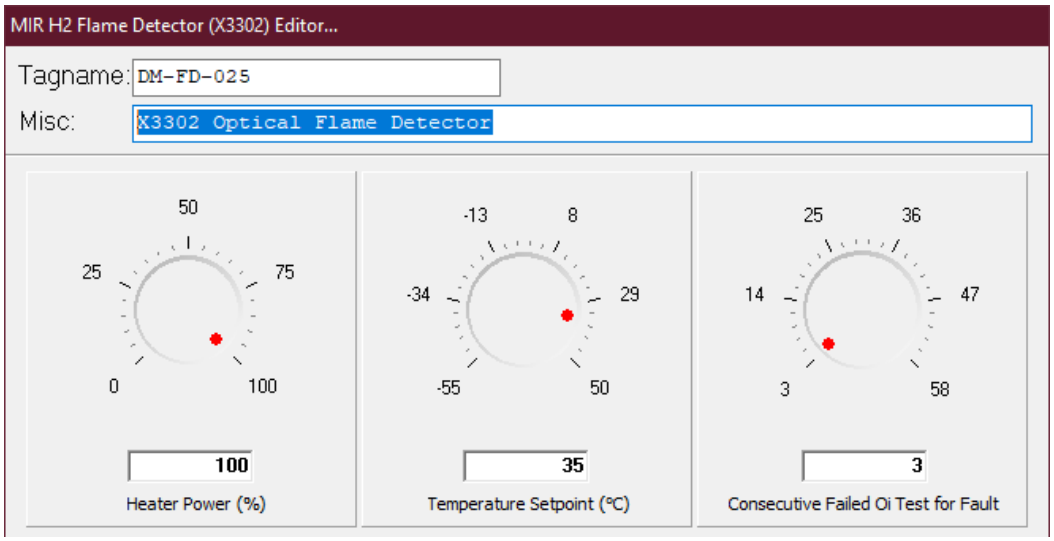
The X3302 contains three IR sensors with their associated signal processing circuitry. A multi-color LED on the detector faceplate indicates detector status condition. Microprocessor controlled heated optics increase resistance to moisture and ice.

The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

12.4.1 Tagname

The tagname at the top of the dialog box refers to the flame detector. Until a tagname is entered the detector is not available in the S³ database for programming, monitoring, or dynamic graphic purposes.

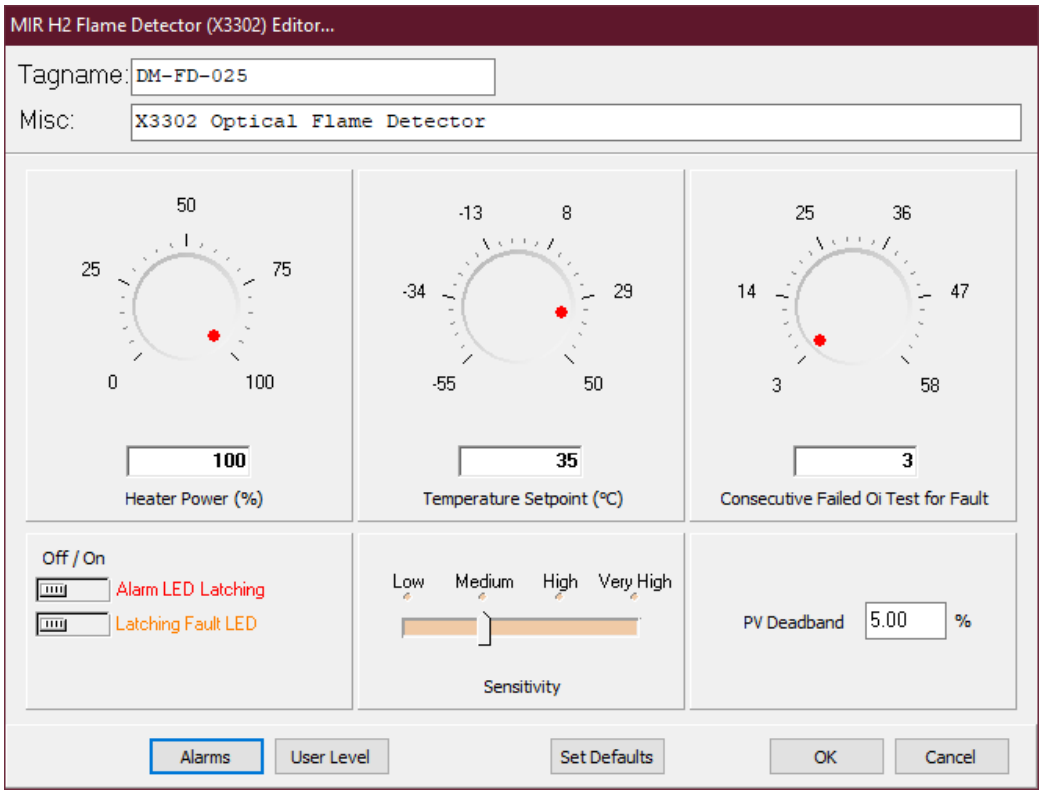
X3302 / X3302 Enhanced



12.4.2 Heater Optics

Up to 8 watts of power can be utilized to provide heat to the optical sensing elements. The “Heater Power” adjustment allows the user to determine the maximum amount of power to use in trying to achieve the temperature setpoint. This can be an important adjustment in situations where the power budget is limited or in installations with large quantities of detectors.

X3302 / X3302 Enhanced



12.4.3 Temperature Setpoint

The default temperature setpoint for the heated optics is 35°C but can be adjusted utilizing the rotary dial or by entering a value in the setpoint field.

12.4.4 Automatic Oi

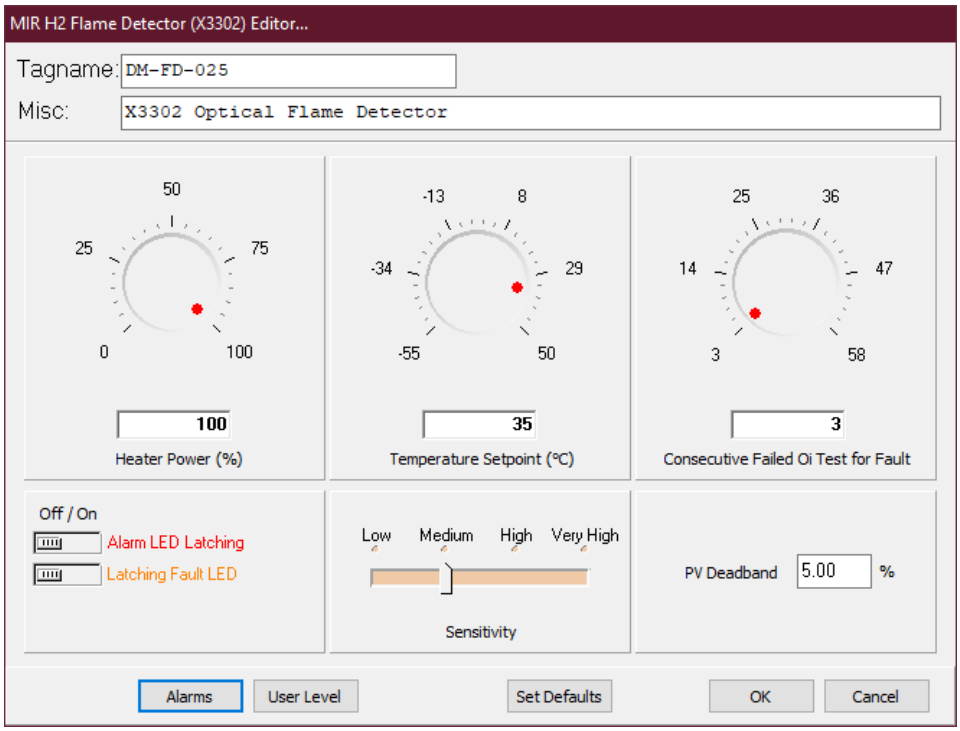
The MIR X3302 includes the Automatic Optical Integrity (Oi) feature — a calibrated performance test that is automatically performed once per minute to verify complete detector operation capabilities. No testing with an external test lamp is required.

The detector automatically performs the same test that a maintenance person with a test lamp would perform — once every minute, 60 times per hour. However, a successful automatic Oi test does not produce an alarm condition. The X3301 signals a fault condition when less than half of the detection range remains. This is indicated remotely on the S_3 Point Display and is evident locally by the yellow color of the LED on the face of the detector.

12.4.5 Oi Test Fault

The detector automatically conducts Oi tests to check the integrity of the optical sensing systems. Three consecutive failed Oi tests will generate a fault condition, which will be indicated by the LED on the face of the detector turning yellow. The EQP Controller and S^3 software will also annunciate this fault.

X3302 / X3302 Enhanced



In certain environmental conditions like very heavy rain, Oi test failures can occur even though the hardware is not faulty. To compensate for this the number of failed Oi tests required to generate the fault can be adjusted upward to a maximum of 30.

12.4.6 Magnetic Oi / Manual Oi

The detector also incorporates both magnetic Oi and manual Oi features that provide the same calibrated test as the automatic Oi, and in addition actuates the Alarm to verify output operation for preventive maintenance requirements. These features can be performed at any time and eliminate the need for testing with a non-calibrated external test lamp.

The magnetic Oi test is performed by placing a magnet by the marked location (mag Oi) on the outside of the detector. The manual Oi test is accomplished by selecting the Oi Test button on the Point Display in the S^3 software. The magnet must be held in place for a minimum of 6 seconds to complete the test.

Either of these test methods activates the calibrated IR emitters. If the resulting signal meets the test criteria, indicating that greater than half of the detection range remains, the alarm status message to the EQP controller changes state. The indicating LED will change to red, and the analog signal displayed in the tracking area of the S^3 point display goes to maximum.

This condition remains until the magnet is removed or the software test is complete. If the alarm LED is configured for non-latching operation, it will change states and the red LED will turn to green. If the unit has latching LED's, the detector's operating software will automatically reset the relays with no operator action required.

If less than half of the detection range remains, no alarm is produced, and a fault is generated. The fault indication can be reset by momentarily by applying the magnet or via S^3 Software command.

12.4.7 Alarm LED Latch

The tri-color LED on the face of the detector turns red when in alarm and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.

12.4.8 Fault LED Latch

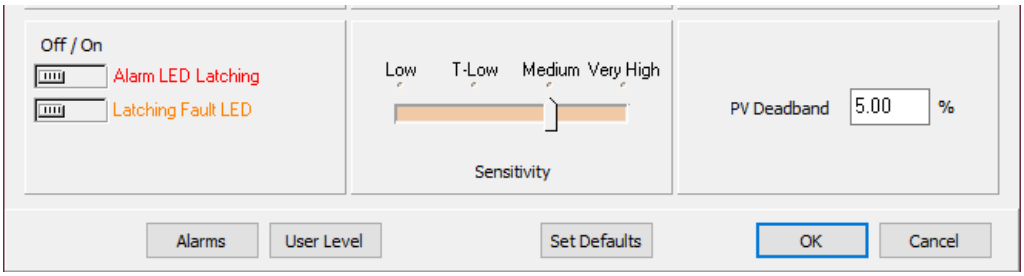
The tri-color LED on the face of the detector turns yellow when a fault is present (fire over-rides fault) and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.

12.4.9 PV Deadband

A field is provided to enter the desired PV (Process Variable) Deadband.

Normally all values are transmitted to the controller every five seconds; If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

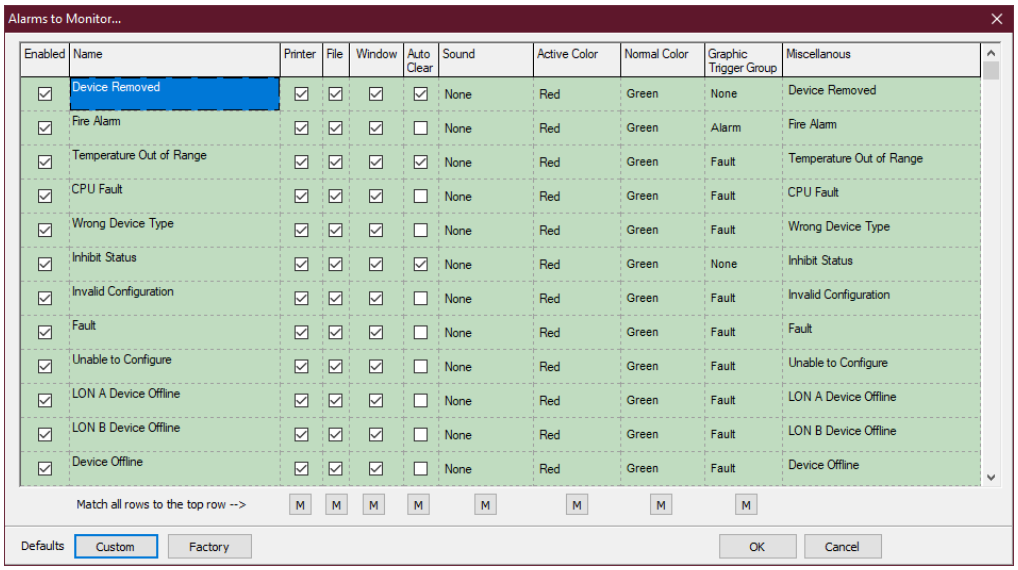
X3302 / X3302 Enhanced



12.4.10 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3.

X3302 / X3302 Enhanced



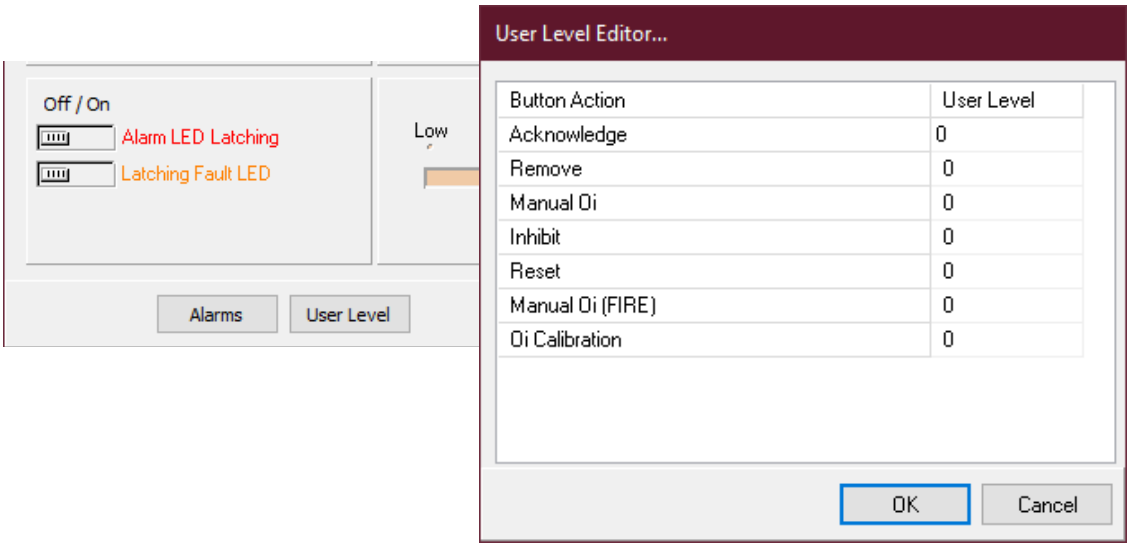
There are 31 alarms and events that pertain to the status and diagnostics for the MIR X3302.

12.4.11 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, “Manual Oi”, “Inhibit”, “IR Calibration”, “Manual Oi (FIRE)” and “Reset” buttons for the module which are accessible from the devices point display. The default value is “0” and provides access to all users.

Change these values to match a user account configuration and security needs.

X3302 / X3302 Enhanced



12.4.12 Point Display

The MIR X3302 has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device.

X3302 / X3302 Enhanced

12.4.12.1 Analog Input Track

The top left quadrant shows a dynamic 60 second history of the measured variable (IR counts) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.4.12.2 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.4.12.3 Manual Oi Log

The bottom left quadrant of the point display shows the detectors manual Optical Integrity (Oi) log. The last eight manual tests are shown with the date, time, and a PASS/FAIL indicator.

12.4.12.4 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.4.12.5 Buttons

There are six buttons that can send commands to the detector including: remove, inhibit, reset, Manual Oi, Manual Oi (FIRE) and Oi Calibration.

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12.5 Infrared (IR) Flame Detector X9800

The IR X9800 is located on the LON/SLC and provides Infrared Optical Flame detection capability for the Eagle Quantum Premier system.

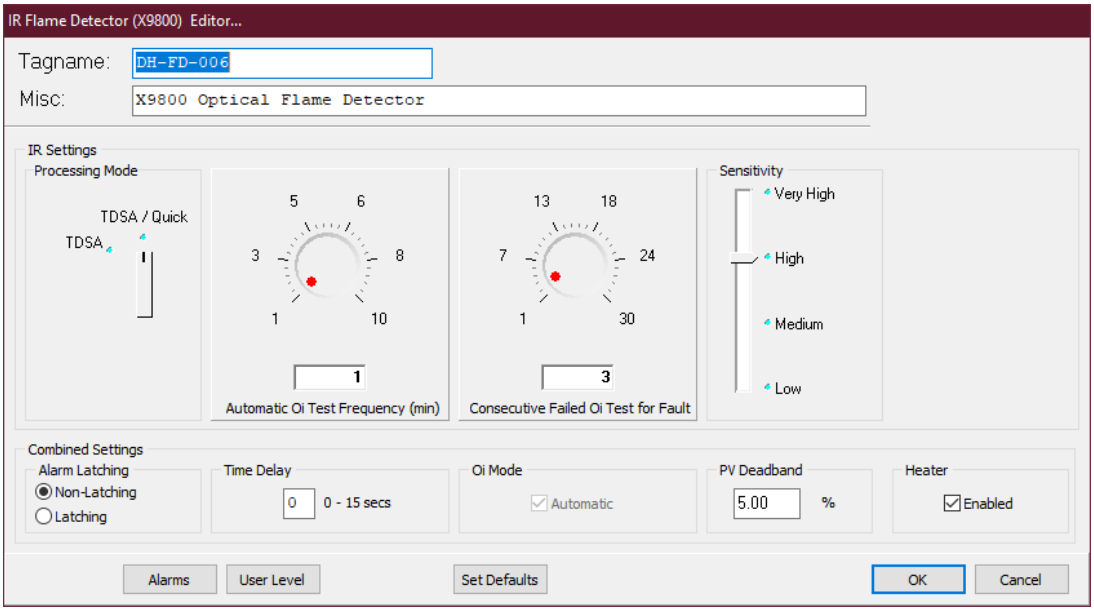
The IR X9800 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design.

The detector is equipped with both automatic and manual Oi test capability. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

12.5.1 Tagname

The tagname at the top of the dialog box refers to the flame detector.

Until a tagname is entered, the detector is not available in the S^3 Database for programming, monitoring, or dynamic graphic purposes.



12.5.2 Processing Mode

The IR X9800 features signal processing options.

These options determine the type of logic that the detector will use for processing fire signals to customize the IR X9800 to the application.

Two signal processing options are available for the IR X9800: “TDSA” and “TDSA & Quickfire”.

12.5.2.1 TDSA Enabled

The TDSA signal processing technique analyzes the input signal in real time, requiring the IR signal to flicker randomly, to recognize it as a fire condition.

Using TDSA signal processing, the X9800 ignores regularly chopped blackbody sources (occurring in areas where moving conveyors and hot objects in proximity to one another result in a regularly chopped IR signal), because it looks for a less uniform signal.

However, in the presence of a regularly chopped signal, the unit is more susceptible to false alarms due to sporadic IR that functions as a trigger when occurring in conjunction with the regularly chopped signal.

12.5.2.2 TDSA and Quick Fire Enabled

Either initiates a fire alarm.

The Quick Fire (High Speed) feature can be used in conjunction with the TDSA signal processing method.

This method overrides TDSA requirements in the event of an intense signal. When Quick Fire is activated, the detector can respond to an intense fire signal in less than 30 milliseconds (0.030 seconds).

Using the Quick-Fire feature in conjunction with TDSA signal processing allows the detector to provide a high-speed response to a large, non-flickering fire (such as in high pressure gas applications) while maintaining an ability to respond to smaller fires.

12.5.3 Automatic Oi

The IR X9800 includes the Automatic Optical Integrity (Oi) feature — a calibrated performance test that is automatically performed once per minute to verify complete detector operation capabilities. No testing with an external test lamp is required.

The detector automatically performs the same test that a maintenance person with a test lamp would perform — once every minute, 60 times per hour. However, a successful automatic Oi test does not produce an alarm condition.

The IR X9800 signals a fault condition when less than half of the detection range remains. This is indicated by the yellow color of the LED on the face of the detector.

12.5.4 Magnetic Oi / Manual Oi

The detector also incorporates both magnetic Oi and manual Oi features that provide the same calibrated test as the automatic Oi, and in addition actuates the message to verify output operation for preventive maintenance requirements.

These features can be performed at any time and eliminate the need for testing with a non-calibrated external test lamp.

CAUTION

These tests require disabling of all extinguishing devices to avoid release resulting from a successful test.

The magnetic Oi test is performed by placing a magnet by the marked location (mag Oi) on the outside of the detector.

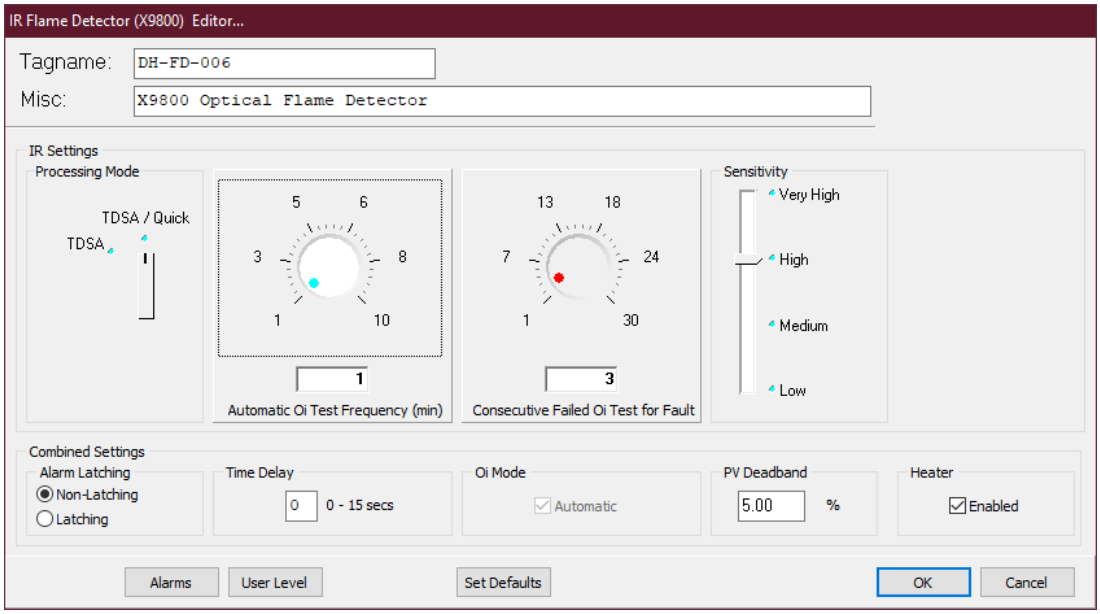
The manual Oi test is accomplished by selecting the button on the devices Point Display. The magnet must be held in place for a minimum of 6 seconds to complete the test. These test methods activate the calibrated IR emitter.

If the resulting signal meets the test criteria, indicating that greater than half of the detection range remains, the Alarm message changes state, the indicating LED changes to red, and a full-scale reading is displayed in the analog readout on the S^3 Point Display.

This condition remains until the magnet is removed or the S^3 software test command is released. If less than half of the detection range remains, no alarm is produced, and a fault is generated. The fault indication can be reset by momentarily applying the magnet or the S^3 Software Point Display reset button.

12.5.5 Oi Configuration

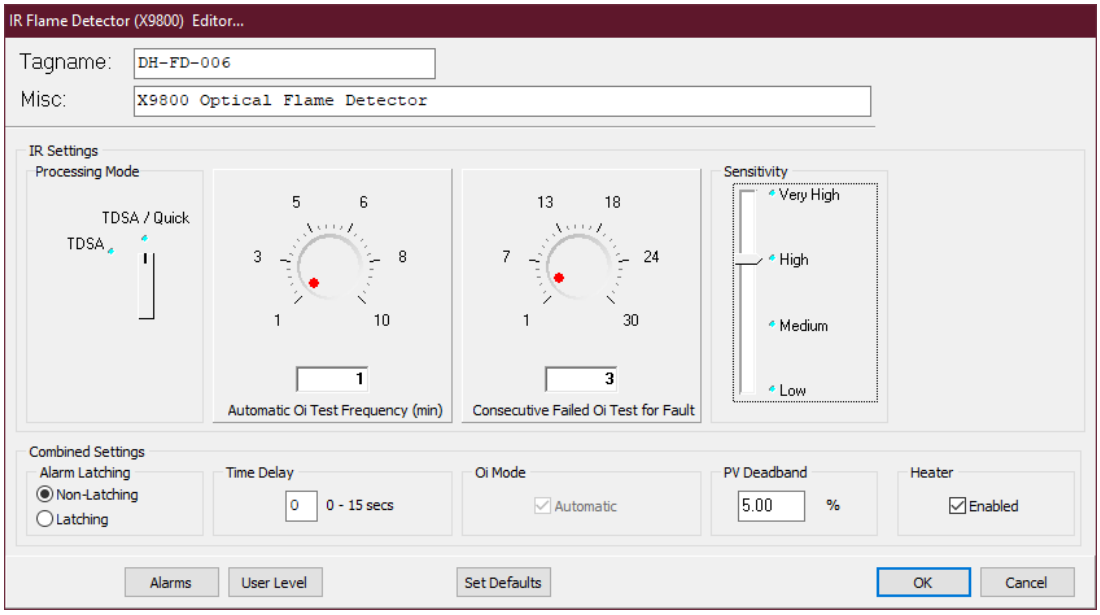
The frequency of Oi testing can be adjusted between once a minute as maximum and up to once every ten minutes as a minimum. There is also a checkbox for automatic operation.



The number of failed Oi tests needed to generate a fault can also be adjusted within a range of 1 to 30. Test failures can sometimes be generated during heavy rain or other environmental conditions thus requiring this parameter to be flexible.

12.5.6 Sensitivity

Dense fog, rain as well as certain gases and vapors can absorb IR radiation and reduce the sensitivity of the detector.



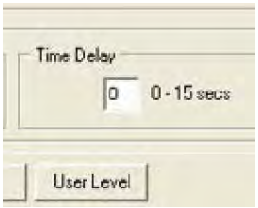
The sensitivity of the detector can be adjusted to any one of four settings using the slider control as shown above.

12.5.7 Alarm Latching

This refers to the fire alarm "message" being sent from the detector to the EQP controller and then used in both the embedded and user programmed logic. Non-latching is the default and most common setting.

Using the Radio Buttons select either latching or non-latching for the alarm operation. If set to latching, the user will have to reset the detector from its S^3 Point Display following an alarm.

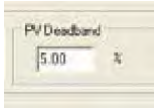
12.5.8 Time Delay



An input time delay can be programmed by entering a value from 1 to 15 seconds in the provided field.

This will delay sending the fire alarm message to the EQP controller until the fire alarm has been generated **uninterrupted** for the specified time. This programmable delay can be used to filter out spurious events.

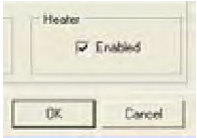
12.5.9 PV Deadband



A field is provided to enter the desired PV (Process Variable) Deadband.

Normally, all values are transmitted to the controller every five seconds. If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

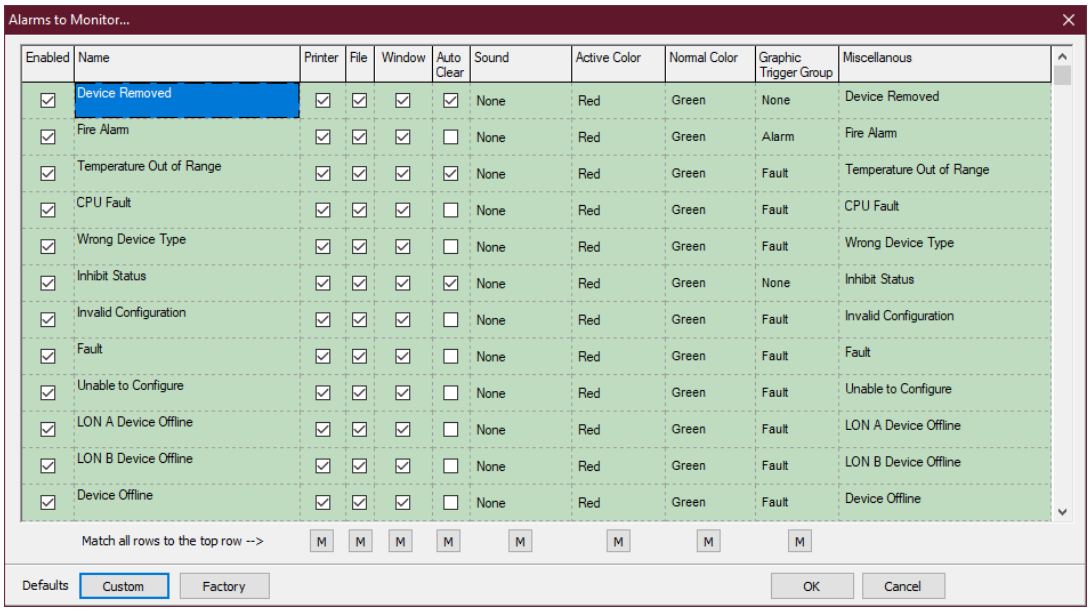
12.5.10 Heater



A checkbox is provided to enable the Microprocessor controlled heated optics for increased resistance to moisture and ice. In climates where this is not an issue, de-selecting this option will save up to 8 Watts per detector.

12.5.11 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box.

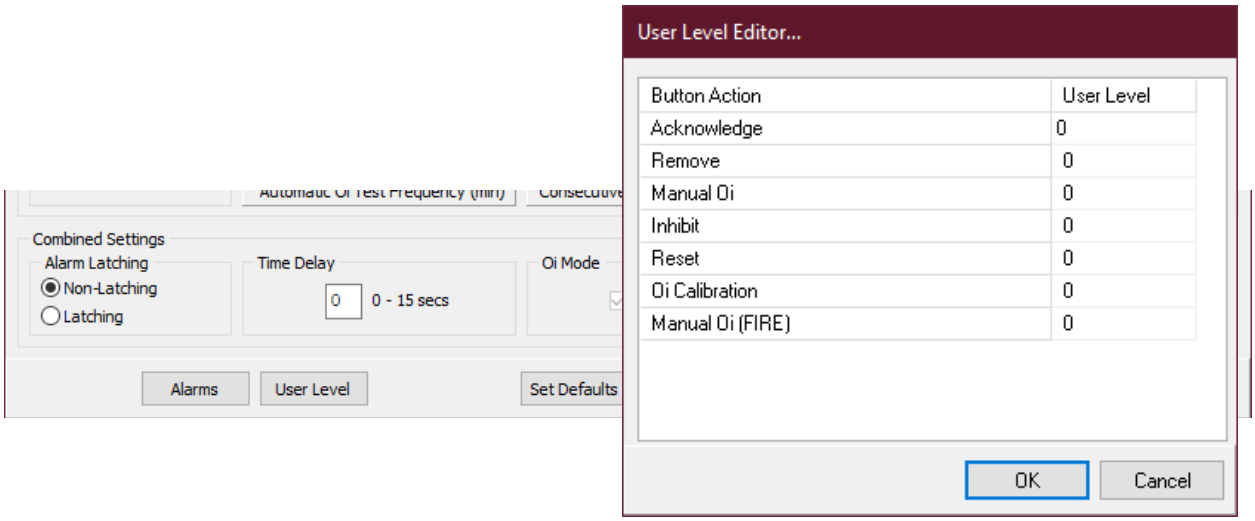


This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3. There are 28 alarms and events that pertain to the status and diagnostics for the IR X9800.

12.5.12 User Levels

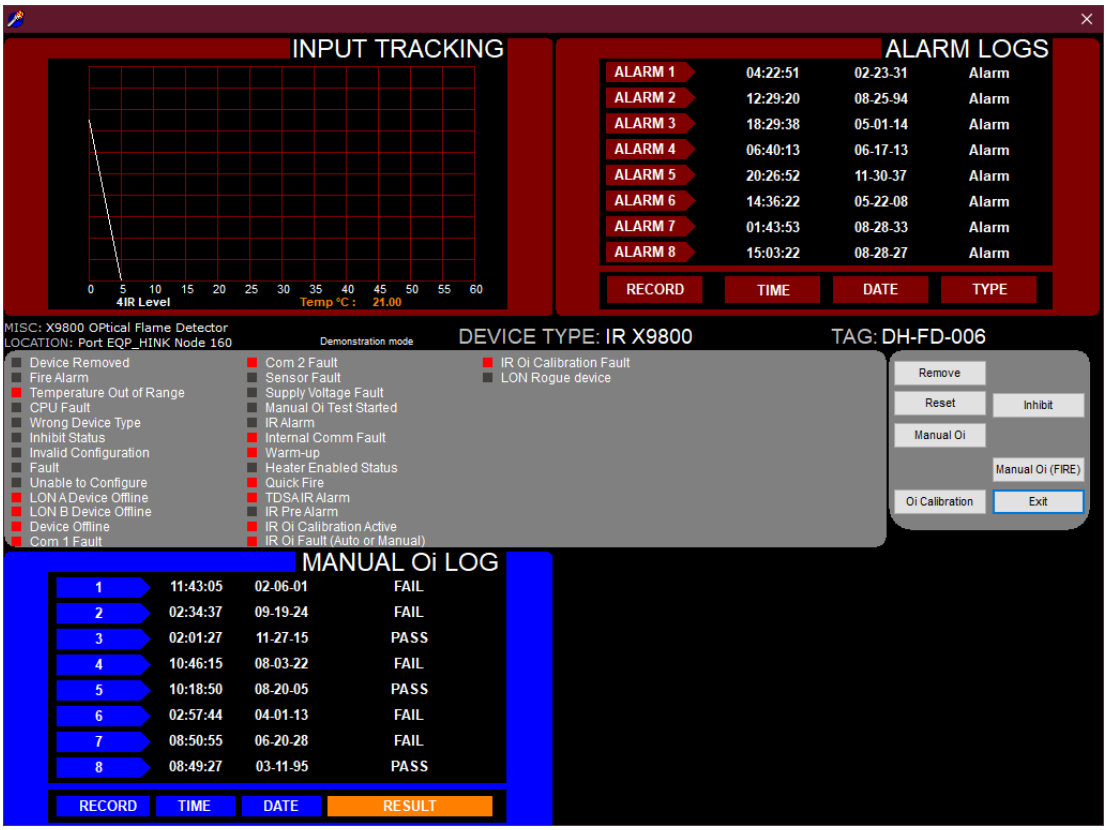
The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, “Manual Oi”, “Inhibit”, “IR Calibration”, “Manual Oi (FIRE)” and “Reset” buttons for the module which are accessible from the devices point display. The default value is “0” and provides access to all users.

Change these values to match a user account configuration and security needs.



12.5.13 Point Display

The IR X9800 has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



12.5.13.1 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.5.13.2 Analog Input Track

The top left quadrant shows a dynamic 60 second history of the measured variable (IR counts) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.5.13.3 Manual Oi Log

The bottom left quadrant of the point display shows the detectors manual Optical Integrity (Oi) log. The last eight manual tests are shown with the date, time, and a PASS/FAIL indicator.

12.5.13.4 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.5.13.5 Buttons

There are six buttons that can send commands to the detector including: remove, inhibit, reset, Manual Oi, Manual Oi (FIRE) and IR Calibration.

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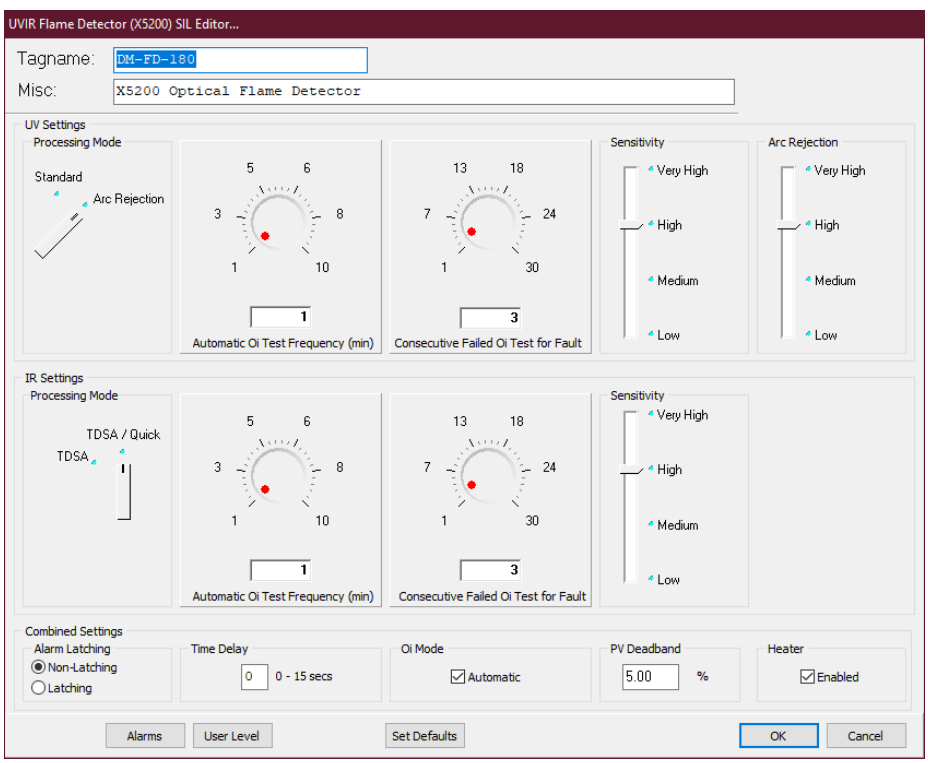
12.6 Ultraviolet (UV) / Infrared (IR) Flame Detector X5200

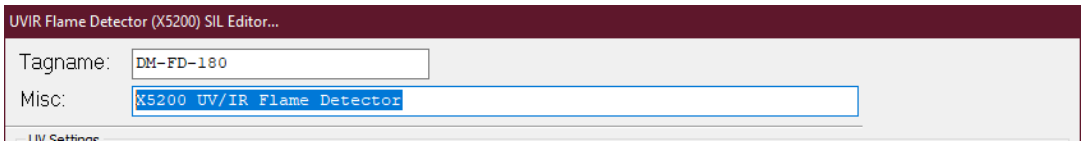
The UVIR X5200 is located on the LON/SLC and provides UVIR Optical Flame detection capability for the Eagle Quantum Premier system. The UVIR X5200 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design. The detector is equipped with both automatic and manual Oi test capability. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

12.6.1 Tagname

Configuration of the detector is through the “UVIR Flame Detector (X5200) Editor...” dialog box which contains controls for manipulating all adjustable parameters of the detector. This includes processing and sensitivity adjustments for both sensors along with some global settings for alarm action, Oi, time delays and deadband. The tagname at the top of the dialog box refers to the flame detector as a whole and is the identifier used for programming. Until a tagname is entered, the detector is not available in the S^3 Database for programming, monitoring, or dynamic graphic purposes.



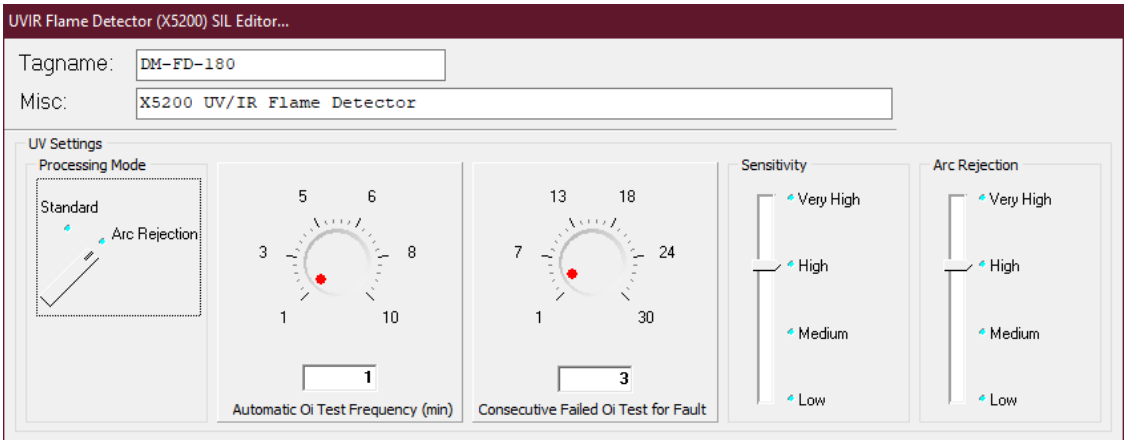
The optional description entered in the miscellaneous text field can be used for further describe where or how the detector is being used and can be helpful in troubleshooting.



The UVIR X5200 features signal processing options for both the UV and IR sensors. These options determine the type of logic that the detector will use for processing fire signals to customize the UVIR X5200 to the application.

12.6.2 UV Flame Detector Options

The UV flame detector output (measured in counts per second) is compared to the fire threshold (the "sensitivity" setting). If the radiant energy level from the fire exceeds the selected alarm threshold level, the fire alarm output is activated. In every application, it is crucial to ensure that the radiant ultraviolet energy level from the expected fire at the required distance from the detector will exceed the selected sensitivity level.



The UV flame detector in the X5200 can be programmed for "Standard" signal processing or "Arc Rejection".

12.6.2.1 Arc Rejection (Recommended Factory Setting)

The Arc Rejection mode enables the detector to prevent nuisance fire alarms caused by UV from short-duration electrical arcs or electrostatic discharge, while maintaining the ability to reliably detect the UV given off by a flame.

Typical applications that benefit from arc rejection logic include electrostatic coating processes and uncontrolled environments where transient UV sources can be present, such as many typical outdoor applications. Most false alarm sources have short transient UV signatures, while fire creates a long UV signature over many seconds. Most fires are detected in a few seconds.

12.6.2.2 Standard Signal Processing

Standard signal processing is recommended for high-speed suppression systems only. To allow for high-speed operation, the standard processing mode does not incorporate the arc rejection programming. This mode should only be used in a controlled, indoor environment.

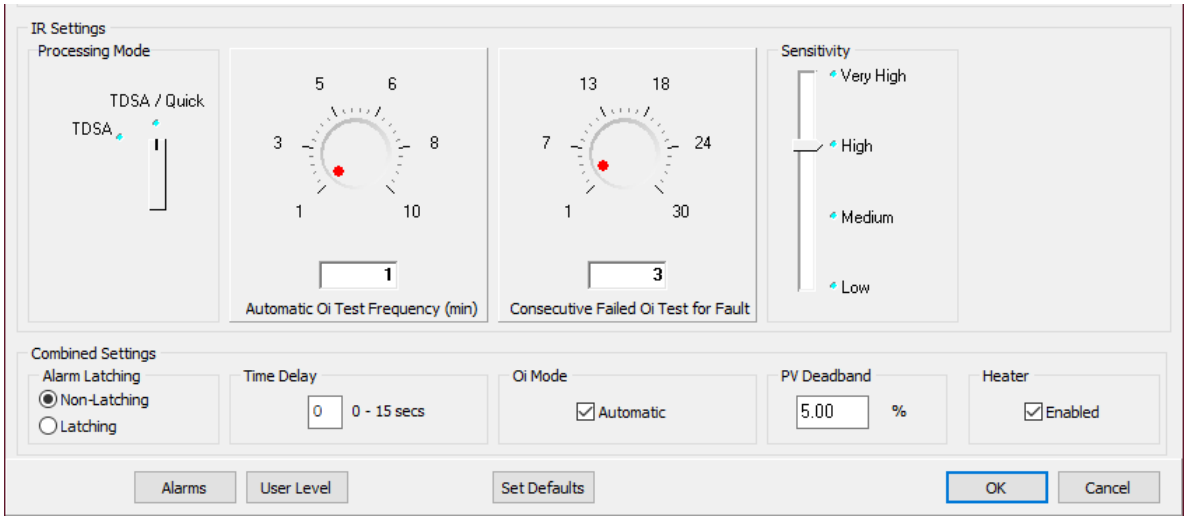
12.6.3 IR Detector Options

The IR detector in the UVIR X5200 can be programmed for “TDSA enabled” or both “TDSA and Quick Fire enabled” (either initiates fire alarm).

12.6.3.1 Time Domain Signal Analysis (TDSA)

The TDSA signal processing technique analyzes the input signal in real time, requiring the IR signal to flicker randomly to recognize it as a fire condition.

Using TDSA signal processing, the UVIR X5200 ignores regularly chopped blackbody sources (occurring in areas where moving conveyors and hot objects in proximity to one another result in a regularly chopped IR signal), because it looks for a less uniform signal.



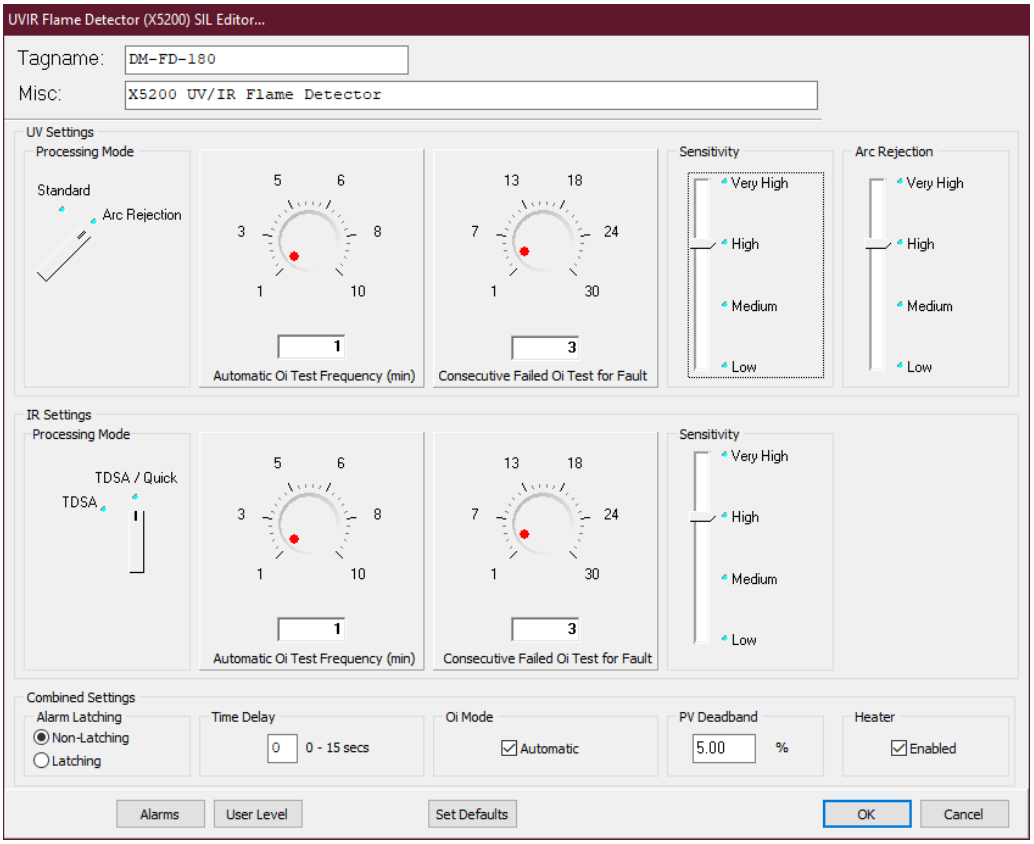
However, in the presence of a regularly chopped signal, the unit is more susceptible to false alarms due to sporadic IR that functions as a trigger when occurring in conjunction with the regularly chopped signal.

12.6.3.2 Quick Fire (High Speed)

The Quick Fire (High Speed) feature can be used in conjunction with the TDSA signal processing method. This method overrides TDSA requirements in the event of an intense signal. When Quick Fire is activated, the detector can respond to an intense fire signal in less than 30 milliseconds (0.030 seconds). Using the Quick Fire feature in conjunction with TDSA signal processing allows the detector to provide a high-speed response to a large, non-flickering fire (such as in high pressure gas applications) while maintaining an ability to respond to smaller fires.

12.6.3.1 Sensor Sensitivity Adjustments

Both the UV and IR sensors have individually adjustable sensitivity selections. These settings combined with the signal processing and arc rejection selections will affect how the detector responds to different types of fires. For details on the impact of these settings on a variety of common fuels, refer to the UVIR X5200 instruction manual 95-8546.



12.6.3.2 Automatic Optical Integrity (Oi)

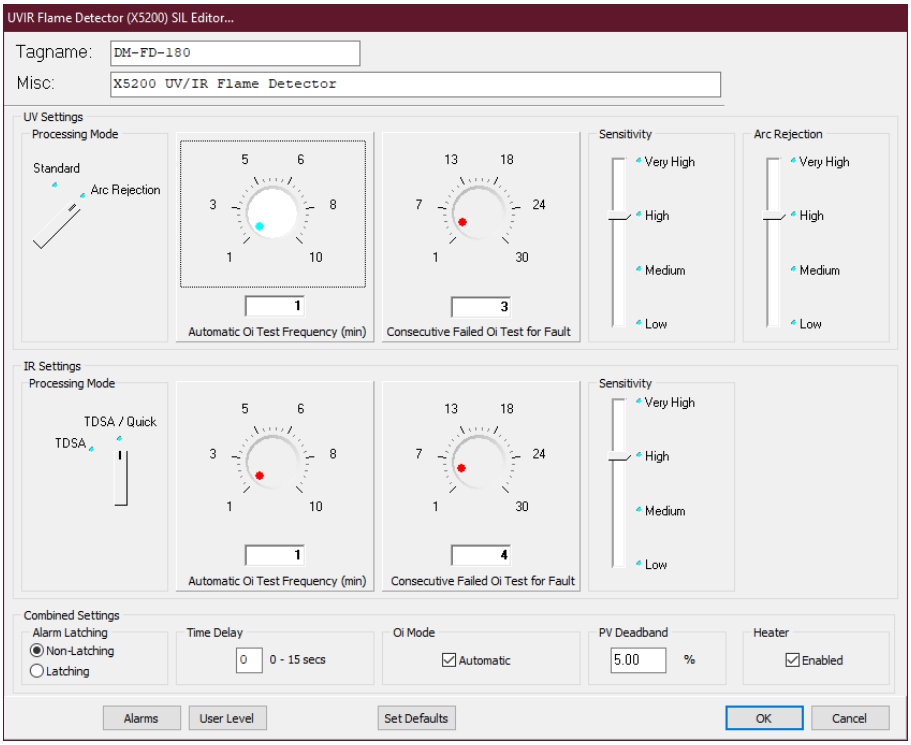
No testing with an external test lamp is required. The detector automatically performs the same test that a maintenance person with a test lamp would perform—once every minute, 60 times per hour. However, a successful automatic Oi test does not produce an alarm condition.

The UVIR X5200 signals a fault condition when less than half of the detection range remains. This is indicated by the Fault relay and is evident by the yellow color of the LED on the face of the detector.

The Oi feature is set to automatic as a factory default but can be deselected for “manual only” operation. Manual Oi tests can be initiated via the detectors point display in the S^3 software.

12.6.3.3 Oi Test Frequency

The default Oi test frequency is once a minute but can be adjusted to any whole minute increment up to a maximum of 10 minutes.



12.6.3.4 Oi Test Fault

The detector automatically conducts Oi tests to check the integrity of the optical sensing systems. Three consecutive failed Oi tests will generate a fault condition, which will be indicated by the LED on the face of the detector turning yellow. The EQP Controller and S^3 software will also annunciate this fault.

In certain environmental conditions like very heavy rain, Oi test failures can occur even though the hardware is not faulty. To compensate for this the number of failed Oi tests required to generate the fault can be adjusted upward to a maximum of 30.

12.6.3.5 Combined Settings

The bottom portion of the dialog box contains settings for the alarm latching, Optical Integrity (Oi), input time delay and PV Deadband adjustments that apply to the whole detector as opposed to a specific sensor.

12.6.3.5.1 Alarm Latching Mode

The red LED on the face of the detector comes on when in alarm and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.

12.6.3.5.2 Time Delay

An input time delay can be programmed by entering a value from 1 to 15 seconds in the provided field. This will delay sending the fire alarm message to the EQP controller until the fire alarm has been generated **uninterrupted** for the specified time. This programmable delay can be used to filter out spurious events.

12.6.3.5.3 Oi Mode

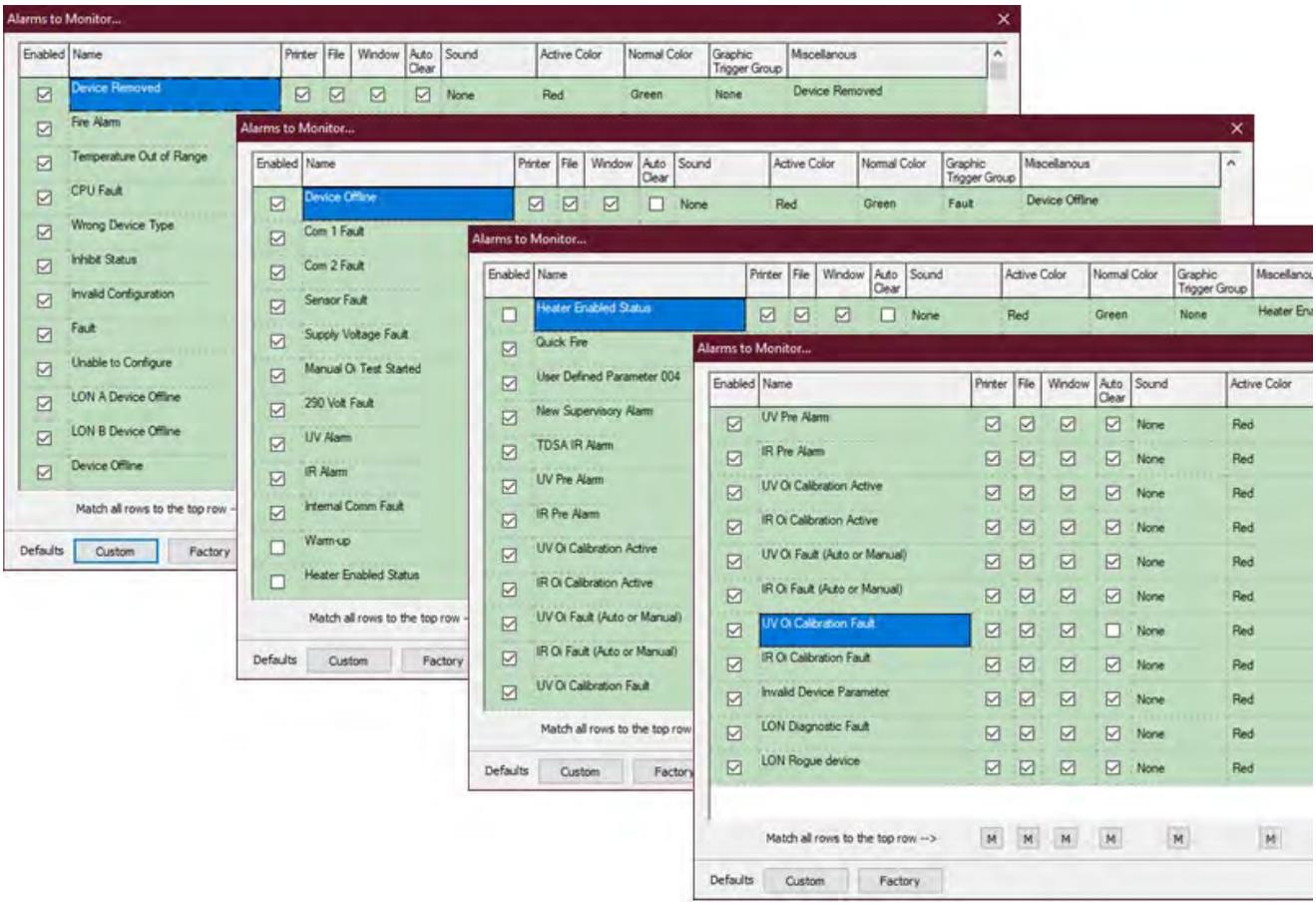
The UVIR X5200 includes the Automatic Optical Integrity (Oi) feature — a performance test that is automatically performed to verify complete detector operation capabilities.

12.6.3.5.4 PV Deadband

A field is provided to enter the desired PV (Process Variable) Deadband. Normally all values are transmitted to the controller every five seconds; If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

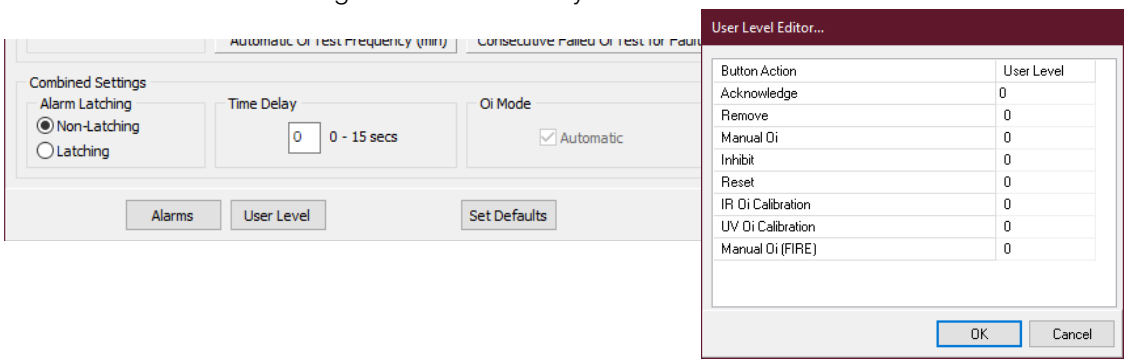
12.6.3.1 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3. There are 33 alarms and events that pertain to the status and diagnostics of the UVIR X5200.



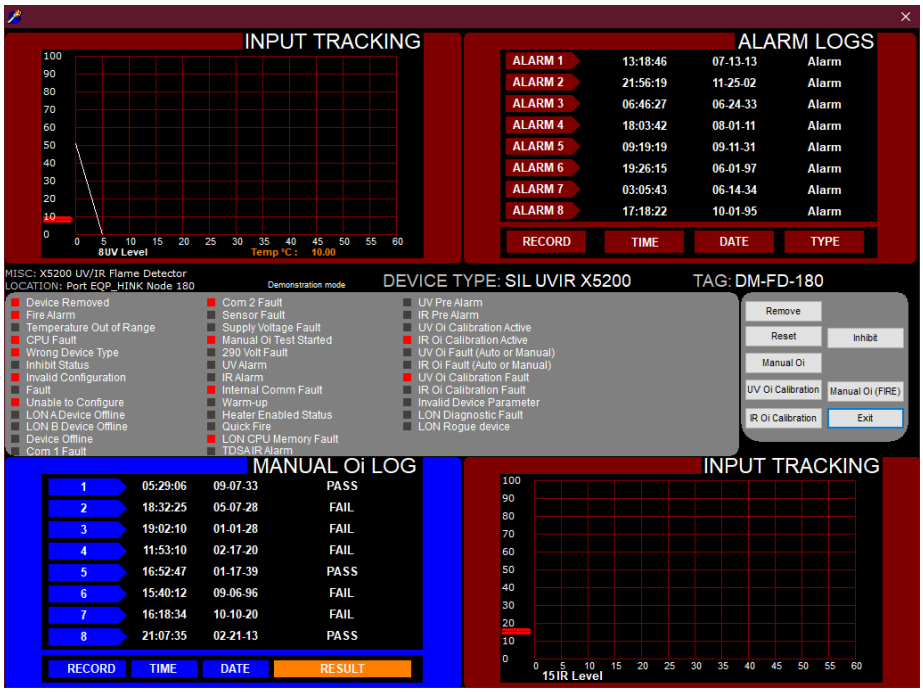
12.6.3.2 User Levels

The "User Level Editor..." provides a means for limiting access to the "Acknowledge", "Remove", "Manual Oi", "Inhibit", Manual Oi (FIRE)", "IR Calibration", "UV Calibration" and "Reset" buttons for the module which are accessible from the devices point display. The default value is "0" and provides access to all users. Change these values to match a user account configuration and security needs.



12.6.3.3 Point Display

The UVIR X5200 detector has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



12.6.3.3.1 Analog Input Tracks

The top left and bottom right quadrants show a dynamic 60-second history of the detectors measured variables, UV, and IR levels. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.6.3.3.2 Alarm Logs

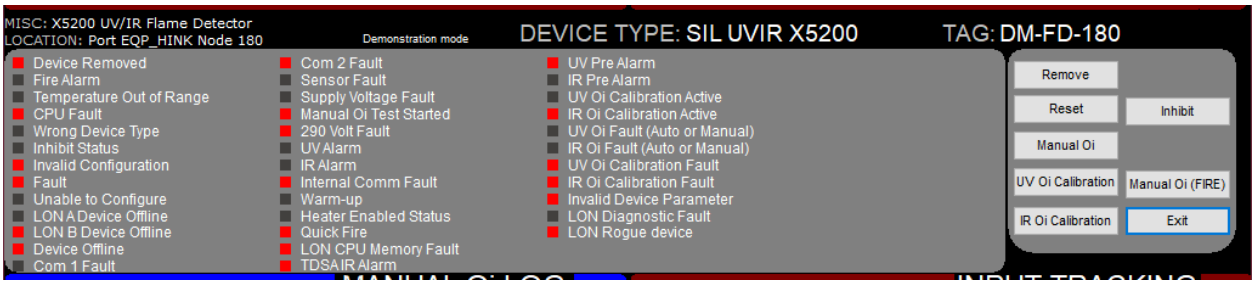
The top right quadrant of the display shows the last eight alarms with their date and time data.

12.6.3.3.3 Oi Log

The bottom left quadrant of the point display shows the detectors manual Optical Integrity (Oi) log. The last eight manual tests are shown with the date, time, and a PASS/FAIL indicator.

12.6.3.3.4 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.



12.6.3.3.5 Buttons

There are seven buttons that can send commands to the detector, including: Remove, Inhibit, Reset, Manual Oi, Manual Oi (FIRE), IR Calibration and UV Calibration.

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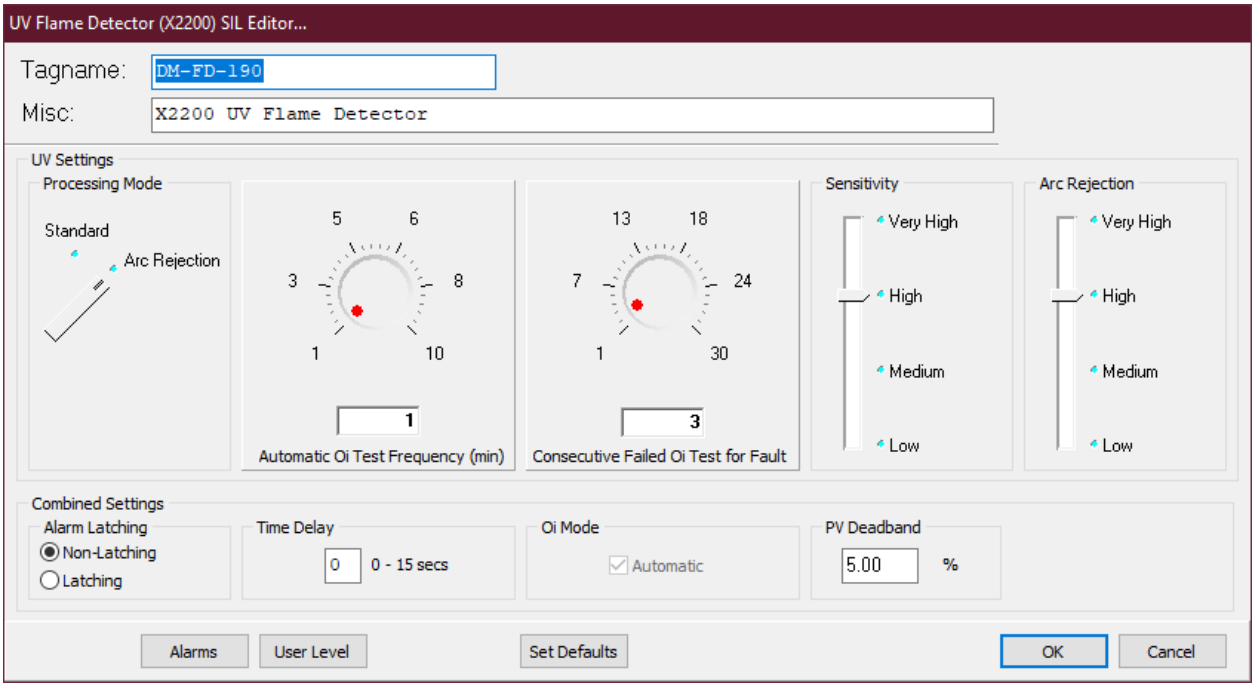
12.7 Ultraviolet Flame Detector X2200

The UV X2200 is located on the LON/SLC and provides Multi-Spectrum Infrared Optical Flame detection capability for the Eagle Quantum Premier system. The UV X2200 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design. The detector is equipped with both automatic and manual Oi test capability. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

12.7.1 Tagname

The tagname at the top of the dialog box refers to the flame detector. Until a tagname is entered, the detector is not available in the S³ database for programming, monitoring, or dynamic graphic purposes.

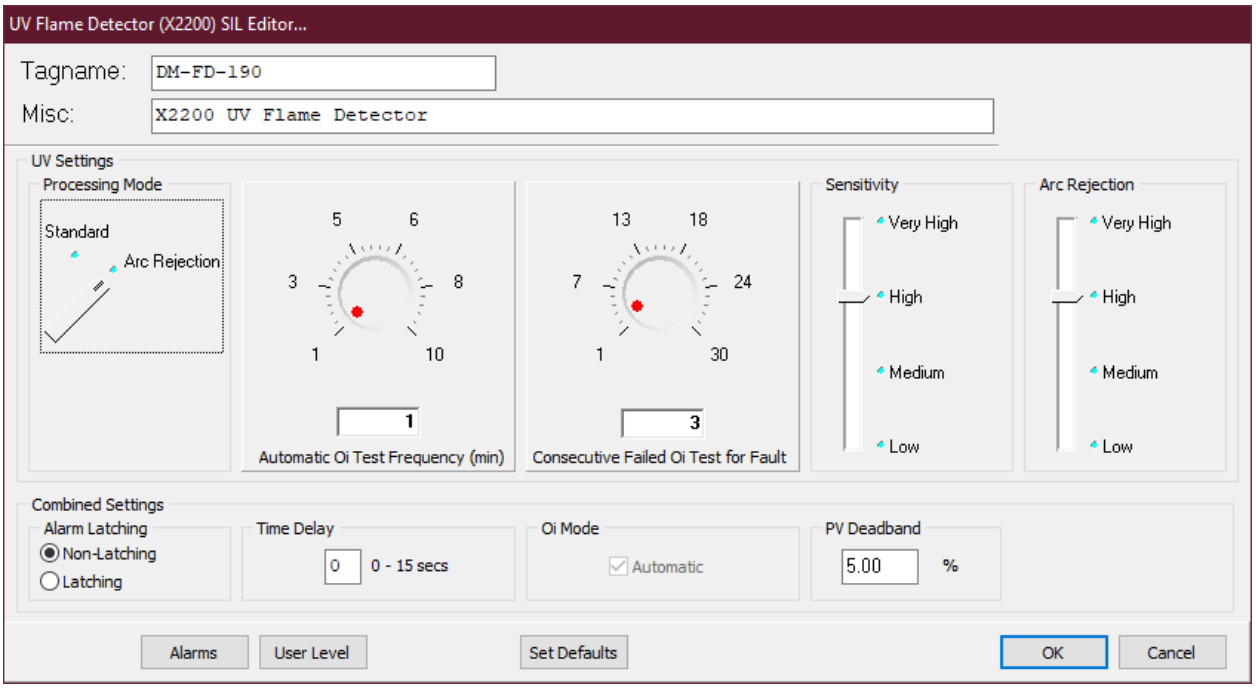


12.7.2 Signal Processing Options

The UV flame detector output (measured in counts per second) is compared to the fire threshold (the "sensitivity" setting). If the radiant energy level from the fire exceeds the selected alarm threshold level, the fire alarm output is activated. In every application, it is crucial to ensure that the radiant ultraviolet energy level from the expected fire at the required distance from the detector will exceed the selected sensitivity level. The UV detector in the UV X2200 can be programmed for "Arc Rejection" or "Standard Signal Processing".

12.7.2.1 STAR (Arc Rejection)

The "STAR" mode (recommended factory setting) enables the detector to prevent nuisance fire alarms caused by UV from short-duration electrical arcs or electrostatic discharge, while maintaining the ability to reliably detect the UV given off by a flame.



Typical applications that benefit from arc rejection logic include electrostatic coating processes and uncontrolled environments where transient UV sources can be present, such as many typical outdoor applications. Most false alarm sources have short transient UV signatures, while fire creates a long UV signature over many seconds. Most fires are detected in a few seconds.

12.7.2.2 Standard Signal Processing

Standard signal processing is recommended for high-speed suppression systems only. To allow for high-speed operation, the standard processing mode does not incorporate the arc rejection programming. This mode should only be used in a controlled, indoor environment.

12.7.3 Oi Test Frequency

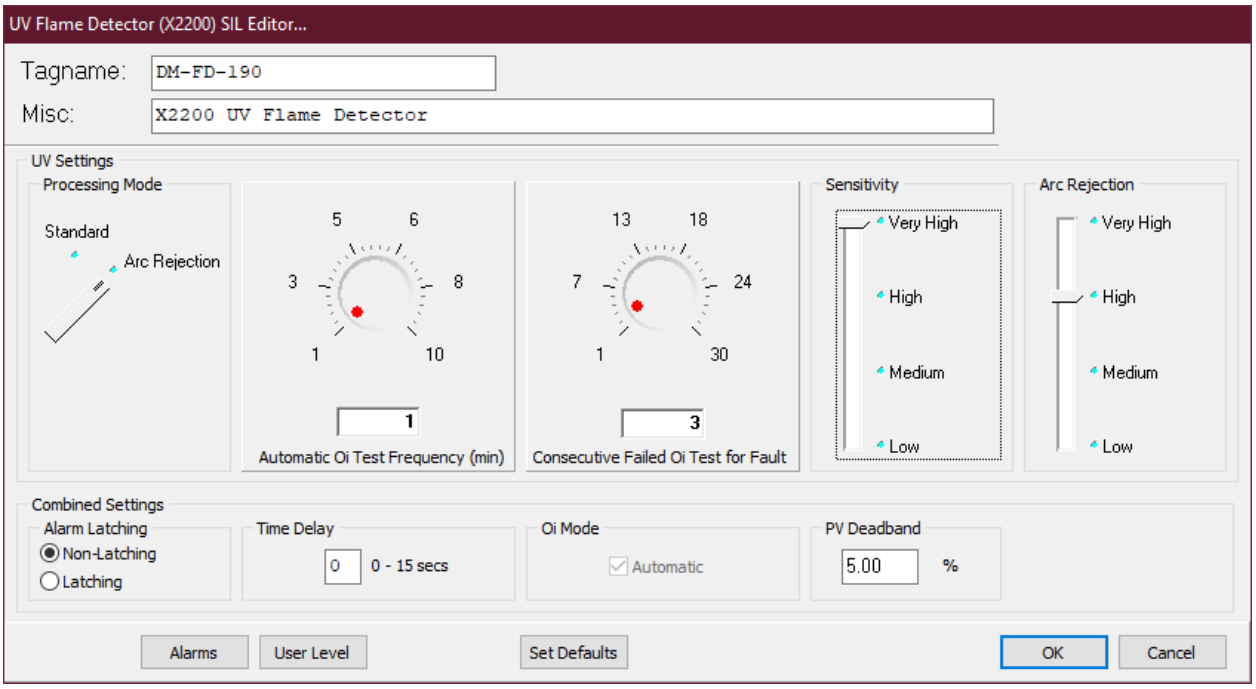
The default Oi test frequency is once a minute but can be adjusted to any whole minute increment up to a maximum of 10 minutes.

12.7.4 Oi Test Fault

The detector automatically conducts Oi tests to check the integrity of the optical sensing systems. Three consecutive failed Oi tests will generate a fault condition, which will be indicated by the LED on the face of the detector turning yellow. The EQP Controller and S^3 software will also annunciate this fault. In certain environmental conditions like very heavy rain, Oi test failures can occur even though the hardware is not faulty. To compensate for this the number of failed Oi tests required to generate the fault can be adjusted upward to a maximum of 30.

12.7.5 Sensitivity and Arc Rejection

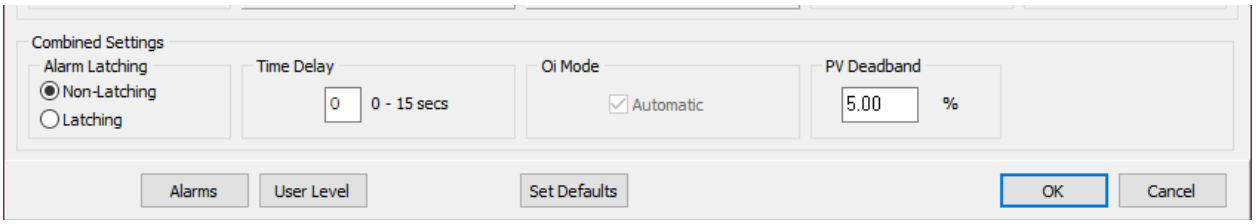
The detector sensitivity and arc rejection settings are adjusted using the four position sliders provided in the configuration dialog box.



The factory default for both is “High” which responds to a 1 x 1 foot n-Heptane fire at 60 feet in 1 second with standard processing. For other fuels, distances, etc. refer to the Appendix in the UV X2200 Instruction Manual 95-8549.

12.7.6 Combined settings

Alarm LED Latch: The tri-color LED on the face of the detector turns red when in alarm and can be configured to be either latching or non-latching.



If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3software. The default is non-latching.

12.7.6.1 PV Deadband

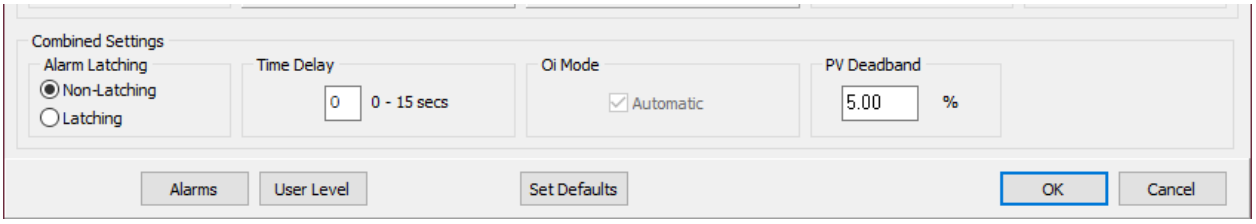
Normally all values are transmitted to the controller every five seconds; If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

12.7.6.2 Time Delay

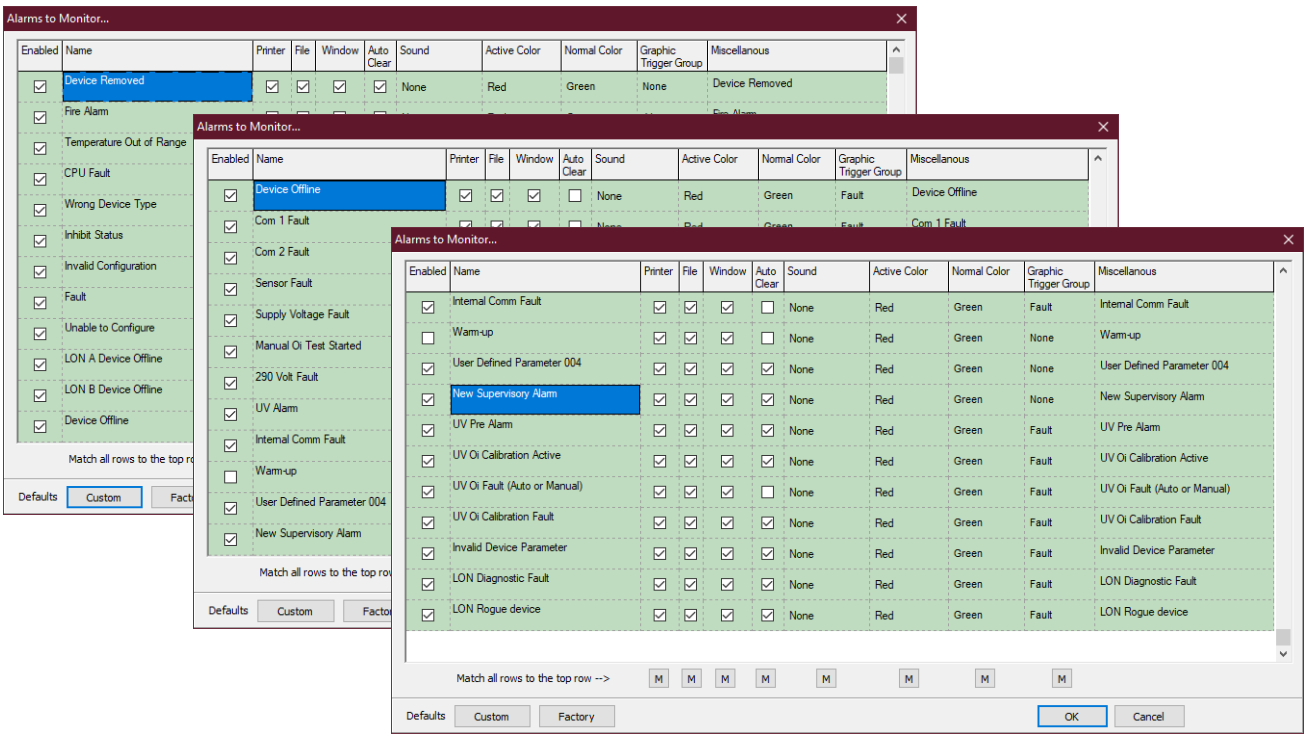
An input time delay can be programmed by entering a value from 1 to 15 seconds in the provided field. This will delay sending the fire alarm message to the EQP controller until the fire alarm has been generated **uninterrupted** for the specified time. This programmable delay can be used to filter out spurious events.

12.7.7 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box.



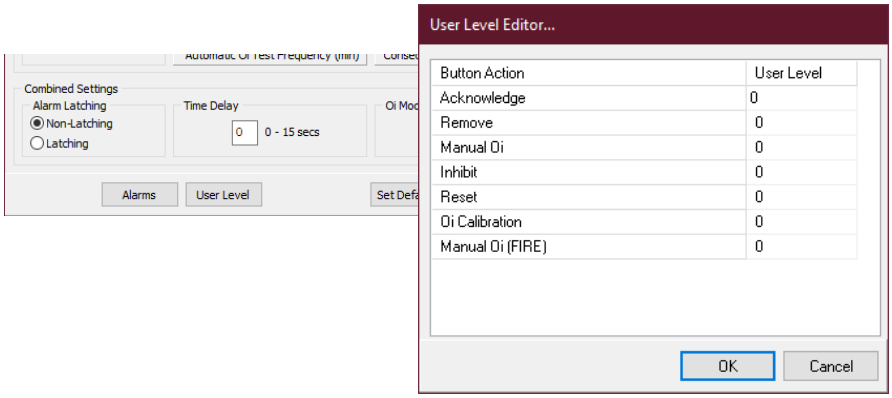
This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



There are 25 alarms and events that pertain to the status and diagnostics of the UV X2200 detector.

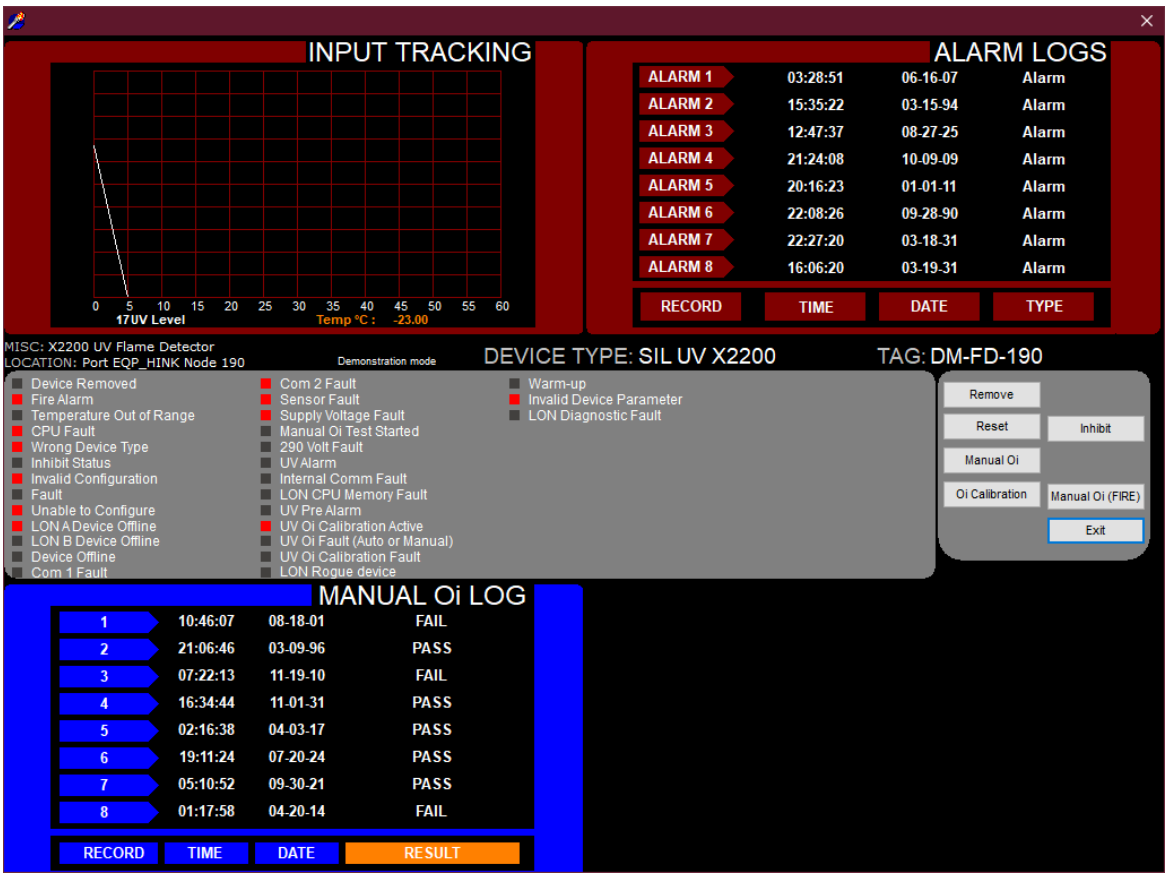
12.7.8 User Levels

The "User Level Editor..." provides a means for limiting access to the "Acknowledge", "Remove", "Manual Oi", "Inhibit", Manual Oi (FIRE)" and "Reset" buttons for module, which are accessible from the devices point display. The default value is "0" and provides access to all users. Change these values to match a user account configuration and security needs.



12.7.9 Point Display

The UV Flame Detector (X2200) has a custom "Point Display" that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the device.

12.7.9.1 Analog Input Track

The top left quadrant shows a dynamic 60-second history of the measured variable (UV Level) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.7.9.2 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.7.9.3 Oi Log

The bottom left quadrant of the point display shows the detectors manual Optical Integrity (Oi) Log. The last eight manual tests are shown with the date, time, and a PASS/FAIL indicator.

12.7.9.4 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.7.9.5 Buttons

There are six buttons that can send commands to the detector including: Remove, Inhibit, Reset, Manual Oi, Manual Oi (FIRE), and Oi Calibration.

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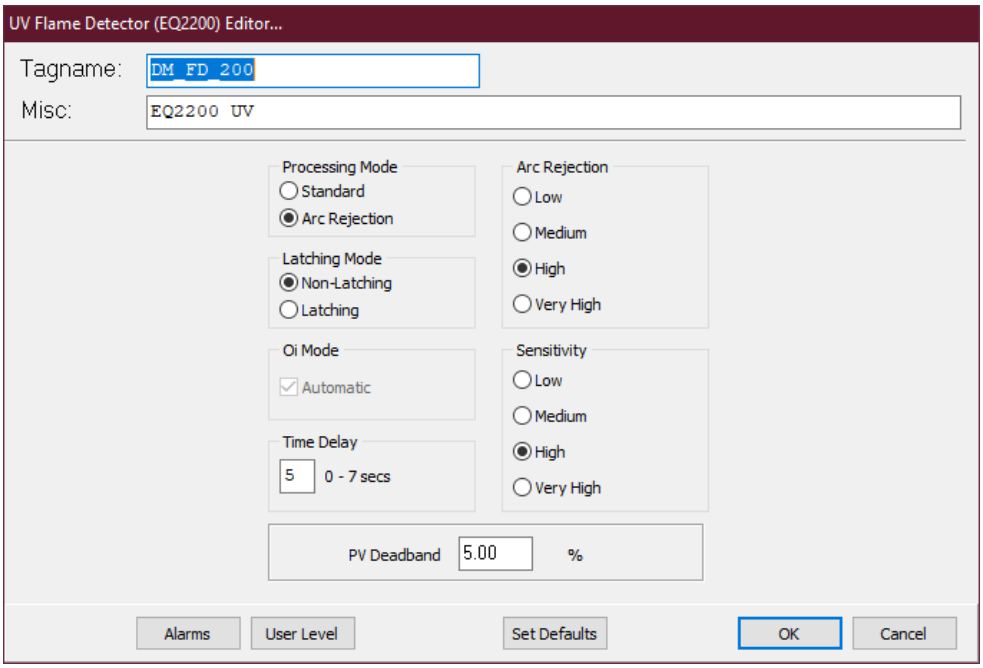
12.8 Ultraviolet (UV) Flame Detector EQ2200UV

The UV EQ2200 is located on the LON/SLC and provides UV Optical Flame detection capability for the Eagle Quantum Premier system. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

12.8.1 Tagname

The tagname at the top of the dialog box refers to the flame detector. Until a tagname is entered the detector is not available in the S^3 database for programming, monitoring, or dynamic graphic purposes.



12.8.2 Arc Rejection (Recommended Factory Setting)

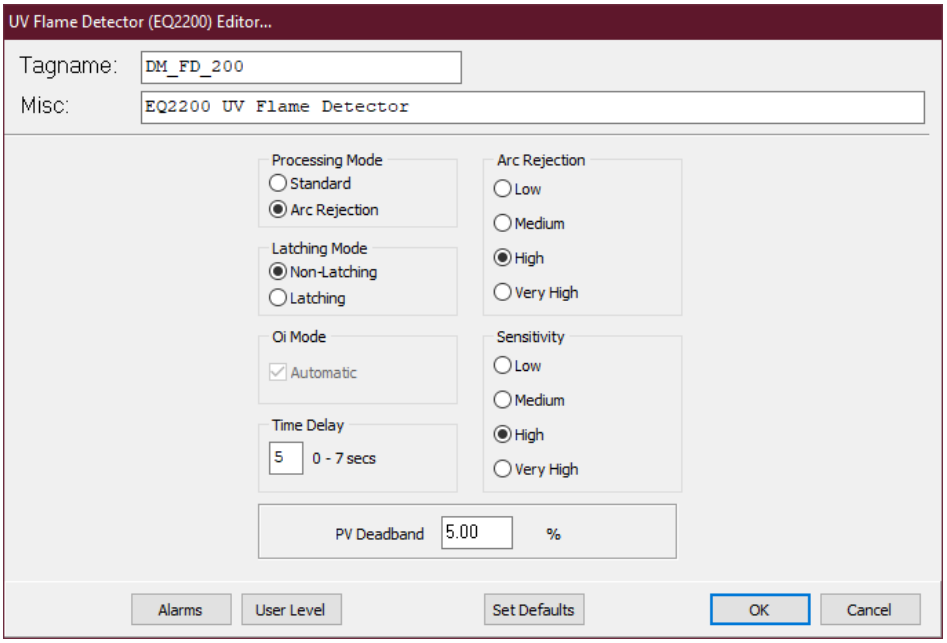
The Arc Rejection mode enables the detector to prevent nuisance fire alarms caused by UV from short-duration electrical arcs or electrostatic discharge, while maintaining the ability to reliably detect the UV given off by a flame. Typical applications that benefit from arc rejection logic include electrostatic coating processes and uncontrolled environments where transient UV sources can be present, such as many typical outdoor applications. Most false alarm sources have short transient UV signatures, while fire creates a long UV signature over many seconds. Most fires are detected in a few seconds.

12.8.3 Standard Signal Processing

Standard signal processing is recommended for high-speed suppression systems only. To allow for high-speed operation, the standard processing mode does not incorporate the arc rejection programming. This mode should only be used in a controlled, indoor environment.

12.8.4 Alarm Latching Mode

The red LED on the face of the detector comes on when in alarm and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.



12.8.5 Oi Mode

The UV EQ2200 includes the Automatic Optical Integrity (Oi) feature—a performance test that is automatically performed once per minute to verify complete detector operation capabilities. No testing with an external test lamp is required. The detector automatically performs the same test that a maintenance person with a test lamp would perform—once every minute, 60 times per hour. However, a successful automatic Oi test does not produce an alarm condition. The UV EQ2200 signals a fault condition when less than half of the detection range remains. This is indicated by the Oi fault message on the EQP Controller and via the S^3 software. The default mode is Automatic. Manual Oi tests can be initiated from the point display in the S^3 software.

12.8.6 Time Delay

An input time delay can be programmed by entering a value from 1 to 7 seconds in the provided field. This will delay sending the fire alarm message to the EQP controller until the fire alarm has been generated **uninterrupted** for the specified time. This programmable delay can be used to filter out spurious events.

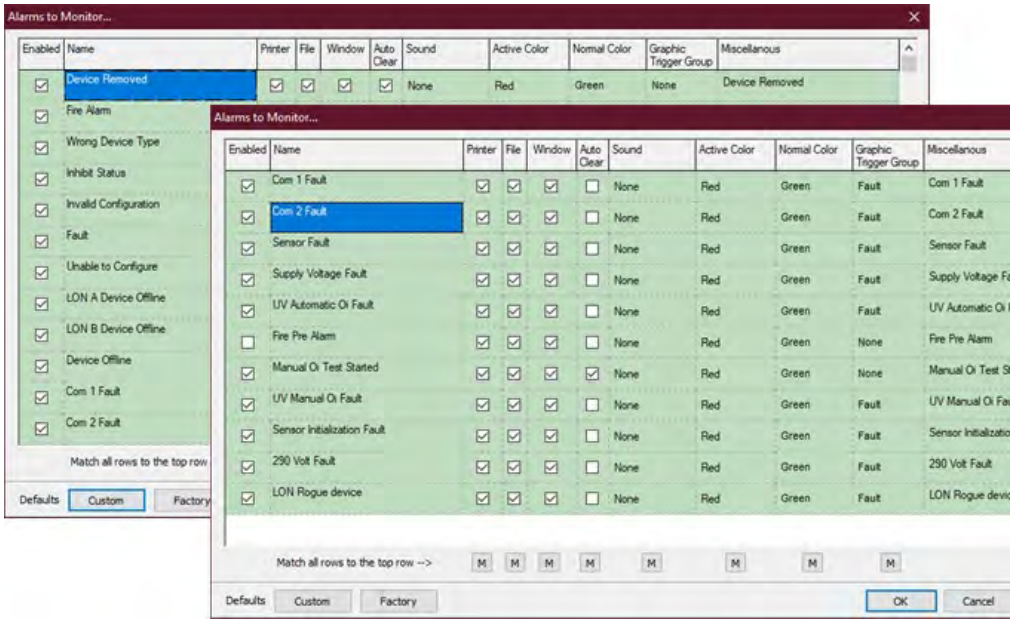
12.8.7 PV Deadband

A field is provided to enter the desired PV (Process Variable) Deadband.

Normally all values are transmitted to the controller every five seconds; If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

12.8.8 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3.



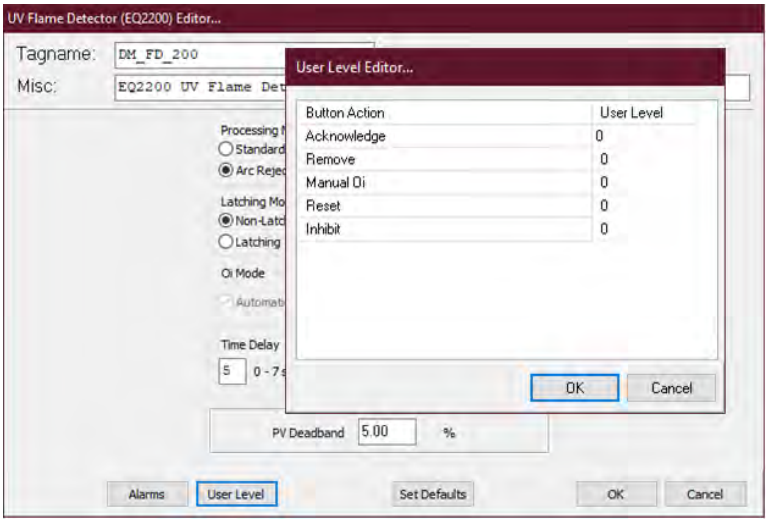
There are 21 alarms and events that pertain to the status and diagnostics for the UV EQ2200.

12.8.9 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”,

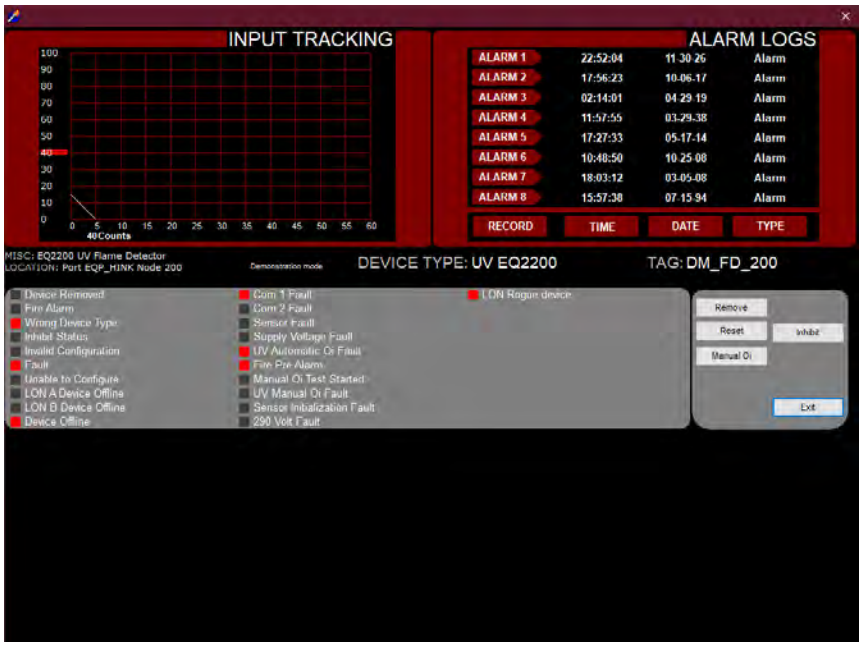
“Remove”, “Manual Oi”, “Inhibit”, Manual Oi (FIRE)” and “Reset” buttons for the module which are accessible from the devices point display. The default value is “0” and provides access to all users.

Change these values to match a user account configuration and security needs.



12.8.10 Point Display

The UV EQ2200 has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



12.8.10.1 Analog Input Track

The top left quadrant shows a dynamic 60-second history of the measured variable (UV counts) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds.

12.8.10.2 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.8.10.3 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.8.10.4 Buttons

There are four buttons that can send commands to the detector including: Remove, Inhibit, Reset, and Manual Oi.

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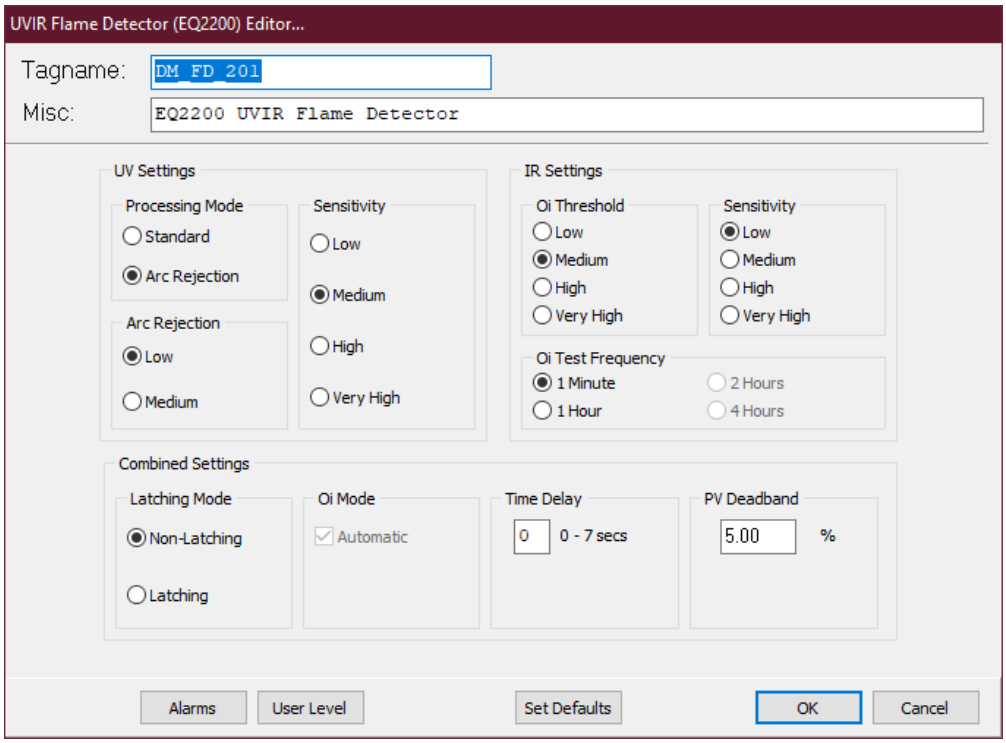
12.9 Ultraviolet (UV) / Infrared (IR) Optical Flame Detector EQ2200UVIR

The UVIR EQ2200 is located on the LON/SLC and provides a combination UV & IR Optical Flame detection capability for the Eagle Quantum Premier System. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

Configuration of the detector is through the “UVIR EQ2200 Flame Detector Editor...” dialog box which contains controls for manipulating all adjustable parameters of the detector. This includes processing and sensitivity adjustments for both sensors, along with some global settings for alarm action, Oi, time delays, and Deadband.



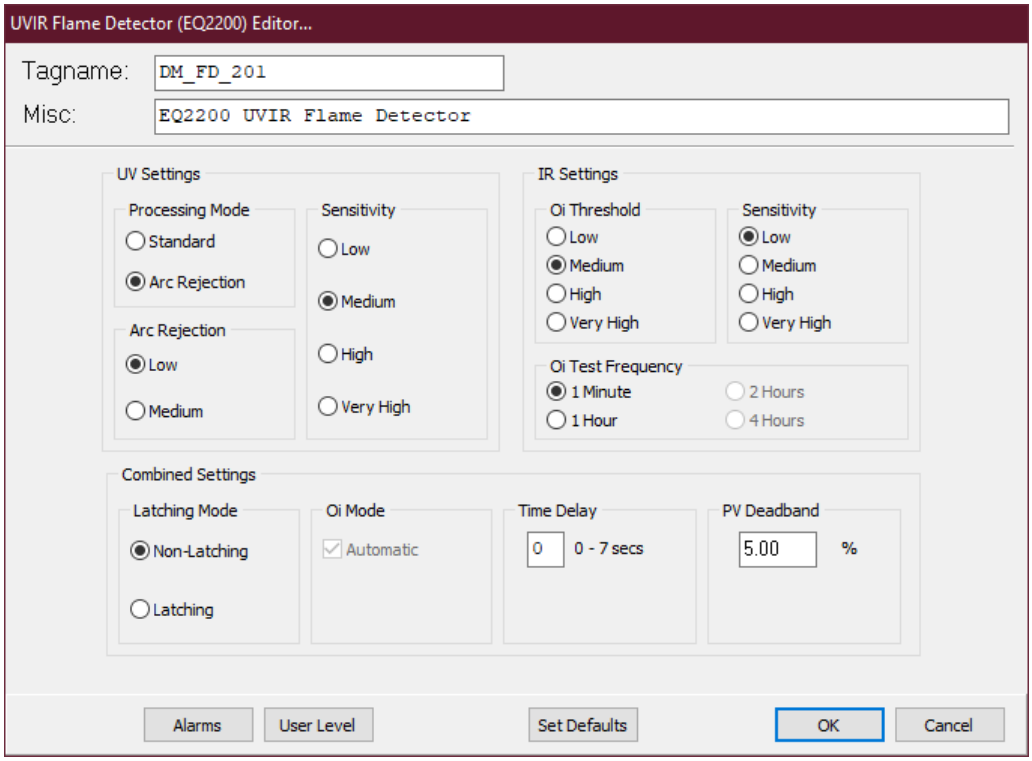
12.9.1 Tagname

The tagname at the top of the dialog box refers to the flame detector as a whole and is the identifier used for programming.

Until a tagname is entered, the detector is not available in the S^3 database for programming, monitoring, or dynamic graphic purposes. The optional description entered in the miscellaneous text field can be used to further describe where or how the detector is being used and can be helpful in troubleshooting.

12.9.2 Sensor Settings & Sensitivity

Both the UV and IR sensors have independently adjustable settings for a variety of processing and sensitivity variables that can be used to fine tune the detectors operation to fit the application.



12.9.3 UV Specific Settings

The UV flame detector can be programmed for either “Standard Signal Processing” or “Arc Rejection”.

12.9.3.1 Arc Rejection (Recommended Factory Setting)

The Arc Rejection mode enables the detector to prevent nuisance fire alarms caused by UV from short-duration electrical arcs or electrostatic discharge, while maintaining the ability to reliably detect the UV given off by a flame. Most false alarm sources have short transient UV signatures, while fire creates a long UV signature over many seconds. Most fires are detected in a few seconds.

12.9.3.2 Standard Signal Processing

Standard signal processing is recommended for high-speed suppression systems only. To allow for high-speed operation, the standard processing mode does not incorporate the arc rejection programming.

This mode should only be used in a controlled, indoor environment.

12.9.4 UV and IR Sensor Sensitivity Settings

Both the UV and IR detectors can be individually programmed to operate in one of four sensitivity settings; Low, Medium, High, or Very High.

The sensitivity level determines the maximum response distance — the UVIR will be the lesser of the two (UV or IR) in feet.

Examples of sensitivity settings are shown in the table below:

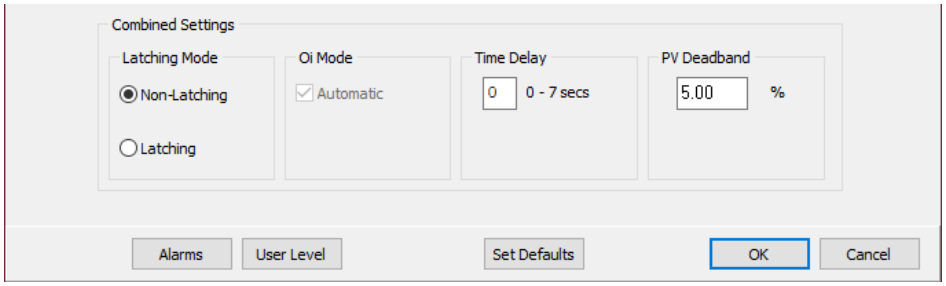
	Sensitivity	Arc Rejection	30-Inch Methane	1 Sq. Ft. Gasoline	1 Sq. Ft. Methanol
UV Standard	Low		40	30	15
	Medium		60	45	20
	High		80	65	35
	Very High		100	100	55
UV Arc Rejection	Low	Medium	35	30	10
	Low	High	35	30	10
	Medium	Medium	55	40	15
	Medium	High	55	40	15
	High	Medium	60	50	25
	High	High	65	50	25
	Very High	Medium	85	65	50
	Very High	High	85	65	50
IR	Low		40	65	40
	Medium		55	75	45
	High		65	90	55
	Very High		90	100	60

12.9.5 Combined Settings

The bottom portion of the dialog box contains settings for the alarm latching, Optical Integrity (Oi), input time delay and PV Deadband adjustments that apply to the whole detector as opposed to a specific sensor.

12.9.5.1 Alarm Latching Mode

The red LED on the face of the detector comes on when in alarm and can be configured to be either latching or non-latching. If latching is selected, following a fire detection, the LED will stay on until the detector is reset from the point display for the detector in the S^3 software. The default is non-latching.



12.9.5.2 Automatic Oi

The UVIR EQ2200 includes the Automatic Optical Integrity (Oi) feature — a performance test that is automatically performed to verify complete detector operation capabilities.

No testing with an external test lamp is required. The detector automatically performs the same test that a maintenance person with a test lamp would perform —once every minute, 60 times per hour. However, a successful automatic Oi test does not produce an alarm condition. While the default Oi test frequency is once a minute, it can be changed to once an hour, every two hours, or once every four hours. The default mode is Automatic. Manual Oi tests can be initiated from the point display in the S^3 software.

12.9.5.3 Time Delay

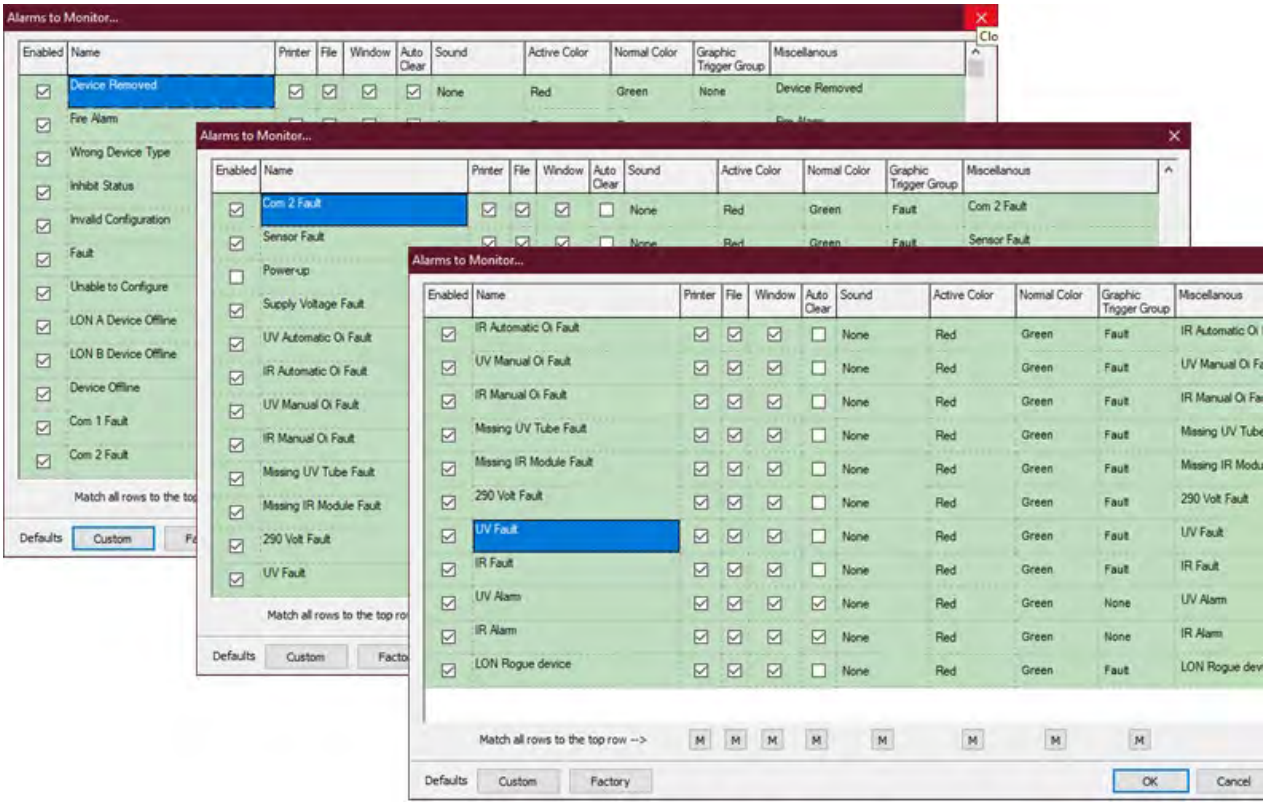
An input time delay can be programmed by entering a value from 1 to 7 seconds in the provided field. This will delay sending the fire alarm message to the EQP controller until the fire alarm has been generated **uninterrupted** for the specified time. This programmable delay can be used to filter out spurious events.

12.9.5.4 PV Deadband

A field is provided to enter the desired PV (Process Variable) Deadband. Normally all values are transmitted to the controller every five seconds. If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

12.9.6 Alarms

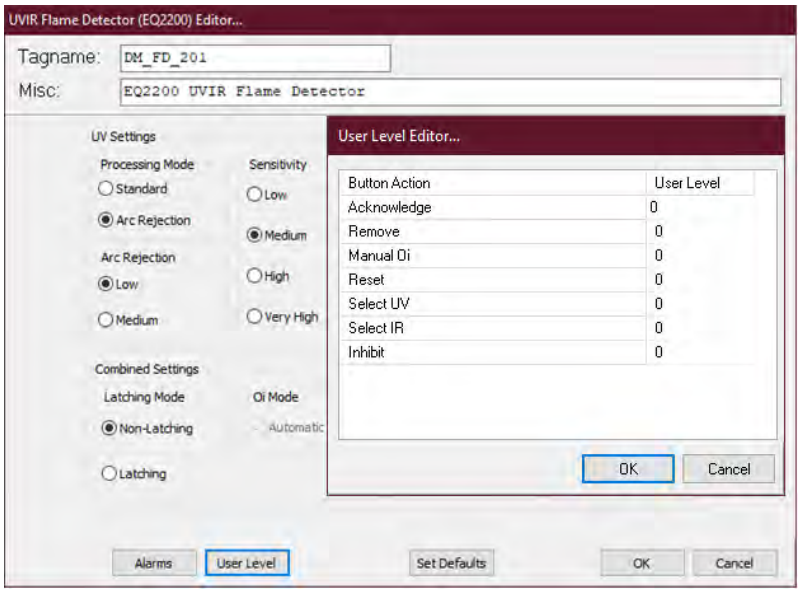
Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



There are 27 alarms and events that relate to the status and diagnostics of the UVIR EQ2200.

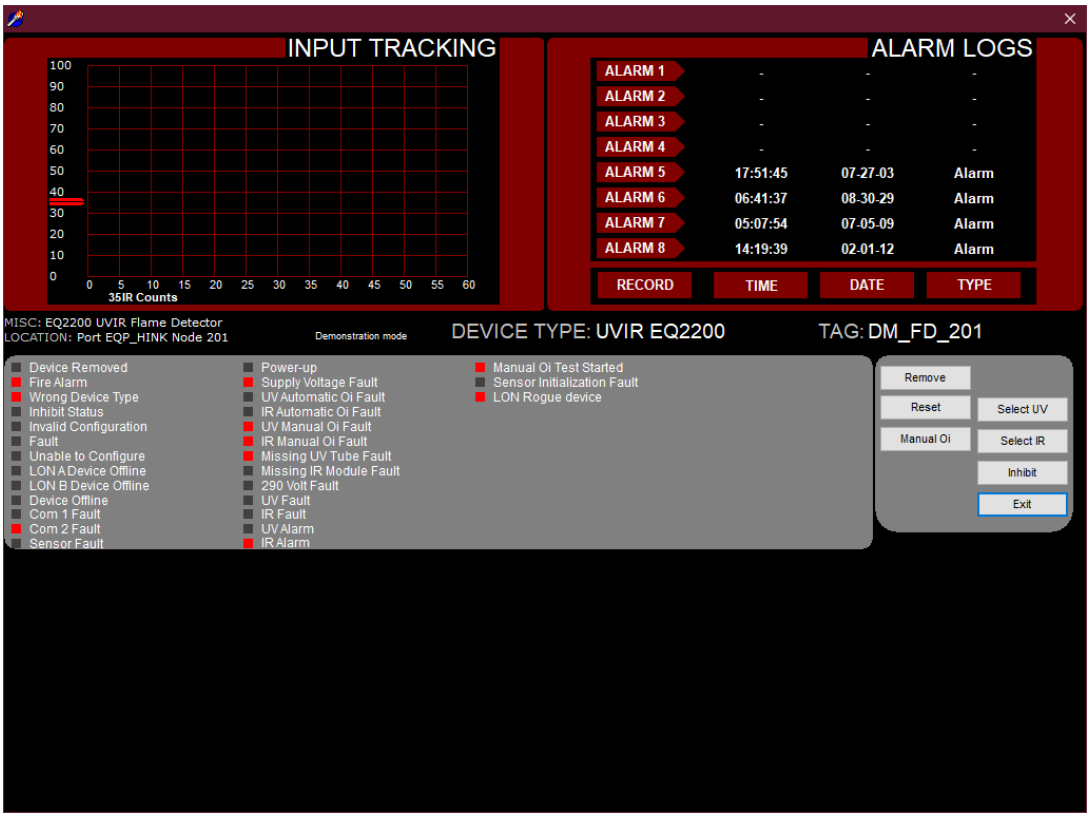
12.9.7 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, “Manual Oi”, “Inhibit”, Manual Oi (FIRE)” and “Reset” buttons for the module which are accessible from the devices point display. The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.



12.9.8 Point Display

The UVIR EQ2200 has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



12.9.8.1 Analog Input Track

The top left quadrant shows a dynamic 60 second history of the measured variable (UV counts or IR level) for the detector. The input track scrolls from left to right with the most current data at the “pen” on the left margin. The display updates once every five seconds. Only one of the two PV’s (UV or IR) can be displayed at a time, used the “Select UVIR” buttons on the center right side of the display to toggle between displaying UV Counts as shown in the example above, or the IR sensors level.

12.9.8.2 Alarm Logs

The top right quadrant of the display shows the last eight alarms with their date and time data.

12.9.8.3 Status & Diagnostics

The middle portion of the point display shows the discrete status and health indicators for the detector.

12.9.8.4 Buttons

There are six buttons that can send commands to the detector including: Remove, Inhibit, Reset, Select UV, Select IR, and Manual Oi.

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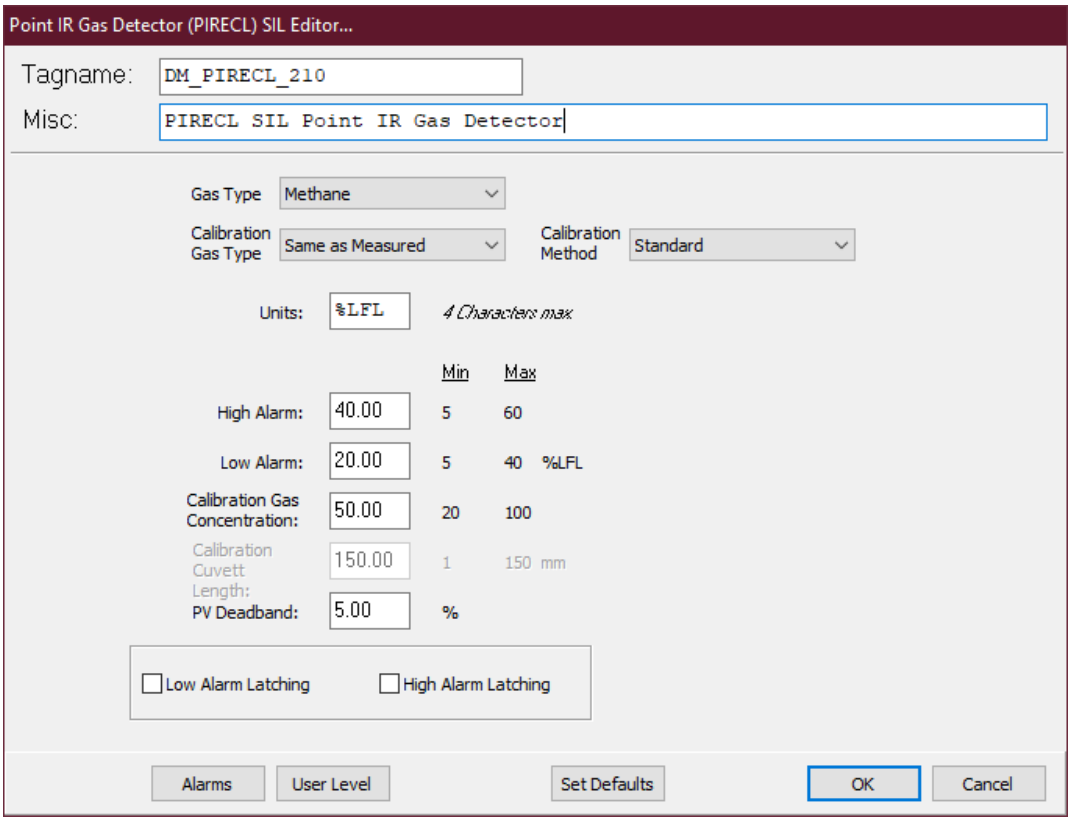
12.10 Point IR Gas Detector PIRECL

The PIRECL is a diffusion based, point-type infrared gas detector that provides continuous monitoring of combustible hydrocarbon gas concentrations in the range of 0 to 100% LFL.

The Point IR Gas Detector has integral communication hardware and resides on the EQP communication network without the need for external interface modules.

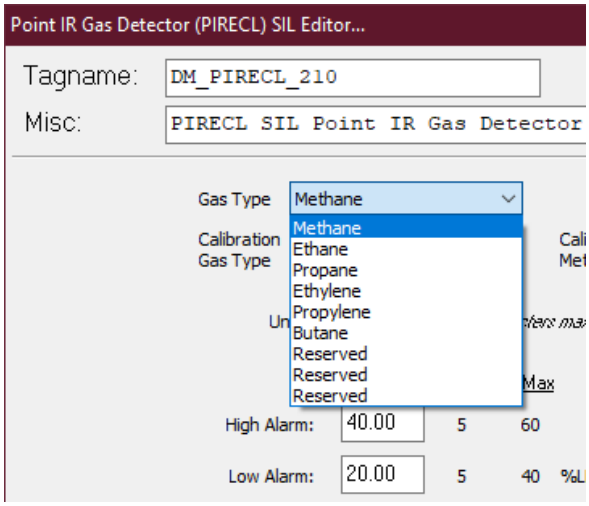


The first step in configuring the PIRECL detector is to enter the tagname and any miscellaneous text in the appropriate fields at the top of the dialog box.

12.10.1 Gas Type

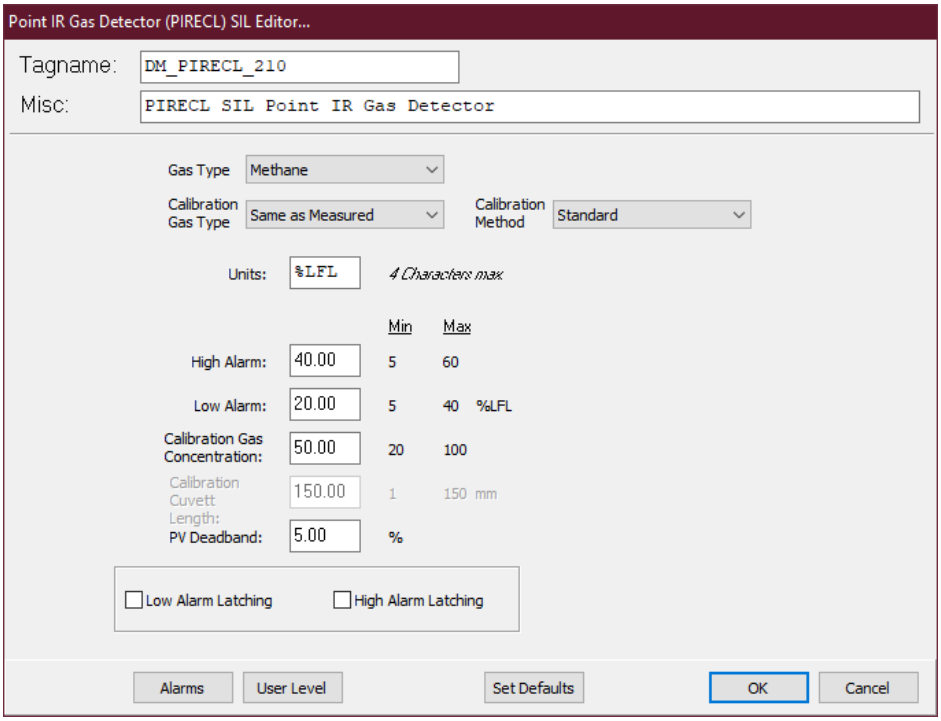
After entering the desired tagname and miscellaneous information, select the gas type from the pull-down list that the detector is to primarily monitor.

There are six common hydrocarbon gases that are available in the detector's memory: three are "Reserved" fields for future standard characterizations.



12.10.2 Calibration Gas: Type and Concentration

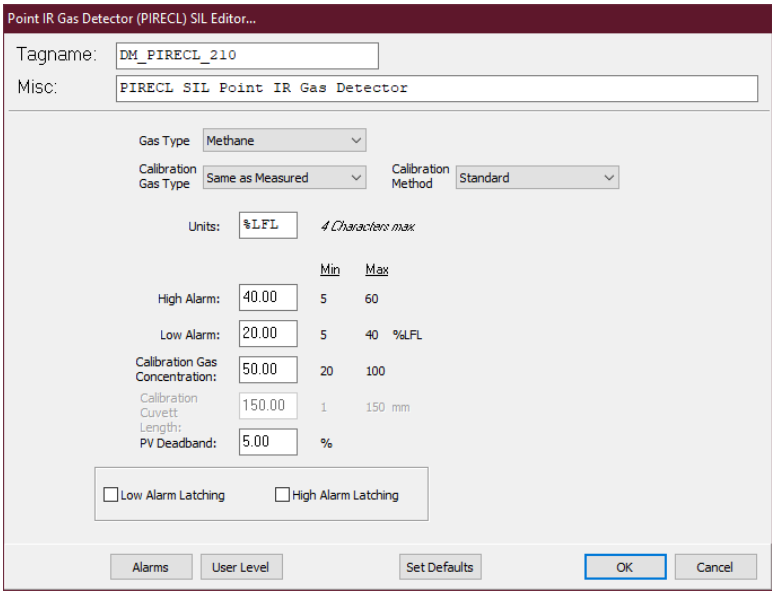
PIRECL only supports "same as measured".



Once the calibration gas type is set, the concentration must be set. The default value of 50% LFL can be changed between 20% LFL and 100% LFL to match the gas being used.

12.10.3 Alarm Setpoints

The High and Low gas alarm setpoints can be changed by entering new values in the fields provided on the dialog box.



The default values are 40% LFL for the High Alarm and 20% LFL for the Low Alarm.

The High alarm can be adjusted within a range of 5% LFL and 60% LFL.

The Low alarm can be adjusted within a range of 5% LFL and 40% LFL.

NOTE

The High and Low alarm levels cannot be the same values, and the high value must be above the low value.

12.10.4 PV Deadband

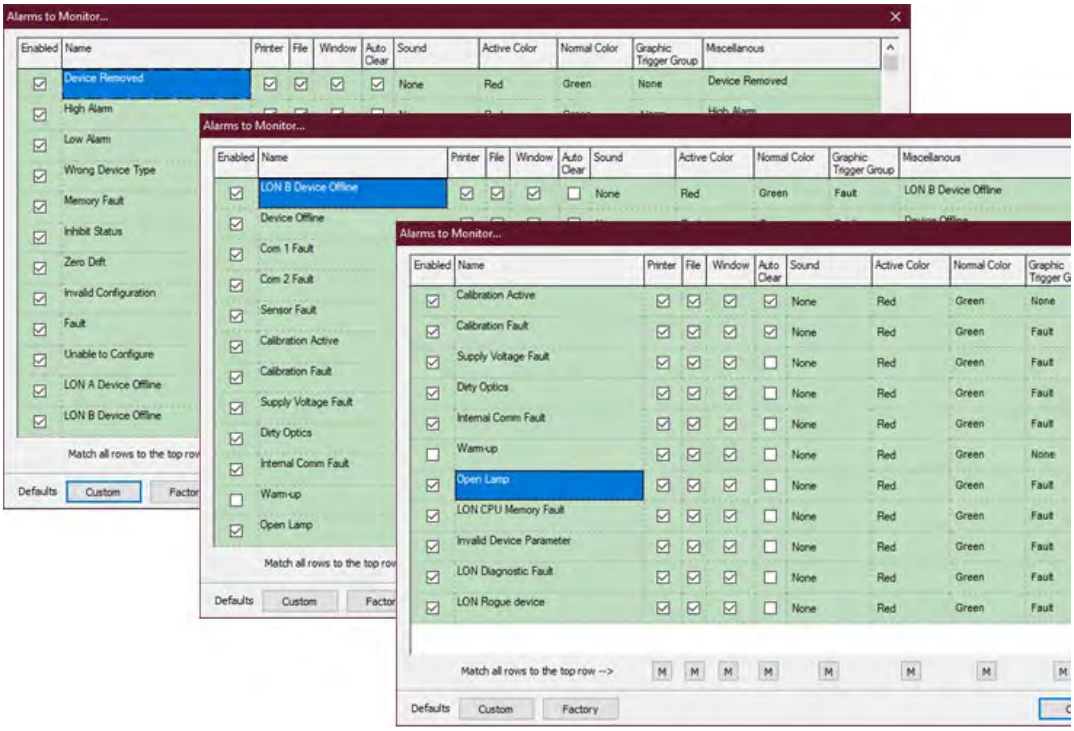
The “PV Deadband” field determines what percentage change in the Process Variable (PV) will prompt the unit to send an immediate update to the controller instead of waiting for its regularly scheduled message time. The default is 5%.

12.10.5 Common Settings

The bottom of the “PIRECL Editor...” dialog box contains buttons for setting all common settings on the device.

12.10.6 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



There are 27 alarms and events that relate to the status and diagnostics of the PIRECL.

NOTE

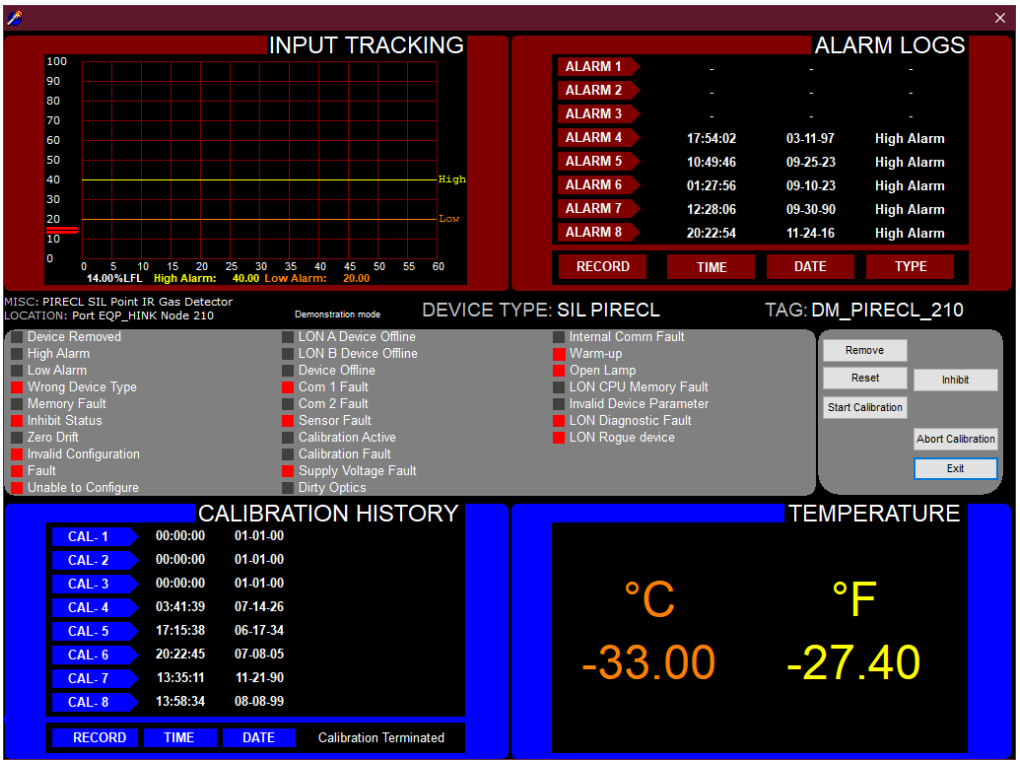
The Download command will send all configurations. Individual nodes cannot be downloaded as is the case with earlier generations of Eagle products (i.e., Eagle2000 & Eagle Quantum).

12.10.7 Point Display

The Eclipse has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

NOTE

The SIL variant has extra diagnostic flags (as below) for 'Invalid device Parameter' and 'LON Diagnostic Fault'.



The point display provides a single window view of all available real-time data for the device.

12.10.7.1 Input Tracking

The upper left quadrant contains a 60-second analog track running from left to right, the newest data on the left margin. This area graphically displays the low and high alarm setpoints as horizontal lines crossing the graph area, yellow for high and orange for low. Digital readouts at the lower margin also display the PV and alarm setpoints.

12.10.7.2 Alarm History

The upper right quadrant displays the alarm history for the device. The last eight alarms with date and time are shown. This data is stored in the field device and retrieved over the LON for display.

12.10.7.3 Calibration History

The lower left quadrant displays the calibration history for the device. The last eight calibrations with date and time are shown. This data is stored in the field device and retrieved over the LON for display.

12.10.7.4 Temperature

The lower right quadrant displays the sensor package temperature.

12.10.7.5 Status & Diagnostics

Crossing the whole point display in the center is an area displaying 24 discrete pieces of status and diagnostic information on the detector.

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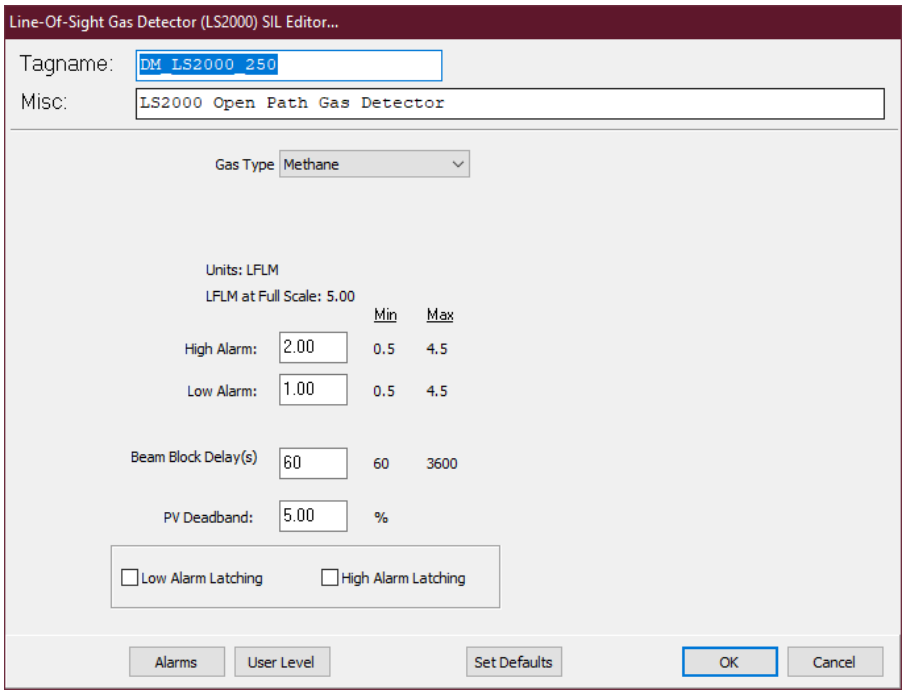
12.11 Open Path Eclipse Gas Detectors OPECL/LS2000

NOTES

Controller Firmware 7 is required for the OPGD to function with the EQP Controller.

The LS2000 is only available as a SIL 2 device on the EQP system.



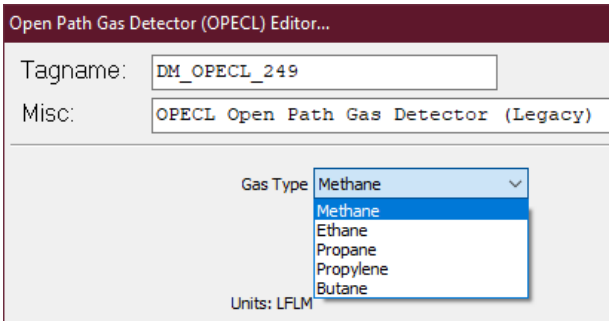
The OPECL and LS2000 are open path infrared gas detector systems that provides continuous monitoring of combustible hydrocarbon gas concentrations in the range of 0 to 5 LFL-meters, over 5 and up to 200 meters.

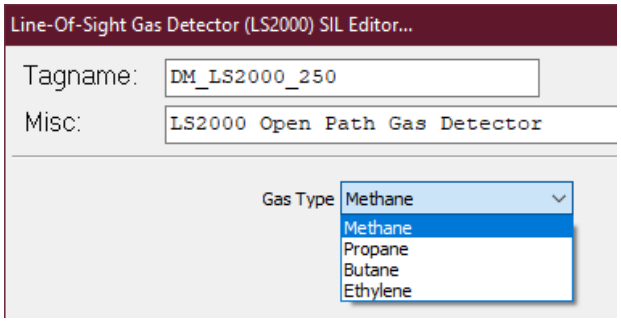
OPECL and LS2000 have integral communication hardware and reside on the EQP communication network without the need for external interface modules.

The first step in configuring an OPGD detector is to enter the tagname and any miscellaneous text in the appropriate fields at the top of the dialog box.

12.11.1 Gas Type

After entering the desired tagname and miscellaneous information, select the gas type from the pull-down list that the detector is to primarily monitor.





For the LS2000, there are 4 common hydrocarbon gases (OPECL has 5) that are available in the detector's memory.

12.11.1.1 Other Gases

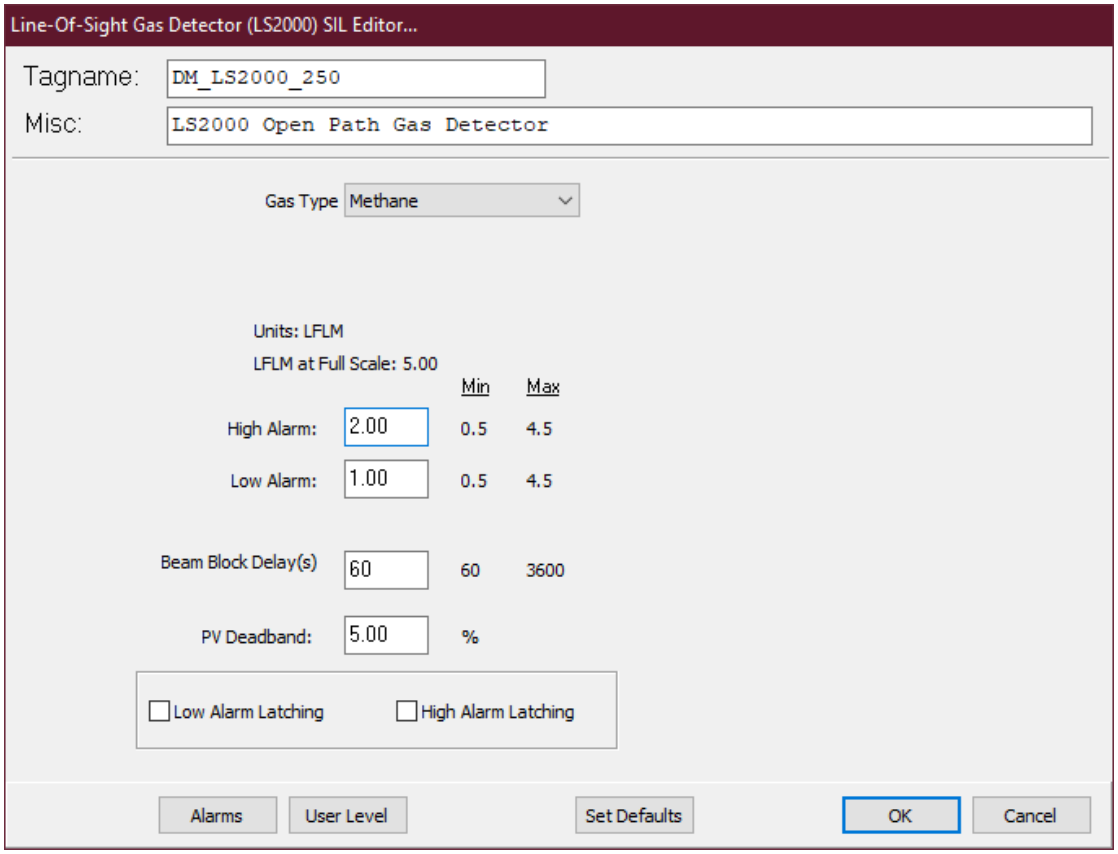
If a gas other than one of the available gases is required, the user should consult the appropriate published Gas Curves and select a defined gas that will give an appropriate response and then adjust the alarm set points accordingly.

12.11.2 Alarm Setpoints

The High and Low gas alarm setpoints can be changed by entering new values in the fields provided on the dialog box.

NOTE

The maximum setpoint levels are 3 for OPECL and 4 for LS2000).



The default values are 2 LFLM for the High Alarm and 1 LFLM for the Low Alarm at a full scale of 5.00 LFLM. The High and Low alarms can be adjusted within a range of 0.25 LFLM and 3 LFLM.

NOTE

The Low Alarm Setpoint cannot be set to a higher value than the High Alarm Setpoint.

12.11.3 PV Deadband

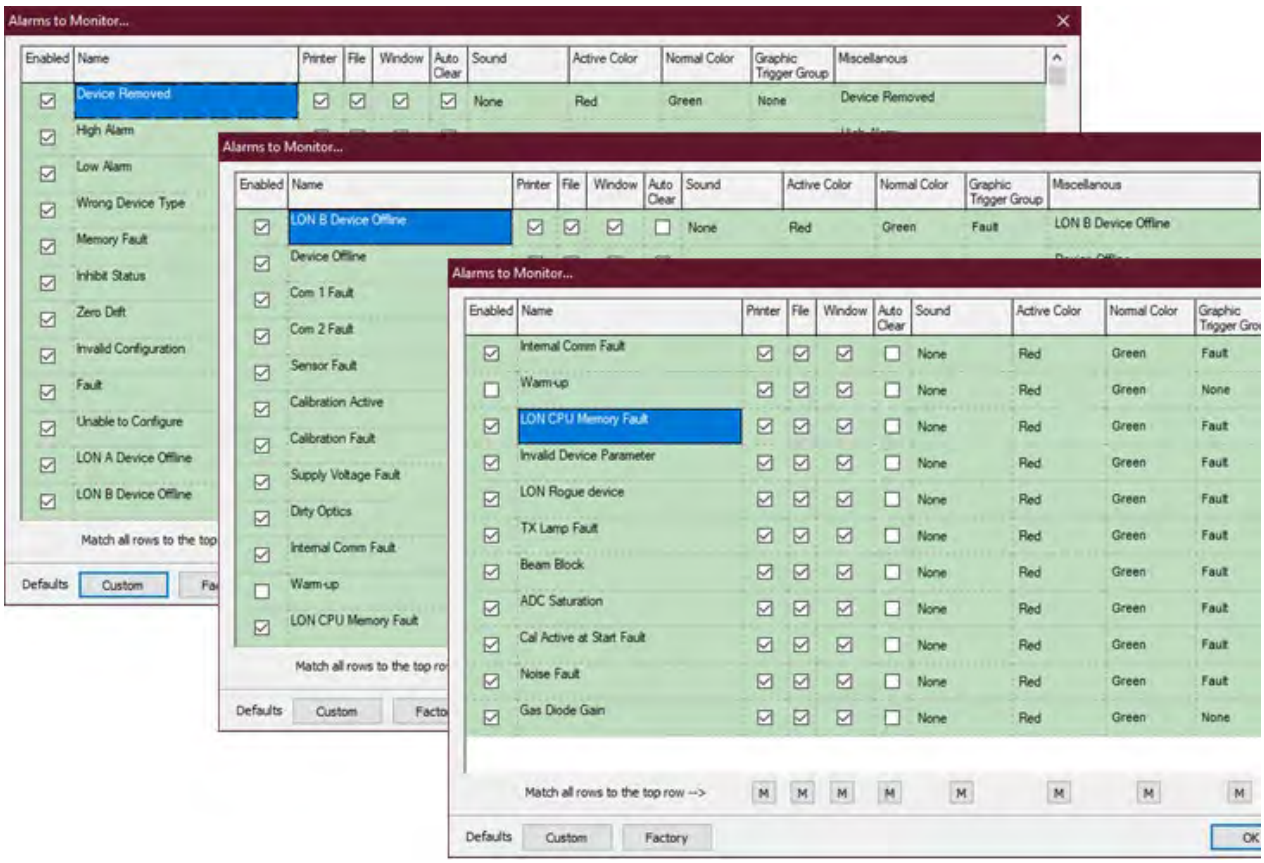
The “PV Deadband” field determines what percentage change in the Process Variable (PV) will prompt the unit to send an immediate update to the controller instead of waiting for its regularly scheduled message time. The default is 5%.

12.11.4 Common Settings

The bottom of the dialog box contains buttons for setting all common settings on the device.

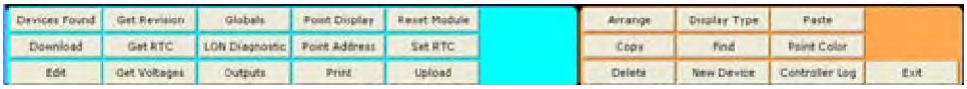
12.11.4.1 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



12.11.4.2 Completing Configuration

When all parameters have been set, select the “OK” button to return to the LON configuration screen.



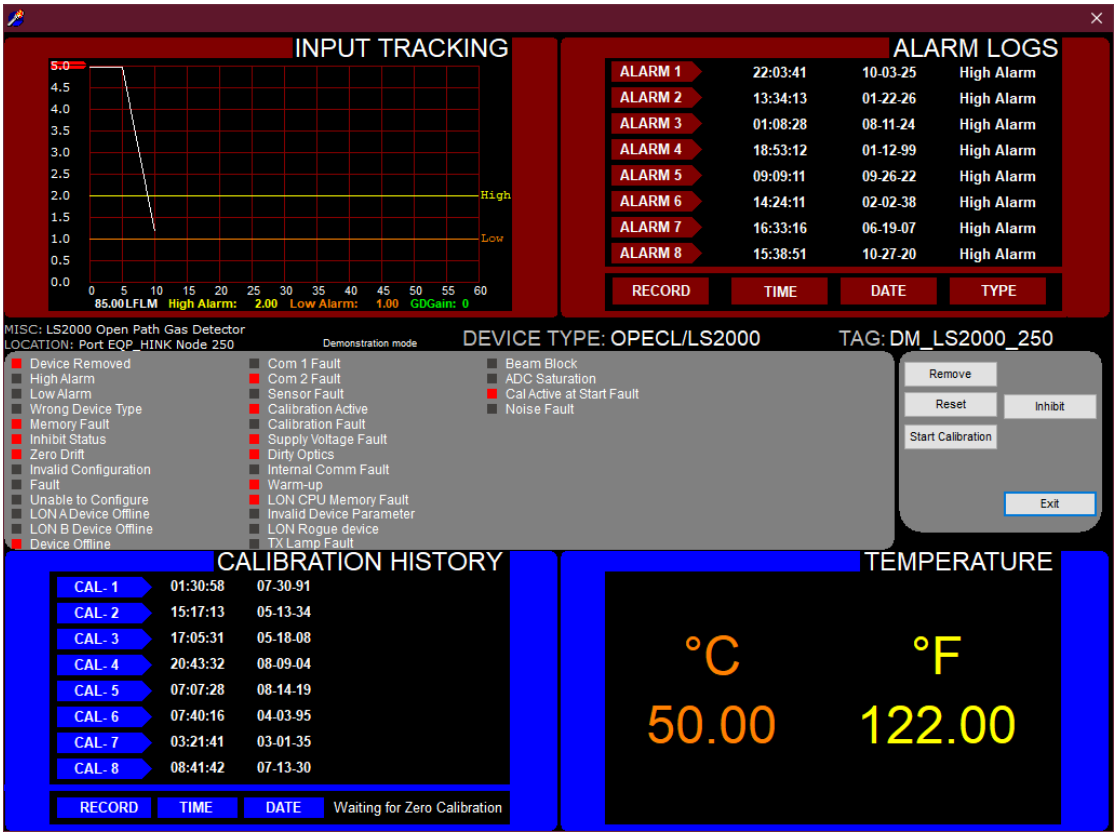
From the Command Bar Download the new configuration to the controller or configure other devices.

NOTE

*The Download command will send **all** configurations. Individual nodes cannot be downloaded as is the case with earlier generations of eagle products (i.e., Eagle2000 & Eagle Quantum Premier).*

12.11.5 Point Display

The OPGD has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the device.

12.11.5.1 Input Tracking

The upper left quadrant contains a 60-second analog track running from left to right, the newest data on the left margin. This area graphically displays the low and high alarm setpoints as horizontal lines crossing the graph area, Yellow for High and Orange for Low. Digital readouts at the lower margin also display the PV and alarm setpoints.

12.11.5.2 Alarm History

The upper right quadrant displays the alarm history for the device. The last eight alarms with date and time are shown. This data is stored in the field device and retrieved over the LON for display.

12.11.5.3 Calibration History

The lower left quadrant displays the calibration history for the device. The last eight calibrations with date and time are shown. This data is stored in the field device and retrieved over the LON for display.

12.11.5.4 Temperature

The lower right quadrant displays the sensor package temperature.

12.11.5.5 Status & Diagnostics

Crossing the whole point display in the center is an area displaying 24 discrete pieces of status and diagnostic information on the detector.

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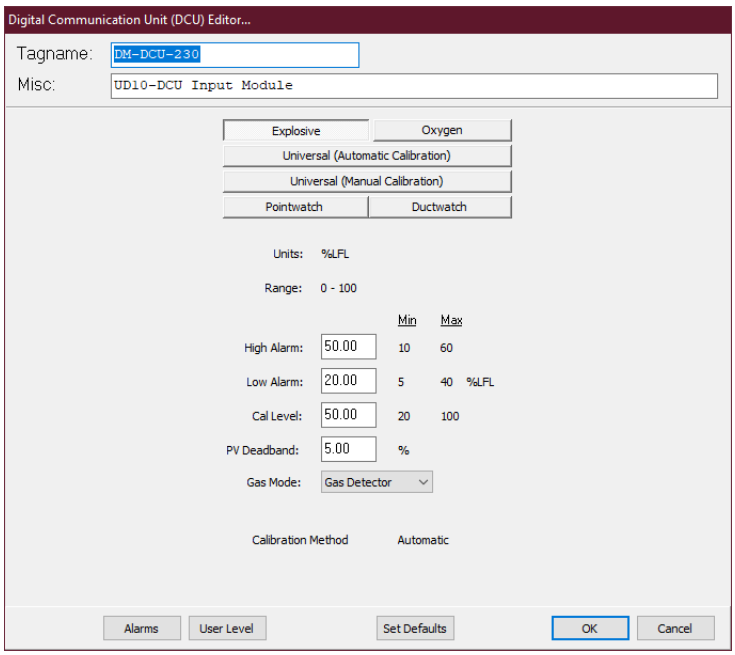
12.12 Digital Communication Unit (UD10-DCU)

12.12.1 Overview

UD10-DCU's are single channel analog input modules for the Eagle Quantum Premier LON. S^3 provides five variations of software support for UD10-DCU's, as follows:



- **Explosive**

  For use with Det-Tronics catalytic bead combustible gas detectors.

- **Oxygen**

  For use with Det-Tronics electrochemical oxygen depletion cells.

- **Universal**

  Used with Det-Tronics line of electrochemical cells measuring a variety of toxic gasses.

  The "Universal" DCU can also be used with any standard 4-20ma* analog input and it for allows for the entry of user assigned units and ranges.

- **DCU PointWatch**

  Used with Detector Electronics PointWatch PIR9400 series infrared point hydrocarbon detectors.

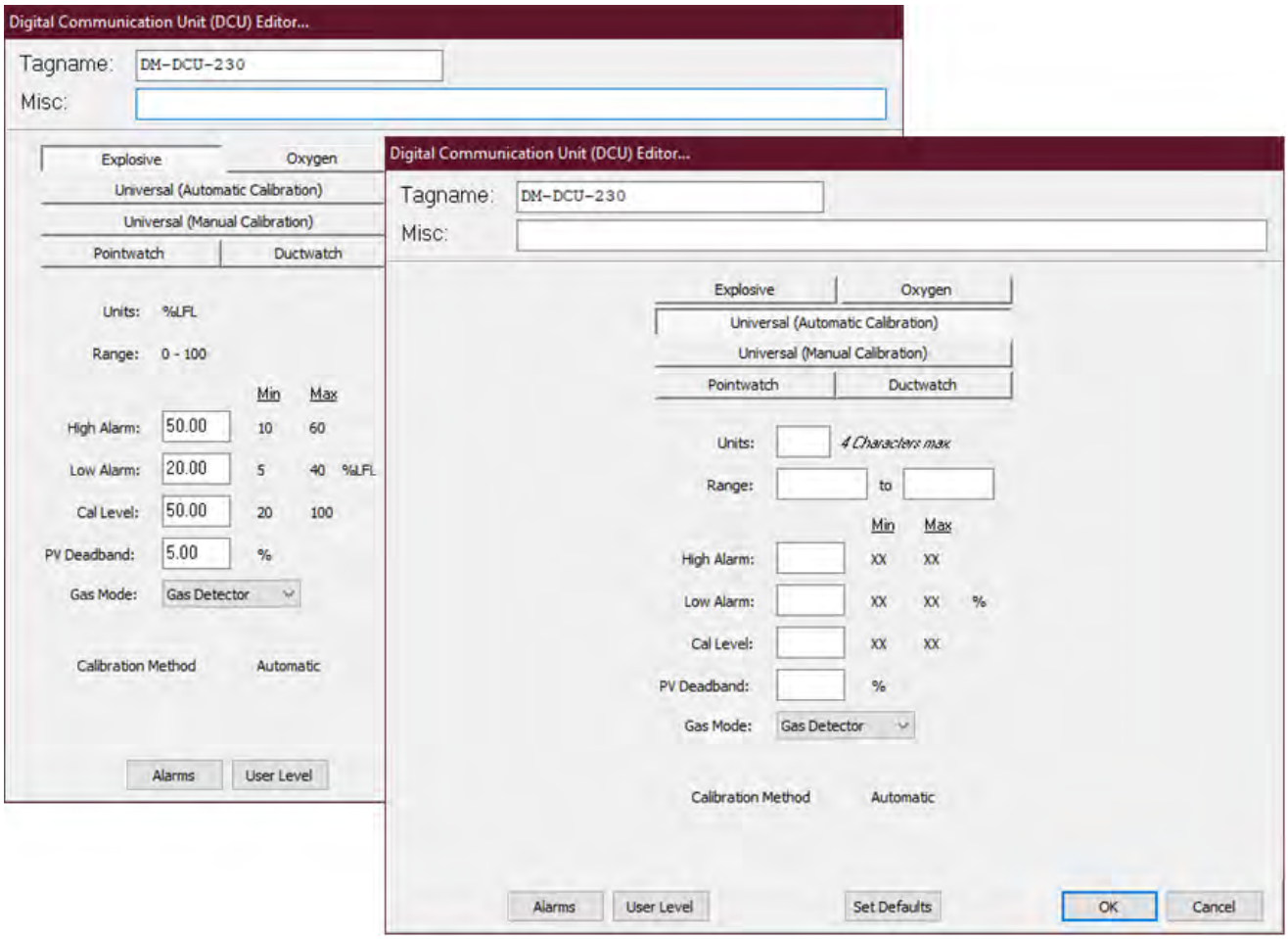
- **DCU Ductwatch**

  Used with the Detector Electronics Ductwatch PIR9400 series extended bench point infra-red hydrocarbon gas detector.

NOTE

**The actual range digitized by the UD10-DCU is between 0 and 24 mA because some field devices utilize the over-range & under-range areas for diagnostic or other data.*

From a configuration standpoint, all UD10-DCU's have the same basic adjustable parameters; Alarm 1, Alarm 2, and calibration gas concentration (Cal Level).



The Universal option also has fields for entering the engineering units and unit range for the attached sensor.

The "PV Deadband" field determines what percentage change in the Process Variable (PV) will prompt the UD10-DCU to send an immediate update to the controller instead of waiting for its regularly scheduled message time. The default is 5%.

The "Gas Mode" selection has two choices: "Gas Detector" or "Other". The default is "Gas Detector" which limits the adjustable range of the low and high alarm setpoints to be consistent with regulatory requirements.

12.12.2 Common Settings

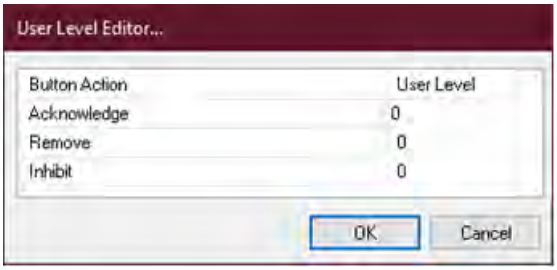
The bottom of the “DCU Editor...” dialog box contains buttons for configuring all common settings on the device.

12.12.2.1 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.

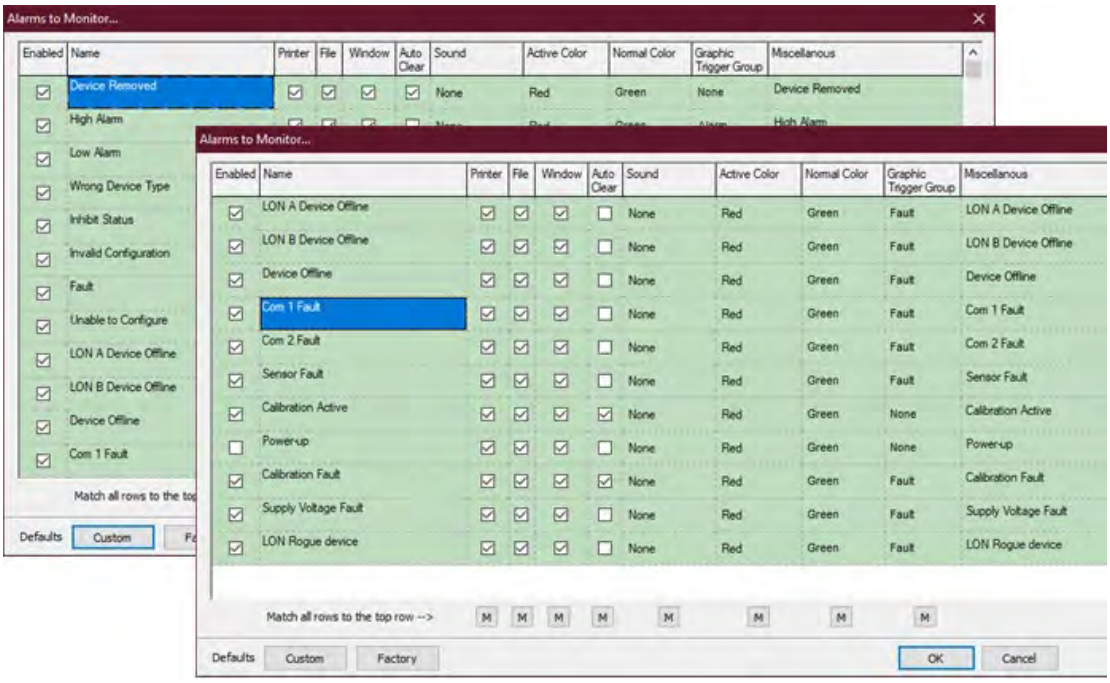
12.12.2.2 User Levels

The User Level Editor provides a means to limit access to the “Acknowledge”, “Remove”, and “Inhibit” buttons for the module, which are accessible from the device’s point display. The default value is “0” and provides access to all users. Change these values to match a user account configuration and security.



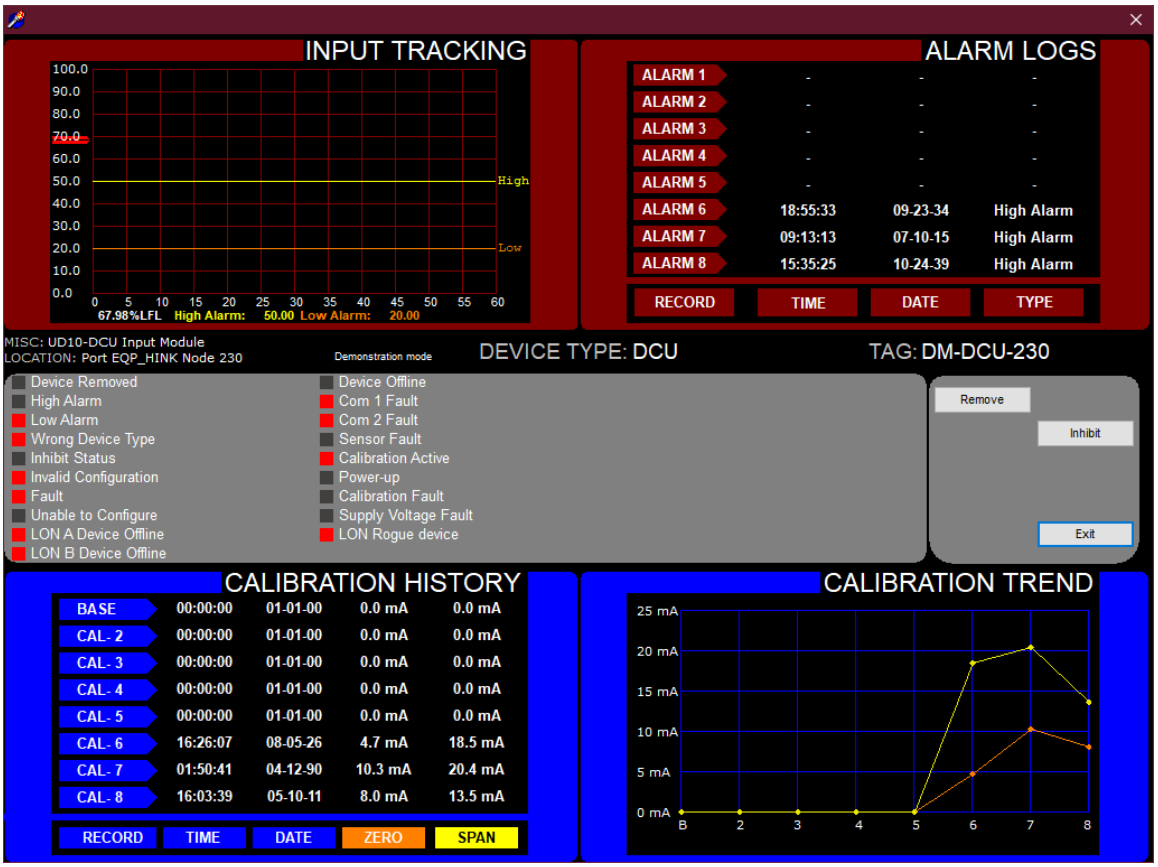
12.12.2.3 Completing Configuration

When all parameters have been set, select the “OK” button to return to the LON configuration screen.



12.12.3 Point Display

The UD10-DCU has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



NOTE

The above point display is accessed from the configuration area. The point display in the online monitoring mode does not include the LON A & B Counters.

12.13 Discrete IO (DCIO) / Enhanced Discrete IO SIL (EDIO)

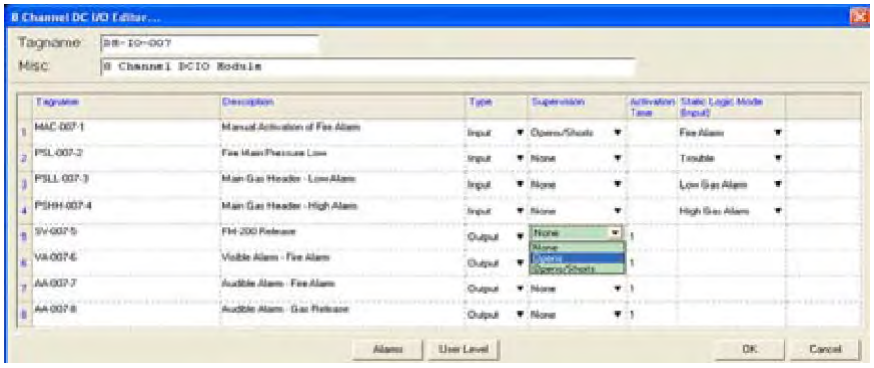
12.13.1 Overview

DCIO's and the newer EDIO's are flexible 8 channel discrete (ON/OFF) input/output modules for the Eagle Quantum Premier LON.

From a configuration standpoint, each channel can be configured to be either an input or an output, supervised or unsupervised.

The DCIO or EDIO is configured by double-clicking on its selection rectangle on the LON schematic.

This opens the "8 Channel DC or ED I/O Editor..." which provides fields for the entry of any user changeable parameters.



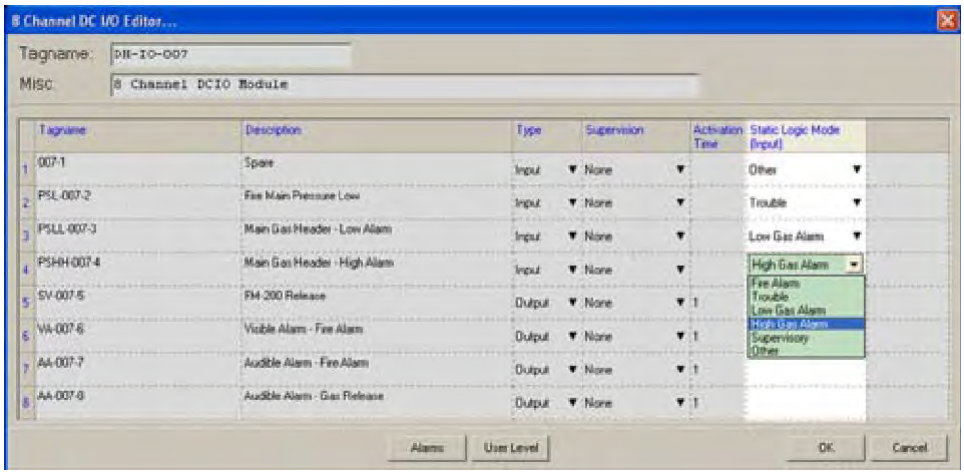
Being a multi-channel device there are multiple tagnames. At the top of the dialog box there is a device tagname that refers to the DCIO or EDIO module and is used with its global status and diagnostic events. Below this are channel tagnames for the status and diagnostics relating to the eight individual channels.

The example above is for a DCIO. Note that the configuration of the DCIO and EDIO are the same, however the EDIO also supports 2-wire smoke detectors and "Class-A" inputs and outputs, so it has additional choices in the "Type" pull down menu.

It also provides buttons for accessing other configurable items such as alarm and event tracking for the unit and user levels settings.

12.13.2 Tagname

The tagname at the top of the dialog box refers to the entire module. Each of the eight channels also require a tagname and until one is entered, that channel is not available in the S^3 database for programming, monitoring, or dynamic graphic purposes.



12.13.2.1 Type

Using a pull-down menu each channel can be configured to be either an input or an output. When configured as an input the channels will work with “dry” contact closure type devices. When configured as an output the channels will power a 24 Vdc load.

12.13.2.2 Supervision

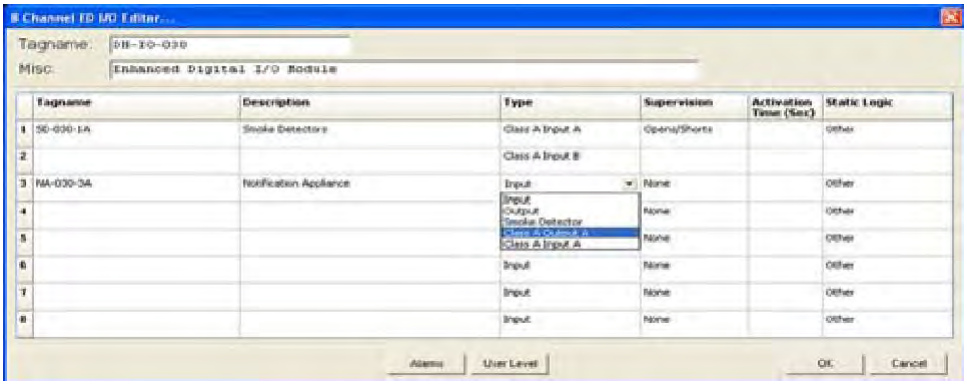
Via a pull-down menu, the inputs and outputs may be software configured to supervise their attached device. Available supervision options include “None”, “Open Circuit” detection, “Open and Short” circuit detection.

12.13.2.3 Activation Time

If a channel is configured as an output, an “Activation Time” (in seconds) can be entered. This feature works in conjunction with the user program to simplify the logic and protect the field device. When being programmed in the controller, if this channel is selected as a “Timed” output then the value entered in the “Activation Time” field determines how long the output remains energized, even if the user logic keeps the output energized.

12.13.3 Static Logic Mode (Input)

If the channel is configured as an input, a pull-down menu will allow any of five different “static logic” functions to be assigned, or, to select “Other” which is the default and has no automatic function.



12.13.3.1 Fire Alarm

Sets off the “Fire Alarm” LED and relay* on the EQP controller.

12.13.3.2 Trouble

Sets off the “Trouble” LED and relay* on the EQP controller.

12.13.3.3 Low Gas Alarm

Sets off the “Low Gas” LED and relay* on the EQP controller.

12.13.3.4 High Gas Alarm

Sets off the “High Gas” LED and relay* on the EQP controller.

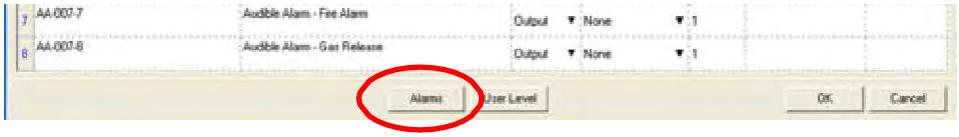
12.13.3.5 Supervisory

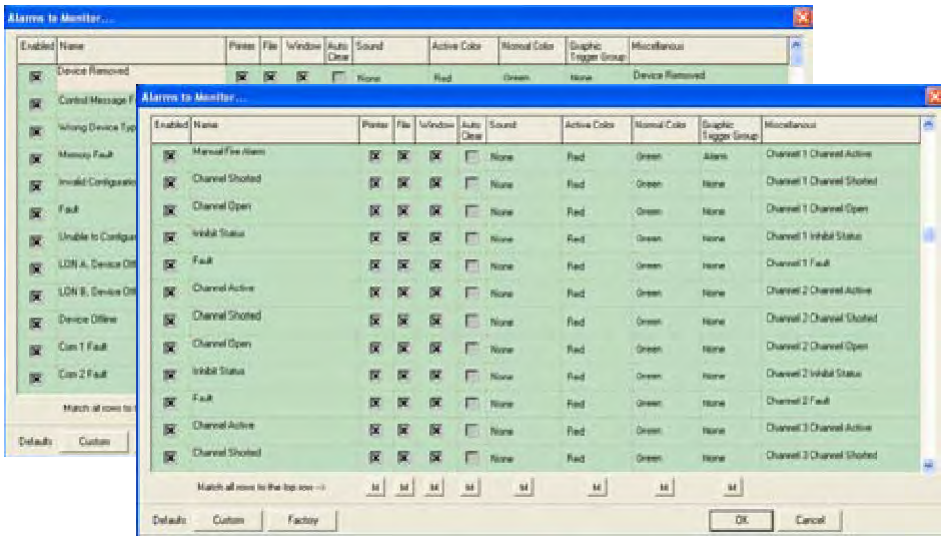
Sets off the “Supr” LED and relay* on the EQP controller.

If a static logic function has been selected for an input, when the input is active that action will occur automatically without the need for any user programmed logic. If the input is to be used with user programmed logic only, select “Other”.

12.13.4 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



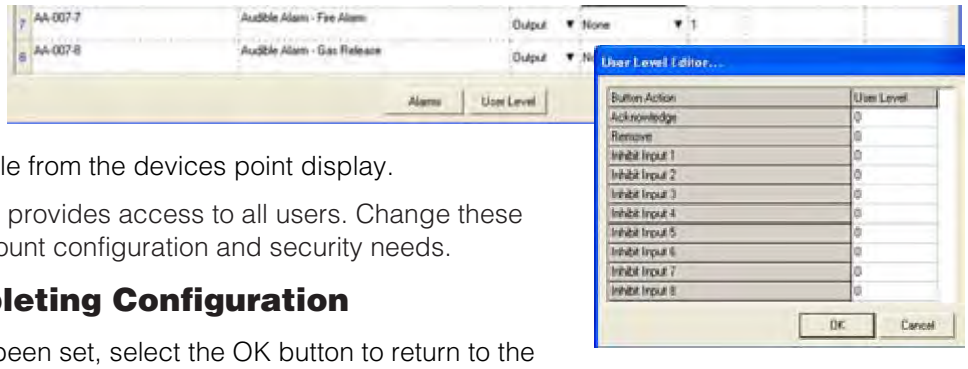


The first 13 alarms pertain to the status and diagnostic for the overall module.

After this come 5 alarms for each of the eight channels. This gives a total of 53 alarms and events that can be enabled and monitored by S³ for this module type.

12.13.4.1 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, and “Inhibit” buttons for the module which are accessible from the devices point display.



The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.

12.13.4.2 Completing Configuration

When all parameters have been set, select the OK button to return to the LON configuration screen.

From the Command Bar, download the new configuration to the controller or configure other devices.

12.13.5 Point Display

The DCIO has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device.

The bottom half of the point display provides a data display area and annunciator for all 8 inputs. It also provides for “Inhibiting” the channels.

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12.14 Intelligent Protection Module (IPM)

12.14.1 Overview

The Intelligent Protection Module (IPM) is a part of the Det-Tronics Eagle Quantum Premier (EQP) System that is specially designed to monitor, supervise and control one fire suppression hazard.

The IPM is designed to provide continuous and automated local area fire protection, while monitoring system operation through continuous supervision of its Inputs/Outputs and Local Operating Network / Signaling Line Circuit (LON/SLC) connection to the EQP Controller.

In addition, the module contains a unique “embedded logic program” that if enabled during configuration allows the IPM to perform local area protection in a “back-up mode” without controller interaction. The IPM utilizes eight pre-configured Input/Output (I/O) channels to perform its monitoring, supervision, and mitigation functions.

12.14.1.1 Inputs

On the input side, three supervised channels provide the following connections:

- Channel 1 for an Abort station
- Channel 2 for a Manual Release station
- Channel 3 for a Supervisory device.

Two additional input channels (zones) provide connections for “two-wire” conventional (non-relay based) smoke and heat detectors:

- Channel 4: Zone 1 detection circuit
- Channel 5: Zone 2 detection circuit

12.14.1.2 Outputs

On the output side, three supervised outputs (1 signaling, 2 releasing) provide the following connections:

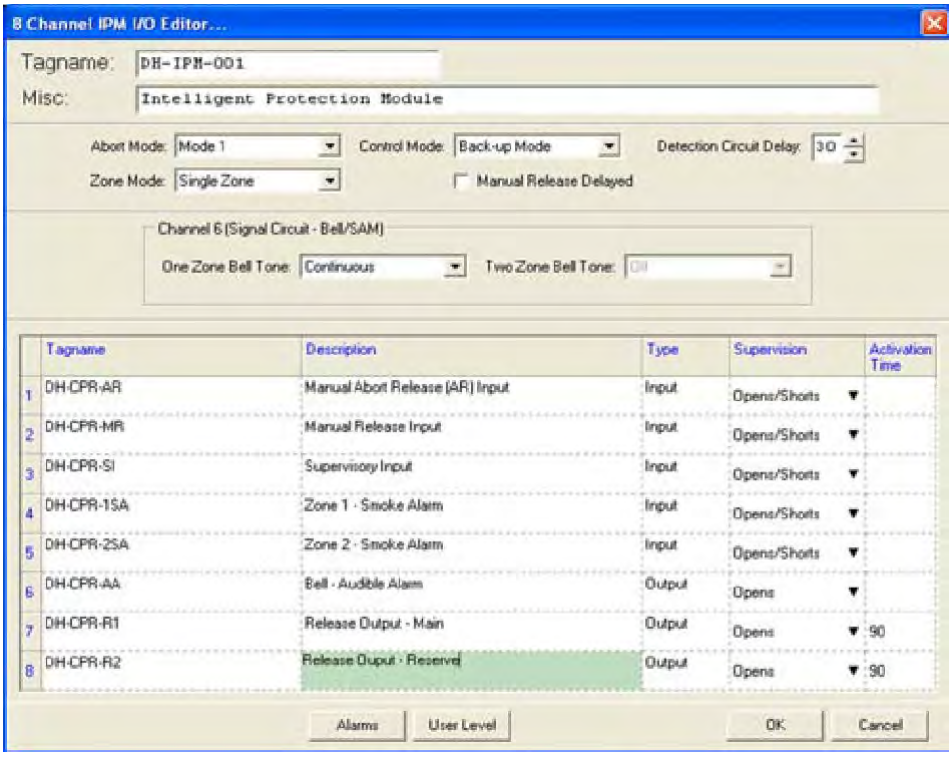
- Channel 6 for a notification appliance such as a bell, horn, or lamp.

Channels 7 and 8 for a main and reserve or secondary agent release.

12.14.1.3 Tagname

The tagname at the top of the dialog box refers to the entire module.

Each of the eight channels also require a tagname and until one is entered, that channel is not available in the S^3 database for programming, monitoring, or dynamic graphic purposes.



12.14.1.4 Type

The channel type on the IPM is preset and not user changeable.

12.14.1.5 Supervision

Via a pull-down menu, the inputs and outputs may be software configured to supervise their attached device. Available supervision options include “None”, “Open Circuit” detection, “Open and Short” circuit detection.

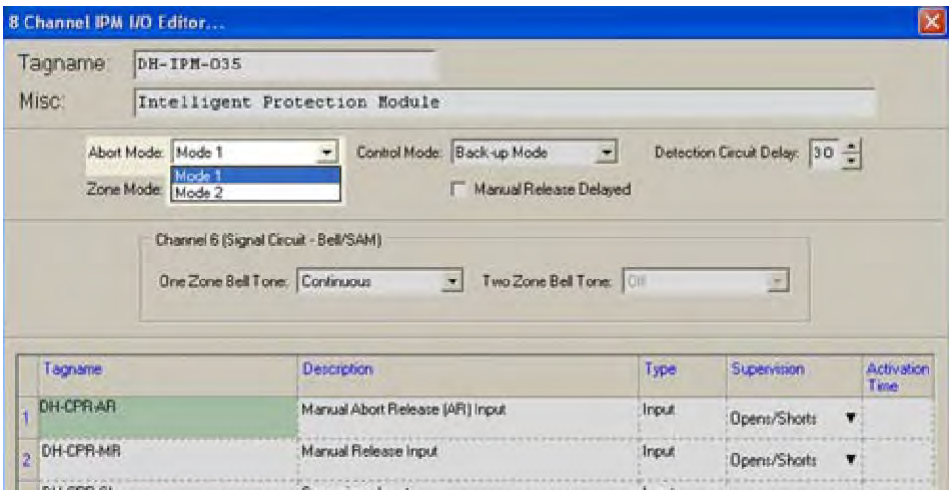
12.14.1.6 Activation Time

If a channel is configured as an output, an “Activation Time” (in seconds) can be entered. The value is in seconds. This feature works in conjunction with the user program to simplify the logic and protect the field device.

When being programmed in the controller, if this channel is selected as a “Timed” output then the value entered in the “Activation Time” field determines how long the output remains energized, even if the user logic keeps the output energized.

12.14.1.7 Abort Mode

The IPM abort input, Channel 1, is software configurable to use any one of three modes of operation. These three modes operate as follows:



12.14.1.7.1 Mode 1

Upon activation, the delay timer will count down to and hold at 10 seconds; upon release, timer will continue to count down to zero.

NOTE

Only this mode complies with UL 864.

12.14.1.7.2 Mode 2

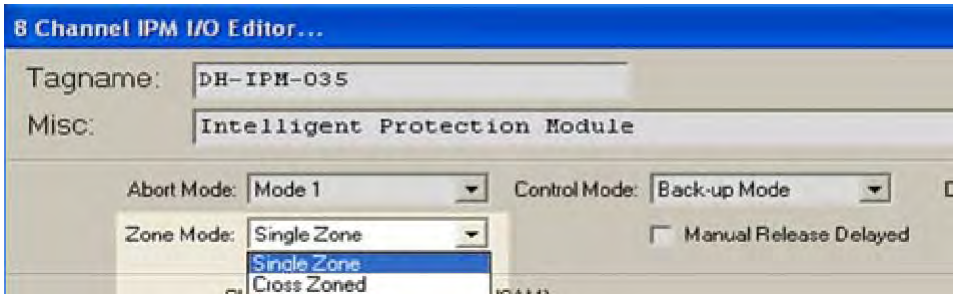
Upon activation the delay timer will reset to its initial value and on release will continue counting down to zero.

12.14.1.8 IRI Mode

Functions like “Mode 1” except the abort will only function if activated prior to a second alarm.

12.14.1.9 Zone Modes

The IPM has two “zone modes”; Single or Cross Zoned. The backup logic will execute differently depending on the zone mode selected.



12.14.1.10 Alarm Condition

12.14.1.10.1 Single Zone Mode

Upon receipt of an alarm from an activated detector on IPM channel 4 or 5 OR activation of the manual station, channel 2:

- Signal circuit devices are activated per the software selected signaling circuit configuration described earlier – Bell Circuit (SAM) Channel 6.
- Programmed release time delay activated. Release output(s) activated.

Operation of Abort: Discharge is aborted ONLY when alarm is from a detector, and abort is activated during programmed release time delay. Abort sequence is dependent on the abort mode selection as described earlier.

12.14.1.10.2 Cross Zoned Mode

Upon receipt of an alarm from one activated detector in one zone.

Signal circuit devices are activated per the software selected signaling circuit configuration, two zone mode, one zone in alarm, as described earlier – Bell Circuit (SAM) Channel 6.

12.14.1.10.3 Second Alarm Condition

Upon receipt of an alarm from a second, activated detector in the other zone:

- Signal circuit devices are activated per the software selected signaling circuit configuration, two zone mode, two zones in alarm.
- Programmed release time delay activated. Release output(s) activated.

12.14.1.11 Manual Alarm Condition – Cross Zoned Mode

Upon receipt of a manual alarm from Channel 2:

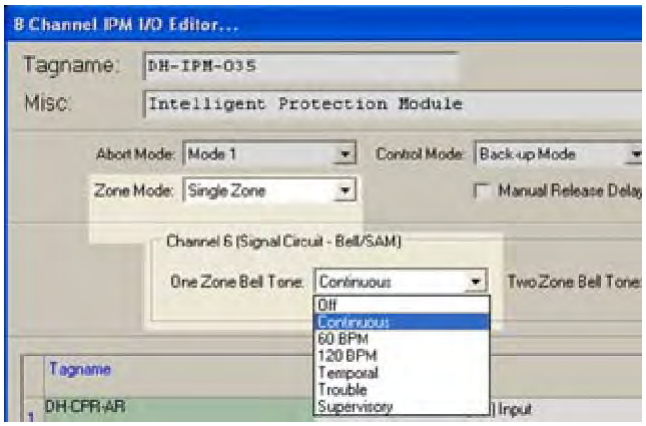
- Signal circuit devices are activated per the software selected signaling circuit configuration, two zone mode, two zones in alarm.
- Programmed release time delay activated.
- Release output(s) activated.

12.14.1.12 Signaling Circuit Operation – Bell Circuit (SAM), Channel 6

This output channel can be software selected to any standard EQP Signal Audible Module (SAM) configuration. In a cross-zoned mode, selections are limited as described in the following sections.

12.14.1.12.1 Single Zone Mode

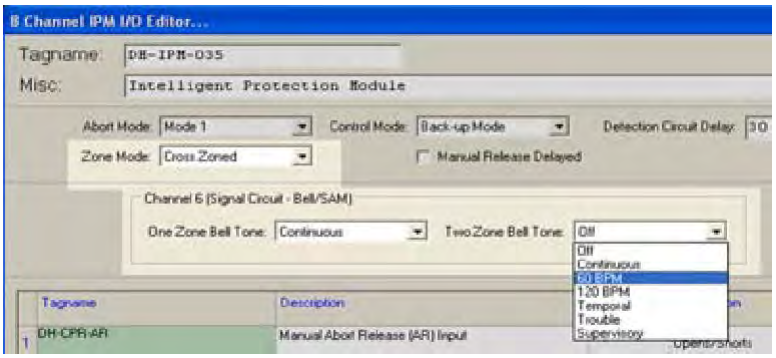
The signaling circuit can be configured to any standard SAM selection.



12.14.1.12.2 Signal Circuit in Cross Zoned Mode

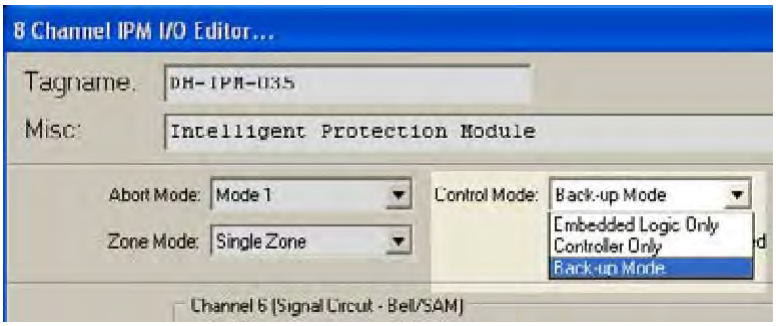
In this mode the user must make two selections.

A standard SAM selection for when a single detection circuit is in alarm, and another selection for when both detection circuits are in alarm.



12.14.1.12.3 Control Mode

The IPM has 3 operation modes: Controller Only, Back-up Mode, and Embedded Only, which are described on the next page.



12.14.1.12.3.1 Embedded Only

In this mode, the IPM continuously operates from its embedded logic. The status of all IPM I/O is available to the EQP Controller but control of the outputs is not. However, controller and S^3 reset commands are accepted.

12.14.1.12.3.2 Controller Only

In this mode the I/O of the IPM will be controlled from the EQP Controller only and embedded logic is inactive.

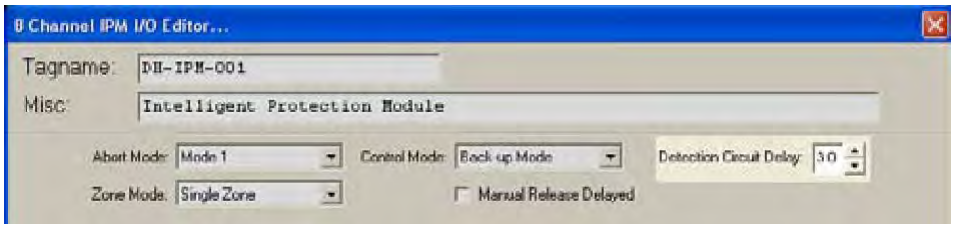
12.14.1.12.3.3 Back-up Mode

The default selection) the IPM I/O is normally controlled by the EQP Controller but utilizes embedded logic in accordance with the “Control Transfer Sequence Description” to control its I/O under certain circumstances.

12.14.1.13 Detection Circuit Delay Selection

This selection provides a time delay that will apply to the two detector circuits, (Channels 4 and 5) as well as to the manual release signal (Channel 2).

There are seven time-delay selections running between 0 and 60 seconds in ten-second increments (0, 10, 20, 30, 40, 50, and 60 seconds).

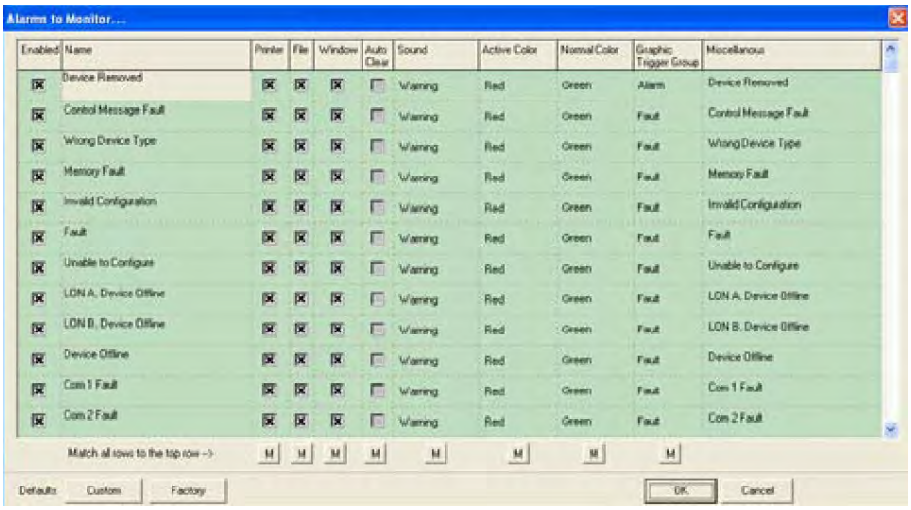


If the time delay selected is greater than 30 seconds, this time will apply only to the two detection circuits. The manual release time delay will be clamped at 30 seconds.

12.14.1.14 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured for monitoring by S³.

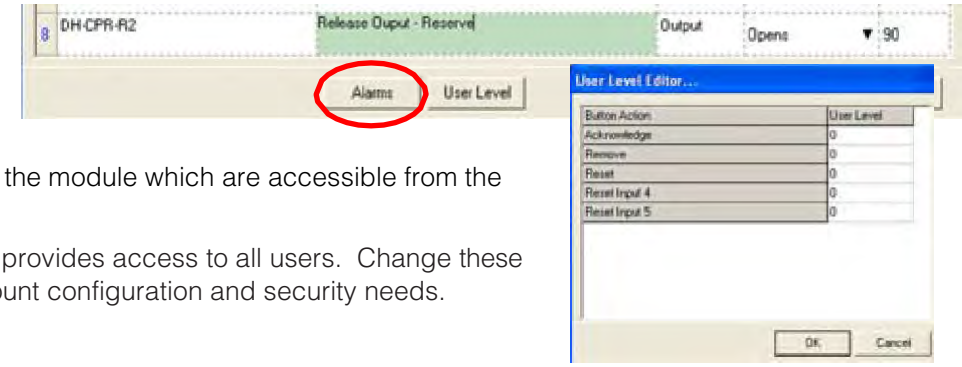
The first 14 alarms pertain to the status and diagnostic for the overall module.



After this come 4 alarms for each of the eight channels. This gives a total of 46 alarms and events that can be enabled and monitored by S³ for this module type.

12.14.1.15 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, Module and



Channel “Reset” buttons for the module which are accessible from the devices point display.

The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.

12.14.1.16 Point Display

The IPM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device. The bottom half of the point display provides a data display area and annunciator for all 8 inputs and outputs.

12.14.1.17 Reset Button

The reset button on the IPM point display will reset the module. Part of this reset includes automatically cycling power to the two smoke detector zones (channels 4 & 5) to reset these latching devices.

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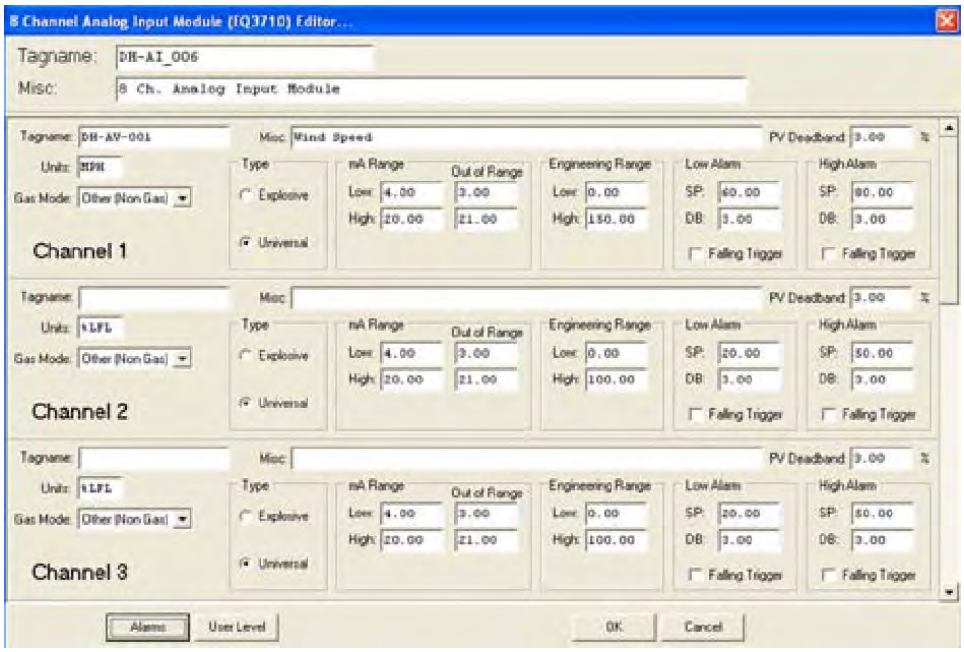
12.15 Analog Input Module (AIM)

12.15.1 Overview

AIMs are multi-channel analog modules for the Eagle Quantum Premier LON. From a configuration standpoint, each channel can be configured to be either a gas detector or a generic analog input.

The AIM is configured by double-clicking on its selection rectangle on the LON schematic. This opens the “8 Channel AIM Editor...” which provides fields for the entry of any user changeable parameters.

Each of the eight inputs have their configuration information grouped by channel and a scroll bar is used to see them all.



12.15.2 Channel Configuration

Adjustable parameters include the engineering units and range, the analog signal (ma) range, alarm setpoints, Deadband adjustments for both the module and the eight individual channels, and an alarm trigger direction selection per channel.

12.15.2.1 Ranges

Below this are channel tagnames and configuration fields relating to the eight individual channels. Fields are provided to enter the engineering units and ranges for both the milliamp input and engineering range.

12.15.2.2 Deadband

A field is provided to enter the desired PV (Process Variable) Deadband. Normally all values are transmitted to the controller every five seconds; If the PV changes more than the entered percentage before the five second report time arrives, an immediate message is sent with the current values.

The Alarm Setpoint areas also provide a Deadband (DB) field allowing the individual alarm hysteresis to be configured.

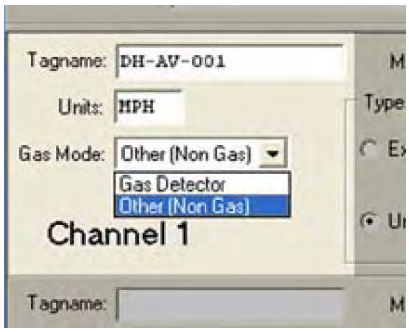
12.15.2.3 Alarm Trigger Direction

In addition, each alarm has a checkbox to choose a “Falling Trigger” alarm type.

When selected, the alarm will activate when the analog value drops below the setpoint as its value is falling.

In the default configuration, a rising value activates the alarm as it passes through the setpoint.

12.15.2.4 Gas Mode



Each channel can be configured to be used with a “Gas Detector” or “Other (Non Gas)” instrument.

When a channel is configured as “Other” it can be used to monitor virtually any linear analog value from a wide range of temperature, pressure, level, and other transmitter types.

When configured as a gas detector, regulatory requirements will preset alarm setpoint ranges and certain alarm characteristics.

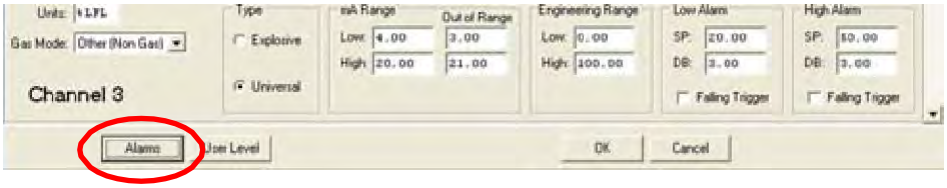
12.15.3 Common Settings

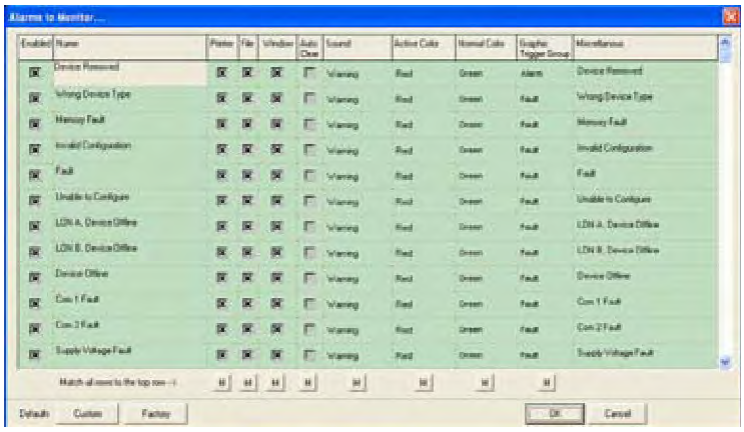
The bottom of the “AIM Editor...” dialog box contains buttons for setting all the common settings on the device.

12.15.3.1 Alarms

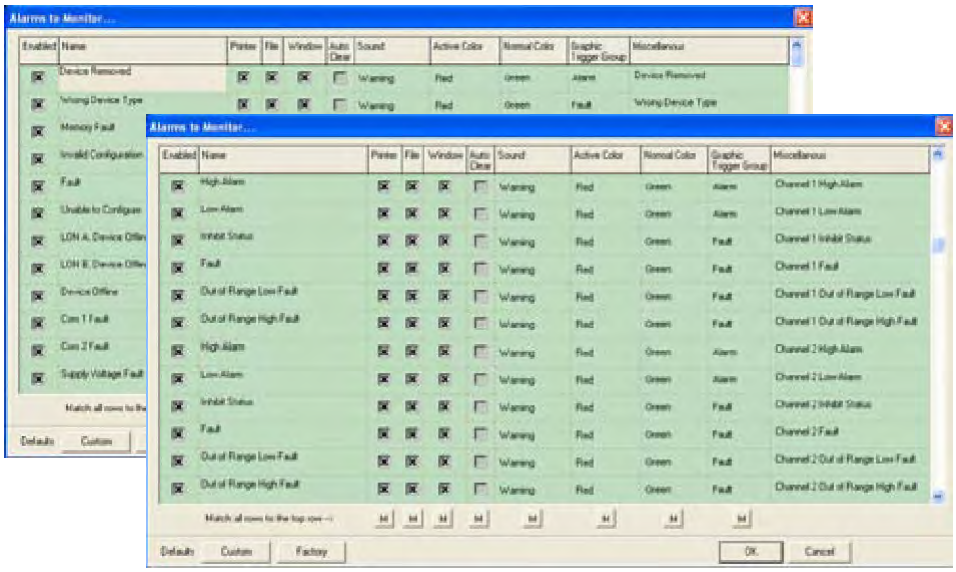
Selecting this button opens the “Alarms to Monitor...” dialog box.

This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.





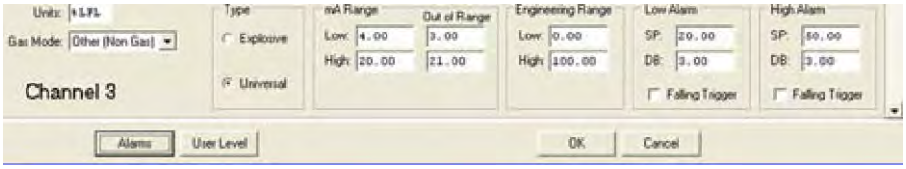
The first 12 alarms pertain to the status and diagnostic for the overall module.

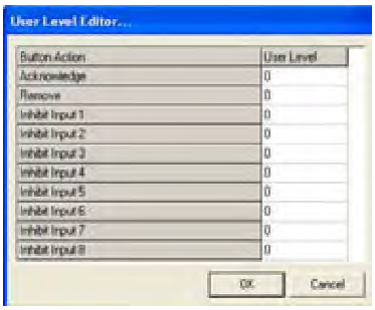


After this come 6 alarms for each of the eight channels. This gives a total of 60 alarms and events that can be enabled and monitored by S³ for this module type.

12.15.3.2 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, and “Inhibit” buttons for the module which are accessible from the devices point display.

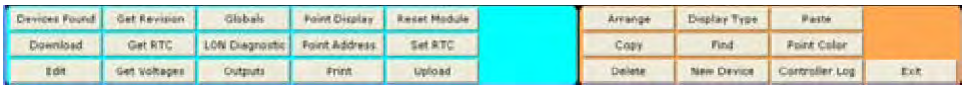




The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.

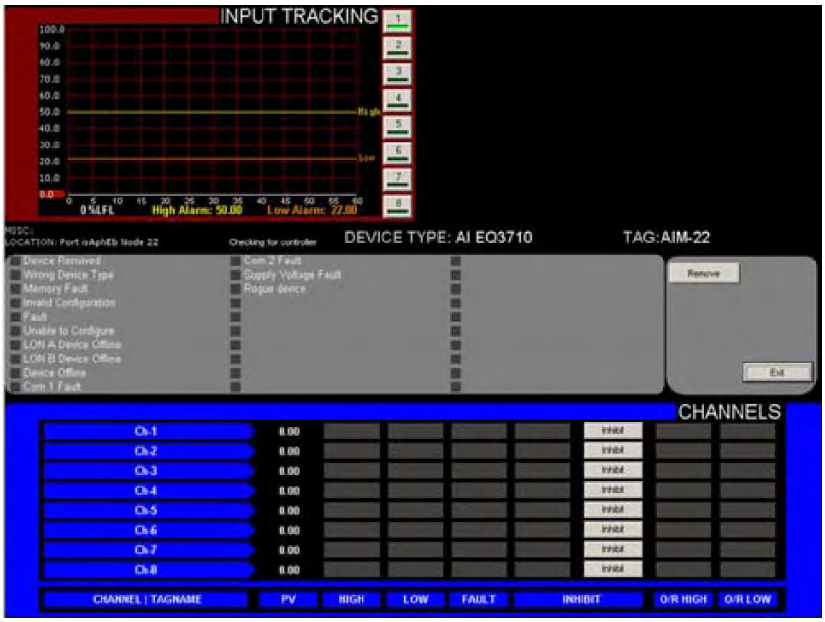
12.15.3.3 Completing Configuration

When all parameters have been set, select the OK button to return to the LON configuration screen. From the Command Bar, download the new configuration to the controller or configure other devices.



12.15.4 Point Display

The AIM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode. The point display provides a single window view of all available real-time data for the device.



Being a multichannel device, the AIM point display allows any of the 8 inputs to be connected to the analog input track in the top left quadrant by clicking on the desired channel button on the right of the graph.

The bottom half of the point display provides a data display area and annunciator for all 8 inputs. It also provides for “Inhibiting” the channels.

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12.16 Relay Module (8-Channel)

12.16.1 Overview

The 8 Channel Relay Module consists of eight individually configured output channels. Each output channel drives a Form-C relay.

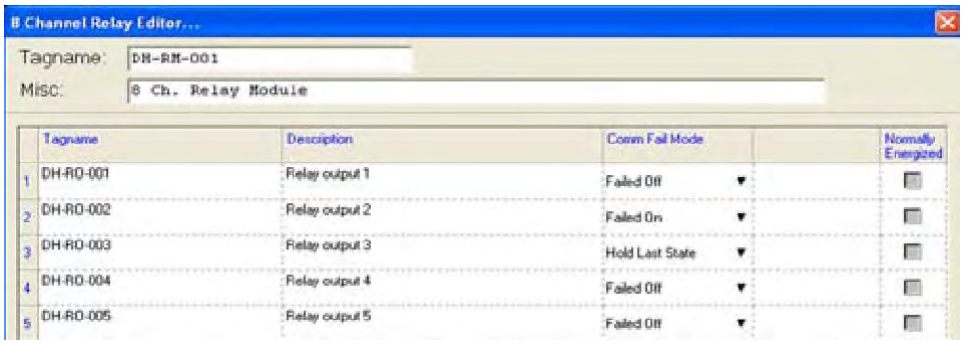
NOTE

The relay module only supports equipment that operates on 24 Vdc/Vac (not to exceed 2 amperes) at each output channel.

The relay module has two LEDs for the device and two LEDs for each channel.

On the device level, one green LED indicates power, while the other yellow LED indicates a LON communication fault.

For each channel, one red LED indicates channel activation, and the yellow LED indicates a fault condition.



12.16.2 Tagname

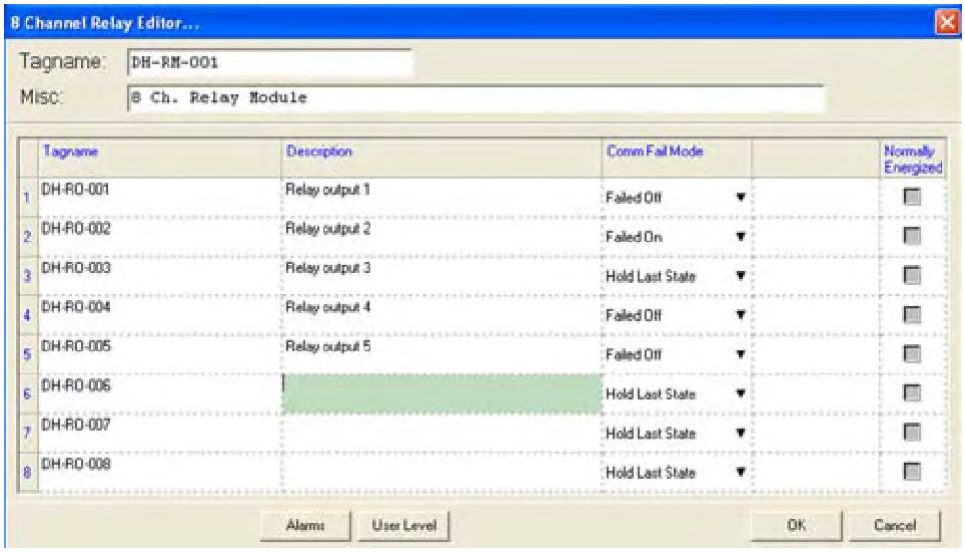
The tagname at the top of the dialog box refers to the entire module. Each of the eight channels also require a tagname and until one is entered, that channel is not available in the S^3 database for programming, monitoring, or dynamic graphic purposes.

12.16.3 Description

This field provides an area to describe the function of each relay. Adding this optional information can make troubleshooting and startup easier.

12.16.4 Com Fail Mode

Each of the 8 relays can be individually configured to respond in one of three ways in the unlikely event of a complete loss of communications with the EQP Controller.



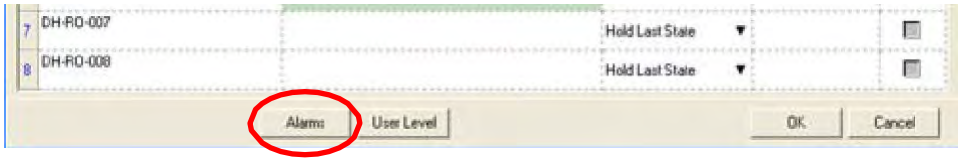
The three selections are as follows:

- **Failed Off**: Relay coil de-energizes
- **Failed On**: Relay coil energizes
- **Hold Last State**: Relay coil stays energized or de-energized as per its last valid command from the EQP Controller.

12.16.5 Alarms

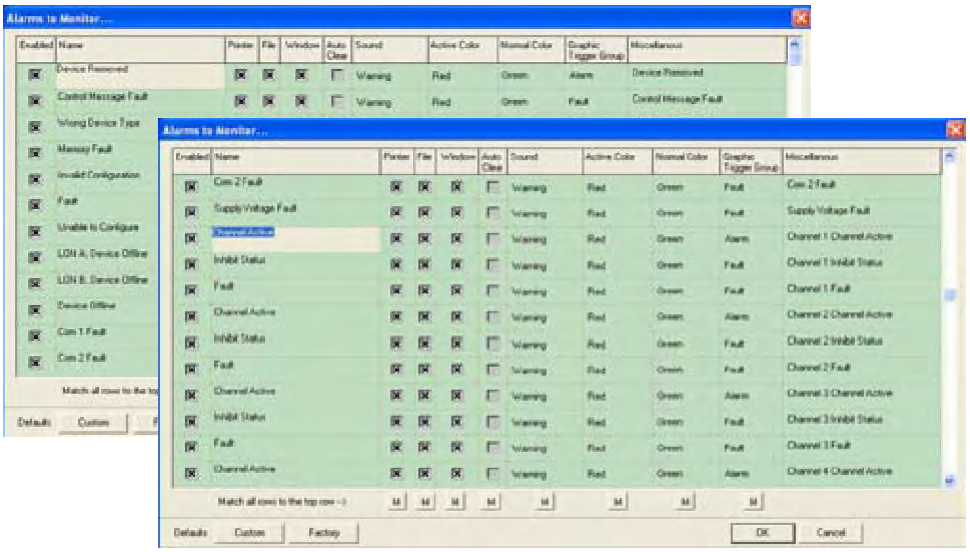
Selecting this button opens the “Alarms to Monitor...” dialog box.

This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3.



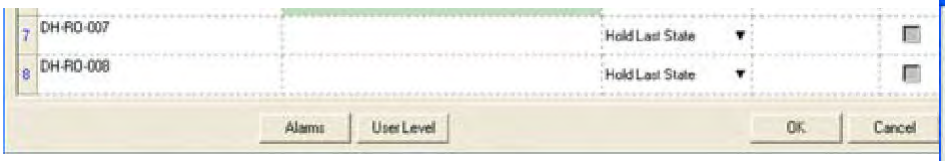
The first 13 alarms pertain to the status and diagnostic for the overall module.

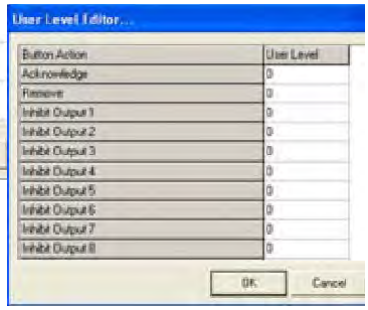
After this come 3 alarms for each of the eight channels. This gives a total of 37 alarms and events that can be enabled and monitored by S^3 for this module type.



12.16.6 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, and “Inhibit” buttons for the module which are accessible from the devices point display.

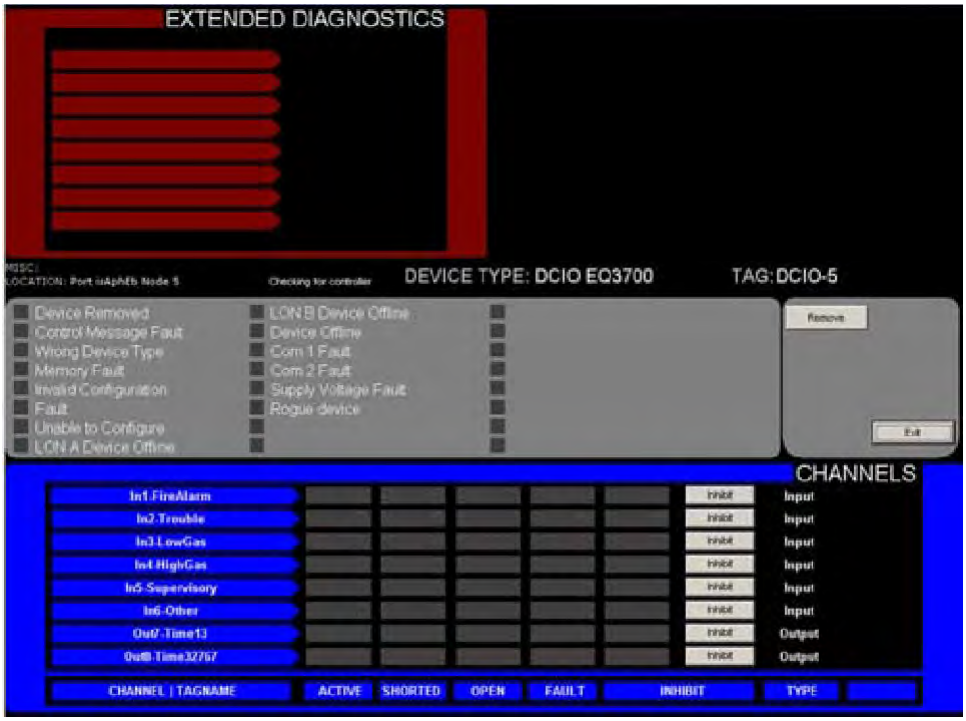




The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.

12.16.6.1 Point Display

The Relay Module has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the device. The bottom half of the point display provides a data display area and annunciator for all 8 relay outputs.

12.16.6.2 Inhibit Buttons

Each relay output has an inhibit button that can be used to disable that channel from responding to commands from the user logic program in the EQP Controller.

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12.17 EQ2500ARM Series Agent Release Module (ARM)

12.17.1 Overview

The EQ2500ARM Series Agent Release Module (ARM) is located on the LON/SLC and provides agent release capability for the Eagle Quantum Premier system. The device is controlled by programmable logic in the Controller and can be used for “Single,” “Cross” or “Counting” Zone Style initiation.

Optional time delay, abort and manual release sequences allow the output to be programmed for use in unique applications. The ARM can monitor and control two output devices (rated for 24 Vdc), which are energized together.

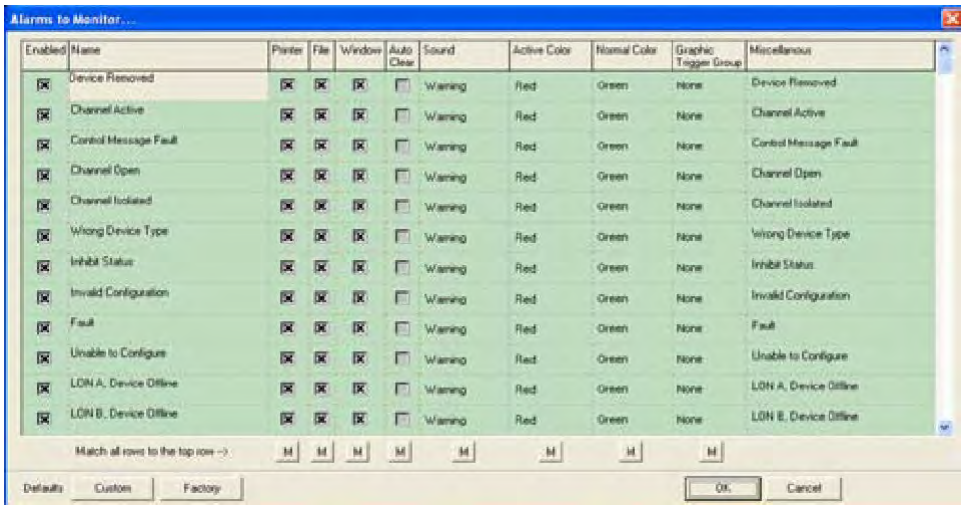
The release circuits are compatible with a variety of solenoid or initiator (squib) based suppression systems. The release circuit is supervised for open circuit conditions. If a trouble condition occurs (open circuit or solenoid supply voltage less than 19 volts), it will be indicated at the controller.

12.17.2 Mode Control

ARM outputs can be latching or non-latching. Non-latching follows the condition of the user programmed logic. Latching requires a reset of the controller.

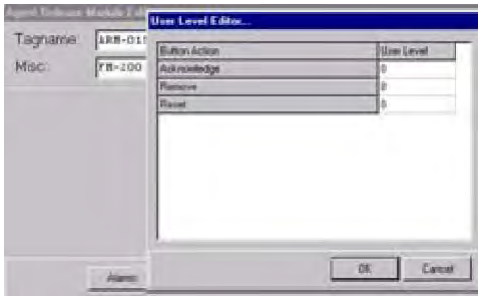
12.17.3 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.



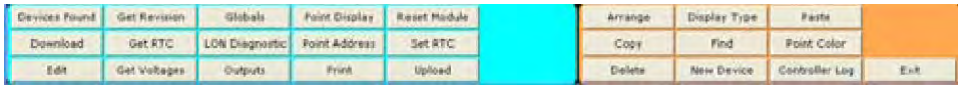
12.17.4 User Level

Allows user levels to be set on a variety of device features for security. Assign an appropriate user level to each item in the list. For details in user level settings, refer to Section 10.



12.17.5 Point Display

The ARM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the device.

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12.18 Initiating Device Circuit (IDC) Module (2-channel)

12.18.1 Overview

The EQ22xxIDC Series Initiating Device Circuit (IDC) module is located on the LON/SLC and provides supervised input capability for the Eagle Quantum Premier system. There are three 2 Channel EQ22xxIDC Series Initiating Device Circuit (IDC) modules available: The EQ22xxIDC allows discrete inputs from smoke/heat detectors, manual call stations, or other contact devices.

It accepts two dry contact inputs for use with devices such as relays, pushbuttons, key switches, etc. The IDC supports ANSI/NFPA 72 Class B, Style B supervised input circuits. Each circuit requires its own end of line (EOL) resistor for monitoring circuit continuity.

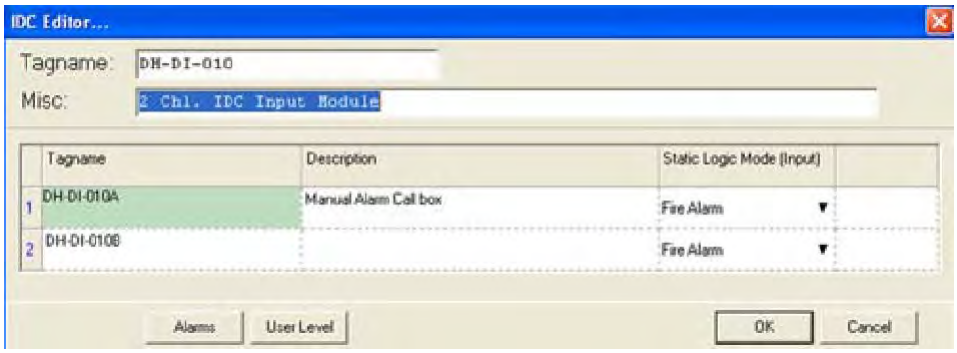
The EQ22xxIDCGF Initiating Device Circuit Ground Fault Monitor (IDCGF) responds to the presence of a ground fault within the power circuitry of the system. It provides an unsupervised dry contact input and ground fault monitoring circuitry for indicating a power supply trouble condition. It is intended for use with a third-party power supply.

The EQ22xxIDCSC Initiating Device Circuit Short Circuit (IDCSC) is like the IDC but supports ANSI/NFPA 72 Class B Style C supervised input circuits. (Not FM Approved).

12.18.2 Tagname

The tagname at the top of the dialog box refers to the entire module.

Each of the two input channels also require a tagname and until one is entered, that channel is not available in the S^3 Database for programming, monitoring, or dynamic graphic purposes.



Enter the Tagname for the module, a miscellaneous description, and then the tagnames and descriptions for the two input channels.

Until tagnames are assigned to the two input channels, they are not available in the S^3 database for programming in the user logic.

12.18.3 Static Logic Mode (Input)

Each of the two inputs has a pull-down menu that allows one of five different “static logic” functions to be assigned, or, to select “Other” which is the default and has no automatic function.

The five static logic functions are:

12.18.3.1 Fire Alarm

Sets off the “Fire Alarm” LED and relay* on the EQP Controller.

12.18.3.2 Trouble

Sets off the “Trouble” LED and relay* on the EQP Controller.

12.18.3.3 Low Gas Alarm

Sets off the “Low Gas” LED and relay* on the EQP Controller.

12.18.3.4 High Gas Alarm

Sets off the “High Gas” LED and relay* on the EQP Controller.

12.18.3.5 Supervisory

Sets off the “Supr” LED and relay* on the EQP Controller.

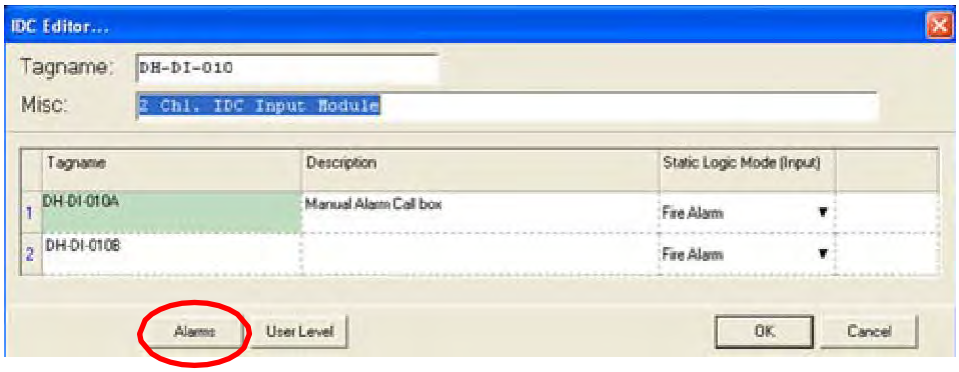
If a static logic function has been selected for an input, when the input is active that action will occur automatically without the need for any user programmed logic.

If the input is to be used with user programmed logic only, select “Other”.

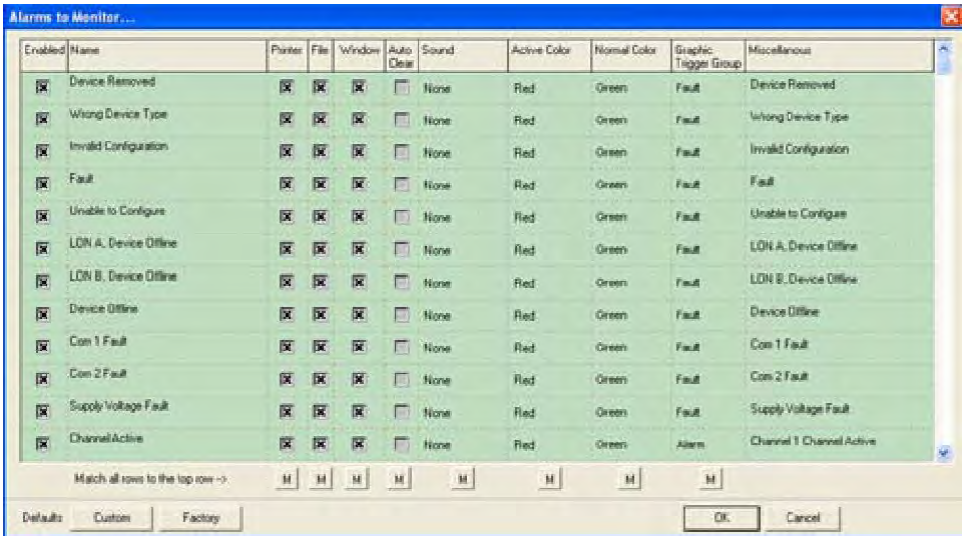
12.18.4 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box.

This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S^3.

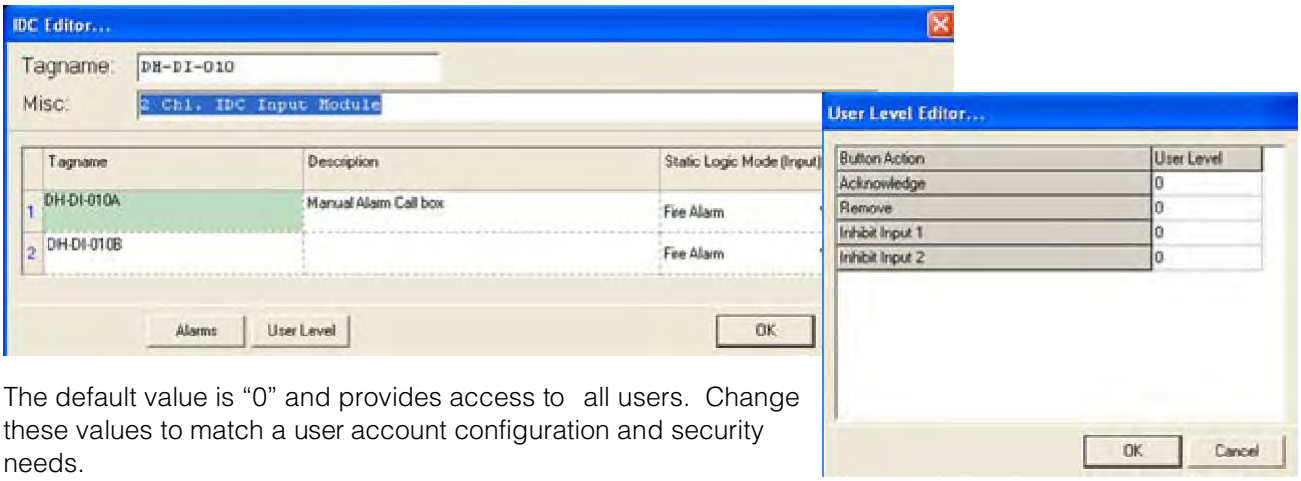


The first 11 alarms pertain to the status and diagnostic for the overall module. After this come 3 alarms for each of the eight channels, resulting in a total of 17 alarms and events that can be enabled and monitored by S^3 for this module type.



12.18.5 User Levels

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove”, and “Inhibit” buttons for the module which are accessible from the devices point display.

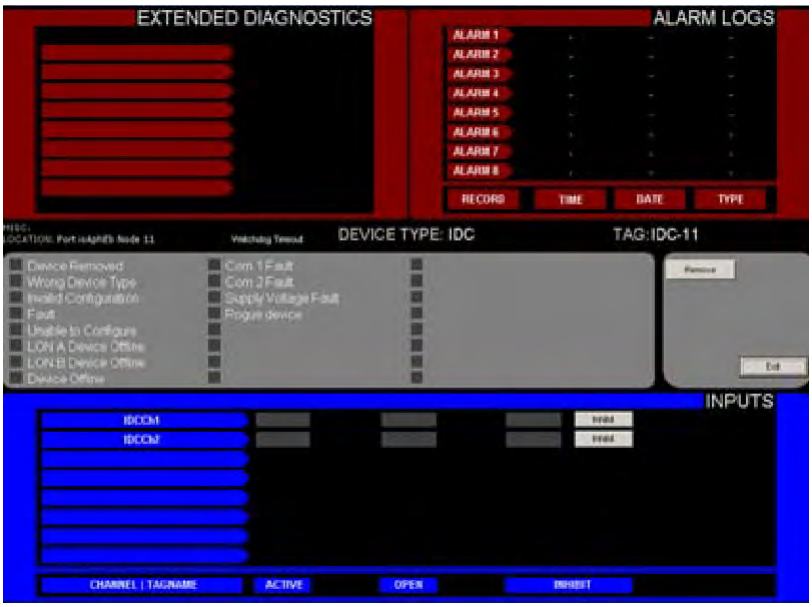


The default value is “0” and provides access to all users. Change these values to match a user account configuration and security needs.

12.18.6 Point Display

The IDC has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device.



The top right quadrant of the display shows the last eight alarms (channel activation) with their date and time data.

The bottom half of the point display provides a data display area and annunciator for the two input channels.

12.18.7 Inhibit Buttons

Each input has an inhibit button that can be used to disable that channels status from reaching the user logic program in the EQP Controller.

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12.19 EQ2500SAM Signal Audible Module (SAM)

12.19.1 Overview

The EQ2500SAM Signal Audible Module is located on the LON/SLC and provides NFPA-72 compliant Notification Appliance Circuit (NAC) control capability to the Eagle Quantum Premier System.

The Signal Audible Module provides two indicating circuits for controlling UL Listed 24 Vdc polarized audible/visual indicating appliances.

The device is located on the LON and is controlled by programmable logic in the Controller. Each output circuit is independently programmable to allow notification of separate events. Each output can be individually activated for any one of the following pre-defined outputs:

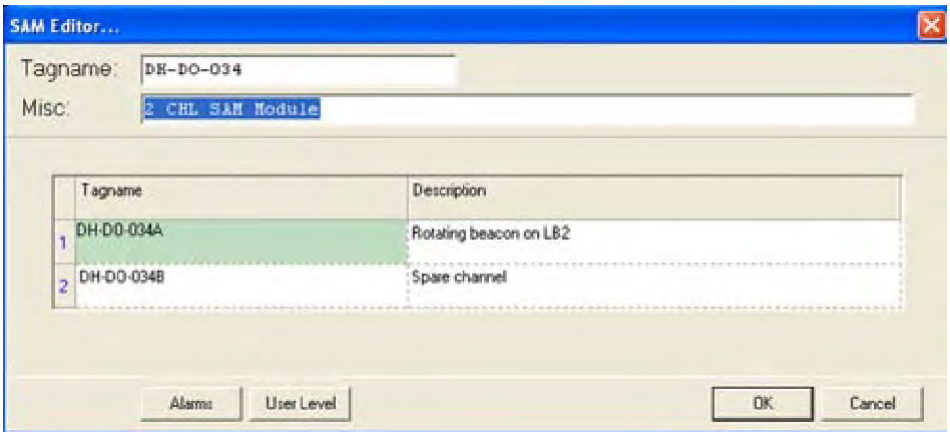
1. Continuous
2. 60 beats per minute
3. 120 beats per minute
4. Temporal pattern.

Device outputs operate in the reverse polarity manner when activated. Each output is rated at 2 amperes. The output circuits are supervised for open and short circuit conditions.

If a wiring fault occurs, a trouble condition will be indicated at the Controller and on the S^3 Point Display.

12.19.2 Tagname

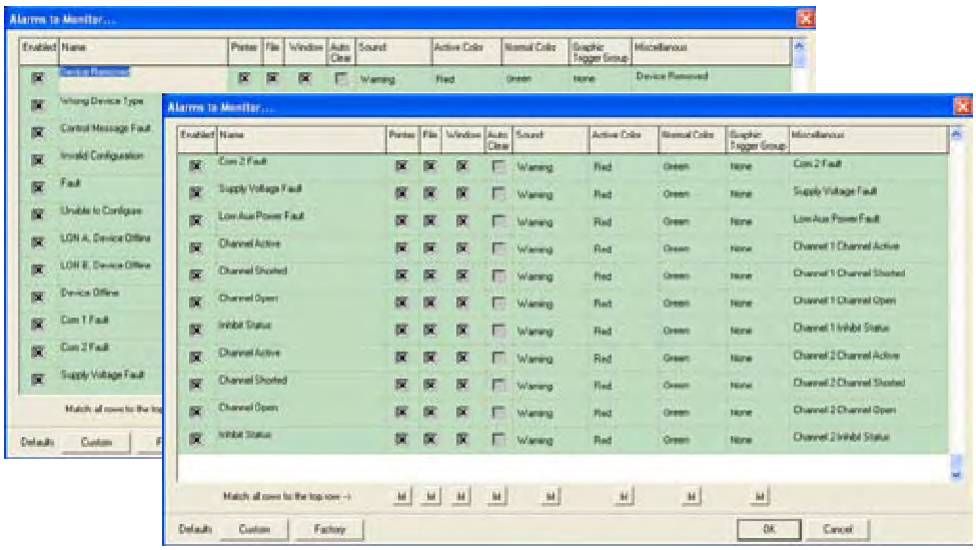
The tagname at the top of the dialog box refers to the module. Each of the two output channels also require a tagname. Until the tagnames are entered the module is not available in the S³ Database for programming, monitoring, or dynamic graphic purposes.



Below, the tagname is a “Misc” text field to enter descriptive information to better identify the location or purpose of the module. Data in this field is optional.

12.19.3 Alarms

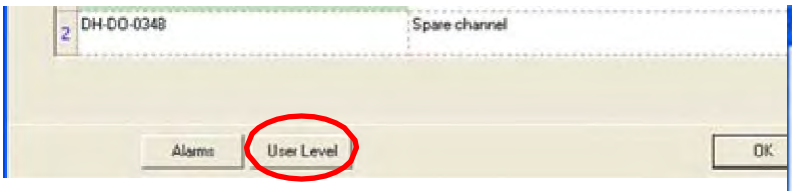
Selecting this button opens the “Alarms to Monitor...” dialog box. This scrolling list displays the alarms and events related to the device that can be configured to be monitored by S³.

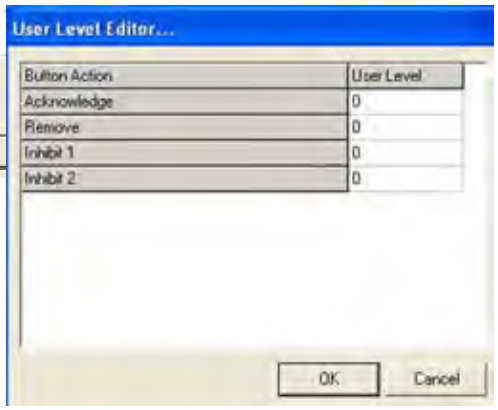


There are 13 alarms and events that pertain to the status and diagnostics for the module plus 4 per output channel.

12.19.4 User Level

The “User Level Editor...” provides a means for limiting access to the “Acknowledge”, “Remove” and “Inhibit” buttons for the module, which are accessible from the device’s point display.





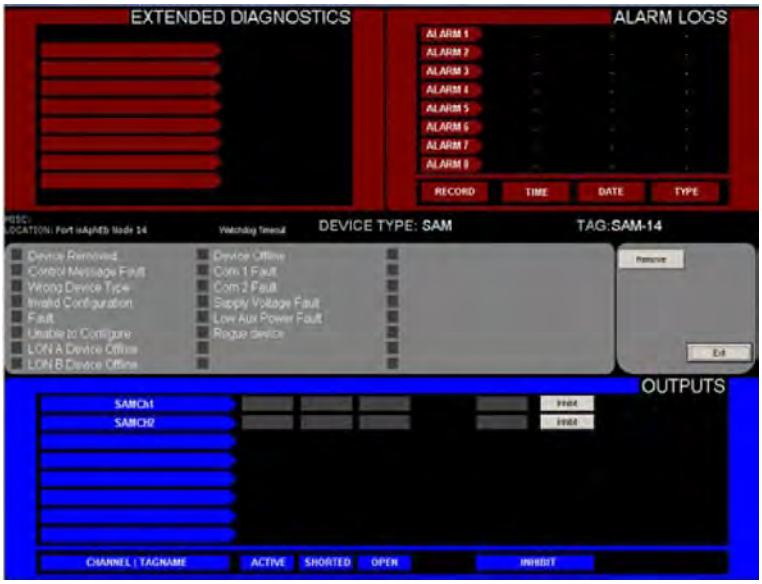
The default value is “0” and provides access to all users.

Change these values to match a user account configuration and security needs.

12.19.5 Point Display

The SAM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.

The point display provides a single window view of all available real-time data for the device.



12.19.5.1 Alarm Logs

The upper right quadrant of the point display shows the last eight alarms that have occurred along with their date & time. This information is stored in the module and is retrieved over the LON for display in this area.

12.19.5.2 Status & Diagnostics

The middle area of the point display shows the discrete status of 13 pieces of tracked status and diagnostic data.

12.19.5.3 Channel Status

The bottom half of the point display provides an annunciator style display depicting the status and health of the two output channels. Next to the channel tagname are indicators for Active, Shorted, Open, and the Inhibit status. Buttons are also provided to inhibit either of the output channels. (If the user has sufficient access privileges).

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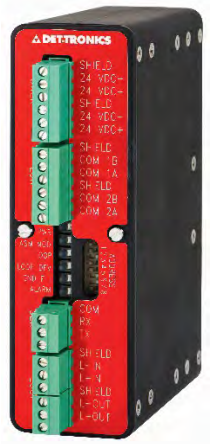
12.20 Addressable Smoke Module (ASM)



12.20.1 Overview

The Eagle Quantum Premier® (EQP) Addressable Smoke Module (ASM) is a certified SIL2 capable interface device designed to expand the input and output capability of Detector Electronics Corporation's (Det-Tronics®) EQP System, by providing continuous and automated fire protection. It ensures system operation through supervision of system inputs/outputs and Local Operating Network/Signaling Line Circuit (LON/SLC) monitoring in the controller.

The ASM is located directly on the LON of the EQP system, with a loop of up to 100 Apollo addressable devices connected to the ASM. This allows the EQP controller to annunciate a fire alarm from either its own LON based I/O or from the ASM connected addressable detection loops. An EQP LON can support up to 10 ASM modules.

12.20.2 Supported Apollo Modules

The below is a list of Apollo modules that are supported on the ASM and where to find their configuration in S^3.

Part Number	Device Name	S^3 Category	S^3 Sub-Category
55000-041	XP95A Open-Area Sounder	Sounder	Sounder / Beacon
55000-181MAR	Marine DIN-Rail Sounder Controller	Interface	Sounder Control Unit
55000-182	DIN-Rail Sounder Controller	Interface	Sounder Control Unit
55000-268	Beam Detector	Detector	Beam Detector
55000-274	Loop-Powered Weatherproof 100dB Sounder	Sounder	Sounder / Beacon
55000-278	Loop-Powered 100dB Sounder	Sounder	Sounder / Beacon
55000-280	Flame Detector	Detector	Flame Detector
55000-293	Multi-Tone Open Area Sounder Beacon, Red with isolator	Sounder	Sounder Beacon
55000-298	Weatherproof Multi-Tone Open-Area Sounder Beacon, Red with Isolator	Sounder	Sounder Beacon
55000-374MAR	Marine Multi-Tone Open Area Sounder (Weatherproof)	Sounder	Sounder / Beacon
55000-398MAR	Marine Multi-Tone Open Area Sounder Visual Indicator (Weatherproof)	Sounder	Sounder Beacon

Part Number	Device Name	S^3 Category	S^3 Sub-Category
55000-401	High Temp Heat Detector	Detector	High Temp Heat Detector
55000-440	XP95 IS Heat Detector	IS Device	Heat Detector
55000-540	XP95 IS Ionization Smoke Detector	IS Device	Ionization Smoke
55000-588	3-Channel Input/Output Unit with Isolator	Interface	3-Channel I/O Unit
55000-640	XP95 IS Optical Smoke Detector	IS Device	Optical Smoke
55000-765	(Priority) Mini Monitor Module	Interface	Priority Mini Monitor Module
55000-765	Mini Monitor Module	Interface	Mini Monitor Module
55000-771MAR	Marine DIN-Rail Output Unit	Interface	DIN Rail Output Unit
55000-772MAR	Marine DIN-Rail Switch Monitor Plus	Interface	Switch Monitor Plus
55000-773MAR	Marine DIN-Rail Zone Monitor	Interface	Zone Monitor
55000-774MAR	Marine DIN-Rail Input/Output Unit	Interface	DIN Rail I/O Unit
55000-775MAR	Marine Mini Switch Monitor	Interface	Switch Monitor
55000-775MAR	Marine Mini Switch Monitor	Manual Call	Manual Call
55000-803	DIN-Rail Input/Output Unit	Interface	DIN Rail I/O Unit
55000-804	DIN-Rail Output Unit	Interface	DIN Rail Output Unit
55000-805	XP95A Switch Monitor	Interface	XP95A Switch Monitor
55000-806	XP95A Priority Switch Monitor Module	Interface	XP95A Priority Switch Monitor Module
55000-812	DIN-Rail Zone Monitor with Isolator	Interface	Zone Monitor
55000-820	XP95A Switch Monitor Input-Output Module	Interface	XP95A I/O Module
55000-822	DIN-Rail Switch Monitor	Interface	Switch Monitor
55000-825	XP95A Sounder Control Module	Sounder	XP95A Sounder Control Module
55000-841	XP95 Switch Monitor Plus with Isolator	Interface	Switch Monitor Plus
55000-845	Zone Monitor with Isolator	Interface	Zone Monitor
55000-847	XP95 Input/Output Unit with Isolator	Interface	XP95 I/O Unit
55000-852	XP95 Sounder Control Unit with Isolator	Interface	Sounder Control Unit
55000-859	XP95A 120 Volt AC Input/Output Module	Interface	120V I/O Module
55000-863	XP95A Relay Output Module	Interface	Relay Output Module
55000-877	Loop-Powered Beacon	Beacon	Beacon

Part Number	Device Name	S^3 Category	S^3 Sub-Category
55000-960	XP95 IS Manual Call Point MEDC Style Break-Glass	IS Device	Manual Call
55000-970	XP95 IS Manual Call Point MEDC Style Push-Button	IS Device	Manual Call
55100-940	XP95 IS Manual Call Point	IS Device	Manual Call
56000-005	Addressable Polycarbonate Pull Station	Manual Call	Manual Pull
58000-005	Discovery Open-Area Sounder	Sounder	Discovery Sounder Beacon
58000-011	Discovery UL Open-Area Sounder	Sounder	Discovery Sounder Beacon
58000-300	Carbon Monoxide Fire Detector	Detector	CO Detector
58000-400	Discovery Heat Detector	Detector	Heat Detector
58000-400MAR	Discovery Marine Heat Detector	Detector	Heat Detector
58000-400SIL	SIL Discovery Heat Detector	Detector	Heat Detector
58000-450	Discovery UL Heat Detector	Detector	Heat Detector
58000-500	Discovery Ionization Smoke Detector	Detector	Ionization Smoke
58000-500MAR	Discovery Marine Ionization Smoke Detector	Detector	Ionization Smoke
58000-500SIL	SIL Discovery Ionization Smoke Detector	Detector	Ionization Smoke
58000-550	Discovery UL Ionization Smoke Detector	Detector	Ionization Smoke
58000-600	Discovery Optical Smoke Detector	Detector	Optical Smoke
58000-600MAR	Discovery Marine Optical Smoke Detector	Detector	Optical Smoke
58000-600SIL	SIL Discovery Optical Smoke Detector	Detector	Optical Smoke
58000-650	Discovery UL Photo-Electric Smoke Detector	Detector	Optical Smoke
58000-700	Discovery Multisensor Detector	Detector	Multisensor
58000-700MAR	Discovery Marine Multisensor Detector	Detector	Multisensor
58000-700SIL	SIL Discovery Multisensor Detector	Detector	Multisensor
58000-750	Discovery UL Multisensor Detector	Detector	Multisensor
58100-908	Discovery Manual Call Point (with Isolator)	Manual Call	Manual Call
58100-951	Discovery Weatherproof Manual Call Point (with Isolator)	Manual Call	Manual Call
58200-910	Discovery Manual Call Point	Manual Call	Manual Call
58200-950SIL	Waterproof Addressable Manual Call Point	Manual Call	Manual Call
58200-971MAR	Discovery Marine Manual Call Point	Manual Call	Manual Call

12.20.3 Configuration

The ASM is configured by double-clicking on its selection rectangle on the LON overview screen.

This opens the “ASM (EQ3760) SIL...” editor, which provides fields for the entry of the user configurable parameters.

ASM (EQ3760) SIL...

Tagname: ASM_SIL

Misc: Addressable Smoke Module SIL 2

Address	Tagname	Description	Loop Device Type	Group Add.	Time Delay (Sec)	Day Mode Start Time	Day Mode Stop Time	Response Mode-Day	Response Mode-Night	Flashing LED	Static Logic	Volume Setting	Tone Pair	Latching LED
1	A_Not_in_List	Unconfigured	UnConfig Loop Device											
2	Beacon	55000-877	Beacon											
3	Detector_CO	58000-300	CO Detector		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
4	Detector_HD_01	58000-400	Heat Detector		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
5	Detector_HD_02	58000-450	Heat Detector		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
6	Detector_HD_03	58000-450DET	Heat Detector		0	12:00:00 AM	12:00:00 AM	3	3	☑	Fire Alarm			☑
7	Detector_HD_04	58000-400MAR	Heat Detector		0	12:00:00 AM	12:00:00 AM	3	3	☑	Fire Alarm			☑
8	Detector_HD_05	58000-400SIL	Heat Detector		0	12:00:00 AM	12:00:00 AM	3	3	☑	Fire Alarm			☑
9	Detector_ID_01	58000-500	Ionization Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
10	Detector_ID_02	58000-550	Ionization Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
11	Detector_ID_03	58000-550DET	Ionization Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
12	Detector_ID_04	58000-500MAR	Ionization Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
13	Detector_ID_05	58000-500SIL	Ionization Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
14	Detector_MS_01	58000-700	Multisensor		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
15	Detector_MS_02	58000-750	Multisensor		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
16	Detector_MS_03	58000-750DET	Multisensor		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
17	Detector_MS_04	58000-700MAR	Multisensor		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
18	Detector_MS_05	58000-700SIL	Multisensor		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
19	Detector_OS_01	58000-600	Optical Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
20	Detector_OS_02	58000-650	Optical Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
21	Detector_OS_03	58000-650DET	Optical Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐
22	Detector_OS_04	58000-600MAR	Optical Smoke		0	12:00:00 AM	12:00:00 AM	3	3	☐	Fire Alarm			☐

AIC Start Time

☑ AIC Enable ☑ 10:00:00 AM ☑ Spur Topology

User Level Alarms OK Cancel

The editor screen also provides buttons for accessing other configurable items such as ‘AIC Enable’ ‘AIC Start Time’, ‘Spur Topology’, ‘Alarms’ and ‘User level’ settings.

12.20.3.1 Tagname

The tag name at the top of the dialog box is used by the Controller and S^3 to identify the ASM.

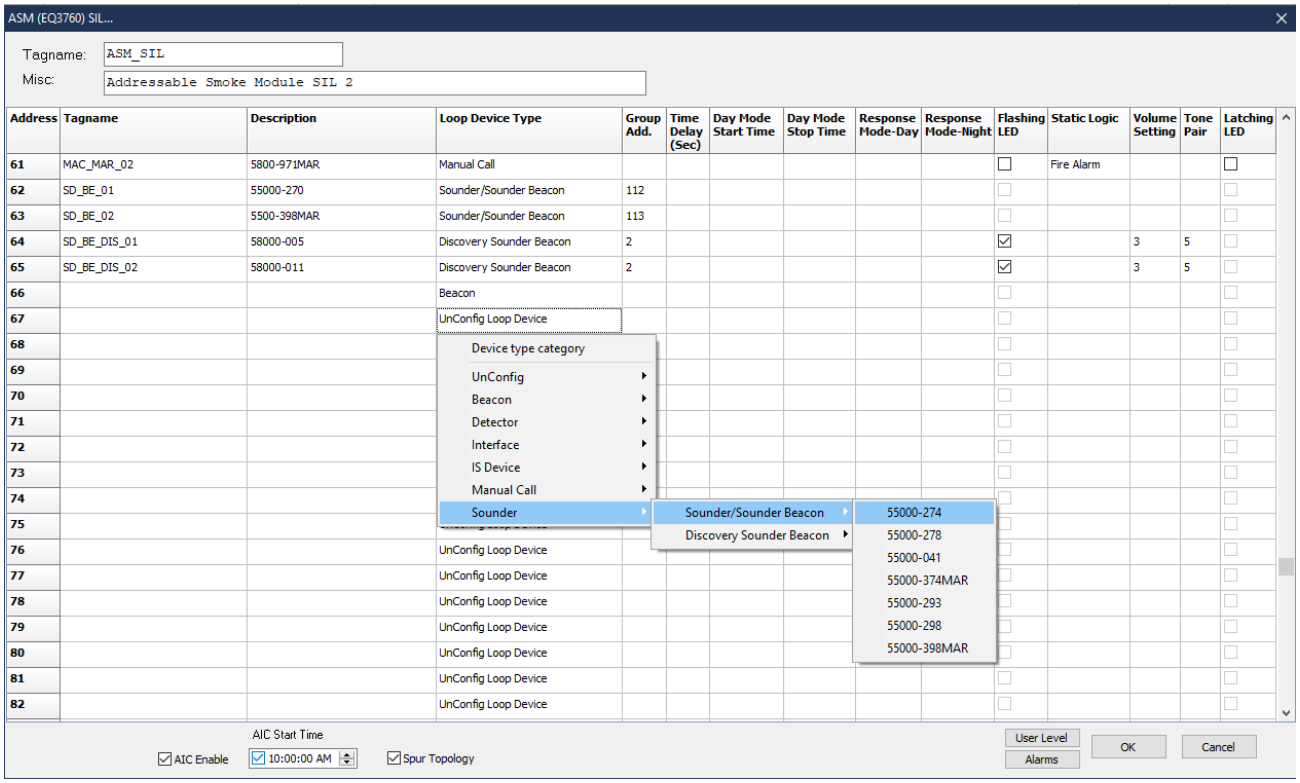
12.20.3.2 Misc

This field allows the user to add a descriptor for the device.

12.20.3.3 Editor Fields

Each channel will have the following:

- **Tagname**: a tag name specific to the Apollo device
- **Description**: a descriptor specific to the Apollo device
- **Loop Device Type**: user can select the device type to be configured by placing the cursor in the 'unconfigured' field and left clicking, then selecting from the drop-down menus that appear.



- **Group Add.**: Only available for specific devices (Control Modules/Units), the user can then select from the available Group address number. This mechanism allows the tone patterns of the sounders to be synchronized. The sounders have a secondary address for creating groups. The groups use addresses 112 through 126. The sounder devices that support group mode have an extra 4 DIL switches for setting the group address. The DIL switch setting must match the address selected from this selection.
- **Time Delay**: Only available for specific devices (detectors), the user can select a time delay from 0 up to 30 seconds.
- **Day Mode Start and Stop Times**: Only available for specific devices (detectors), allows the user to configure the day mode start and stop times.

- **Response Mode-Day**: For devices that support a Day mode, the user can select the Response mode (1-5, default 3) as below:

Mode	Sensitivity
1	Very High
2	High
3	Medium (Default)
4	Low
5	Very Low

- **Flashing LED**: When this mode is selected, the detector LED will flash when it is polled by the ASM.
- **Static Logic**: The user can select which fixed logic in the controller the device should trigger, options are Fire, Low Gas, High Gas, Supervisory, Trouble or Other.
- **Volume Setting**: only available for specific horns (Discovery), allows the user to set the volume of the sounder (1 through 7).

User Selection	Actual Value
1 (Default)	1 (low)
2	2
3	3
4	4
5	5
6	6
7	7 (high)

- **Tone Pair**: only available for specific horns (Discovery) allows the user to select which tone pair is to be used (1 through 15).

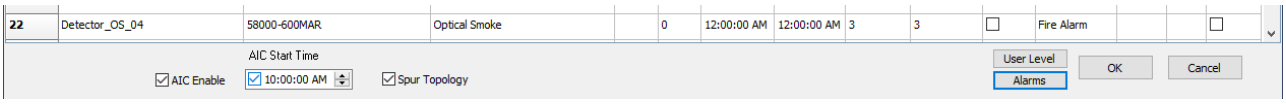
Mode	Tone 1	Primary Tone	Frequency	Tone 2	Secondary Tone	Frequency
1	T1	Apollo Evacuation Tone	550Hz for 0.5s 825Hz for 0.5s	T0	Apollo Alert Tone	1s off 825Hz for 1s
2	T12	Alternating	925Hz for 0.25s 626Hz for 0.25s	T11	Continuous	925Hz
3	T14	Medium Sweep	800Hz to 970Hz at 1Hz	T13	Continuous	970Hz
4	T16	Fast Sweep	2500Hz - 2850Hz at 9Hz	T15	Continuous	2850Hz
5	T3	Dutch Slow Whoop	500Hz - 1200Hz for 3.5s 0.5s off	T2	Continuous	825Hz
6	T4	DIN Tone	1200Hz - 500Hz for 1s	T2	Continuous	825Hz
7	T18	Swedish	660Hz, 150ms on	T17	Swedish	660Hz

Mode	Tone 1	Primary Tone	Frequency	Tone 2	Secondary Tone	Frequency
		Fire Tone	150ms off		All Clear Signal	
8	T6	Aus	3x (500Hz-1200Hz for 0.5s) 0.5s off	T5	Aus Alert Tone	420Hz for 0.625s 0.625s off
9	T7	NZ	500Hz – 1200Hz for 3.75s 0.25s off	T5	NZ Alert Tone	420Hz for 0.625s 0.625s off
10	T19	US Temporal LF	3x (970Hz,0.5s on,0.5s off) 1s off	T13	Continuous	970Hz
11	T20	US Temporal HF	3x (2850Hz,0.5s on,0.5s off) 1s off	T15	Continuous	2850Hz
12	T8	Simulated Bell - Continuous	N/A	T9	Simulated Bell - Intermittent	1s off 1s on
13	T10	Emergency Warning Siren	N/A	T22	Emergency Warning Siren All Clear	N/A
14	T13	Continuous	970Hz	T21	Pulsed at 1s off 1s on	970Hz
15	T1	Apollo Evacuation Tone	550Hz for 0.5s 825Hz for 0.5s	T0	Apollo Alert Tone	1s off 825Hz for 1s

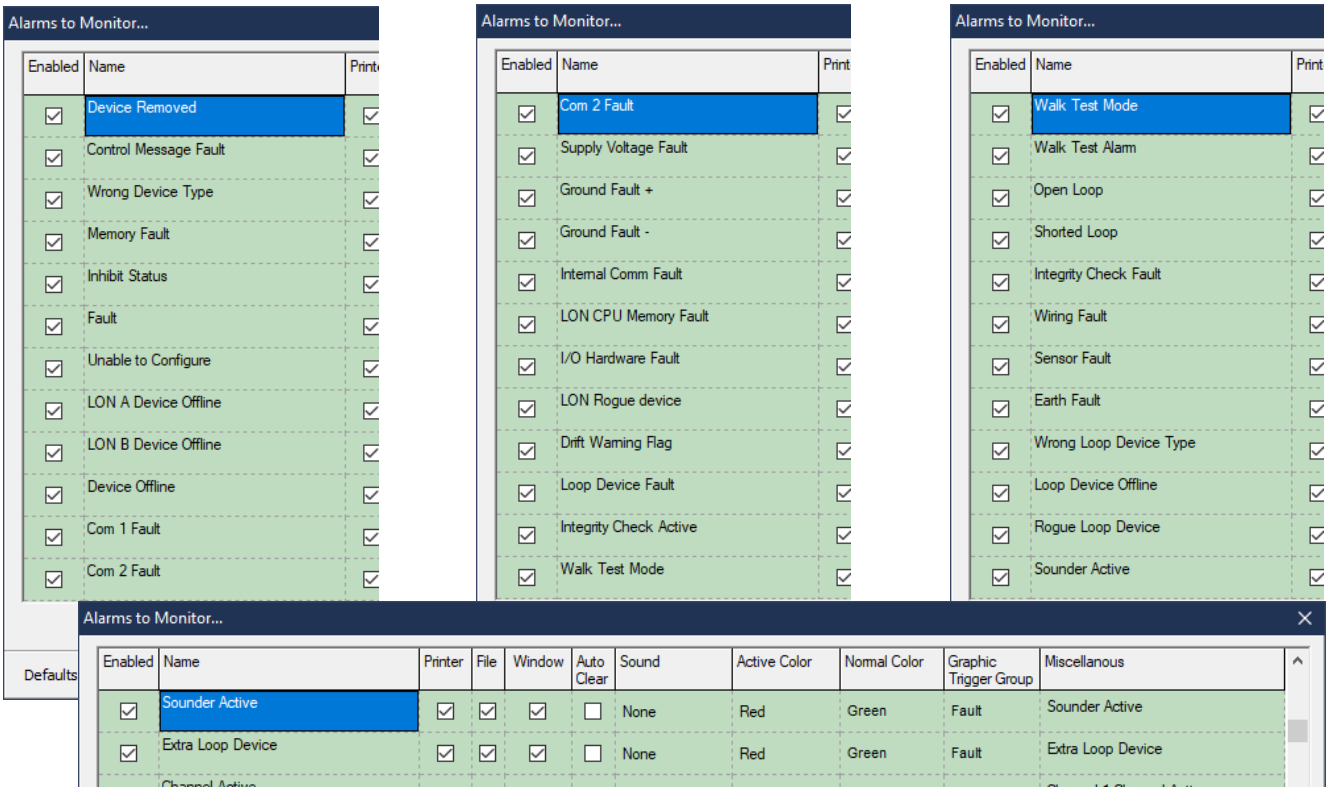
- **Latching LED**: only available for specific devices (Smoke, Heat or MAC's). This check box will latch the device LED if the device is activated and will only be cleared by a Reset.

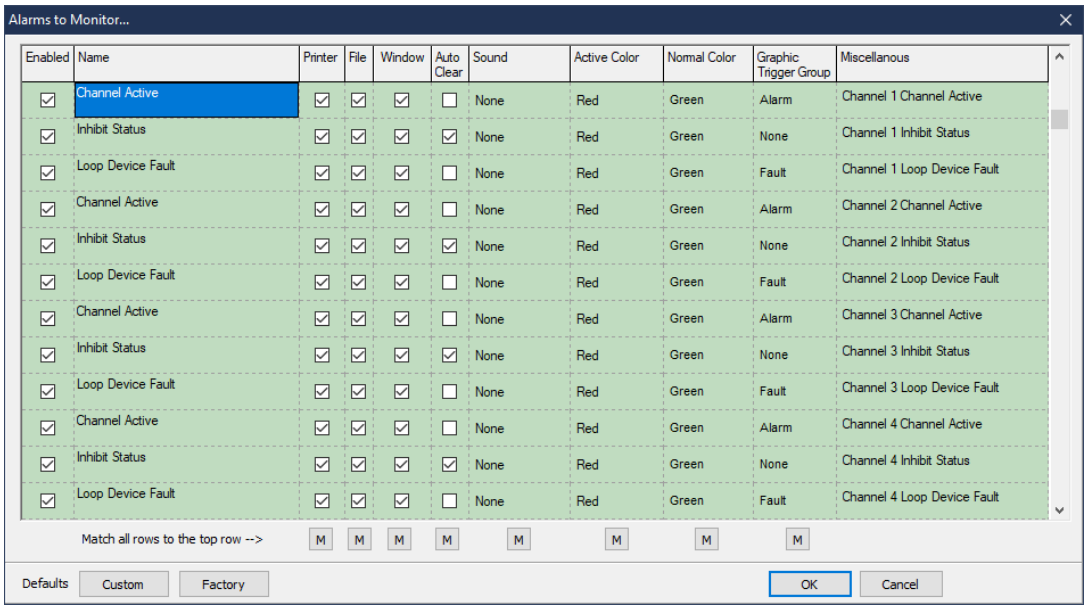
12.20.4 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box.



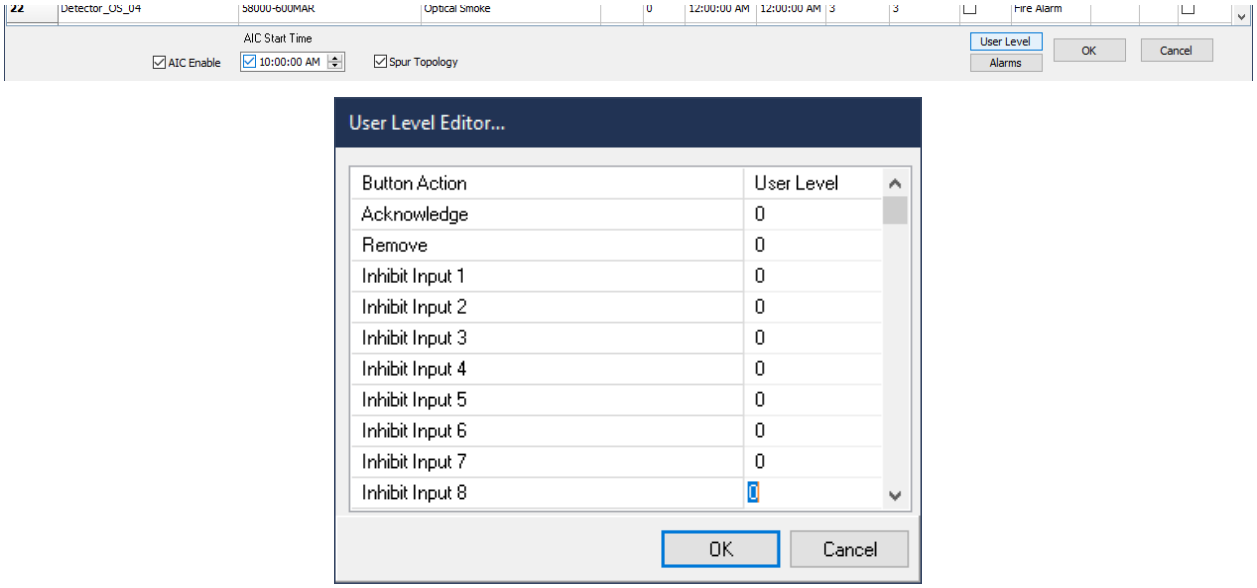
This scrolling list displays the alarms and events related to the ASM that can be configured to be monitored by S³. There are 35 status flags for the PSM module that are then followed by the device specific status flags.





12.20.5 User Levels

Selecting the User Level button opens the “User Level Editor...”



The “User Level Editor…” provides a means for limiting access to the “Acknowledge”, “Remove”, and other device specific functions for the ASM which are accessible from the ASM point display. The default value is “0” which allows access to all users. These values can be altered to match any customized user account configuration and security needs.

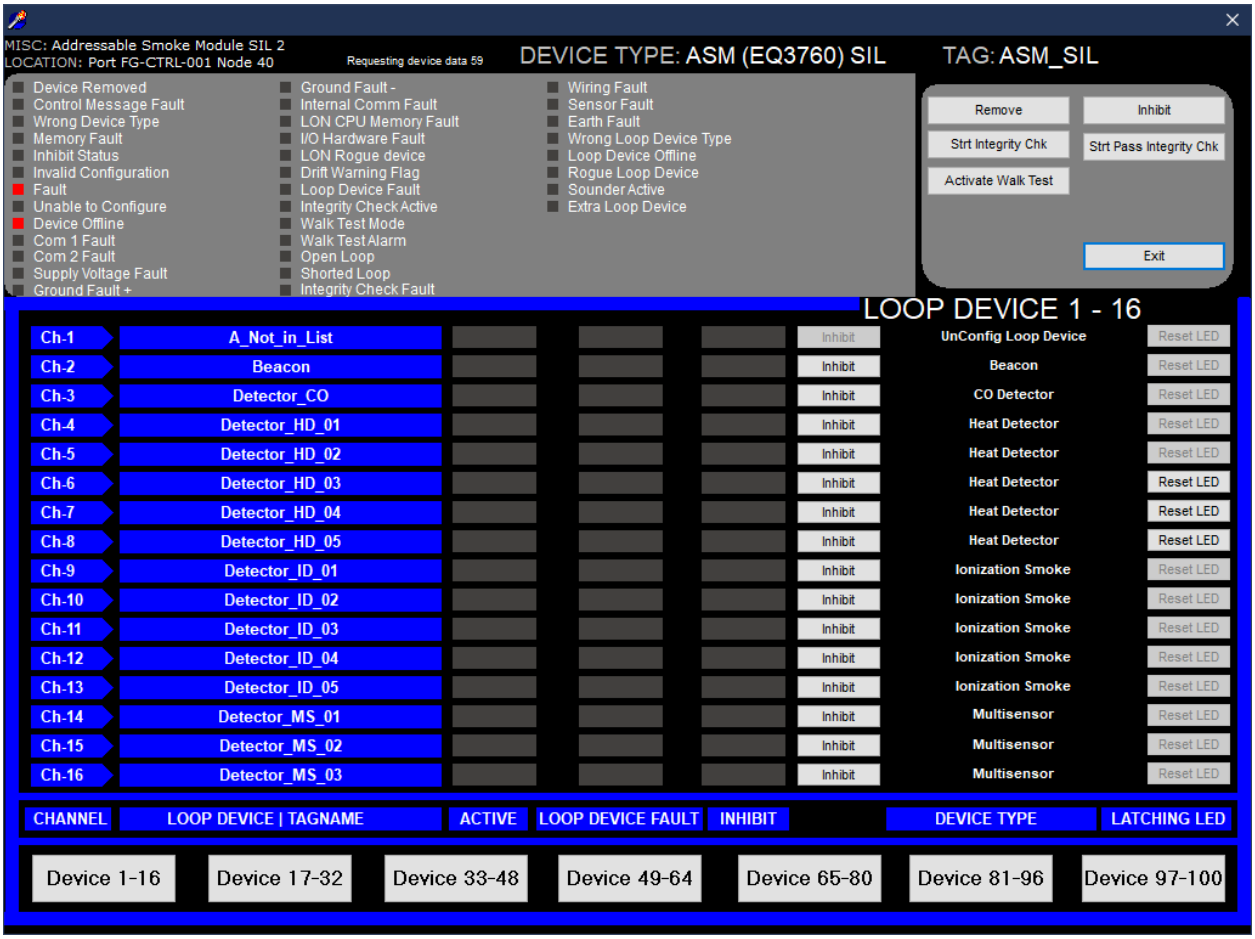
12.20.6 Completing Configuration

When all parameters have been set, select the “OK” button to return to the LON Configuration Screen.

From the Command Bar, download the new configuration to the controller or configure other devices.

12.20.7 Point Display

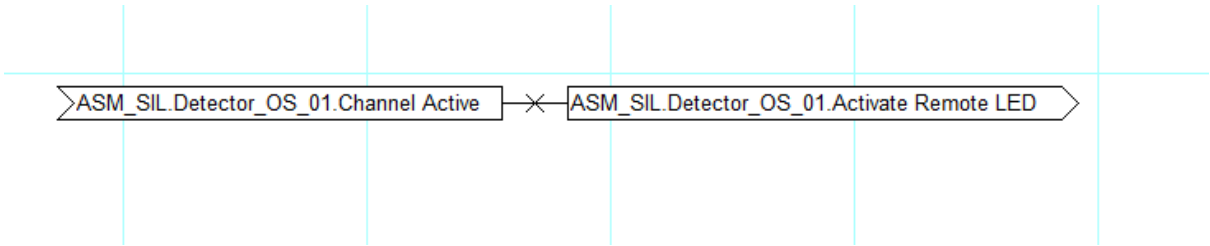
The PSM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the ASM. This includes the module diagnostics in the top of the screen and individual diagnostics for each Apollo addressable device in the lower portion. It also provides for operation of a “Remove”, “Strt Integrity Chk”, “Activate Walk Test”, “Strt Pass Integrity Chk”, “Inhibit” for the modules along with “Inhibit” and “Reset LED” feature for each of the Apollo devices. At the bottom are navigation button to display the Apollo devices (up to 100).

NOTE

When configuring an Apollo smoke detector for Remote LED indication (e.g., in applications such as floor voids), ensure that the LED is connected to the correct terminals on the smoke detector base and that user logic has been created in S³ to turn on the smoke detectors LED. See below example.



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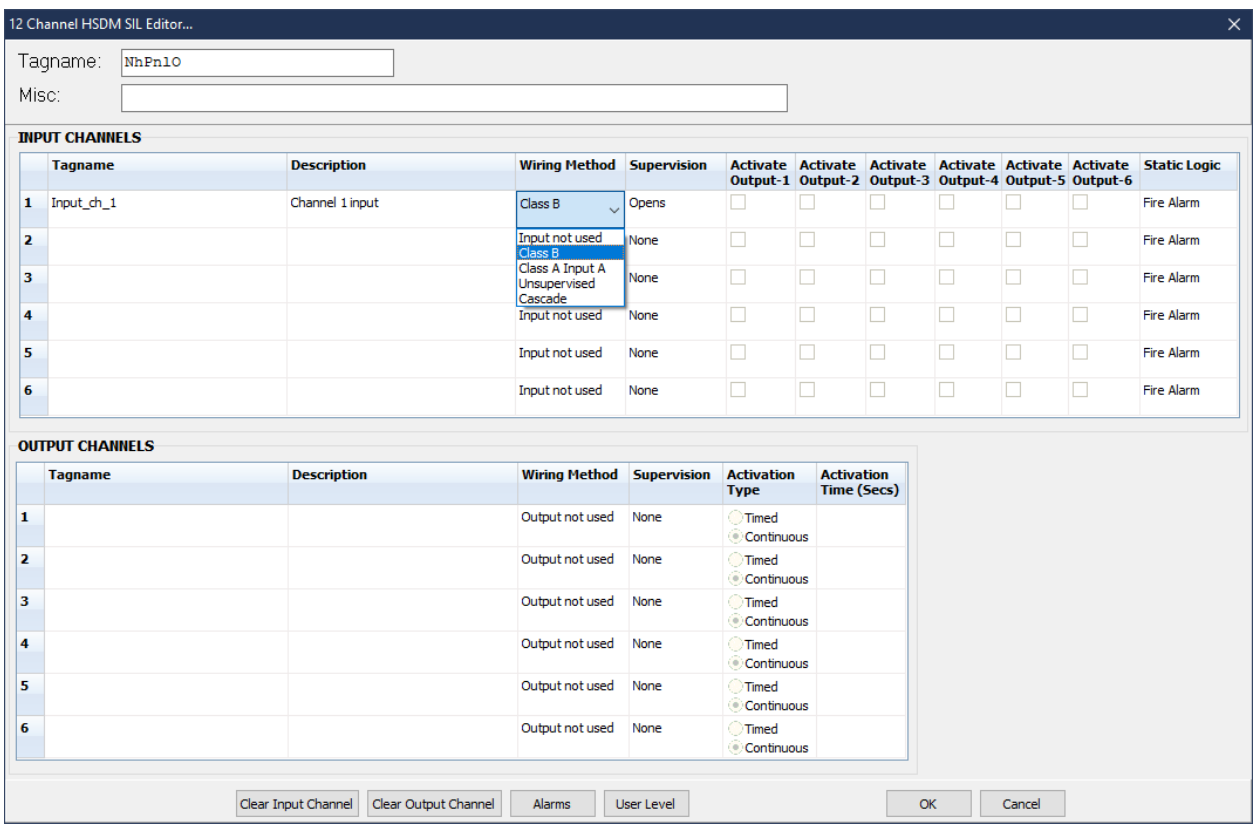
12.21 High-Speed Deluge Model (HSDM)

12.21.1 Overview

The High-Speed Deluge Module (HSDM) is a 12-channel discrete (ON/OFF) input/output module for the Eagle Quantum Premier LON, for high-speed applications. The activation time between an onboard input on to triggering an onboard output is less than 2 milli-seconds.

From a configuration standpoint, six channels are preset as inputs and six channels are preset as outputs. The user can select from the editor which input triggers which output or multiple outputs.

The HSDM is configured by double-clicking on its selection rectangle on the LON schematic. This opens the "12 Channel HSDM SIL Editor...", which provides fields for the entry of any user configurable parameters.



Being a multi-channel device there are multiple tag names. At the top of the dialog box there is a tag name that refers to the HSDM module that is used with its global status and diagnostic events. Below this are tag names for each channel for the status and diagnostics relating to the twelve individual channels.

The editor screen also provides buttons for accessing other configurable items such as 'Clear Input Channel', which clears the user configuration, 'alarms' for the module and 'user level' settings.

12.21.2 Configuration

12.21.2.1 Tagname

The tag name at the top of the dialog box refers to the entire module. Each of the twelve channels also require a tag name and until one is entered, that channel is not available in the S^3 database for programming or monitoring purposes. As the output channels are configured their activation output selection becomes available for the inputs to select.

12.21.2.2 Misc

This field allows the user to add a descriptor for the device.

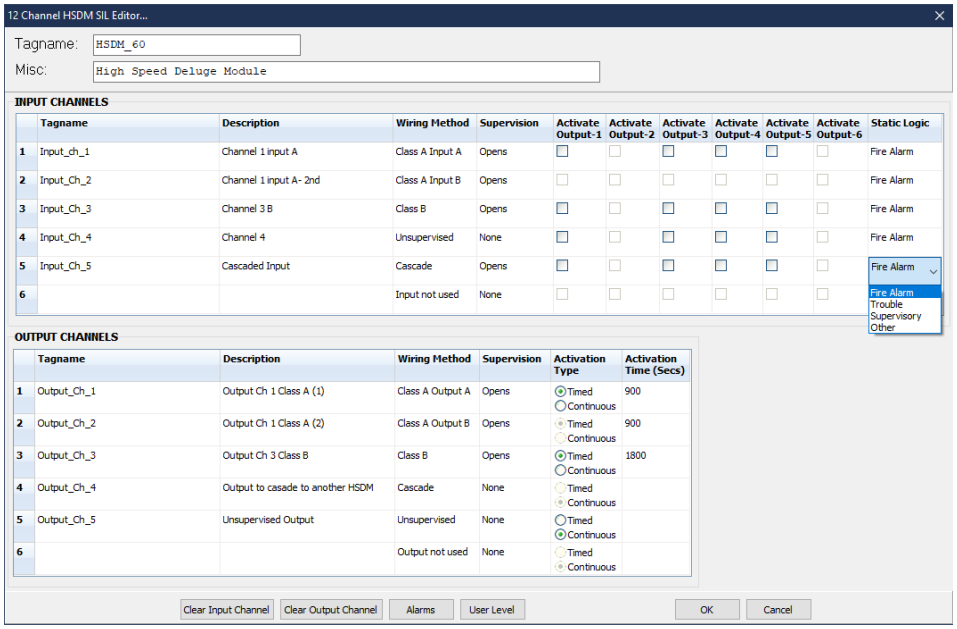
12.21.2.3 Editor Fields – Input/Output Channels

The user-defined input and output channel options are:

- **Tagname**: Unique identifier for each channel.
- **Description**: A user defined description for the channel.
- **Wiring Method**:
  - Class B – uses one channel on the HSDM.
  - Class A Input A – the adjacent channel will automatically be 'Class A Input B'.
  - Unsupervised – no wiring supervision.
  - Cascade – when receiving an input from another HSDM. Caution: Do not use Cascade mode with firmware version 1.1 or earlier. The firmware version can be seen in the LON Overview screen.
- **Supervision**: The pull-down selection is only available for inputs or outputs that are configured as Class A or Class B, with option for 'Opens' (default) or 'Opens/Shorts'.

12.21.2.3.1 User Input Channels

- **Activate** Output **1 thru 6**: These selections are greyed out until the output channel has been configured. Once the outputs have been configured the user can then select which input will trigger one or more output channels.



- **Static Logic**: This provides the option to trigger one of the EQP's preconfigured alarms for annunciation on the controller faceplate.
  - Fire Alarm: Sets off the "Fire Alarm" LED and relay* on the EQP controller.
  - Trouble: Sets off the "Trouble" LED and relay* on the EQP controller.
  - Supervisory: Sets off the "Supr" LED and relay* on the EQP controller.
  - Other: If the input is to be used with user programmed logic only, select "Other".

  If a static logic function has been selected for an input, when the input is active that action will occur automatically without the need for any user programmed logic.

12.21.2.3.2 User Output Channels

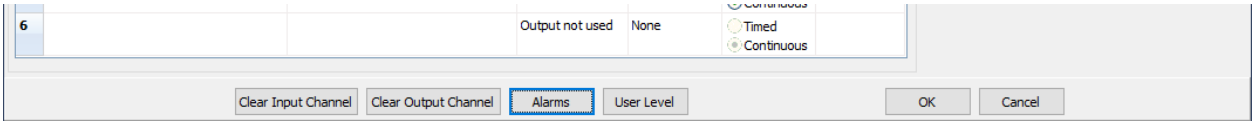
- **Activation Type**
  - Timed – duration is determined by 'Activation Time'.
  - Continuous – the output will remain on until input condition is off.
- **Activation Time (secs):** The default value is 900 seconds, the user can select from the permissible range of 1 to 18000 seconds

12.21.2.4 Clear Input Channel and Clear Output Channel

Operation of these buttons will clear the descriptor field of the selected channel or the first channel in the list. There is no "Undo". The Cancel function should be used to back out of these changes.

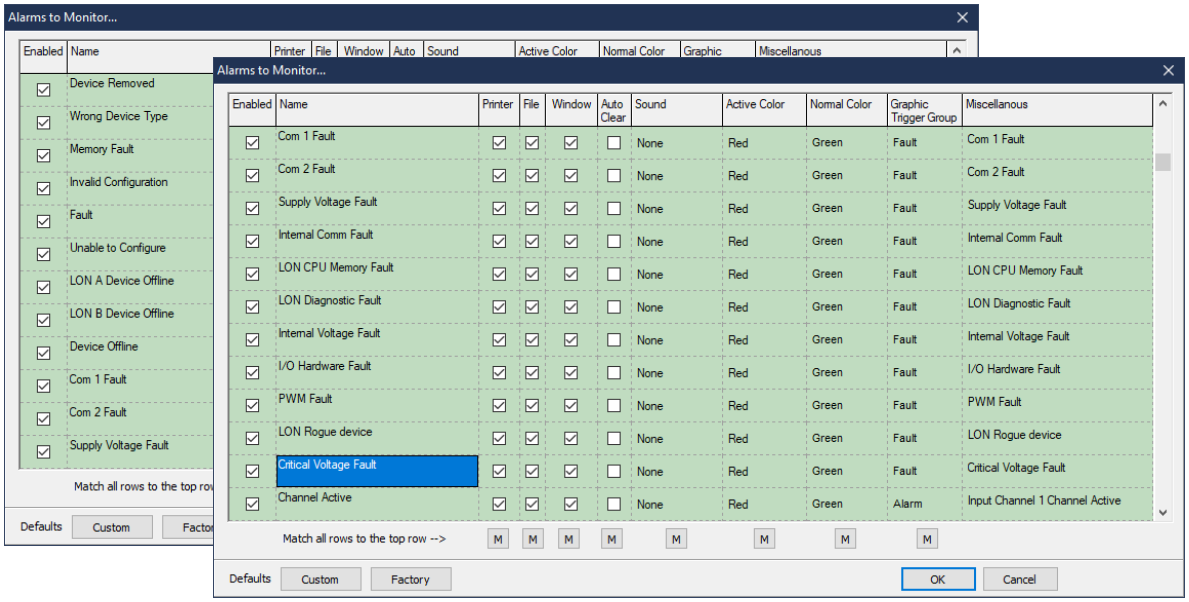
12.21.2.5 Alarms

Selecting this button opens the "Alarms to Monitor..." dialog box.



This scrolling list displays the alarms and events related to the HSDM that can be configured to be monitored by S^3.

The first 20 status flags are the common diagnostics for the HSDM.



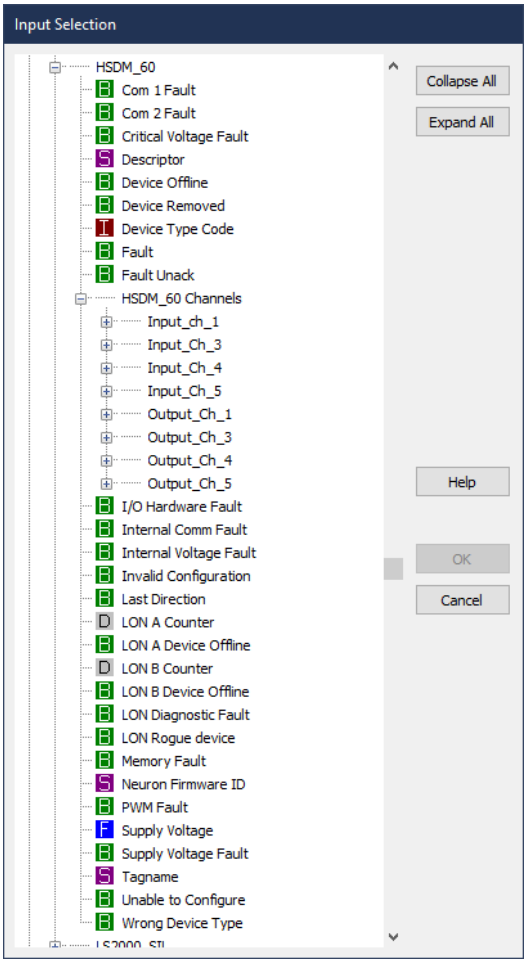
These are followed by the 6 status flags for each of the twelve channels.

Alarms to Monitor...

Enabled	Name	Printer	File	Window	Auto Clear	Sound	Active Color	Normal Color	Graphic Trigger Group	Miscellanous
☑	Channel Active	☑	☑	☑	☐	None	Red	Green	Alarm	Input Channel 6 Channel Active
☑	Channel Shorted	☑	☑	☑	☐	None	Red	Green	Fault	Input Channel 6 Channel Shorted
☑	Channel Open	☑	☑	☑	☐	None	Red	Green	Fault	Input Channel 6 Channel Open
☑	Inhibit Status	☑	☑	☑	☑	None	Red	Green	None	Input Channel 6 Inhibit Status
☑	Fault	☑	☑	☑	☐	None	Red	Green	Fault	Input Channel 6 Fault
☑	Resistance Value	☑	☑	☑	☐	None	Red	Green	None	Input Channel 6 Resistance Value
☑	Channel Active	☑	☑	☑	☐	None	Red	Green	Alarm	Output Channel 1 Channel Active
☑	Channel Shorted	☑	☑	☑	☐	None	Red	Green	Fault	Output Channel 1 Channel Shorted
☑	Channel Open	☑	☑	☑	☐	None	Red	Green	Fault	Output Channel 1 Channel Open
☑	Inhibit Status	☑	☑	☑	☑	None	Red	Green	None	Output Channel 1 Inhibit Status
☑	Fault	☑	☑	☑	☐	None	Red	Green	Fault	Output Channel 1 Fault
☑	Resistance Value	☑	☑	☑	☐	None	Red	Green	None	Output Channel 1 Resistance Value
	Match all rows to the top row -->	M	M	M	M	M	M	M	M	

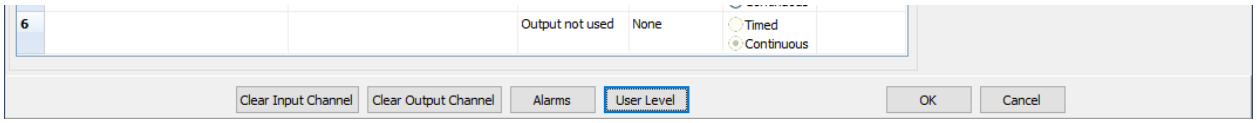
Defaults Custom Factory OK Cancel

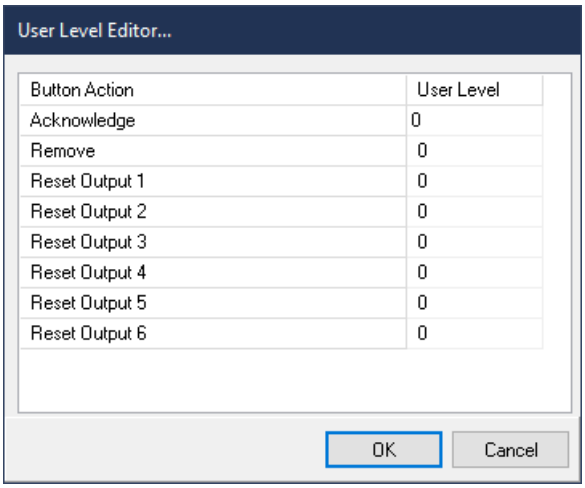
In total, there are a total of 92 status flags that can be enabled and monitored by S³ for the HSDM (refer to the below image for a list of attributes).



12.21.2.6 User Level

Selecting the User Level button opens the “User Level Editor...”





The “User Level Editor…” provides a means for limiting access to the “Acknowledge”, “Remove”, and “Reset” functions for the HSDM which are accessible from the HSDM point display. The default value is “0” which allows access to all users. These values can be altered to match any customized user account configuration and security needs.

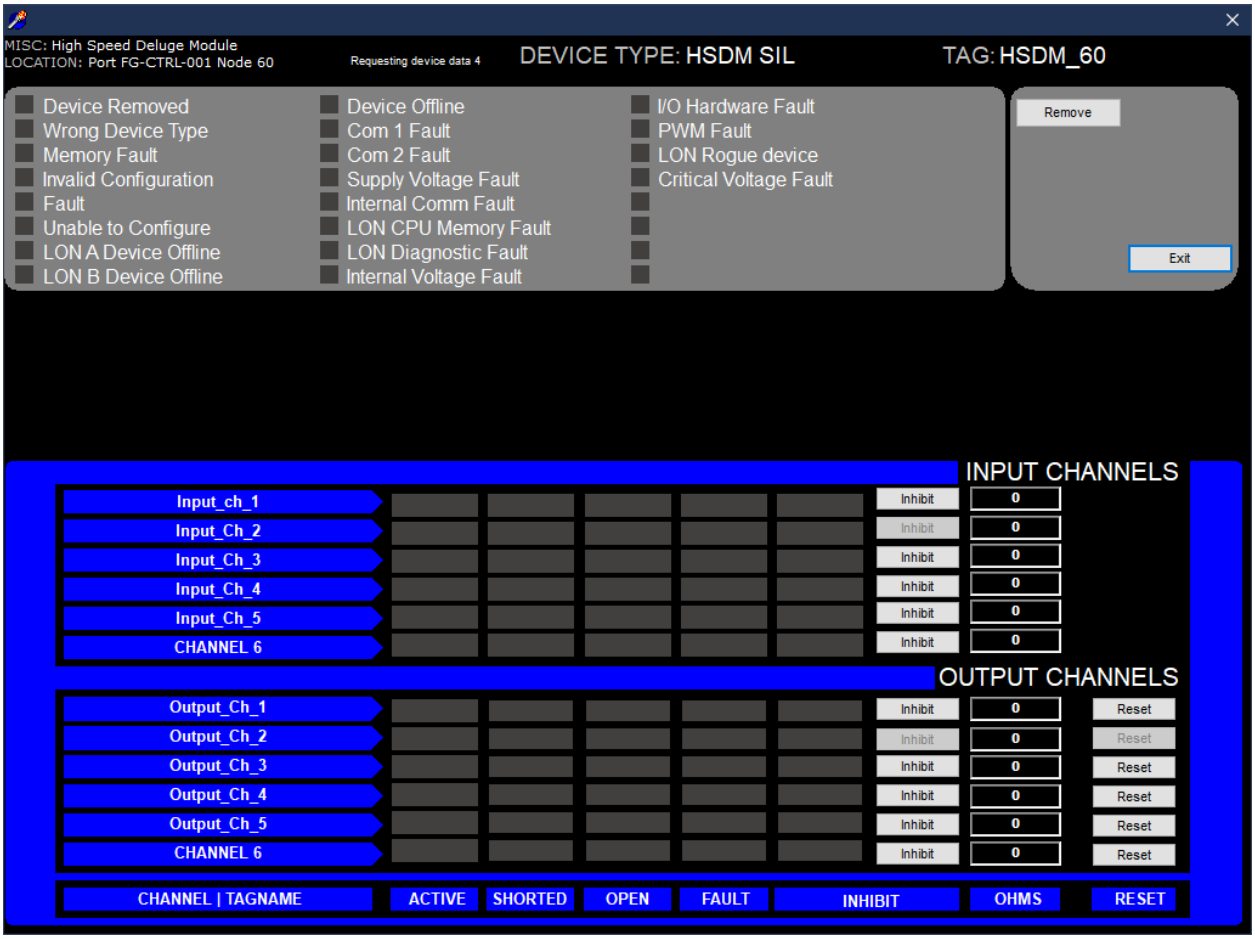
12.21.2.7 Completing Configuration

When all parameters have been set, select the OK button to return to the LON configuration screen.

From the Command Bar, download the new configuration to the controller or configure other devices.

12.21.3 Point Display

The HSDM has a custom “Point Display” that can be accessed from either the Point Display button on the Command Bar or from the Online Mode.



The point display provides a single window view of all available real-time data for the HSDM. This includes the module diagnostics in the top half of the display and in the lower a display of the diagnostics for each channel. It also provides for operation of an “Inhibit” or “Reset” for each of the channels.

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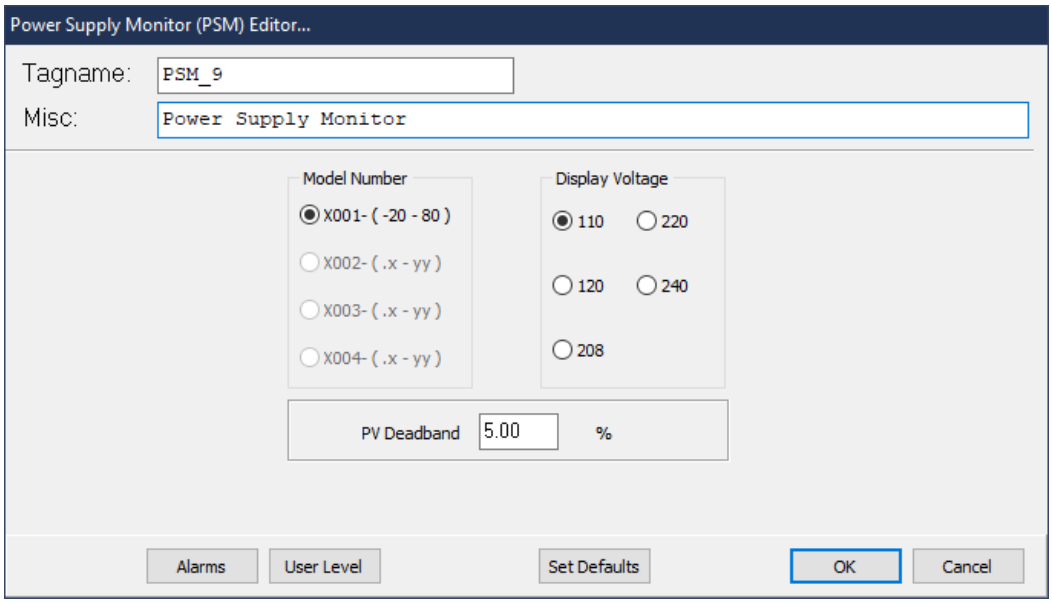
12.22 Power Supply Module (PSM)

12.22.1 Overview

The Power Supply Module (PSM) is an Eagle Quantum Premier LON module, to supervise the power system in accordance with NFPA 72.

The PSM is configured by double-clicking on its selection rectangle on the LON schematic.

This opens the “Power Supply Monitor Editor...” which provides fields for the entry of any user configurable parameters.



The editor screen also provides buttons for accessing other configurable items such as ‘alarms’ for the module and ‘user level’ settings.

12.22.2 Editor Fields

- **Tagname:** The tag name at the top of the dialog box is used by the Controller and S^3.
- **Misc:** This field allows the user to add a descriptor for the device.
- **Model Number:** Default value “X001”.
- **Display Voltage:** The user can select the AC voltage used to power the EQP system/PDM.

12.22.3 Alarms

Selecting this button opens the “Alarms to Monitor...” dialog box. Some of the monitored status conditions include:

- Power supply failure
- Loss of AC power
- Loss of battery power
- Power ground fault
- AC and DC voltage (hi/low level)
- Backup battery current charge levels

A full listing of the alarms is as follows:

Alarms to Monitor...

Enabled	Name	Printer	File	Window	Auto Clear	Sound	Active Color	Normal Color	Graphic Trigger Group	Miscellanous
☑	Device Removed	☑	☑	☑	☑	None	Red	Green	None	Device Removed
☑	Wrong Device Type	☑	☑	☑	☐	None	Red	Green	Fault	Wrong Device Type
☑	Invalid Configuration	☑	☑	☑	☐	None	Red	Green	Fault	Invalid Configuration
☑	Fault	☑	☑	☑	☐	None	Red	Green	Fault	Fault
☑	Unable to Configure	☑	☑	☑	☐	None	Red	Green	Fault	Unable to Configure
☑	LON A Device Offline	☑	☑	☑	☐	None	Red	Green	Fault	LON A Device Offline
☑	LON B Device Offline	☑	☑	☑	☐	None	Red	Green	Fault	LON B Device Offline
☑	Device Offline	☑	☑	☑	☐	None	Red	Green	Fault	Device Offline
☑	Com 1 Fault	☑	☑	☑	☐	None	Red	Green	Fault	Com 1 Fault
☑	Com 2 Fault	☑	☑	☑	☐	None	Red	Green	Fault	Com 2 Fault
☑	Supply Voltage Fault	☑	☑	☑	☐	None	Red	Green	Fault	Supply Voltage Fault
☑	AC Failed	☑	☑	☑	☐	None	Red	Green	Fault	AC Failed
	Match all rows to the top row -->	M	M	M	M	M	M	M	M	

Defaults Custom Factory OK Cancel

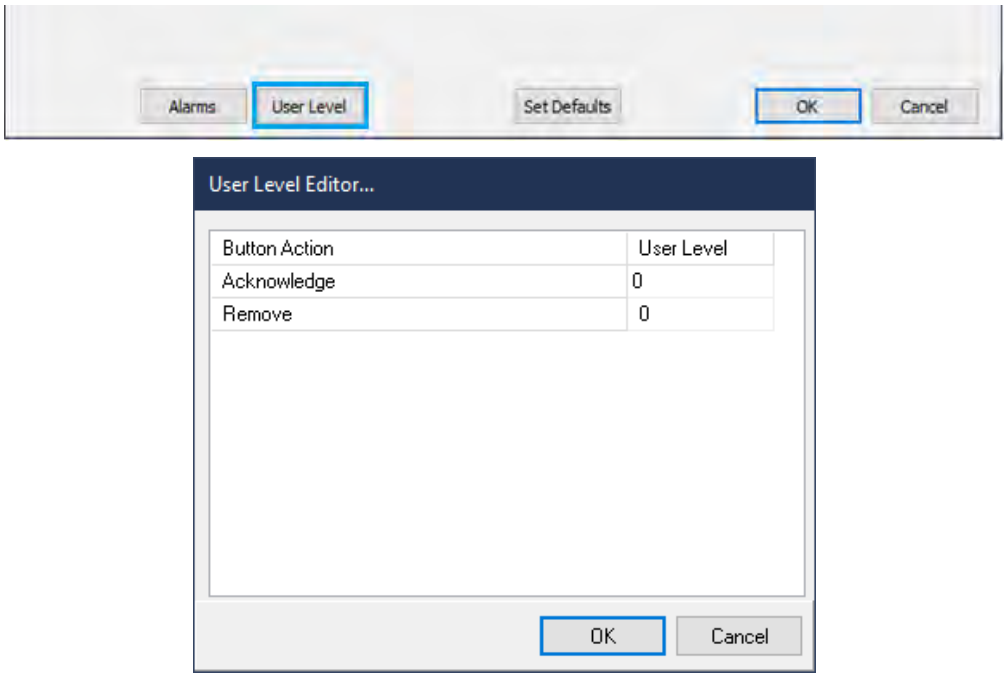
Alarms to Monitor...

Enabled	Name	Printer	File	Window	Auto Clear	Sound	Active Color	Normal Color	Graphic Trigger Group	Miscellanous
☑	LON B Device Offline	☑	☑	☑	☐	None	Red	Green	Fault	LON B Device Offline
☑	Device Offline	☑	☑	☑	☐	None	Red	Green	Fault	Device Offline
☑	Com 1 Fault	☑	☑	☑	☐	None	Red	Green	Fault	Com 1 Fault
☑	Com 2 Fault	☑	☑	☑	☐	None	Red	Green	Fault	Com 2 Fault
☑	Supply Voltage Fault	☑	☑	☑	☐	None	Red	Green	Fault	Supply Voltage Fault
☑	AC Failed	☑	☑	☑	☐	None	Red	Green	Fault	AC Failed
☑	Battery Fault	☑	☑	☑	☐	None	Red	Green	Fault	Battery Fault
☑	Ground Fault +	☑	☑	☑	☐	None	Red	Green	Fault	Ground Fault +
☑	Ground Fault -	☑	☑	☑	☐	None	Red	Green	Fault	Ground Fault -
☑	Power Supply Fault	☑	☑	☑	☐	None	Red	Green	Fault	Power Supply Fault
☑	LON Rogue device	☑	☑	☑	☐	None	Red	Green	Fault	LON Rogue device
	Match all rows to the top row -->	M	M	M	M	M	M	M	M	

Defaults Custom Factory OK Cancel

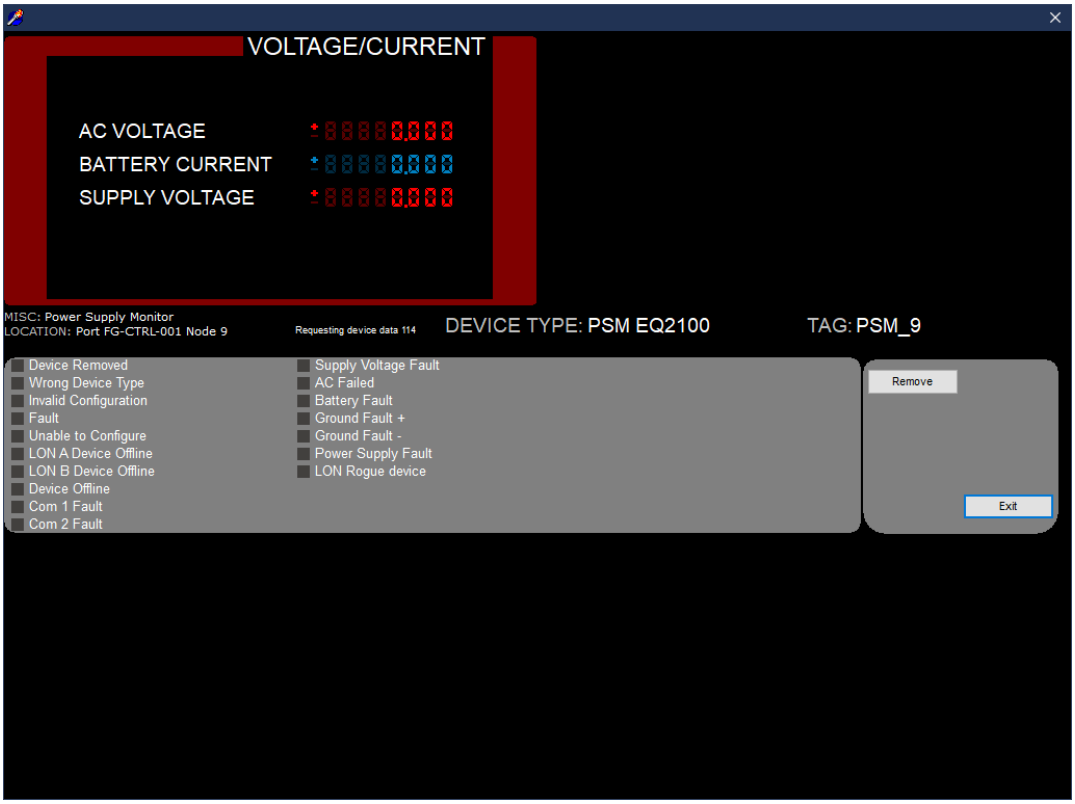
12.22.4 User Level

Selecting the User Level button opens the “User Level Editor...”



The “User Level Editor…” provides a means for limiting access to the “Acknowledge” and “Remove” functions for the PSM, which are accessible from the PSM point display. The default value is “0” which allows access to all users. These values can be altered to match any customized user account configuration and security needs.

12.22.5 Point Display



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13 EQP Logic Editor

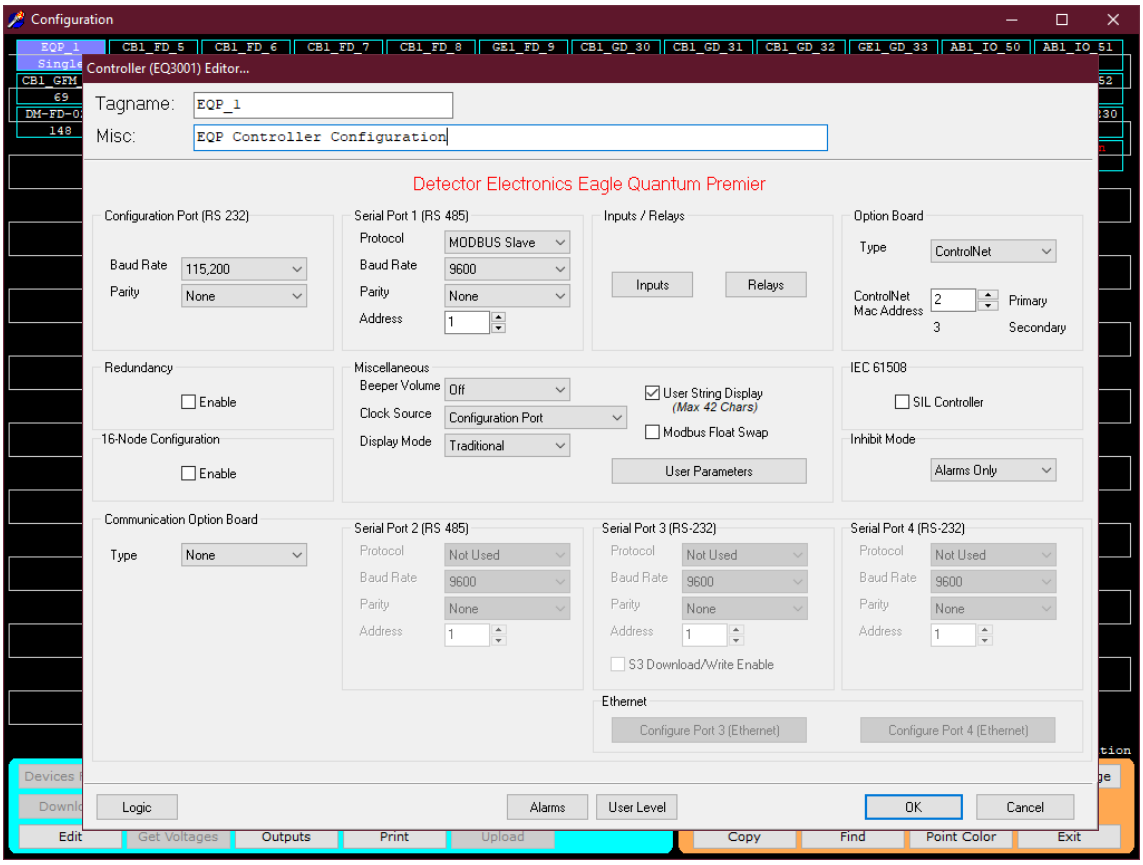
13.1 Overview

The Eagle Quantum Premier controller is a programmable device that requires a “user program” to be written to customize the system for the hazard(s) being monitored.

This “user program” is developed utilizing a “Logic Editor” within the S^3 Software environment that provides the following facilities:

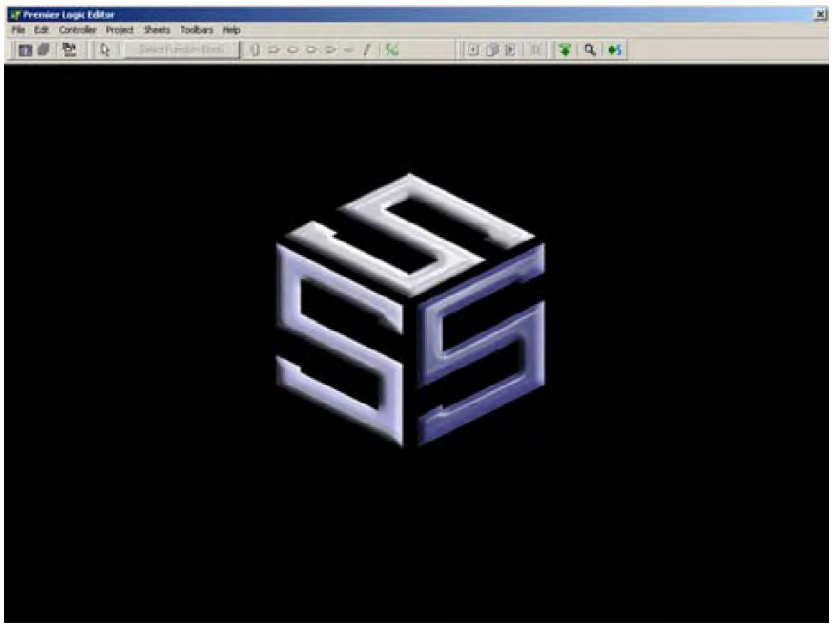
- An IEC-61131-3 style logic editor for developing logic.
- A logic simulator for testing and debugging the logic.
- The ability to download the program to the controller.
- The ability to monitor the operation of the logic online.

The ability to create printed documentation of the user program.



The logic editor is accessed through the controller’s configuration dialog box. In the lower left of the “Configure a controller ...” dialog box there is a “Logic” button. Selecting this button will launch the “Logic Editor”.

Once the “Logic” button is selected from the “Configure a controller ...” dialog box, the “Logic Editor” program is launched.



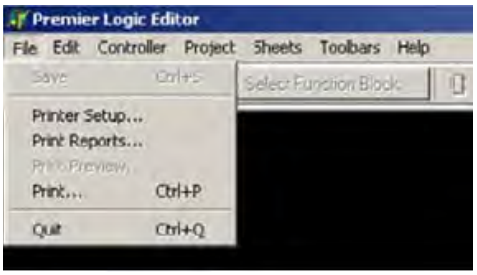
The “Premier Logic Editor” is a full screen application, and when launched looks like the example above.

The upper area of the screen contains the applicable menus at the top and a button bar below that provides access to a variety of editing and display tools. Below the button bar, is an empty area with the S^3 logo, this is the main work area where logic pages are displayed and edited.

There are seven standard Windows pull down menus; File, Edit, Controller, Project, Sheets, Toolbars and Help. Each menu will be described in detail later. The button bar can be customized, but in the examples above and below, it is shown in its default configuration.

13.2 File Menu

This menu contains the standard “Windows” routines for setting up to print to a network printer and then printing selected reports.



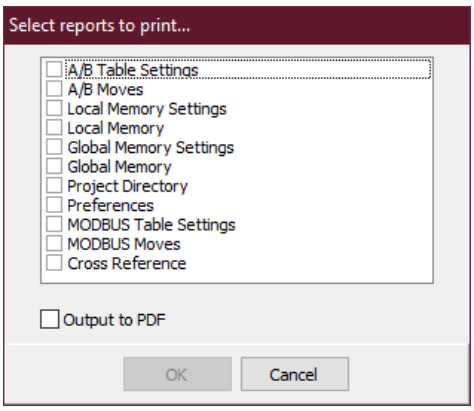
13.2.1 Print Reports

Calls up the “Select reports to print...” dialog box which

presents ten check boxes to select what portions of the controller’s configuration are to be assembled into a report for printing.

In the lower left of the dialog box, there is an “Output to PDF” checkbox that will send the reports to a PDF file instead of to the selected network printer.

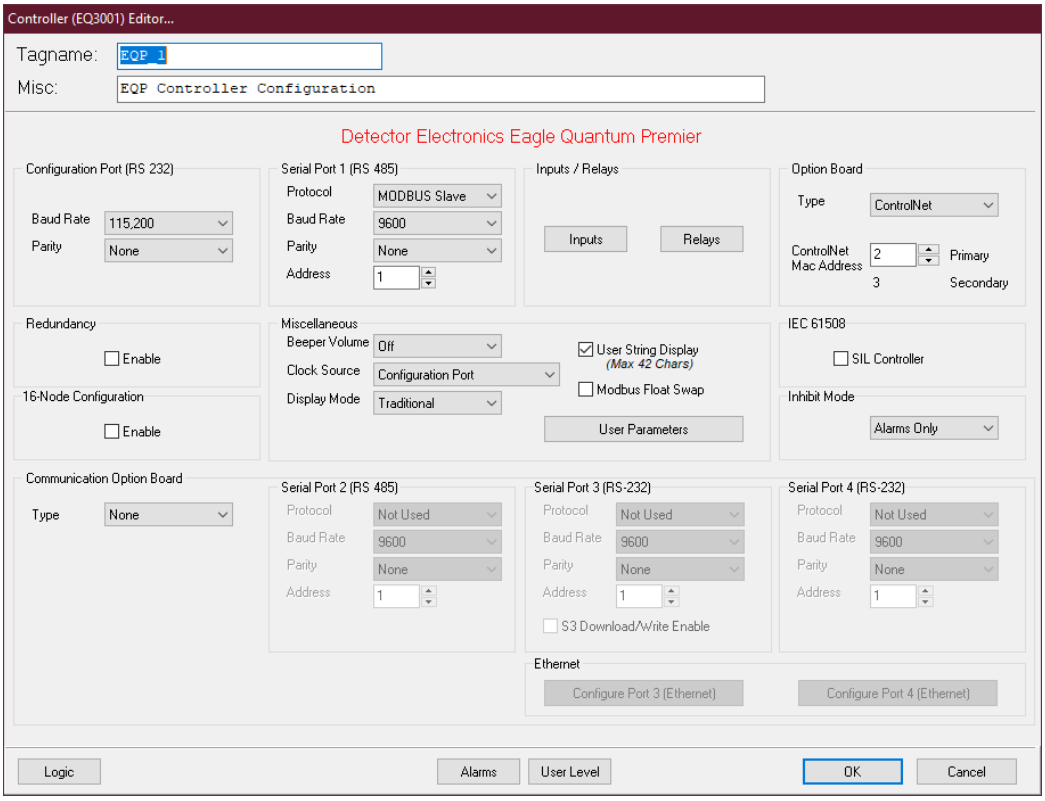
These reports can be read and printed by Adobe Acrobat™ and other PDF compliant programs.



13.2.2 Quit

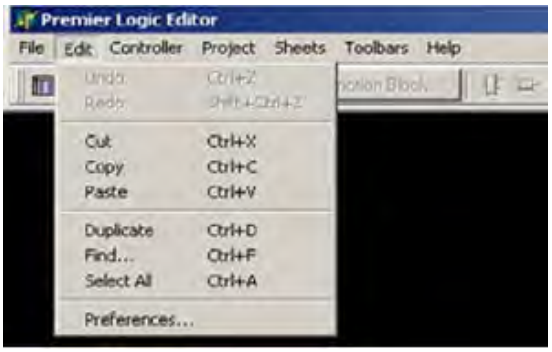
The “Quit” selection will shut down the logic editor program and return to the controller’s configuration dialog box.

If there are unsaved changes to the configuration, a prompt will ask to save changes prior to exiting the logic editor.



13.3 Edit Menu

This menu contains the standard “Windows” routines for Cut, Copy and Paste that will be used throughout the program. In addition, there is a “Find” command, “Select All” and “Preferences”.

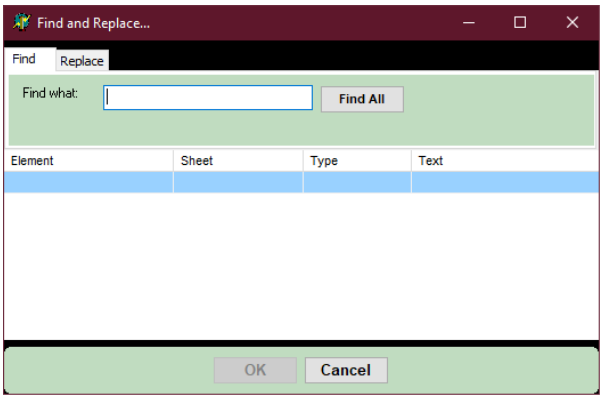


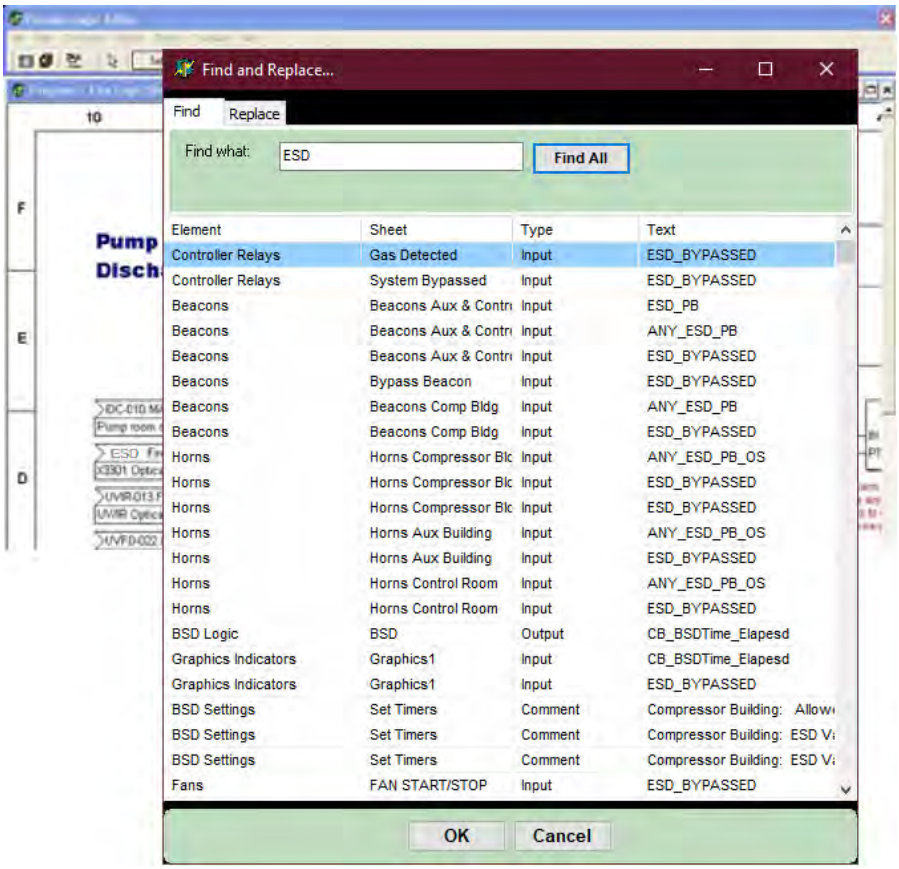
13.3.1 Find

The project must be open for the Find to work. This command will open the “Find” dialog box which provides a Text entry field and a Find button.

When a “Find” is initiated S³ will search the logic drawings and list the matching elements along with their originating drawing sheet, element type, and the full text associated with the search.

In the sample below, a logic page was opened and a search for the text string “ESD” was entered, and the results are shown.



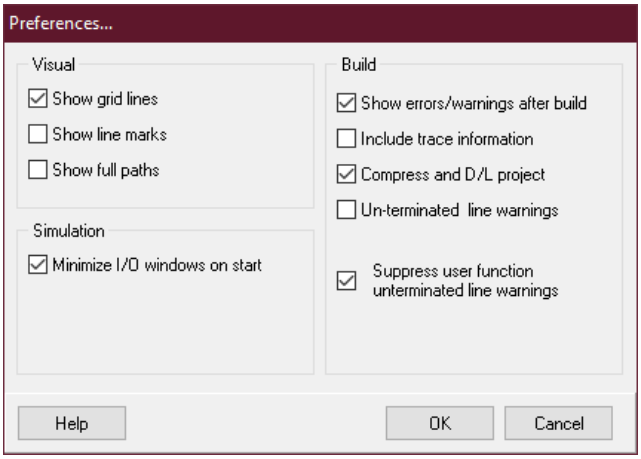


In this sample find, the listed **Element** is “Controller Relays”, which is a controller IO channel, the **Sheet Name** in the logic program is “Gas Detected”, the **Type** is “Input” and finally the located “**Text**” is “ESD_BYPASSED”.

Double clicking the Element will take you to the logic page for this occurrence.

13.3.2 Preferences

This selection opens the “Preferences...” dialog box which contains several checkbox selections pertaining to the visual display of the logic editor, compiling (Build) options and a Simulator selection.

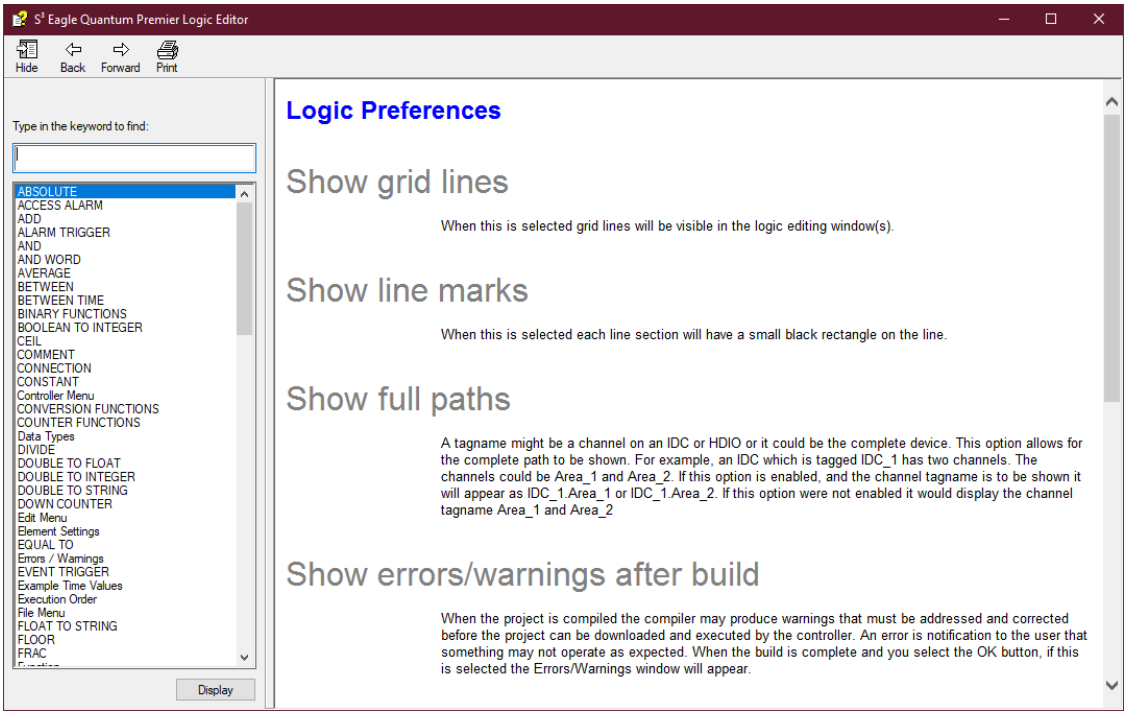


13.3.2.1 Show grid lines

When selected, this will display a faint cyan reference lines on the drawing pages that correspond to the horizontal and vertical references on the drawing title block.

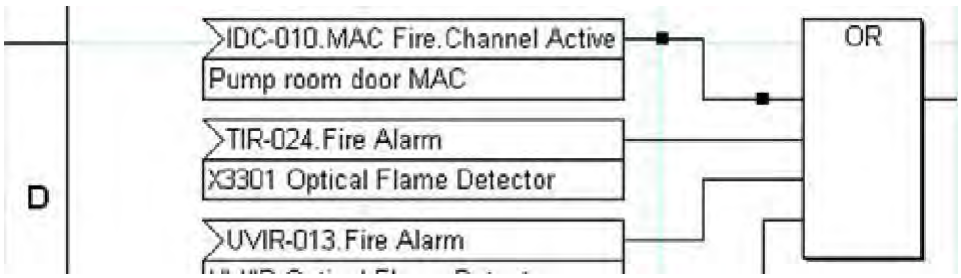
The grid lines are drawn “behind” the graphic logic elements.

Use the “Help” function for additional information on how each checkbox affects the look and feel of a project.

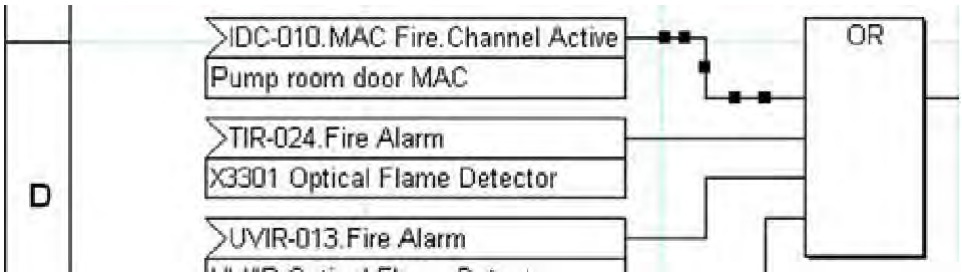


13.3.2.2 Show line marks

In the logic editor, when a line is selected by clicking on it, or, when the “Connection Tool” has been selected, a small black rectangle marks the beginning and end of each line, as shown in the first example below.



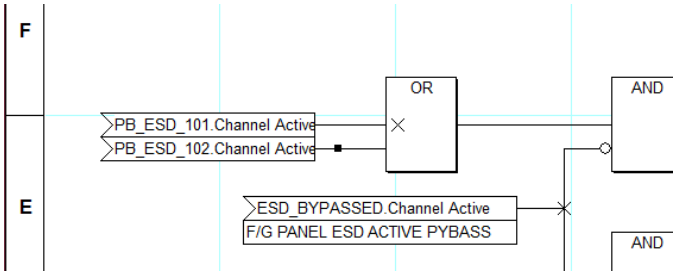
Selecting “Show Line Marks”, as in the example below, will display an additional three visual indicators spaced between the beginning and end of the line to provide better visual cues on lines that are long or close to many others.



This is only a visual cue and has no effect on the ability to select or edit the line.

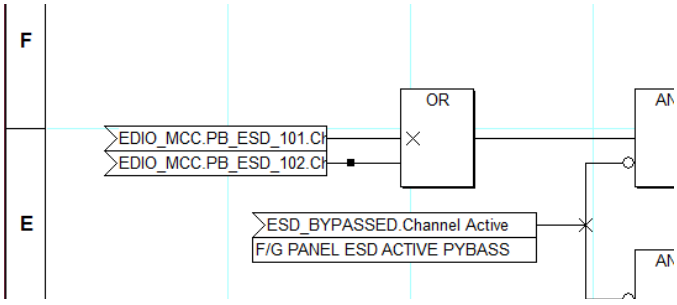
13.3.2.3 Show full paths

A tagname might be a channel on an EDIO or it could be the complete device. This option allows for the complete path to be shown.



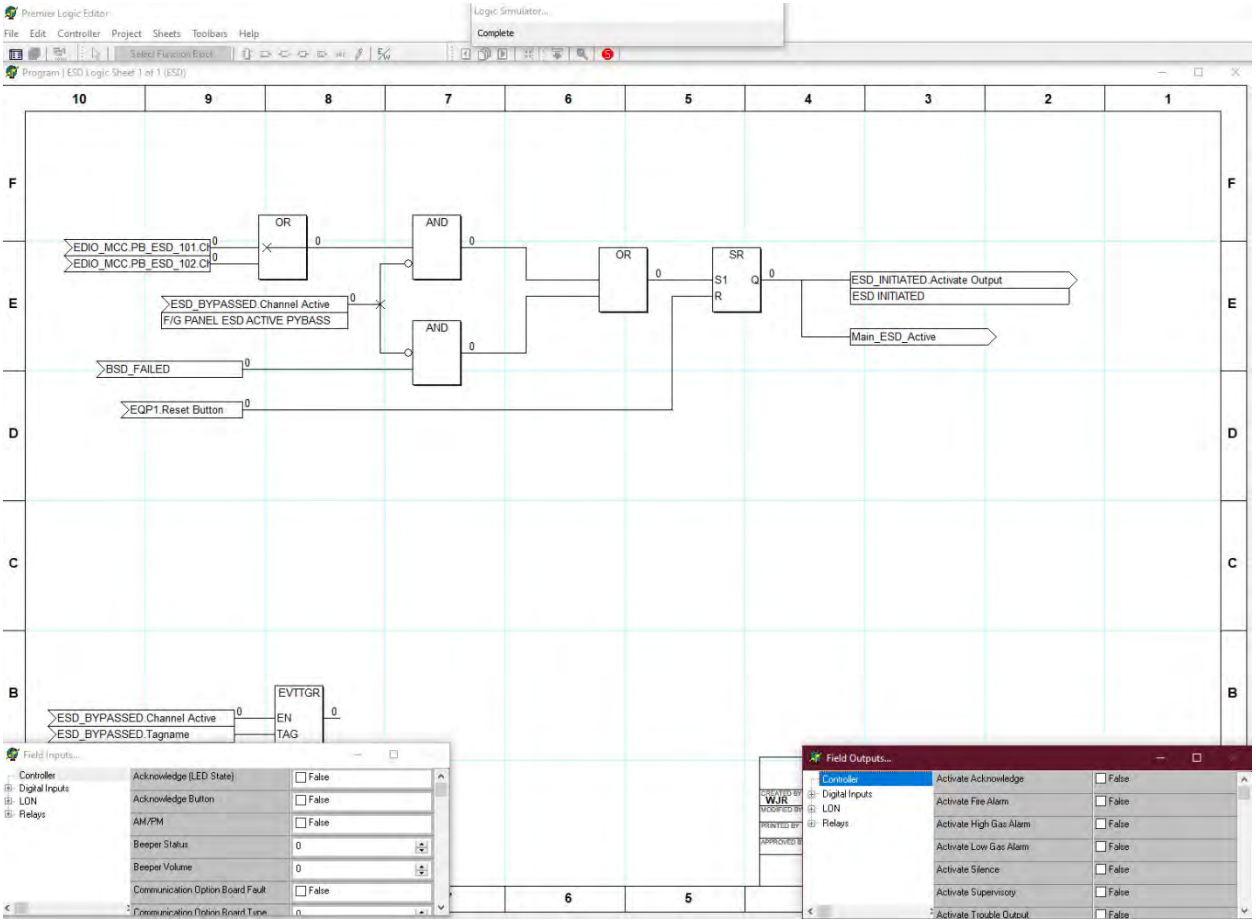
In the example to the right, an EDIO that is tagged “EDIO_MCC” has two channels. One channel is “PB_ESD_101”.

When “Show Full Paths” is enabled, the channel tagname is to be shown to the left of the tagname, as shown in the example to the right. It now reads; “EDIO_MCC PB_ESD_101”.

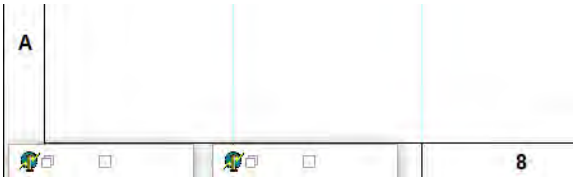


13.3.2.4 Minimize I/O windows on start

This option is used to control the look and feel of the logic simulator on startup. The simulator has two I/O windows. One is inputs and the other is outputs.



When the simulator starts these windows will normally open full size. If the checkbox is enabled, they will open in the minimized state.



13.3.2.5 Show errors/warnings after build

When enabled, the logic editor will automatically display the “ERROR / WARNINGS VIEWER” at the completion of a project compile (build) listing any problems. This can also be done manually by using the “Show Errors/Warnings” menu item under the “Project” menu or by using the “E/W” button on the toolbar. Selecting one of the errors will close the viewer and display the section of logic containing the problem.

The list can be printed using the “Print” button in the lower left of the dialog box.

13.3.2.6 Include trace information

The compiler generates markers in the code for the troubleshooting of compiler or controller errors. Normally, for faster execution of the program, this would not be selected. If a non-logical error is occurring, this could be used to aid in troubleshooting.

13.3.2.7 Compress and D/L project

When enabled the complete project is compressed and downloaded to the controller whenever the download command is executed. This powerful feature backs up all aspects of the project including any non-Premier ports and custom graphics. It is very similar to the routine of the "Backup/Restore" utility described in section 8 except the compressed file is stored in non-volatile memory in the controller instead of on the OIS hard disk or network. This option allows any S^3 station to later "upload" the complete project for editing or display without needing an original copy. If this option is not selected it will be **impossible** for an S^3 station without the original project file to view, edit or troubleshoot the program in the controller. An attached S^3 station will be able to determine the LON makeup and provide LON and device diagnostics, but access to the controller program will not be available.

NOTE

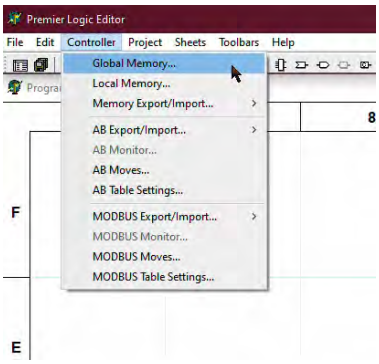
This option adds time to the build and download and is not required for proper operation of the program. However, is highly recommended for the security of a backup image of the project configuration in the EQP Controller.

In practice, this option is usually disabled until the user program and entire project are complete, tested, and ready for service.

13.3.2.8 Un-terminated line warnings

With this checked a warning will be generated when a missing pin is present on a function block. The warning is placed in the "Error/Warnings Viewer". If unchecked, the warning will not be visible in the "Error/Warnings Viewer".

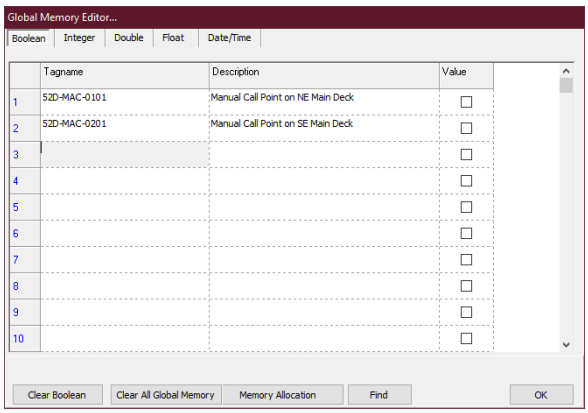
13.4 Controller Menu



This menu provides access to a variety of memory management functions for internal program variables and for the configuration of the Allen Bradley and Modbus tables used by outside systems to access the controller's data.

13.4.1 Global Memory

Global memory is typically used to exchange data with external devices such as Modbus or Allen-Bradley PLC's. This menu item opens the "Global Memory Editor..." which allows for the creation of and displays information on the five types of global memory. It also allows for the adjustment of memory allocations.



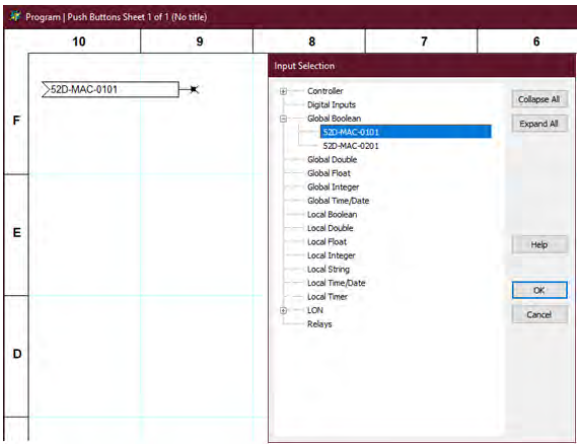
The dialog box is "tabbed" allowing for the selection of the memory type to be displayed/edited. In the example to the right, "Boolean" is selected and there are two points created.

To create a global memory point, put the editing cursor in the "Tagname" field and enter a tagname. If desired, enter a long name in the "Description" field.

13.4.1.1 Value

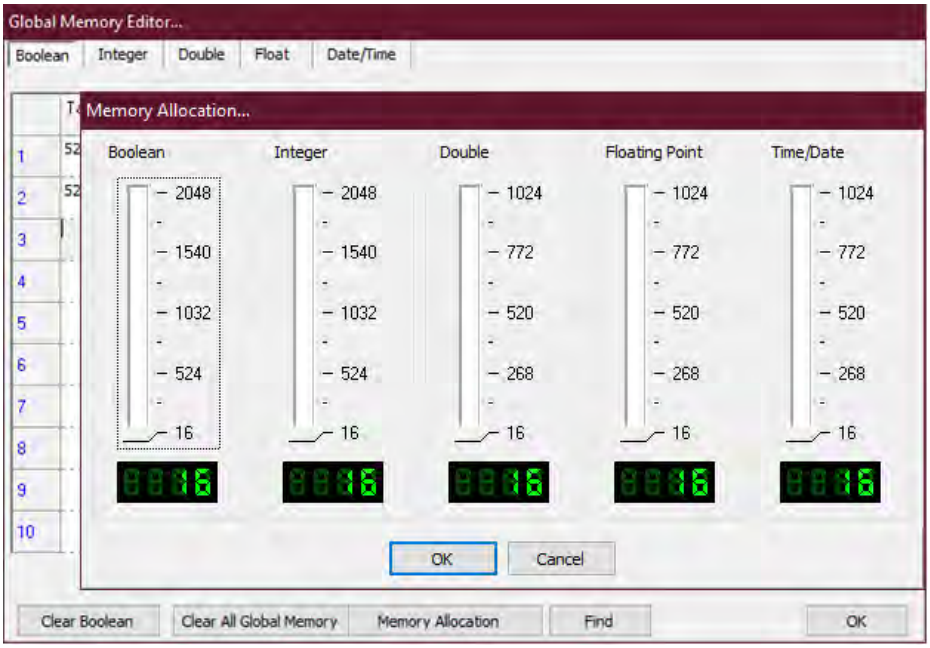
The value column is available in each of the six local memory types and allows the setting of an initial value. This value will be used when the program begins execution and if the variable is not written to it will remain unchanged.

Once created, this global memory point will be available in the logic editor for use as an input to or output from logic elements.



13.4.1.2 Memory Allocation

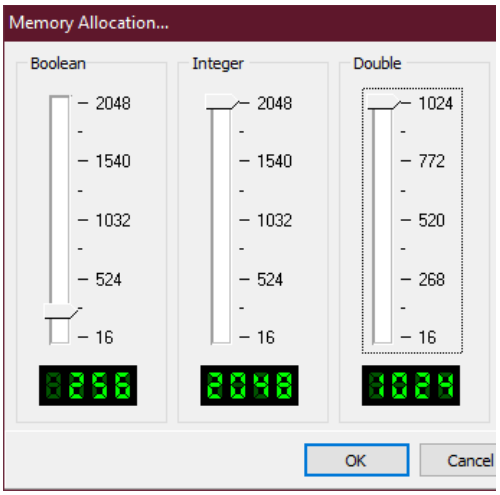
The amount of memory set aside for each of the five types is adjustable. Clicking the “Memory Allocation” button at the bottom of the local memory editor dialog box will open the Memory Allocation dialog box.



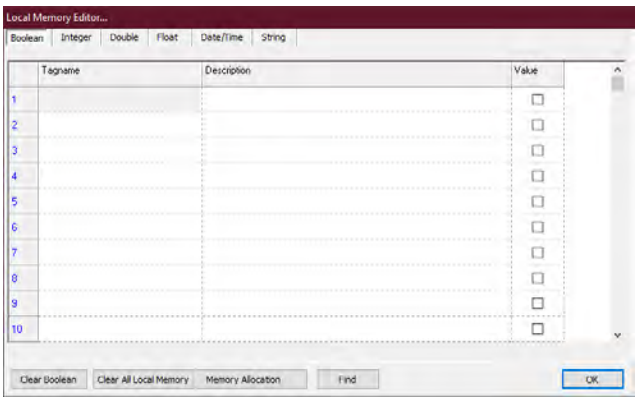
This dialog box provides five “slider” type adjustments to change the memory allocation for each type. The default (minimum) setting is 16.

Up to 2K (2048) can be allocated for Booleans and Integers, and 1024 addresses for Double, Floating Point and Time/Date types of memory.

To set the memory allocation, move the slider to the quantity desired. To set the exact value, observe the digital display and use the Up/Down arrow keys to change the value one count at a time.



13.4.2 Local Memory



This menu item opens the “Local Memory Editor...” which allows for the creation of and displays information on the five types of local memory. It also allows for the adjustment of memory allocations.

The dialog box is “tabbed” allowing for the selection of the memory type to be displayed/edited. In the example to the right, “Boolean” is selected and there are no points created yet.

To create a local memory point, put the editing cursor in the “Tagname” field and enter a tagname, then if desired enter a long name in the “Description” field.

Once created, this local memory point will be available in the logic editor for use as an input to or output from logic elements.

13.4.2.1 Memory Allocation

Local Memory is allocated in the same manner as described earlier for Global Memory. A “Memory Allocation...” dialog box provides a slider to adjust the amount of memory for each type.

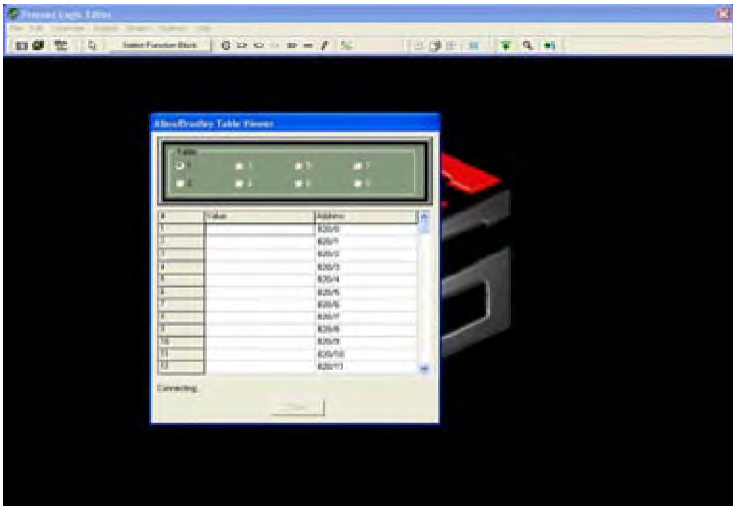
13.4.3 Memory Export/Import

Global and local memories can be exported as an excel spreadsheet (CSV), or a text file which can be opened in a text editing program. Nothing will be exported if the memory editor is not populated.

13.4.4 AB Export/Import

This selection allows the AB (Alan Bradley) settings created to be exported or imported to and from MS Excel or a text editing program.

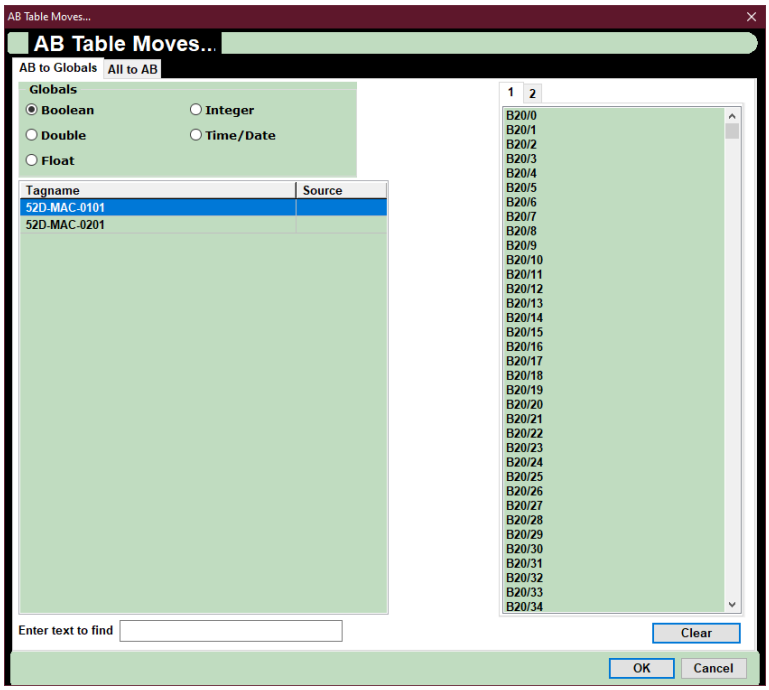
13.4.5 AB Monitor



This dialog box is a tool for checking the value of data in any of the eight configurable data tables used for exchanging data between the Premier Controller and Allen Bradley Systems.

The desired table is selected with a radio button in the top portion of the dialog box and a scrolling list displays the data. In the example to the right, the viewer has just been activated and is attempting to establish communication with the Premier Controller.

13.4.6 AB Moves



This dialog box allows for the configuration of data moving between an Allen Bradley system and the Eagle Quantum Premier Controller's memory. The dialog box uses a tabbed interface with two tabs on the left side representing the two directions data can flow.

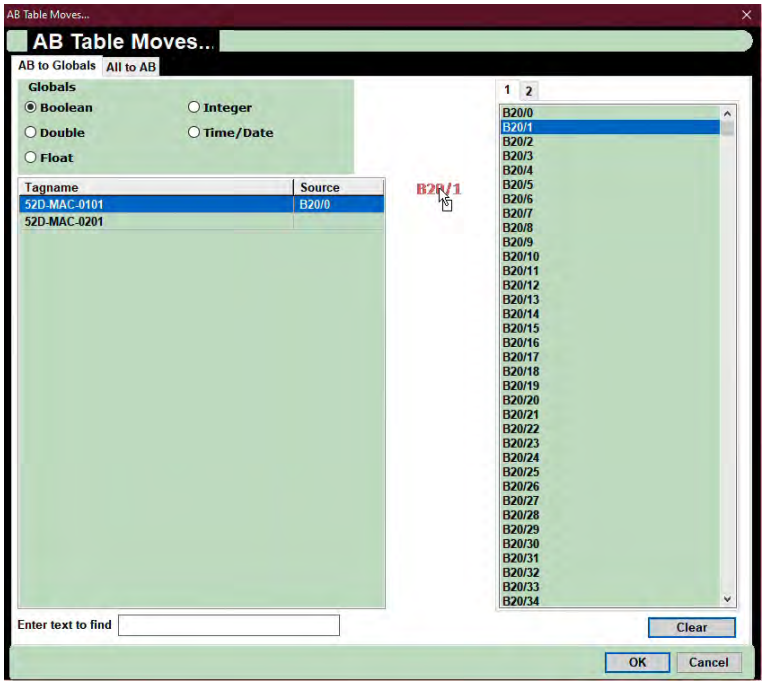
Data to be moved from the AB system into the Premier Controller's memory is configured under the "AB to Globals" tab.

Data that will move from the Premier controller to the AB system is configured under the "All to AB" tab.

On the right side of the dialog box is a tabbed scrolling list representing configured data tables. In the example above, there are two tabs, one for each configured AB table (see previous page). There can be up to eight tabs representing the maximum number of configured data tables.

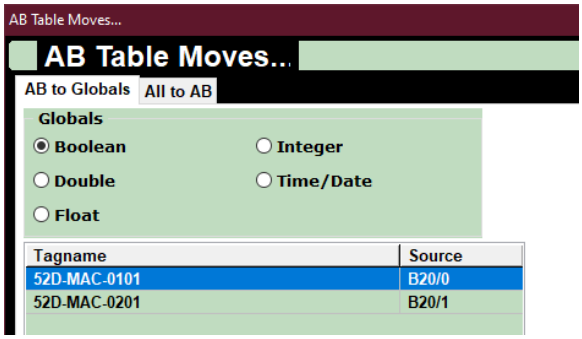
To configure data for movement, select and drag an address from the right-hand side and drop it into the "Source" cell next to the desired "Tagname" on the left-hand side.

In the example below, the AB address "B20/0" is configured to be moved to a Premier Controller global variable "52D-MAC-0101" and AB address "B20/1", in the process of being "dragged and dropped" onto a Premier controller global memory point "52D-MAC-0201".



The radio buttons on the left-hand side of the dialog box will determine which configured global variables are displayed.

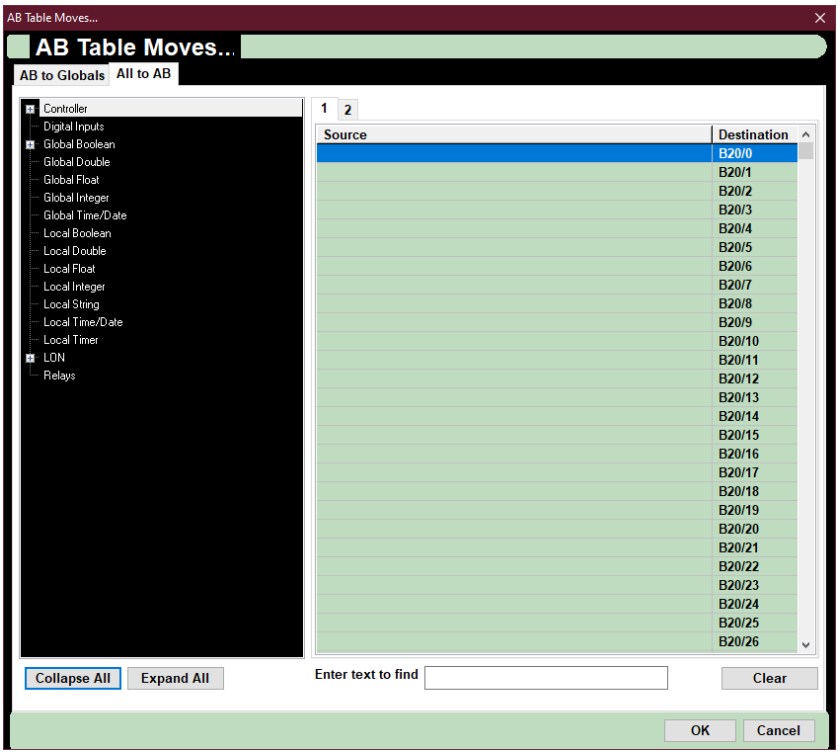
In the example to the right, the “Boolean” radio button is selected, and the three configured Boolean globals are displayed as potential targets for data input.



NOTE

Data coming from an AB System into the Premier controller can only be moved into global memory locations that have been configured using the Global Memory editor as described on preceding pages of this manual.

When the “All to AB” tab is selected, a hierarchical list of sources is shown on the left-hand side of the dialog box and can be selected for “movement” to “destinations” in the AB System.

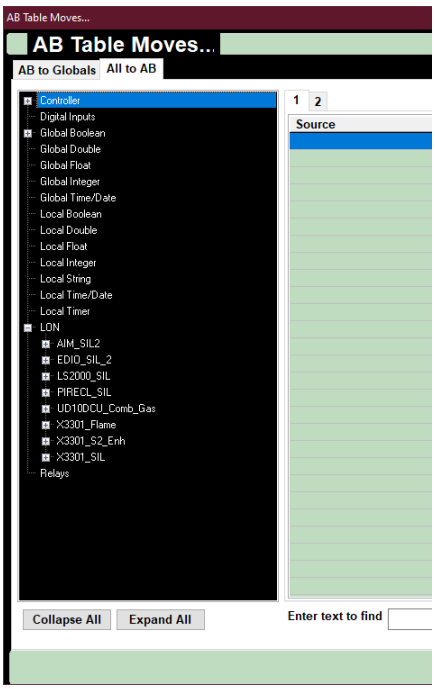


Any item on the list that has a “+” before it has subordinate items and clicking on the “+” will expand the list showing all items that make up that category. Below the list are two buttons that can “Expand” or “Collapse” all subordinate items in the list for easy viewing. The first twelve items on the list provide access to controller status information and the globals database. The “LON” item will allow access to all field device information, the “Relays” item is for accessing the controllers onboard relay status.

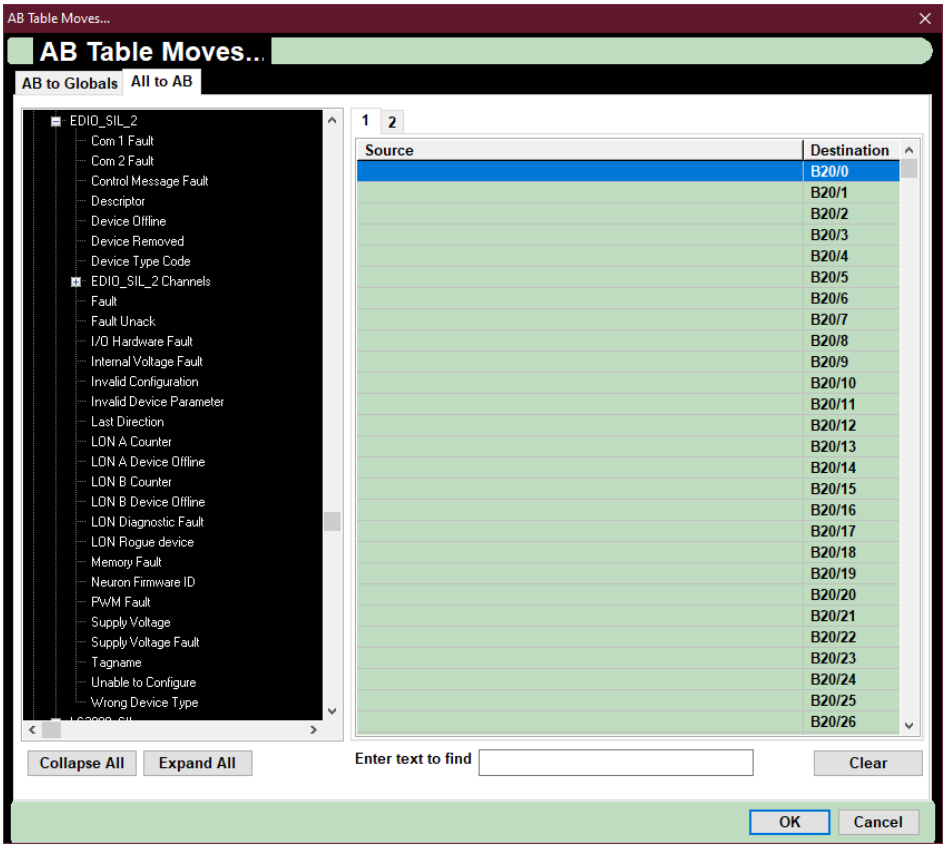
In the example to the right, the “LON” item has been expanded by clicking on the “+” sign and now shows ten subordinate items, each of which is a field device.

As these additional items are revealed, the list extends beyond the bottom and becomes scrolling.

The hierarchical arrangement of items provides an easy and logical method of accessing the thousands of potential items that could be configured as outputs on a large premier system.

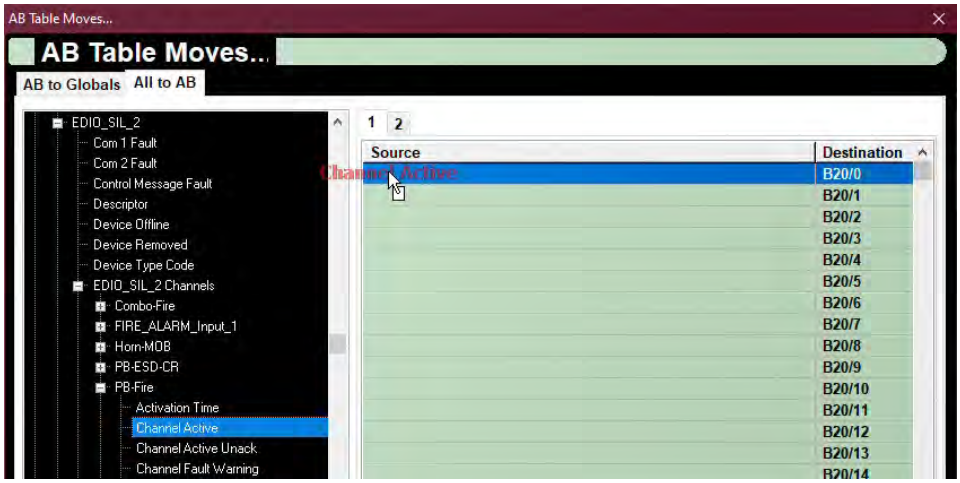


In the example below, a field device on the LON, an EDIO Module with the tagname “EDIO_SIL_2” has been selected and “opened” to display its subordinate data. Any of the displayed items can be selected and configured for “movement” to the AB system utilizing the “drag and drop” method.

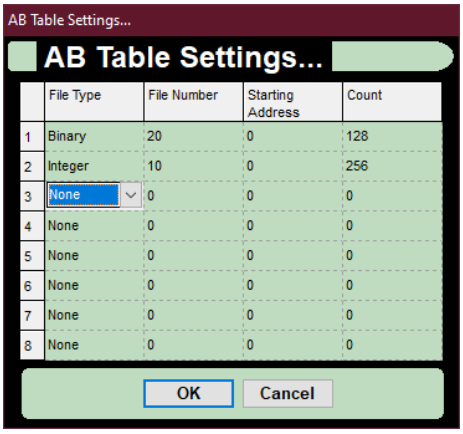


To configure a data point for “movement”, click and “drag” the selected point to the right side of the dialog box and “drop” it on the desired Allen Bradley destination address.

In the example below, the PB-Fire “Channel Active” point is in the process of being moved to the selected destination address “B20/2” in the AB Table. Once “dropped” in the desired cell in the “Source” column on the right side of the dialog box, the “Channel Active” status for “PB-Fire” will now map to the Allen Bradley destination address of “B20/0”. This process must be repeated for all data to be shared with the AB host device.



13.4.7 AB Table Settings



	File Type	File Number	Starting Address	Count
1	Binary	20	0	128
2	Integer	10	0	256
3	None	0	0	0
4	None	0	0	0
5	None	0	0	0
6	None	0	0	0
7	None	0	0	0
8	None	0	0	0

This menu selection opens a dialog box which allows up to eight communication interface “tables” to be configured to allow for data to be “moved” between the Eagle Quantum Premier controller and an Allen-Bradley PLC or other system utilizing Allen Bradley communication protocols. Clicking on any cell in the “File Type” column will activate a pop-up menu allowing the selection of the proper table type for the data to be exchanged.

The three file types are binary, floating point (Float) and Integer. To configure a table, select the appropriate file type, file number, starting address and the number of words to read (count). Once the tables are configured, click the “OK” button to allocate memory to support the new table configuration.

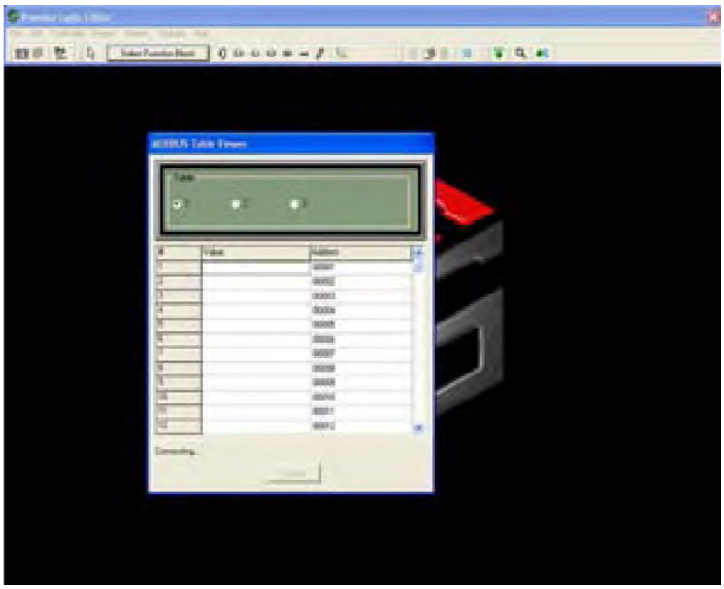
In the example above, table 1 is configured for binary data which will be stored in file 20. The table will be 128 words (16-bit registers) long, and therefore, supports 2048 discrete “bits” of information.

13.4.8 MODBUS Export/Import

This selection allows the MODBUS settings created to be exported or imported to and from MS Excel or a text editing program.

NOTE
When using Modbus, it is important to keep the read and the write data sets in their contiguous addressed blocks to maximize the data throughput.

13.4.9 MODBUS Monitor



This dialog box is a tool for checking the value of data in any of the three configurable data tables used for exchanging data between the Premier controller and Modbus RTU or Modbus TCP/IP systems.

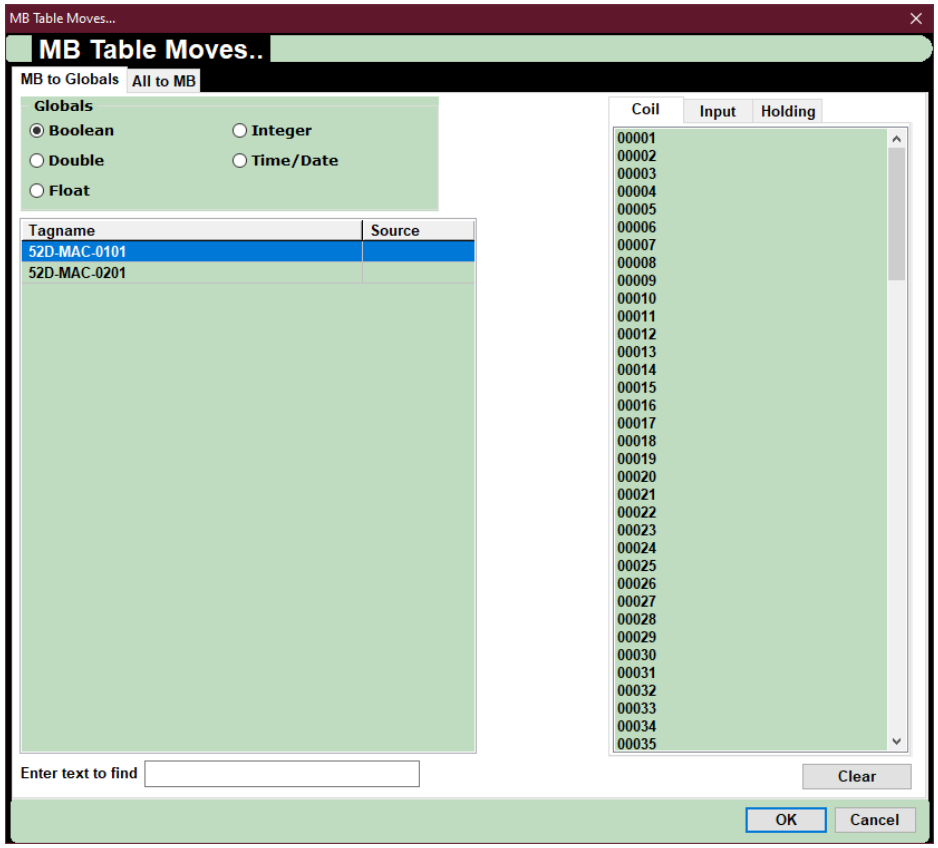
The desired table is selected with a radio button in the top portion of the dialog box and a scrolling list displays the data.

In the example to the right, the viewer has just been activated and is attempting to establish communication with the Premier controller.

13.4.10 MODBUS Moves

This dialog box allows for the configuration of data moving between a “Modbus Master” system and the Eagle Quantum Premier Controller’s memory.

The dialog box uses a tabbed interface with two tabs on the left side representing the two directions data can flow.



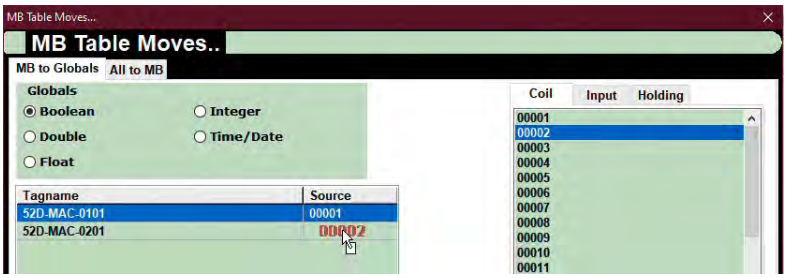
13.4.10.1 MB to Globals

Data to be moved from the MB system into the Premier Controller’s memory is configured under the “MB to Globals” tab. Data that will move from the Premier Controller to the MB System is configured under the “All to MB” tab.

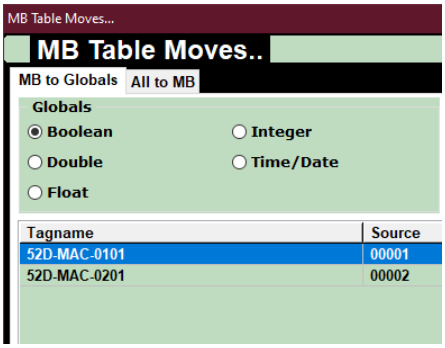
On the right side of the dialog box is a tabbed scrolling list representing configured data tables. In the example above, there are three tabs, one for each available MB table.

To configure data for movement, select and drag an address from the right-hand side and drop it into the “Source” cell next to the desired “Tagname”, on the left-hand side.

In the example below, the MB address “00001” is configured to be moved to a Premier Controller global variable “52D-MAC-0101”, and MB address “00002” is in the process of being “dropped” onto a Premier controller global memory point “52D-MAC-0201”.



The radio buttons on the left-hand side of the dialog box will determine which configured global variables are displayed in the list below it. The tabs to the right (Coil, Input, Holding) are used to select the data address. It is up to the user to determine whether a binary is mapped from a Coil or an Input or bit in a Holding register.

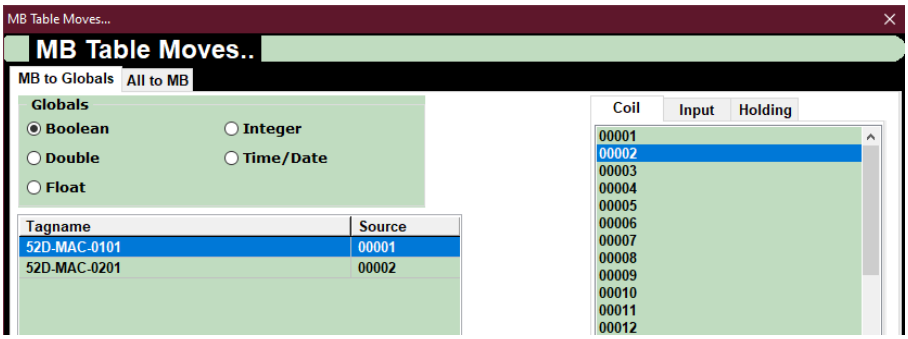


In the example to the right, the "Boolean" radio button is selected and the two configured Boolean globals are displayed as potential targets for data input.

NOTE

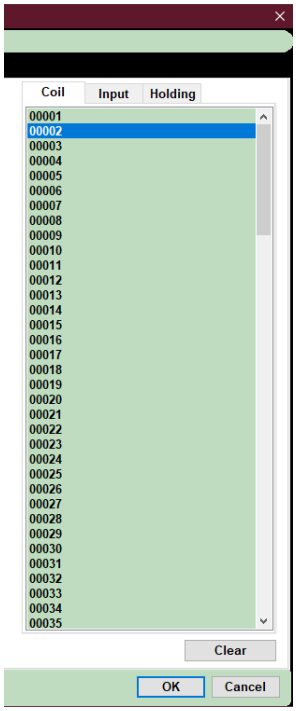
Data coming from a Modbus system into the Premier controller can only be moved into global memory locations that have been configured using the Global Memory editor as described on preceding pages of this manual.

The three available Modbus data tables are accessed by the three tabs at the top of the right-hand side of the dialog box (Coil, Input, or Holding registers). Select the table desired by clicking on the appropriate tab.



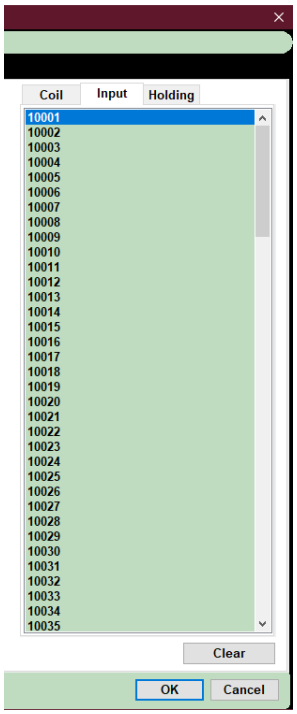
13.4.10.1.1 Coil

For "Coils", which typically represent "Outputs" in a Modbus PLC. Coil addresses start with "0xxx".

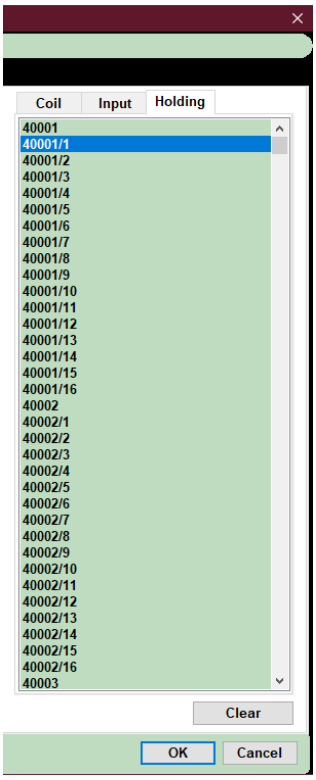


13.4.10.1.2 Input

Is for "Inputs", which typically represent discrete input cards in a Modbus PLC. Input addresses start with "1xxx".



13.4.10.1.3 Holding

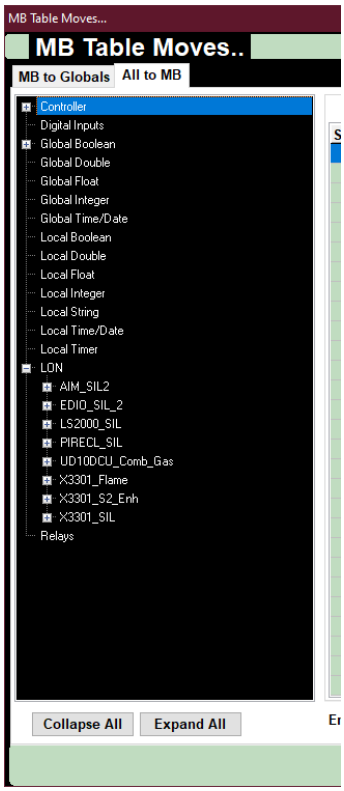


This tab (shown to the right) is for registers (16-bit words) that occupy an address range beginning with 40001 (no comma).

Registers can be used either as a whole “16 bit” word to move an integer value, or as sixteen individual “bits”, into which Boolean “ON/OFF” data can be moved.

13.4.10.2 All to MB

When the “All to MB” tab is selected (below), a hierarchical list of “sources” is shown on the left-hand side of the dialog box which can be selected for “movement” to “destinations” in the Modbus system.



Any item on the list that has a “+” before it has subordinate items and clicking on the “+” will expand the list showing all items that make up that category.

Below the list are two buttons that can “Expand” or “Collapse” all subordinate items in the list for easy viewing. Keyboard arrow keys can be utilized for scrolling.

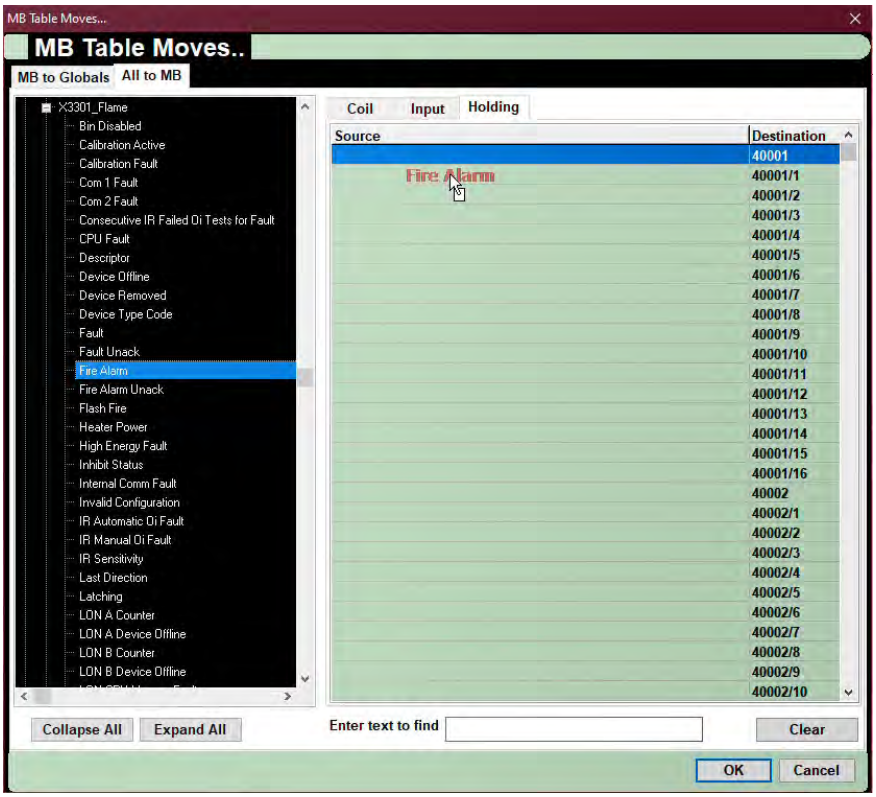
The firsts twelve items on the list provide access to controller status information and the globals database.

The “LON” item will allow access to all field device information, the “Relays” item is for accessing the EQP Controller’s onboard relay status.

Expanding the “LON” item by clicking on the “+” sign will show the available subordinate items, each of which is a field device. As these additional items are revealed, the list extends beyond the bottom and becomes scrolling.

The hierarchical arrangement of items provides an easy and logical method of accessing the thousands of potential items that could be configured as outputs on a large premier system.

In the example below, a field device on the LON, an X3301_Flame Fire Detector with the tagname “X3301_Flame” has been selected and “opened” to display its subordinate data. Any of the displayed items can be selected and configured for “movement” to the MB system utilizing the “drag and drop” method.



To configure a data point for “movement”, click and “drag” the selected point to the right side of the dialog box and “drop” it on the desired Modbus destination address.

In the example on the left, the “Fire Alarm” point is in the process of being moved to the selected destination address “40001/1”, in the MB table.

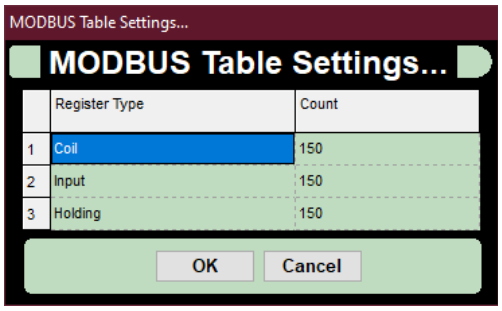
Once “dropped” in the desired cell in the “Source” column on the right side of the dialog box, the “Fire Alarm” status for “X3301_Flame” will now map to the first “bit” of register 40000, Modbus destination address of “40001/1”.

This process must be repeated for all data to be shared with the MB host device.

NOTE

Selecting a process variable to map to a register will take two consecutive registers. This is because Modbus Holding registers are 16-bit integers whereas the PV from a field device is a floating-point number.

13.4.11 MODBUS Table Settings



This menu selection opens a dialog box which shows the three-communication interface “tables” to be configured, to allow for data to be “moved” between the Eagle Quantum Premier Controller and a Modbus based system, utilizing the industry standard Modbus RTU communication protocol.

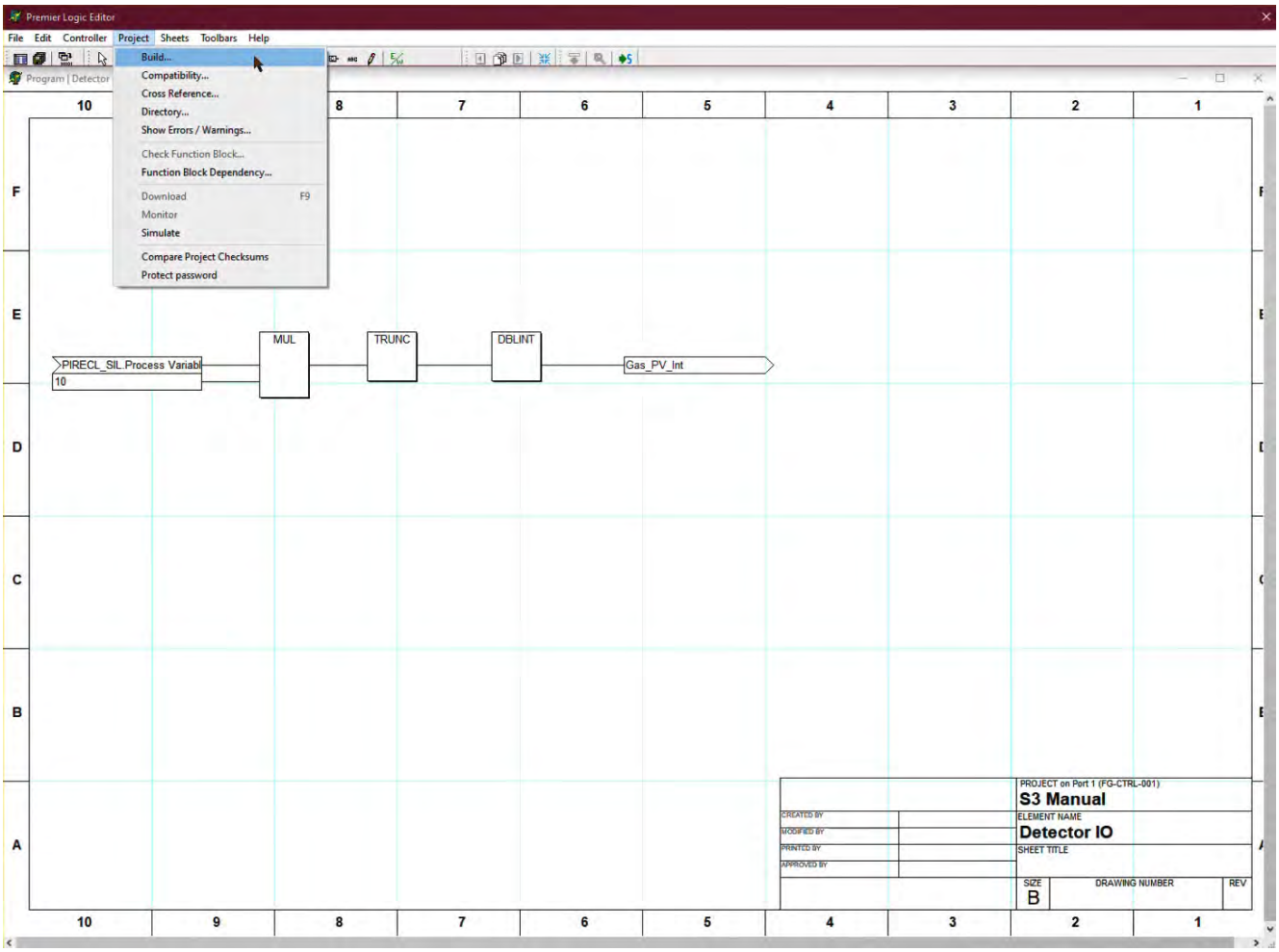
There are three register types: Coil, Input, and Holding, each of which are for the exchange of a different type of data. The default “Count” for each register type is 0.

Adjust the “Count” to match the number of registers required for each type. Once the tables are configured, click the “OK” button to allocate memory to support the new table configurations.

13.5 Project Menu

This menu allows access to the project directory, as well as several functions related to logic creation, debugging, simulation, and downloading to the controller.

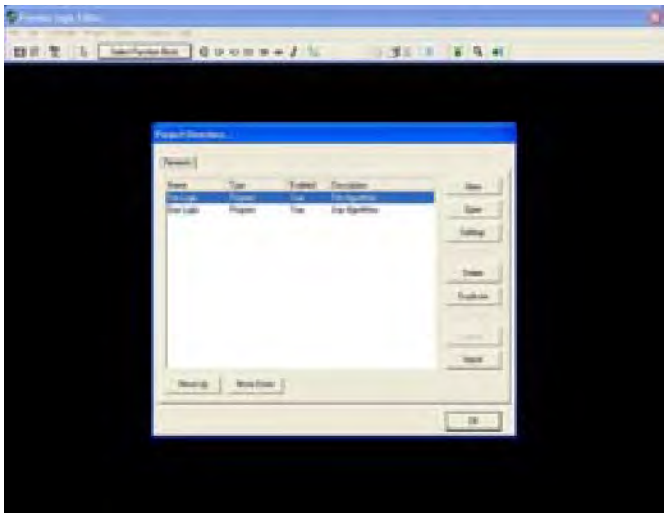
S^3 uses the international standard “IEC-1131” for the structure and style of the logic programming environment.



13.5.1 Directory

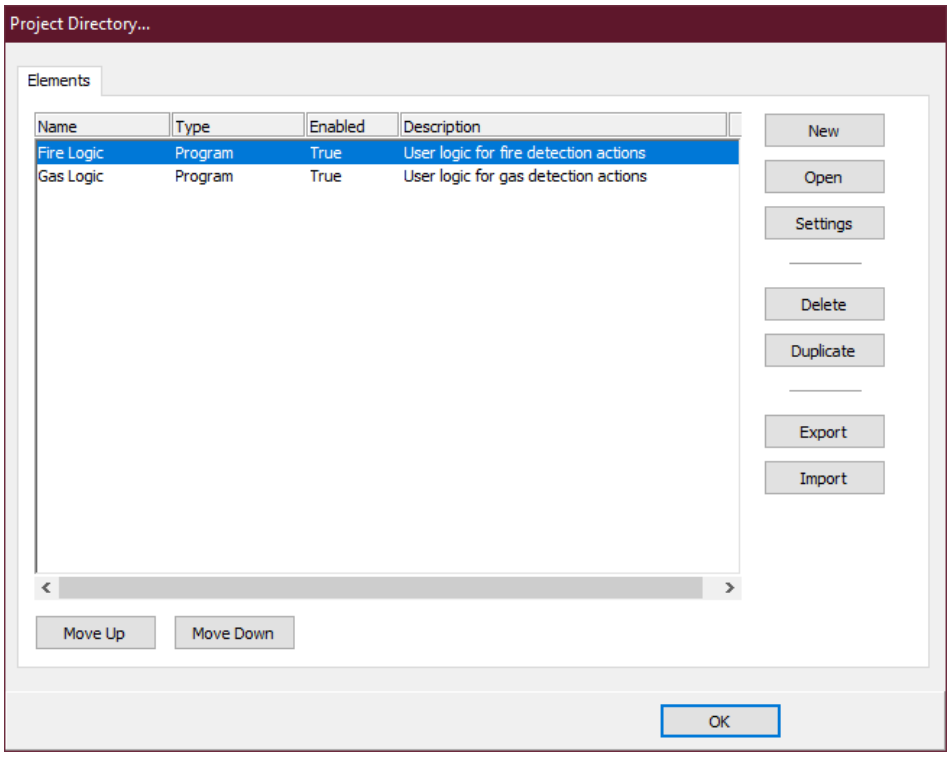
Selecting “Directory” will open the “Project Directory...” dialog box which lists the existing project “Elements” and provides tools for the creation, editing, deletion, duplication, and arrangement of these elements.

In the S^3 programming environment, an “Element” can be either a user program or a function block. In the example to the right, there are two existing elements, both of which are programs.



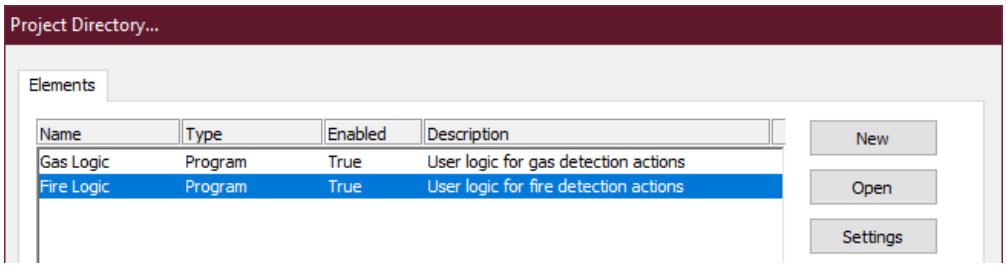
13.5.1.1 Move Up/Move Down

The Premier Controller executes its logic programs in the order that they appear in the “Elements” Tab of the “Project Directory...” dialog box. In the example below, the controller will execute the program “Fire Logic” first and then process the “Gas Logic” program.



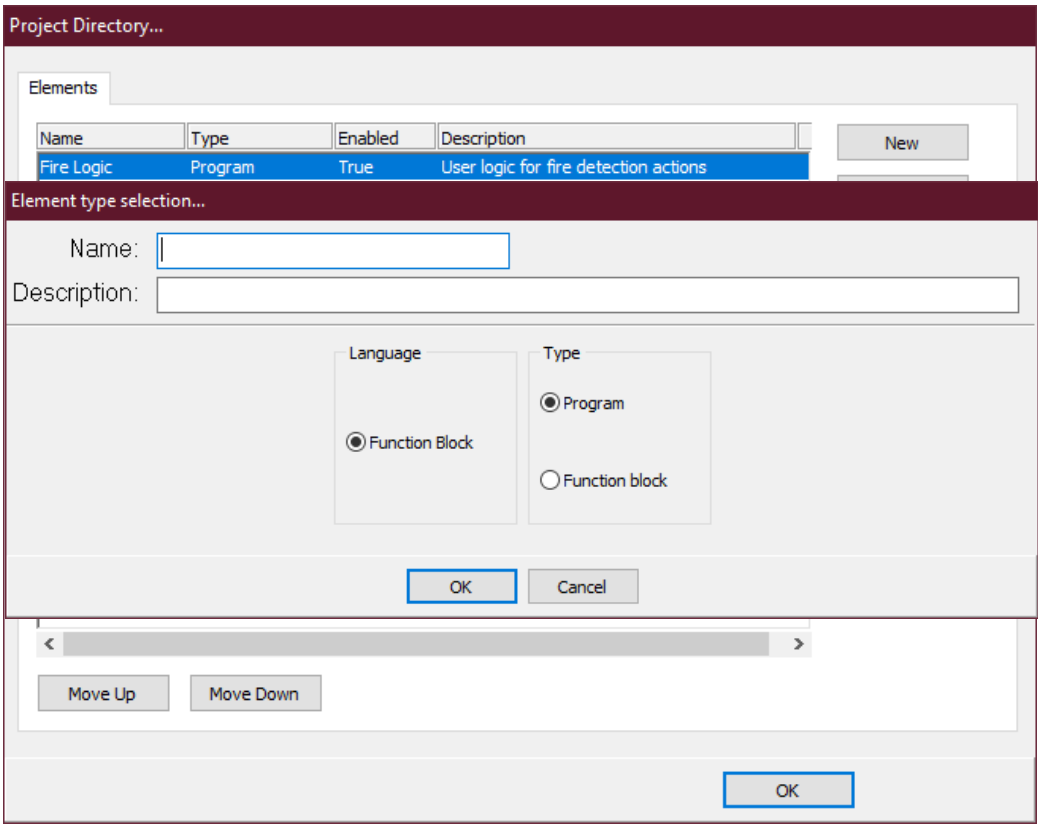
The “Move Up” and “Move Down” buttons located in the lower left of the “Project Directory...” dialog box are used to change the execution order of the programs. In the example above, the “Fire Logic” program is highlighted.

Selecting the “Move Down” button moves it down one position, in this case, to the bottom of the two-element list, as shown in the example below.

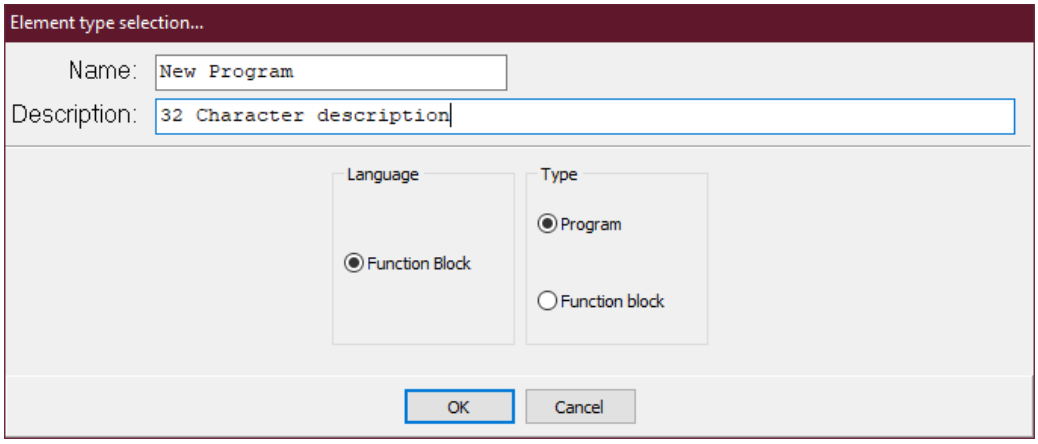


13.5.1.2 New

This button opens the “Element type selection” dialog box used to configure a newly created element. Fields are provided for an element name and description along with radio buttons to select the “Type” of element to be created, “Program” or “Function block”.

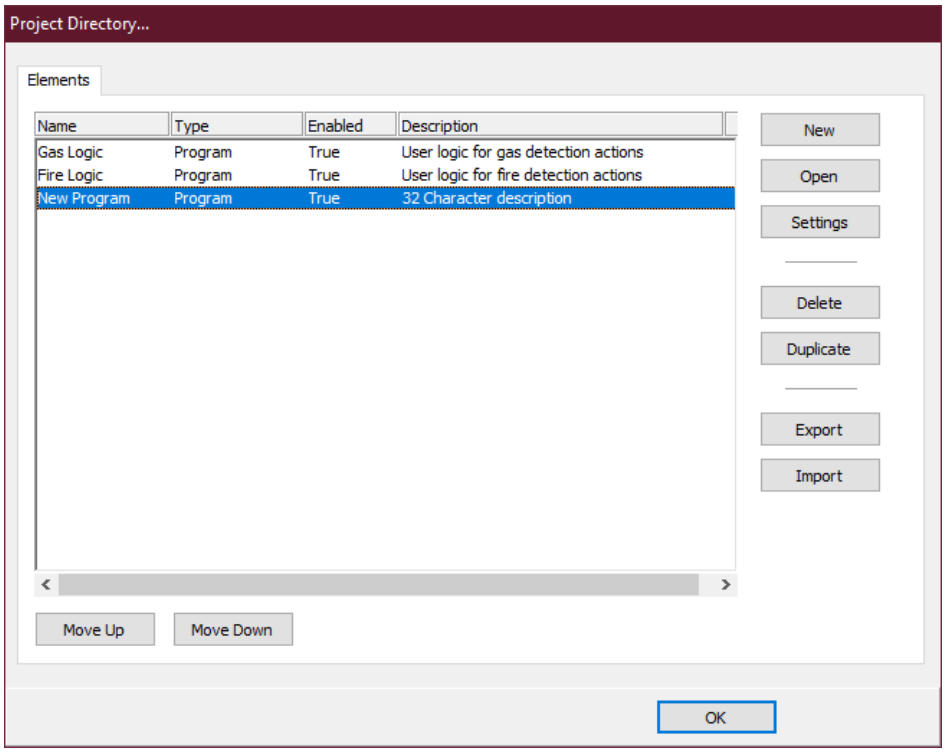


The default selection is for the creation of a new “Program”. The “Language” selection is fixed at “Function Block” as S³ does not currently support any other programming languages.



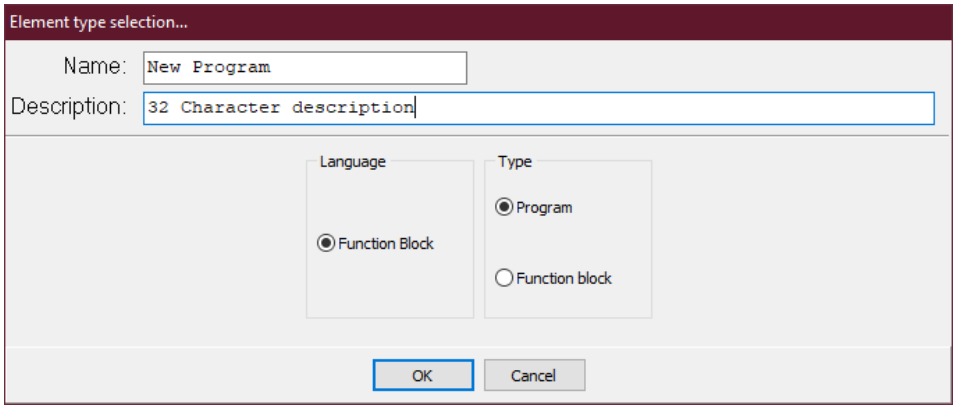
Select the “OK” button to return to the “Project Directory...” dialog box.

The information on the newly created third element named “New Program” is now highlighted.



13.5.1.3 Settings

Select the “Settings” button to open the “Element settings...” dialog box which has two program control check boxes and some additional fields that pertain to “Functions” and will be covered later.



The “Program” check boxes are “Enabled” and “First Scan Only”.

13.5.1.3.1 Enabled

The enabled checkbox determines whether the program will be executed by the controller or not. When checked the program will run.

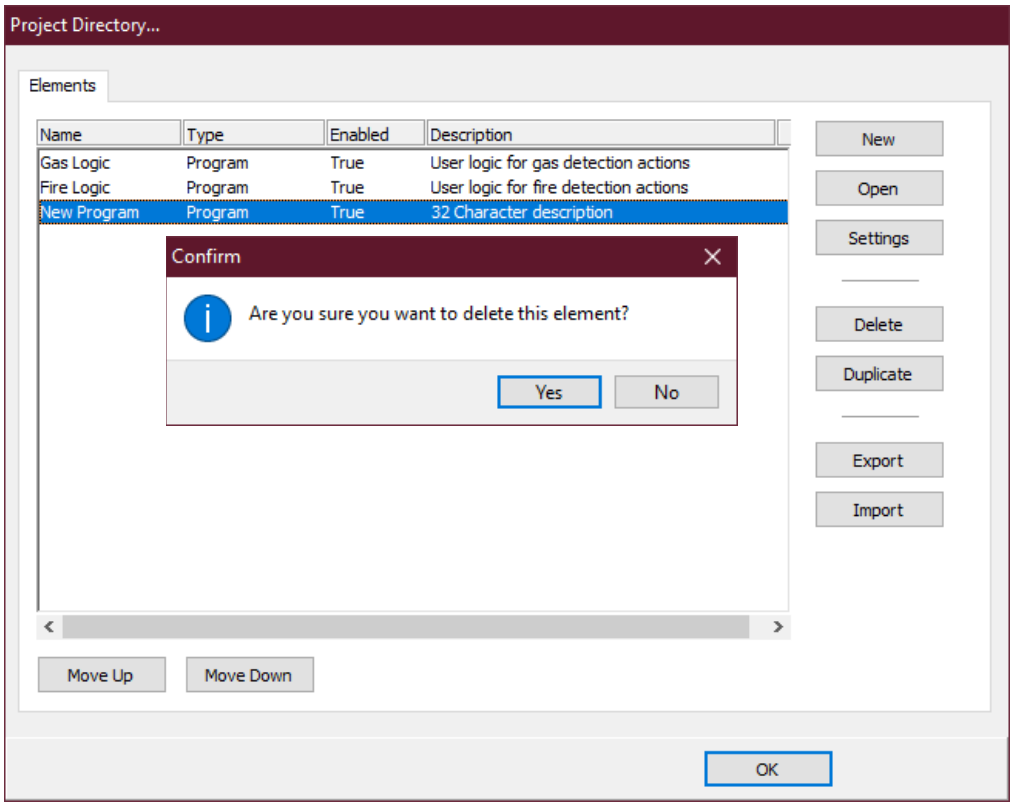
13.5.1.3.2 First Scan Only

When checked, the program will run once when the controller executes its first logic scan and will not run again until the controller is stopped and restarted. This is typically used for a “setup” routine.

13.5.1.4 Delete

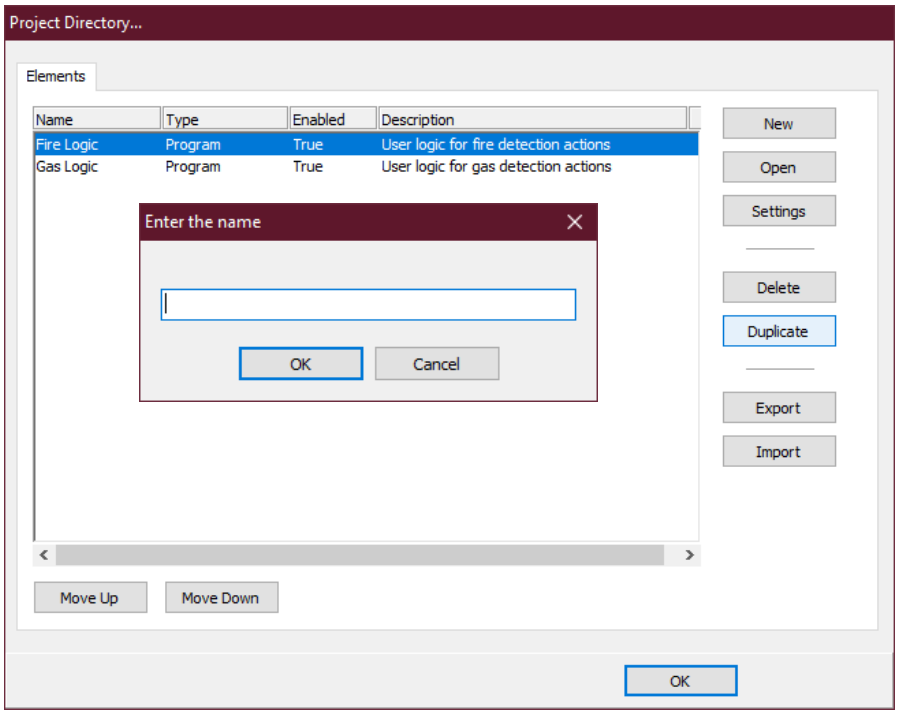
This button will remove the selected program or function block from the directory, project, and hard drive. This function cannot be “undone”.

In the example below, the element “New Program” is selected, choosing the Delete button will display a dialog box asking to confirm the deletion of the element. Selecting “Yes” will permanently remove it.



13.5.1.5 Duplicate

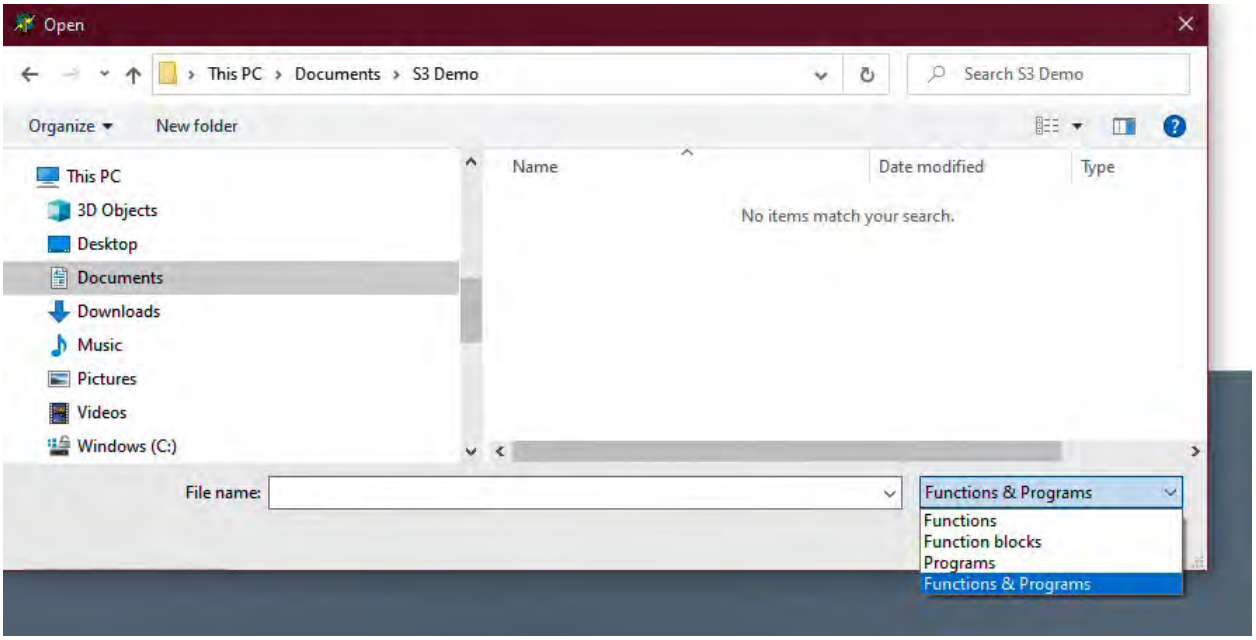
This button will make a copy of a selected element and add it to the project directory. When the Duplicate button is selected, a dialog box will open allowing a new name to be entered for the duplicated element. Enter a name and then select “OK” to complete the duplication. Selecting “Cancel” will abort the duplication.



13.5.1.6 Import

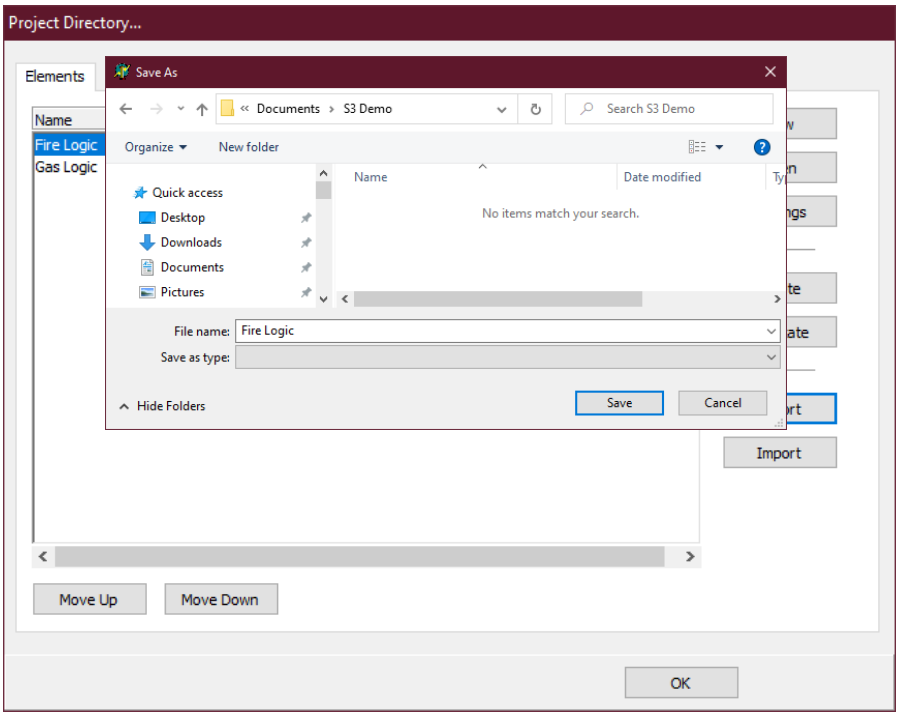
The import function facilitates bringing certain elements created in another project into the current one. These elements can be functions or function blocks.

When the “Import” button is selected, the standard Windows “Open” dialog box appears to allow navigation to the location of the source files to be “imported”. A pull-down menu allows filtering by type making it easier to locate the desired function or function block.



13.5.1.7 Export

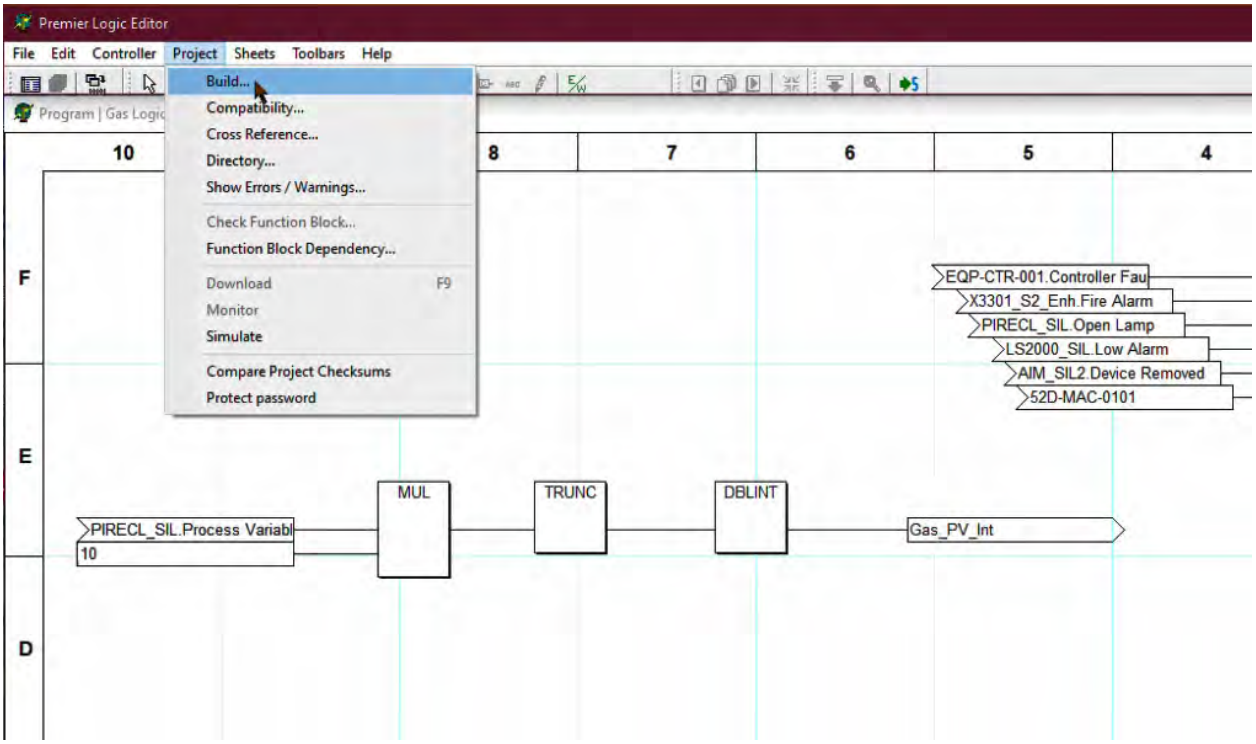
If a function block or function is highlighted in the project directory window, the “Export” button will become active, allowing the element to be exported.



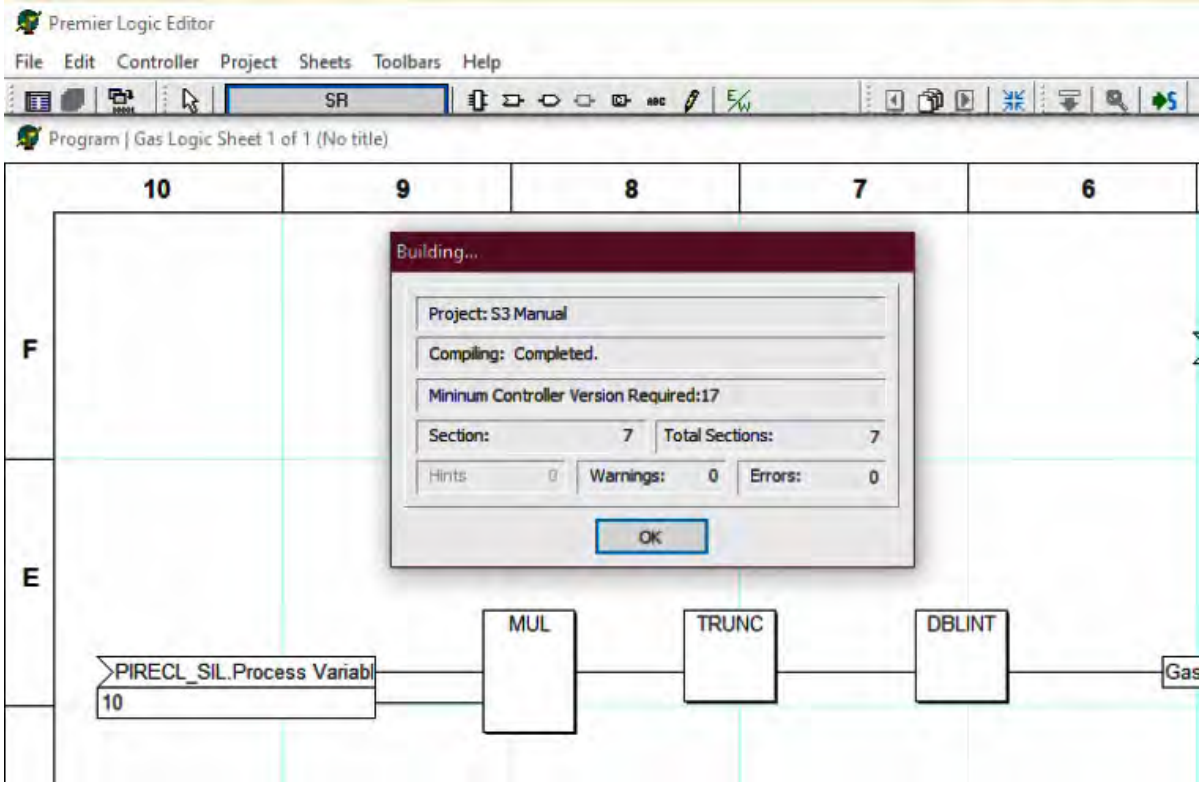
The standard Windows “Save As” dialog box allows for naming the file and choosing a save destination.

13.5.2 Build

The build option “compiles” the project. The project is a program that must be compiled to download to the controller.



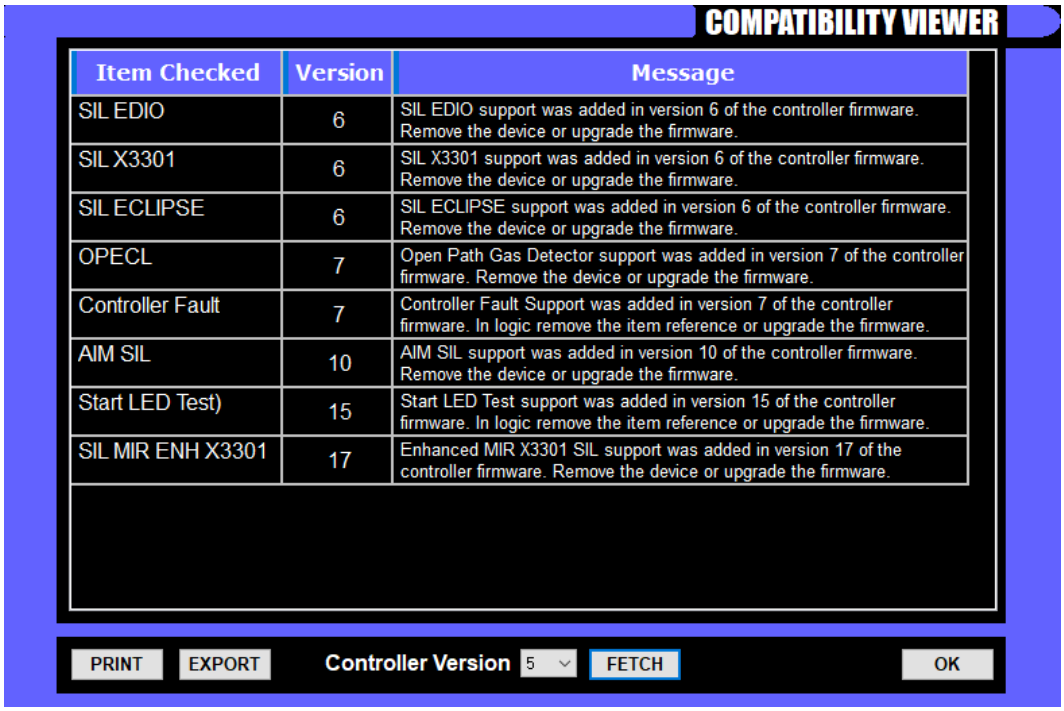
The build process allocates memory, validates tagnames, validates data types, etc.



View the “Errors/Warnings” viewer if the build window indicates any errors or warnings. A preference selection will automatically open the “Errors/Warnings” viewer if selected.

13.5.3 Compatibility

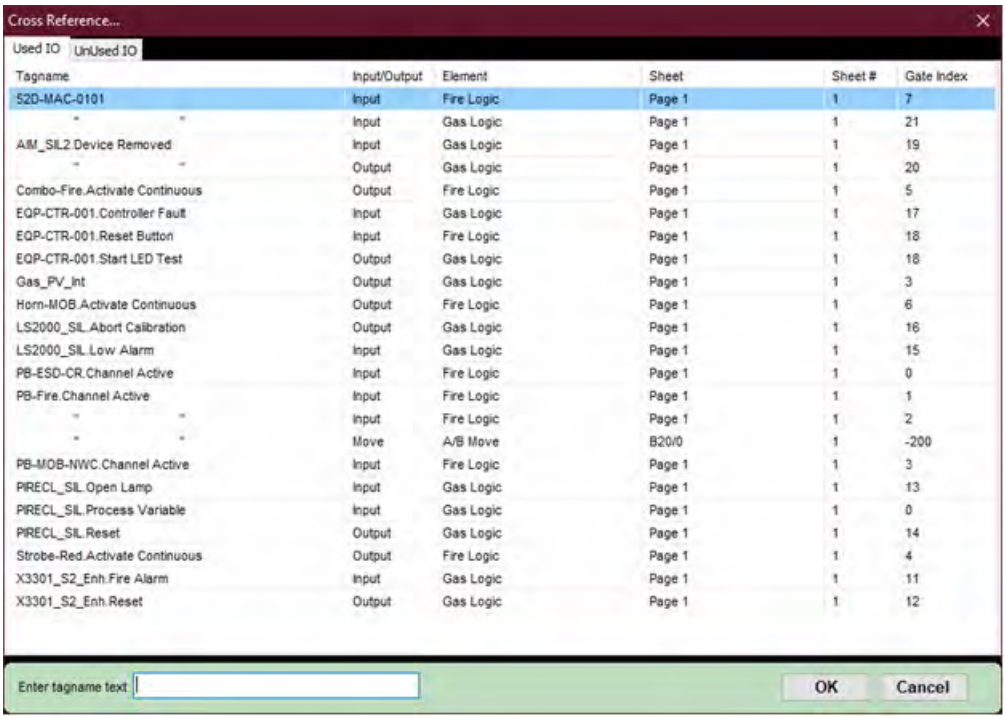
Checks to see compatibility between S³ and controller firmware.



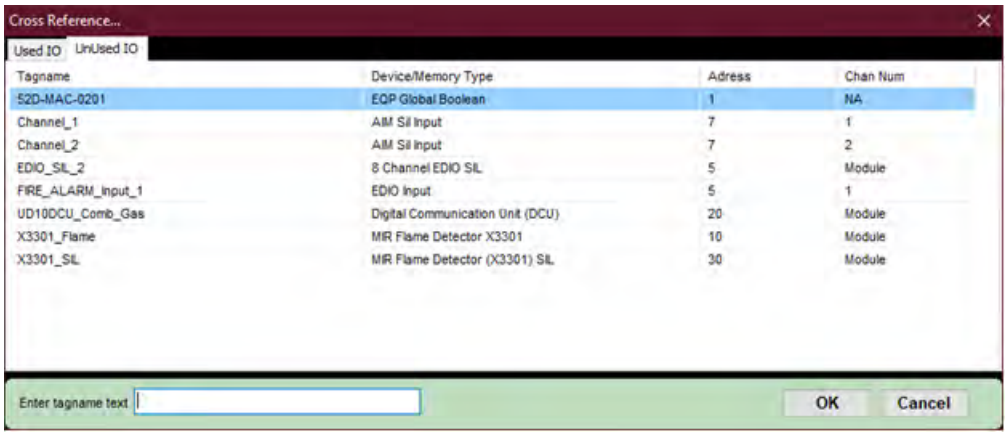
Item Checked	Version	Message
SIL EDIO	6	SIL EDIO support was added in version 6 of the controller firmware. Remove the device or upgrade the firmware.
SIL X3301	6	SIL X3301 support was added in version 6 of the controller firmware. Remove the device or upgrade the firmware.
SIL ECLIPSE	6	SIL ECLIPSE support was added in version 6 of the controller firmware. Remove the device or upgrade the firmware.
OPECL	7	Open Path Gas Detector support was added in version 7 of the controller firmware. Remove the device or upgrade the firmware.
Controller Fault	7	Controller Fault Support was added in version 7 of the controller firmware. In logic remove the item reference or upgrade the firmware.
AIM SIL	10	AIM SIL support was added in version 10 of the controller firmware. Remove the device or upgrade the firmware.
Start LED Test)	15	Start LED Test support was added in version 15 of the controller firmware. In logic remove the item reference or upgrade the firmware.
SIL MIR ENH X3301	17	Enhanced MIR X3301 SIL support was added in version 17 of the controller firmware. Remove the device or upgrade the firmware.

13.5.4 Cross Reference

A list is generated to show every instance of tags and where they are used. There are two tabs in this screen: “Used I/O” and “Unused I/O”. When viewing the cross-reference list, any item can be selected. The screen will then display the location in the program.

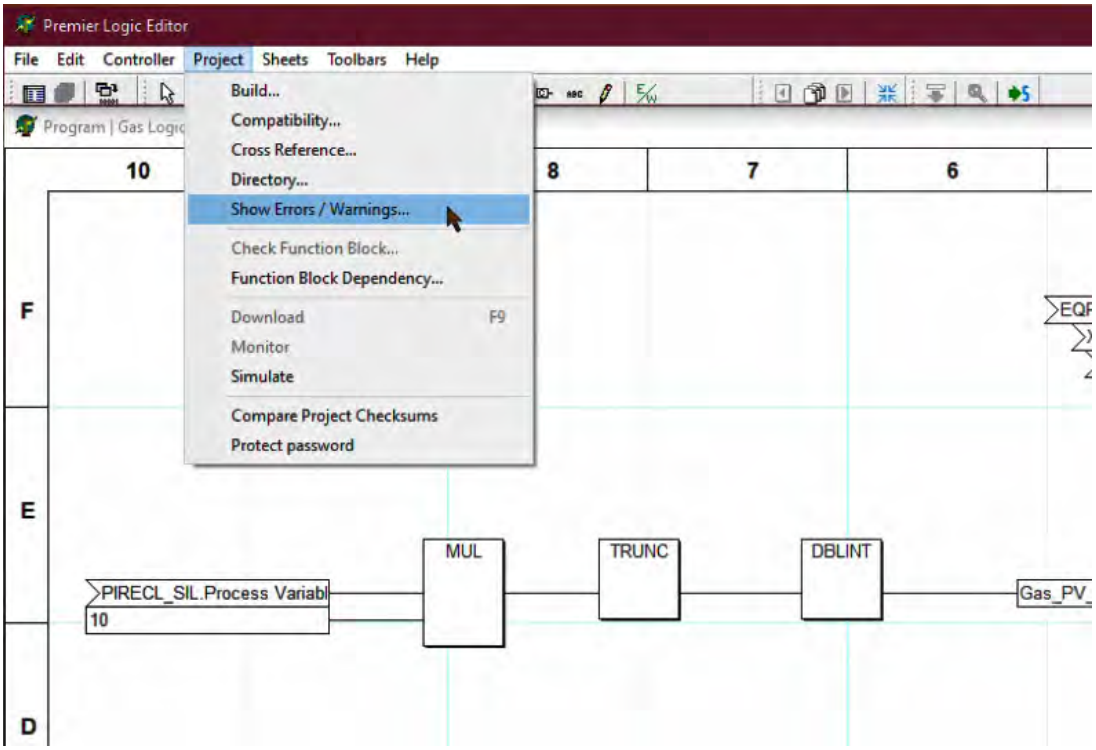


Tagname	Input/Output	Element	Sheet	Sheet #	Gate Index
52D-MAC-0101	Input	Fire Logic	Page 1	1	7
" "	Input	Gas Logic	Page 1	1	21
AIM_SIL2.Device Removed	Input	Gas Logic	Page 1	1	19
" "	Output	Gas Logic	Page 1	1	20
Combo-Fire.Activate Continuous	Output	Fire Logic	Page 1	1	5
EQP-CTR-001.Controller Fault	Input	Gas Logic	Page 1	1	17
EQP-CTR-001.Reset Button	Input	Fire Logic	Page 1	1	18
EQP-CTR-001.Start LED Test	Output	Gas Logic	Page 1	1	18
Gas_PV_Int	Output	Gas Logic	Page 1	1	3
Horn-MOB.Activate Continuous	Output	Fire Logic	Page 1	1	6
LS2000_SIL.Abort Calibration	Output	Gas Logic	Page 1	1	16
LS2000_SIL.Low Alarm	Input	Gas Logic	Page 1	1	15
PB-ESD-CR.Channel Active	Input	Fire Logic	Page 1	1	0
PB-Fire.Channel Active	Input	Fire Logic	Page 1	1	1
" "	Input	Fire Logic	Page 1	1	2
" "	Move	A/B Move	B20/0	1	-200
PB-MOB-NWC.Channel Active	Input	Fire Logic	Page 1	1	3
PIRECL_SIL.Open Lamp	Input	Gas Logic	Page 1	1	13
PIRECL_SIL.Process Variable	Input	Gas Logic	Page 1	1	0
PIRECL_SIL.Reset	Output	Gas Logic	Page 1	1	14
Strobe-Red.Activate Continuous	Output	Fire Logic	Page 1	1	4
X3301_S2_Enh.Fire Alarm	Input	Gas Logic	Page 1	1	11
X3301_S2_Enh.Reset	Output	Gas Logic	Page 1	1	12



13.5.5 Show Errors/Warnings

This menu selection opens the viewer and displays any problems found in the project during the last build (compile).

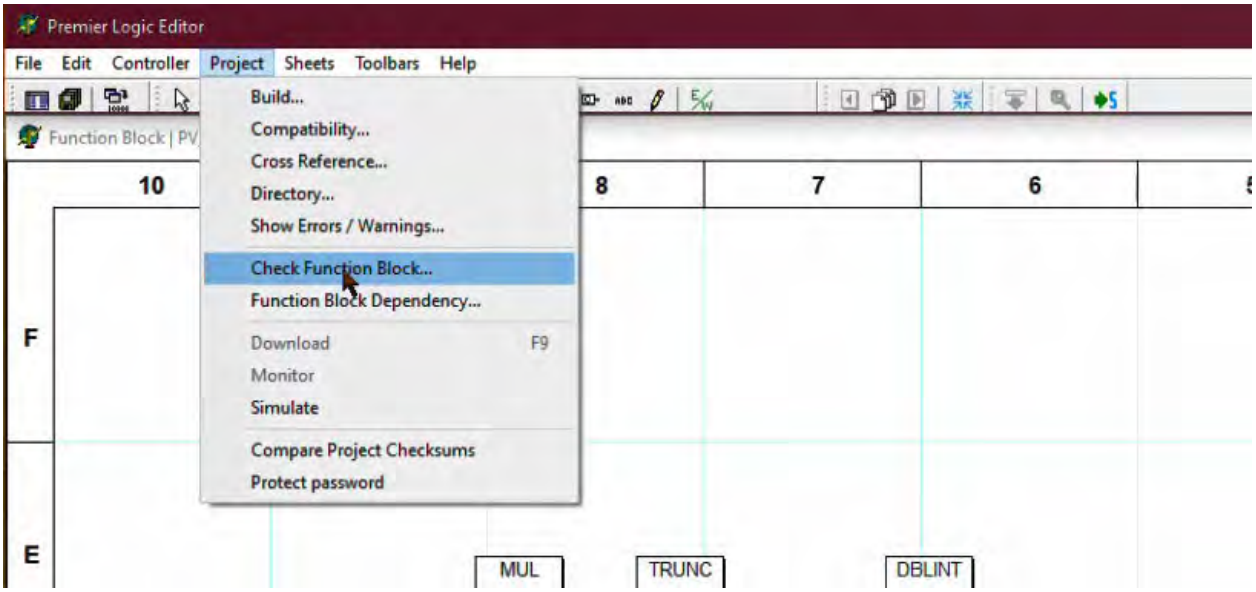


When enabled, the logic editor will display the “ERROR / WARNINGS VIEWER” at the completion of a project build, listing any problems.

Selecting one of the errors will close the viewer and display the section of logic containing the problem. The list can be printed using the “Print” button in the lower left of the dialog box. The error will be indicated by the function block being selected as the current item.

13.5.6 Check Function Block

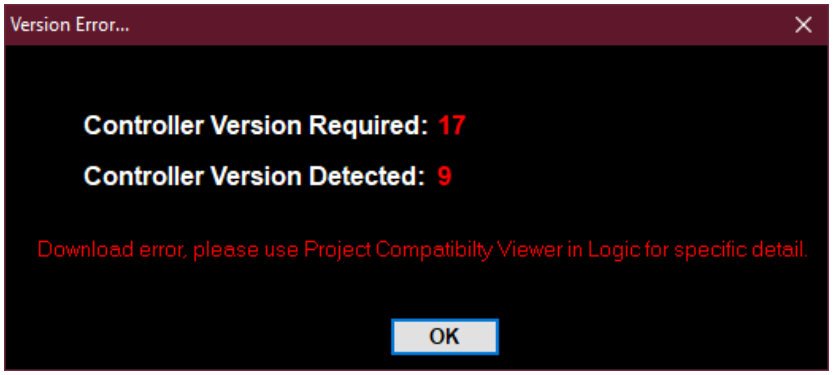
When a function block is open for editing (User Function Blocks only), this menu item becomes available. When selected S³ will check the validity of the program and list any found errors or warnings.



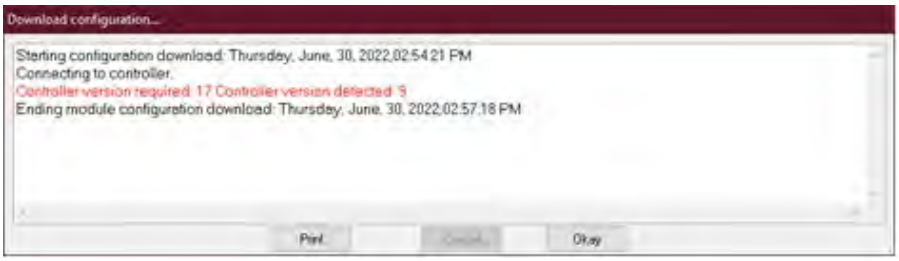
If a function block is not open for editing, this feature is not available.

13.5.7 Download

Once the project has been "built" and no error or warnings were found, the download will proceed. If an error is found (as below), then the user will need to resolve the error, either by regressing the S³ level or using a newer version of controller.



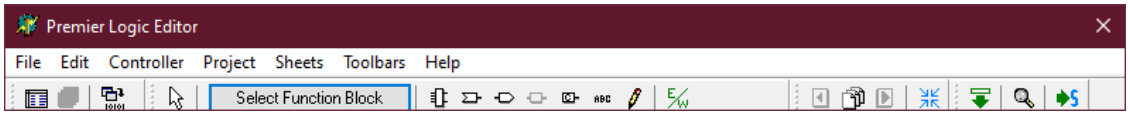
During the download process, a dialog box will open, displaying the establishing of the communication connection with the controller, the download progress and listing any errors or warnings that may occur.



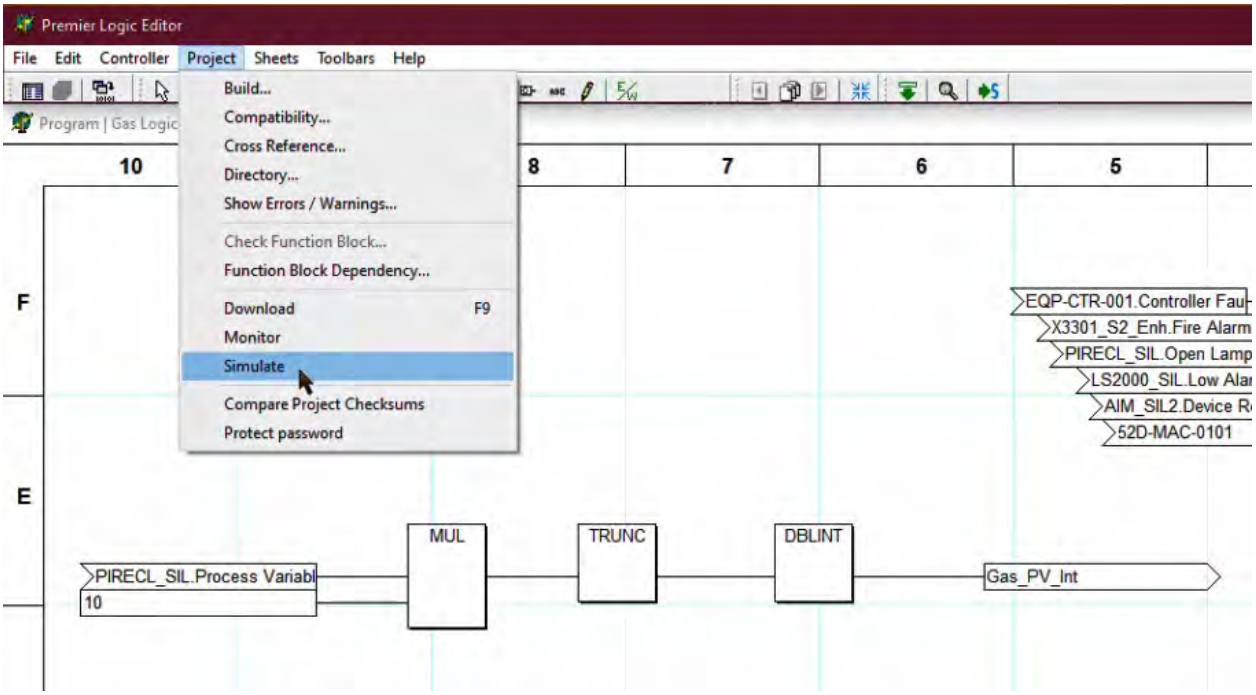
13.5.8 Simulate

If the project has been “built” and no errors were discovered, then the program can be simulated within the S³ environment. Simulation allows for program testing and debugging without the need for an actual Eagle Quantum Premier controller being attached to the S³ workstation. Simulation can be started from either the menu system or by using the simulate button in the logic page view mode.

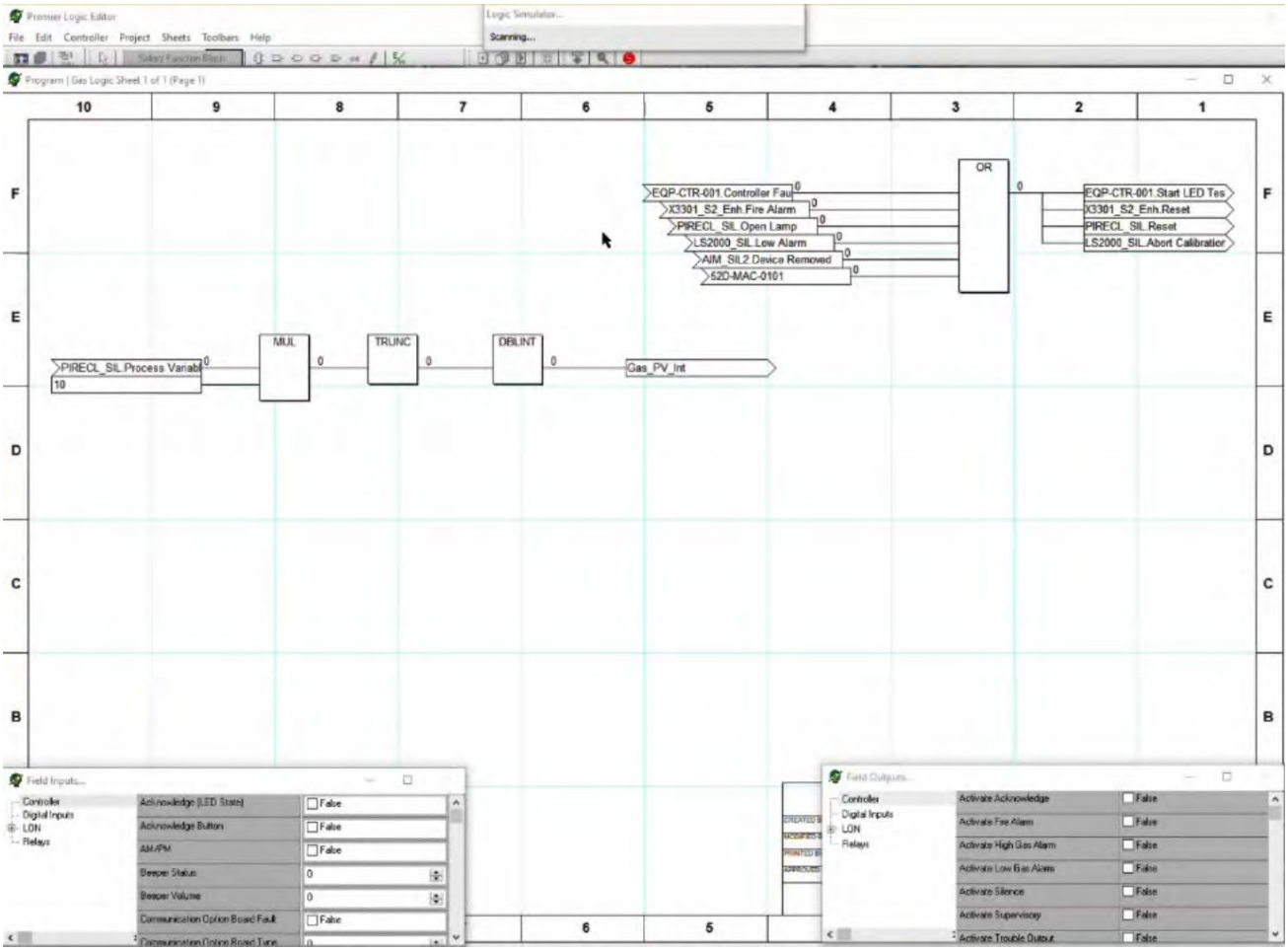
Start button on the Logic Editor Menu:



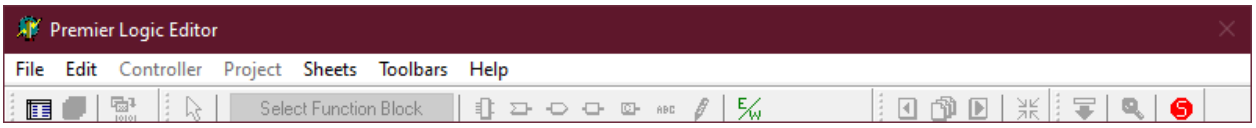
Start from the Project Menu:



Below is an example of a program in the “simulation” mode.



When the simulator is running, the value for each logic element is displayed on the screen to the right of the element. Inputs can be directly manipulated, and variables can be modified as well. The simulation can be stopped by clicking the red S icon in the Logic Editor.

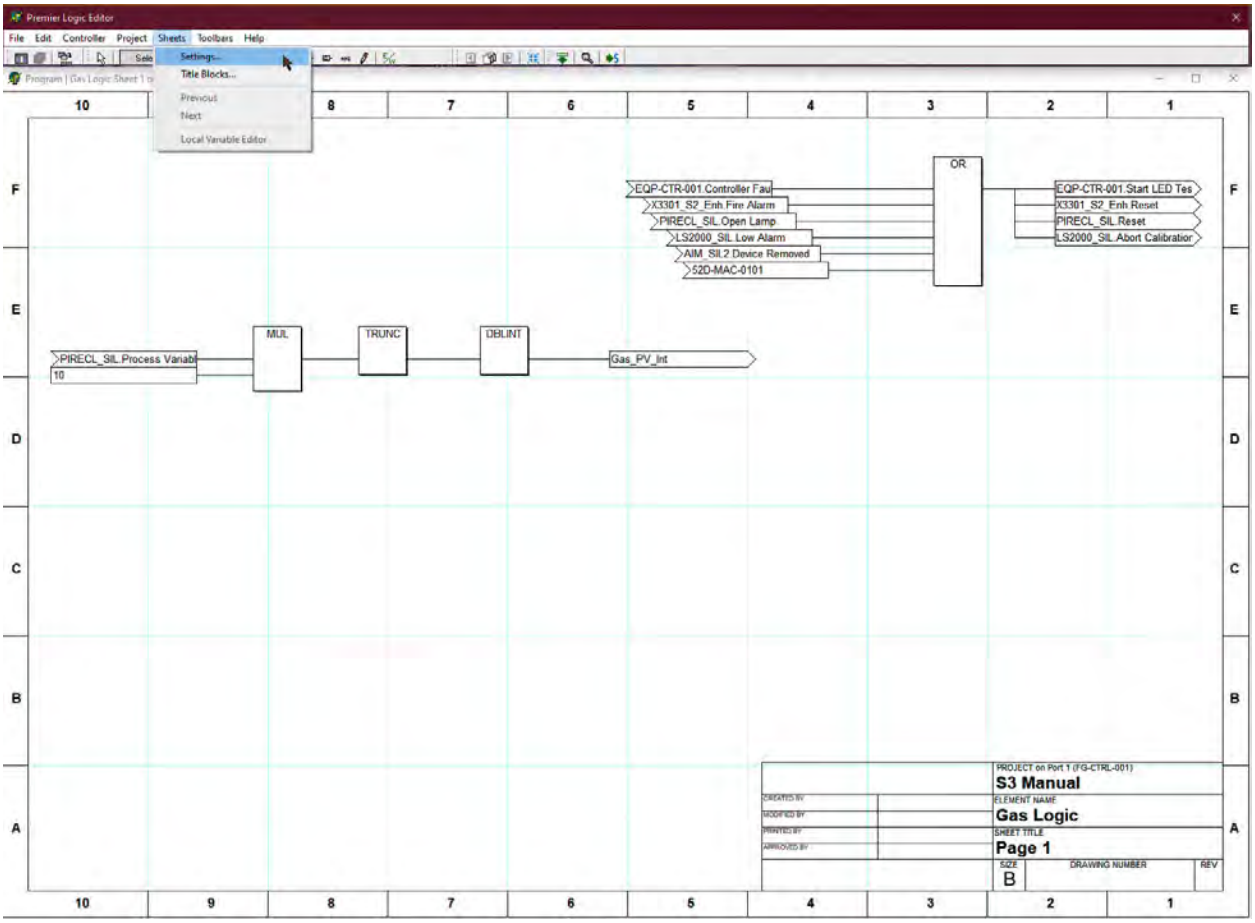


NOTE

Only real I/O can be activated. Internal Global/Local memory cannot be activated during simulation.

13.6 Sheets Menu

The S[3] Logic Editor utilizes a Computer Aided Design (CAD) style of program to create logic in much the same way that a draftsperson would have created drawings depicting logic in the past. Drawing “sheets” are used to create the logic and serve as documentation of this logic.



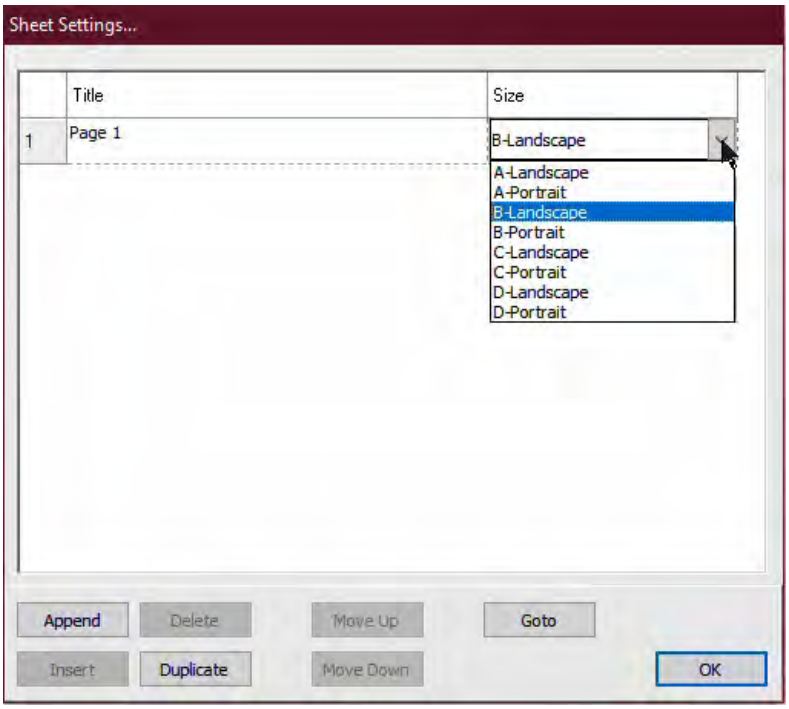
The “Sheets” menu provides access to features determining the layout of the logic pages along with the information in the title block.

NOTE

None of these menu items will “do” anything unless an element (program or function block) has been opened from the project directory window.

13.6.1 Settings

This menu item opens a dialog box where logic pages are given a “title” that appears in the title bar of the window for the drawing sheet, and a size and orientation for the drawing sheet can be selected. The “Sheet Settings...” dialog box will list all existing sheets that have been created for an element (program or function block) along with seven buttons for “sheet management” purposes.



NOTE

Recommend using "B" size landscape setting for ease of viewing and printing the logic.

13.6.1.1 Size

A pull-down menu to the right of the sheets title allows for the selection of the logic sheets size and orientation. Engineering drawing sizes ranging from “A” to “D” can be selected in either a Landscape (Horizontal) or Portrait (Vertical) orientation. In the example below, “B-Landscape” is selected which creates a sheet 17” wide by 11.5” high.

13.6.1.2 Append

This button will create a new sheet at the end of the list of existing sheets. On selection, a dialog box will open allowing the new sheet to be named upon creation.

13.6.1.3 Delete

This button will remove a selected sheet from the element. This cannot be “undone” and should be used with caution!

13.6.1.4 Insert

This button will create a new sheet after the sheet currently highlighted in the list of existing sheets. On selection, a dialog box will open allowing the new sheet to be named upon creation.

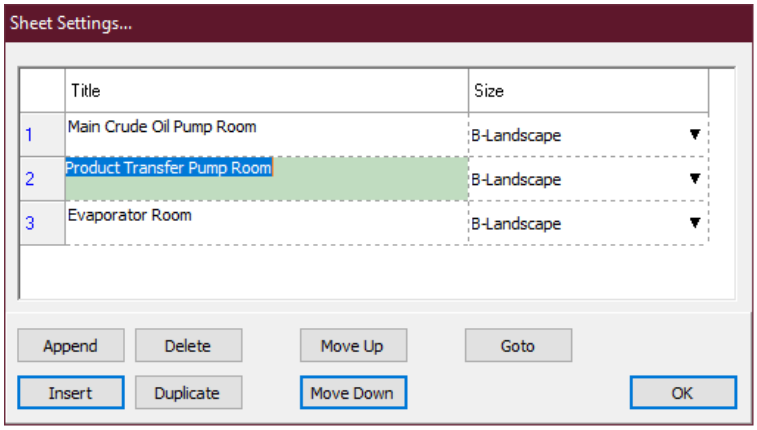
13.6.1.5 Duplicate

This button will create a new sheet at the end of the list of existing sheets. This “duplicate” will have a copy of all logic and settings on the original sheet. A dialog box will open allowing the new sheet to be named upon creation.

13.6.1.6 Move Up/Down

These two buttons are used to change a sheet's position within the element's execution list. This is an extremely important feature in that the Eagle Quantum Premier controller executes logic in the order the sheets appear in the "Sheet Settings..." list.

In the example below, Item 2, the "Product Transfer Pump Room" sheet is selected. In its current position, its logic will execute after the "Main Crude Oil Pump Room" and before the logic for the "Evaporator Room".



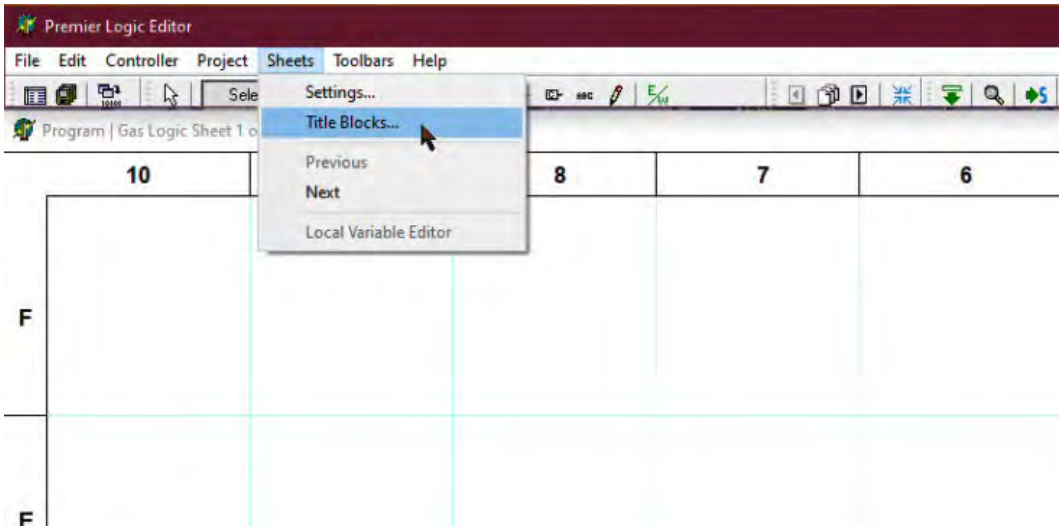
The "Move Down" button will place it after the "Evaporator Room" in both visible location in the list as well as logic execution order. The inverse would be true if the "Move Up" button were selected.

13.6.1.7 Goto

This button will open the sheet currently selected. In the example above, the "Goto" button will open the "Product Transfer Pump Room" sheet.

13.6.2 Title Blocks

In the lower right area of each drawing sheet is a “Title Block” area, which contains fields typically used to describe the project and functionality of the logic on the sheet.



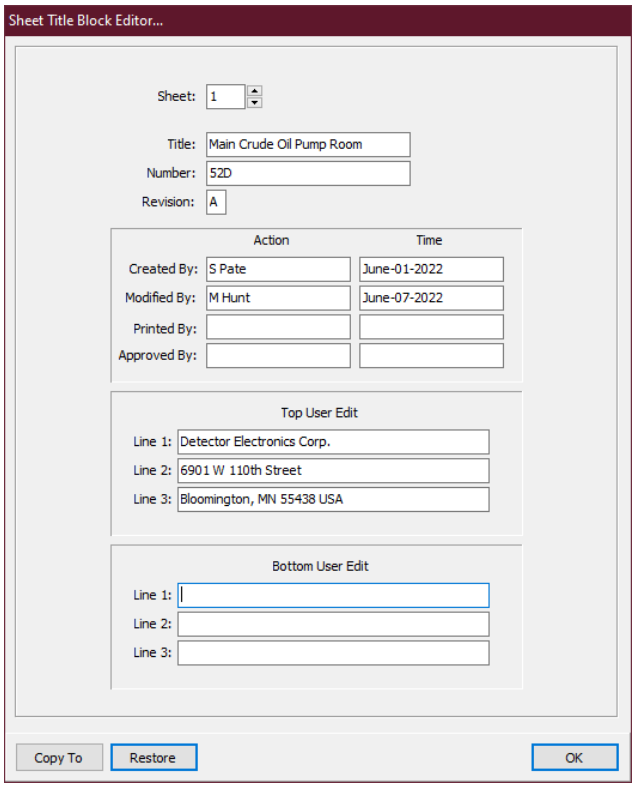
Selecting this menu item opens the “Sheet Title Block Editor...” dialog box. This dialog box provides 18 fields for data entry to describe the project and logic functionality.

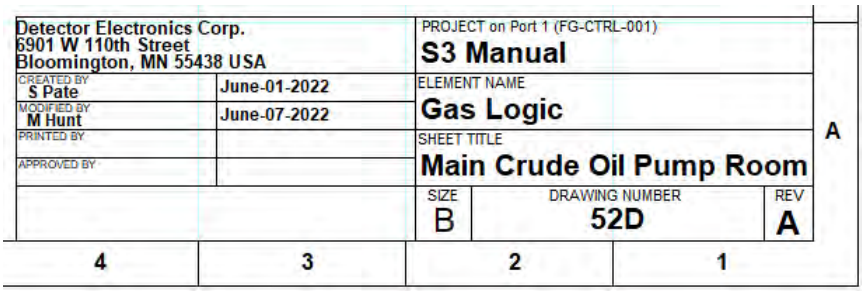
The first field “Sheet” shows the current sheet number within the element (program or function block). Below that are fields for the sheet “Title”, drawing “Number” and drawing “Revision”.

Below this are fields for tracking the creation of the logic and modifications.

Below this are three fields each for a “Top” and “Bottom” user edit. The top area is three lines to the left of the project name, the bottom area is three lines to the left of the drawing size.

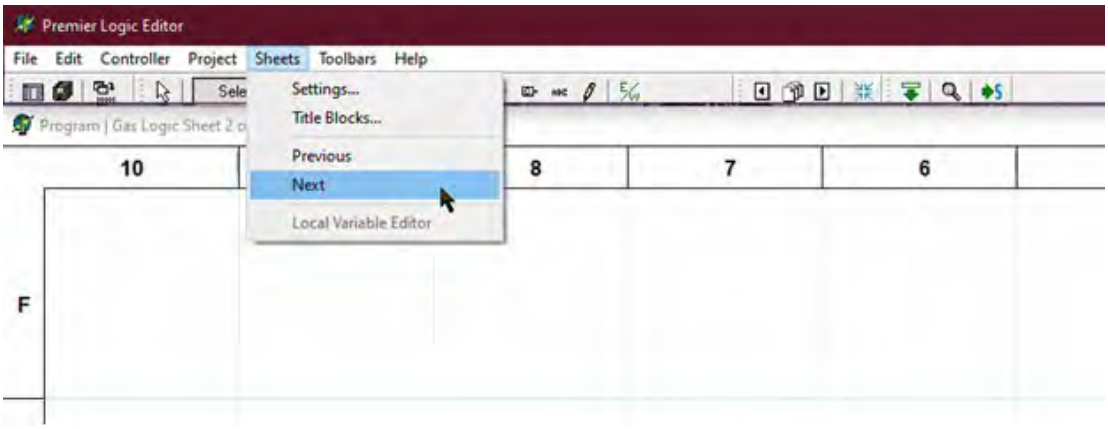
In the lower left of the dialog box, a “Copy To” button allows the entered information to be copied to any other selected sheets within the same element (program or function block).





13.6.3 Next/Previous

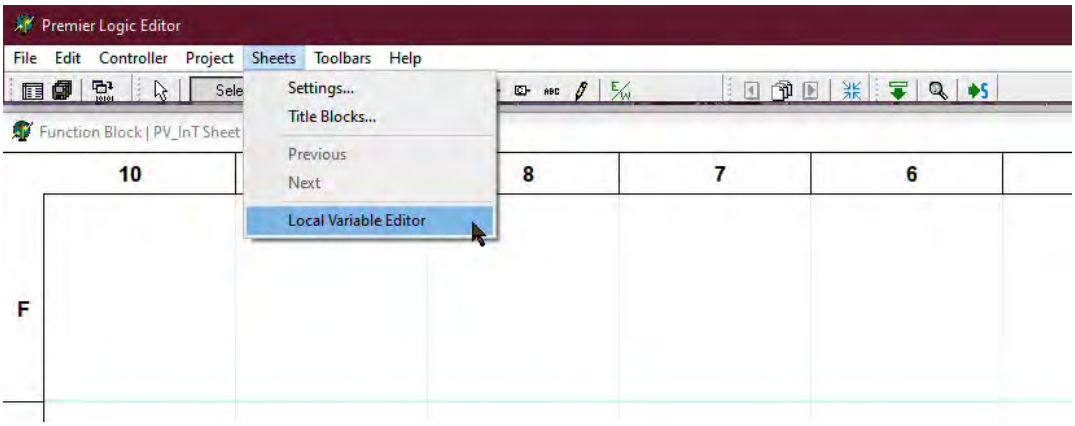
These menu items become active whenever an element has more than one logic sheet.



They change the displayed logic sheet to the next or previous one as is appropriate.

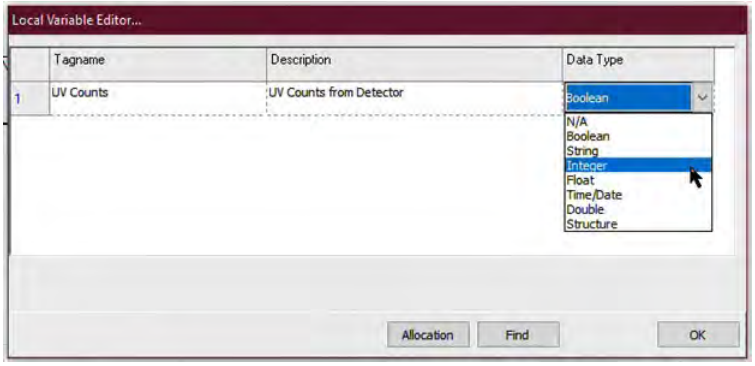
13.6.4 Local Variable Editor

Variables are used to store intermediate values within a logic element or function block. “Local Variables” are only used within a function block and their values are not accessible outside of that specific function block. Before local variables can be used, they must first be created. This is done with the “Local Variable Editor...” accessible through the menu selection.



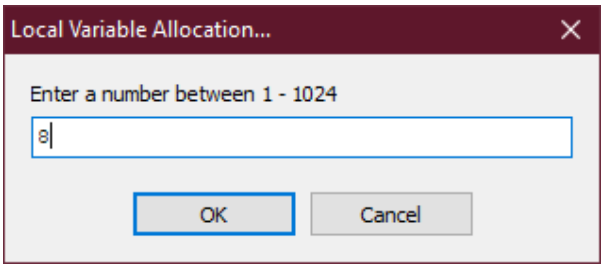
This menu selection is only available when a function block sheet is currently active.

In the example below, a single variable is being created, the tagname “UV Counts” has been entered, the description has been entered, and the pull-down menu is active to choose the appropriate “Data Type” for the variable. The default quantity of local variables allocated by S^3 is “1” and must be changed to meet the needs of the function block being created.



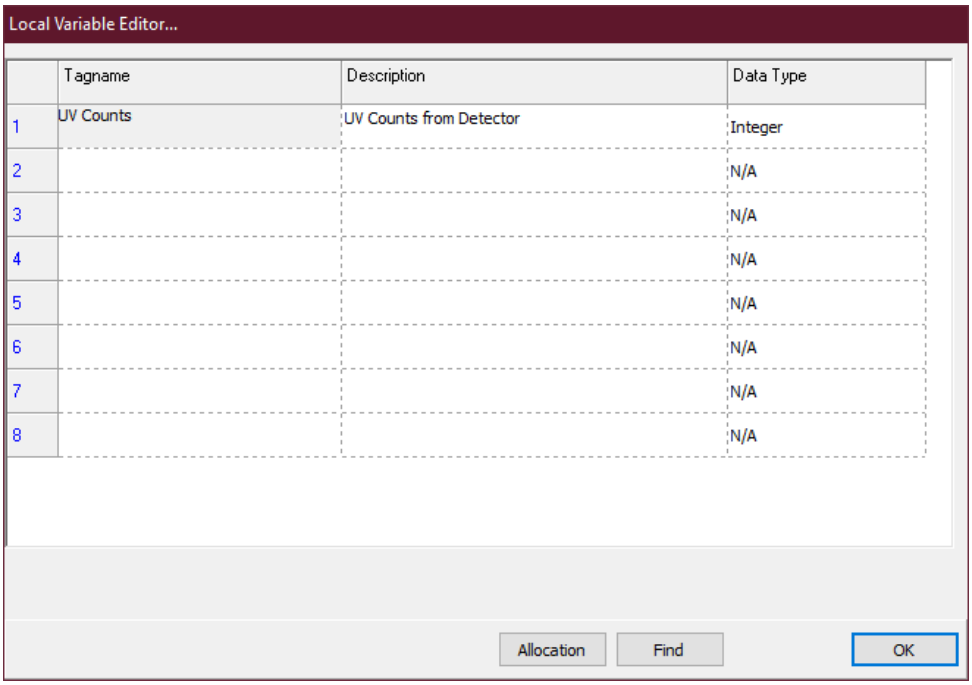
The “Allocation” button at the bottom center of the “Local Variable Editor...” dialog box will open the “Local Variable Allocation...” dialog box.

Once the “OK” button is selected, the allocation dialog box will close, and 8 “slots” are now allocated for variable creation within the Local Variable Editor.



Once the “OK” button is selected, the allocation dialog box will close, and 8 “slots” will now be allocated for variable creation within the Local Variable Editor.

In the example below, the creation of local variable #1 “UV Counts” has been completed and there are now additional slots to create up to eight local variables.



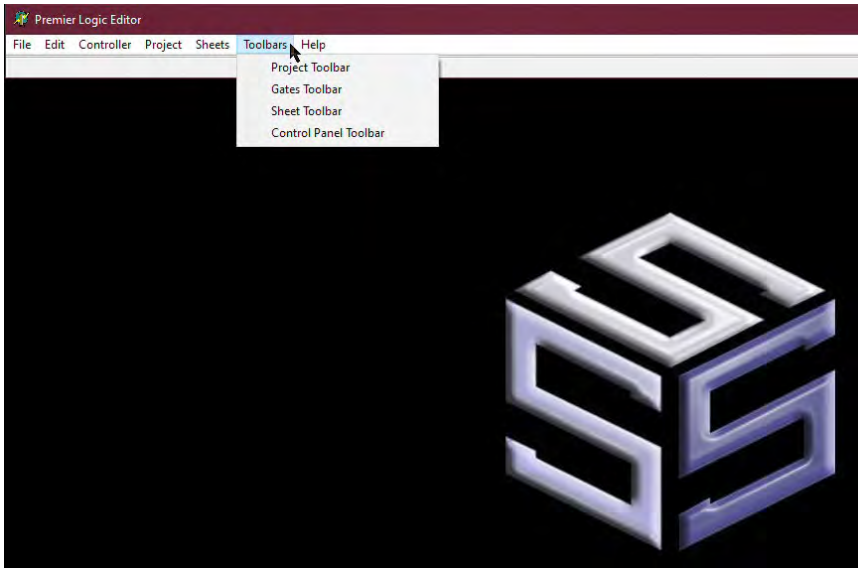
	Tagname	Description	Data Type
1	UV Counts	UV Counts from Detector	Integer
2			N/A
3			N/A
4			N/A
5			N/A
6			N/A
7			N/A
8			N/A

NOTE

The number of local variables available (1-1024) is not dependent on the data type, i.e., more variables do not become available by simply choosing only Boolean types instead of integer or floating-point types.

13.7 Toolbars Menu

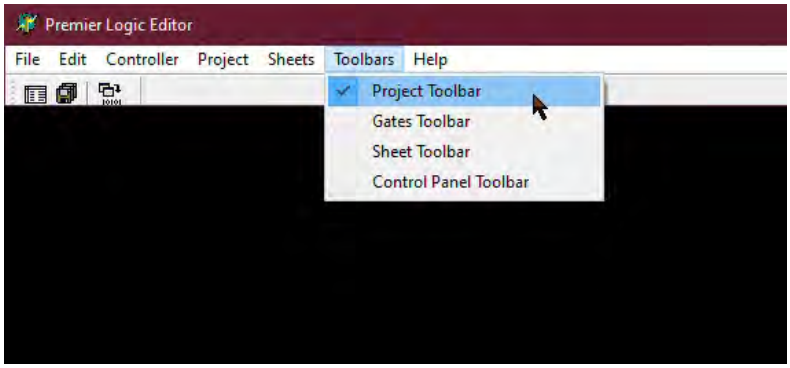
Toolbars provide “shortcuts” to many menu items described earlier. The “Toolbars” menu provides a mechanism for enabling or disabling any or all of the four “Toolbars” used in the logic editor. By default, all are enabled.



For the example above, no toolbars are enabled, and the toolbar area of the logic editor (horizontal area just below the menu names) will be empty.

13.7.1 Project Toolbar

This toolbar provides three shortcuts; Project Directory, Save Project, and Build Project.



13.7.1.1 Project Directory

The project is divided into elements. These elements are made up of programs and function blocks. Selecting this icon provides access to the tools for the creation, opening, ordering, duplication, deleting and configuration of these project elements. It also allows for the importing and exporting of function blocks.

13.7.1.2 Save Project

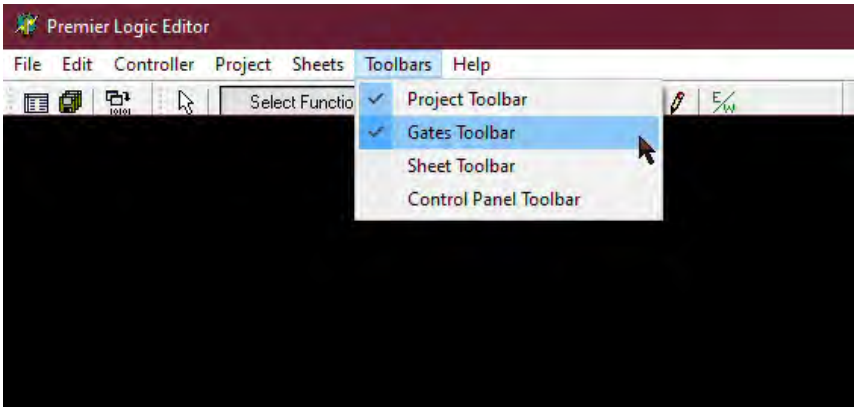
Selecting this icon saves the project. Note that the project is automatically saved whenever the “Build” command is initiated.

13.7.1.3 Build Project

Selecting this icon builds (compiles) the project. The project is a program that must be compiled before it can be downloaded to the controller. The build process allocates memory, validates tagnames, validates data types, etc.

13.7.2 Gates Toolbar

This toolbar provides access to all tools used in the creation of the logic programs and function blocks.



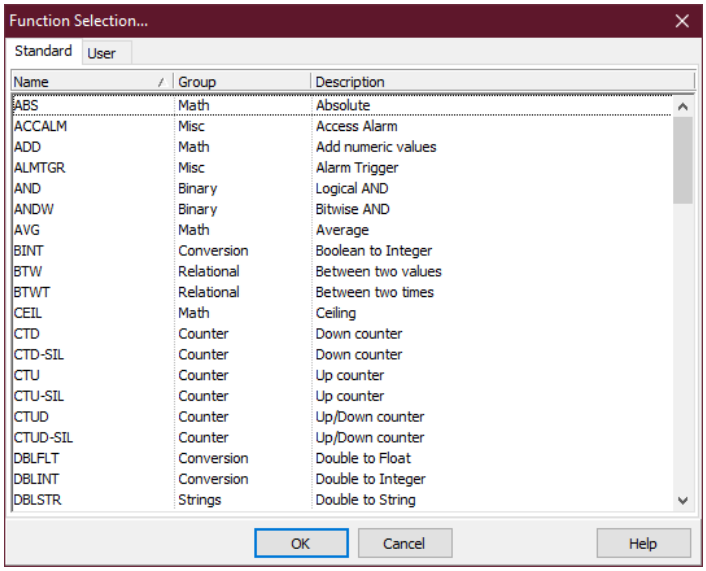
The "Gates Toolbar" provides access to ten logic creation, editing and verification tools.

13.7.2.1 Pointer Tool

This arrow shaped tool is used to select and manipulate the position and or size of any logic function on a sheet.

13.7.2.2 Select Function Block

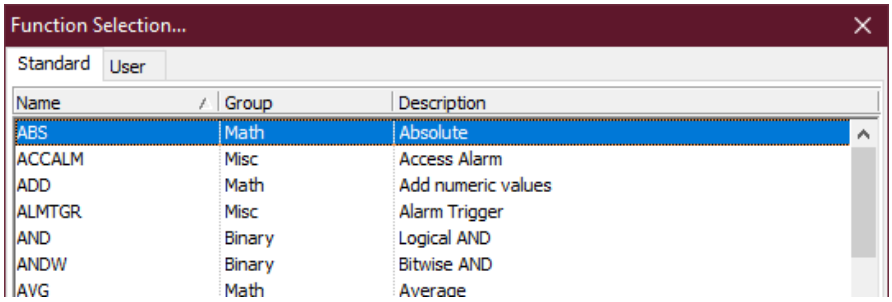
This button opens the "Function Selection" window which contains a scrolling list of all standard and user created functions available for selection.



13.7.2.3 Function Block Icon

When the user selects a standard or a user-created function block from the “Function Selection...” window, the selection is saved. The “Function Block” icon then becomes a shortcut to this last selected function block.

In the example below, the “ABS” function is selected via the “Function Selection...” window. When the window is closed the “ABS” function will be assigned to the “Function Block” icon.



Subsequent selections of this icon will allow repeated selection and placement of this gate type without having to reopen the “Function Selection...” window.

13.7.2.4 Input Variable

All input variables to a program or function are via this symbol. Once placed on a logic sheet, the input variable must be “linked” to a compatible parameter on the controller, a field device, or a location in controller memory.

13.7.2.5 Output Variable

All output variables from a program or function are via this symbol. Once placed on a logic sheet, the output variable must be “linked” to a compatible parameter on the controller, a field device, or a location in controller memory.

13.7.2.6 Local Variable

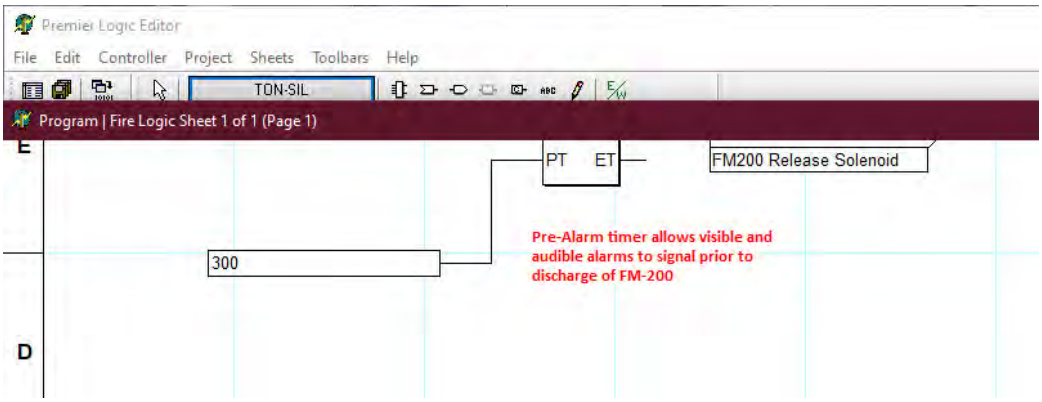
Local variables are available only in User Function Blocks. If a sheet for a standard “Program element” is opened, this function will be grayed out. These variables provide for the transfer of values between sheets of a multi-sheet block and private local storage (local variables).

13.7.2.7 Constant Value

Constants allow for user set values to be input to a function or output variable that do not change during the execution of the program or function.

13.7.2.8 Comment

The user may want to place comments on the sheets to describe which task a section of logic performs, or any other annotation.



In the example above, there is a comment indicating “Pre-Alarm timer allows visible and audible alarms to signal prior to discharge of FM-200” below the timer that delays discharge while annunciation is in progress.

13.7.2.9 Connection Tool

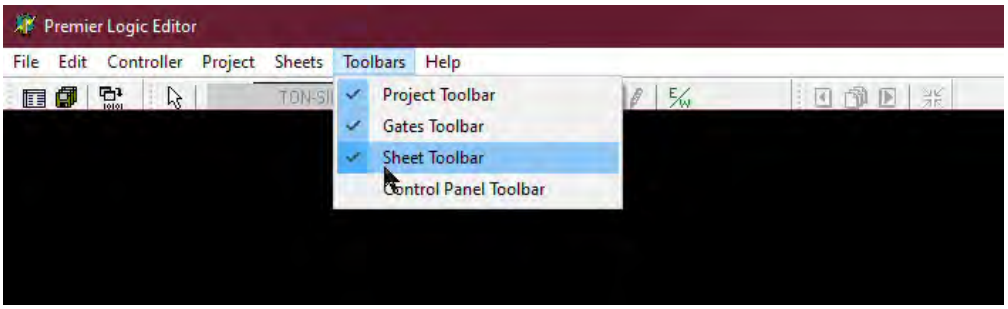
The function block inputs and outputs are connected via the “Connection Tool”. This tool is also referred to as the “Line Tool” and the “Wire Tool”.

13.7.2.10 Errors/Warnings

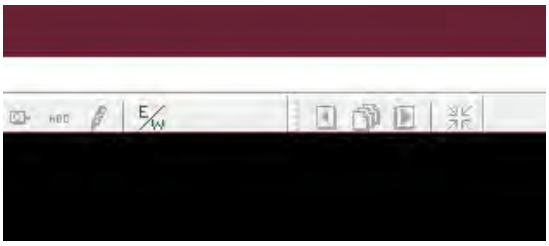
When a build is performed, all errors are reported via a window. This icon opens the “Error/ Warning Viewer”, described earlier in this section.

13.7.3 Sheet Toolbar

There are four icons which provide shortcuts to menu items having to do with logic sheets.



These four icons from left to right are; Previous Sheet, Sheet Settings, Next Sheet, and Fit to Window.



13.7.3.1 Previous Sheet

When a multi-sheet logic or function block element is open and a “previous sheet” exists, this button will highlight, and its selection will open the previous sheet.

13.7.3.2 Sheet Settings

Sheets have a name, size, and position. Via this icon the “Sheet Settings...” window is opened from which sheets can be created, deleted, and have their name changed. In addition, a sheets logic execution order can be changed.

13.7.3.3 Next Sheet

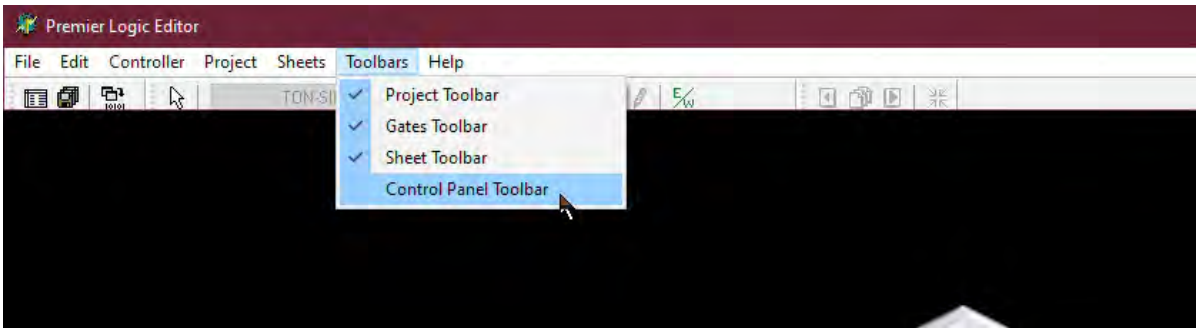
When a multi-sheet logic or function block element is open and a “next sheet” exists, this button will highlight, and its selection will open the next sheet.

13.7.3.4 Fit to Window

This icon scales the drawing sheet so that the entire sheet can be viewed in one window. Editing is not allowed when the “Fit to Window” feature is active.

13.7.4 Control Panel Toolbar

There are three icons which provide shortcuts to menu items having to do with logic and the controller.



These three icons from left to right are; Download, Monitor, and Simulate.

13.7.4.1 Download

When this icon is selected, the project has been “built”, and no errors were discovered, then the program is transferred to the controller. If a valid build is not found, then a “build” is performed. If no errors are discovered, the program will be downloaded to the controller.

13.7.4.2 Monitor

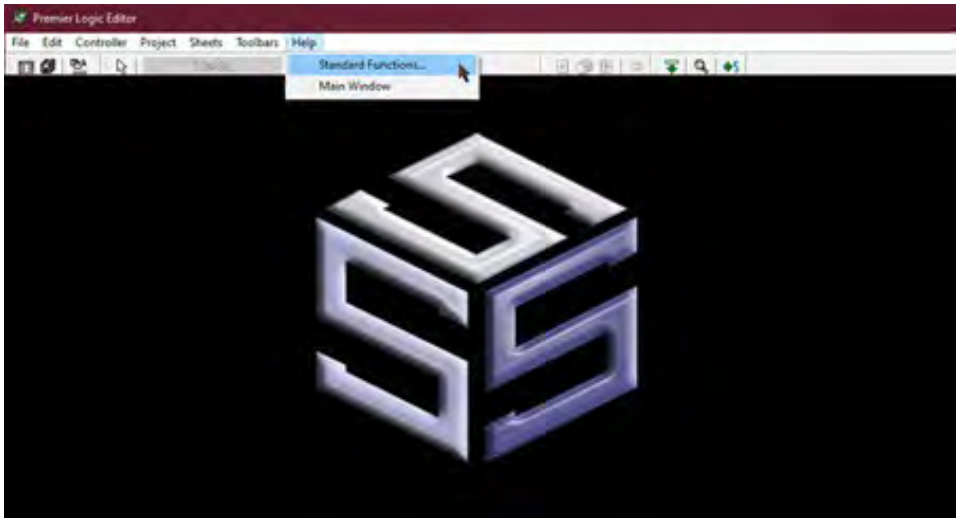
When connected to a controller and the project matches the program in the controller, the logic of the program can be monitored. In the monitor mode, the logic sheet is displayed on screen and the results of all function block bins can be viewed.

13.7.4.3 Simulate

If the project has been “built” and no errors were discovered, then the program can be simulated on the S^3 workstation. If a valid build is not found, the build is automatically performed. If no errors are found, the simulation is started.

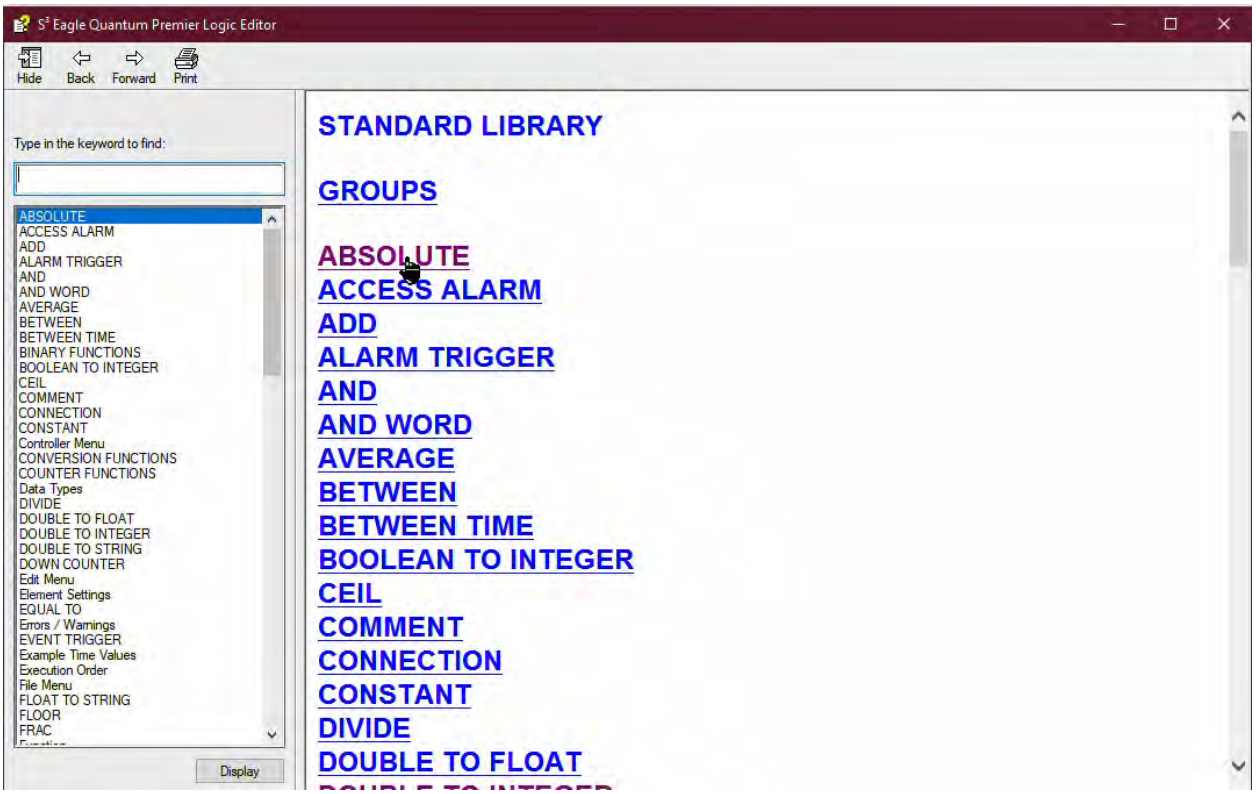
13.8 Help Menu

The help menu provides access to the online help system and has two areas: “Standard Functions” and “Main Window”.



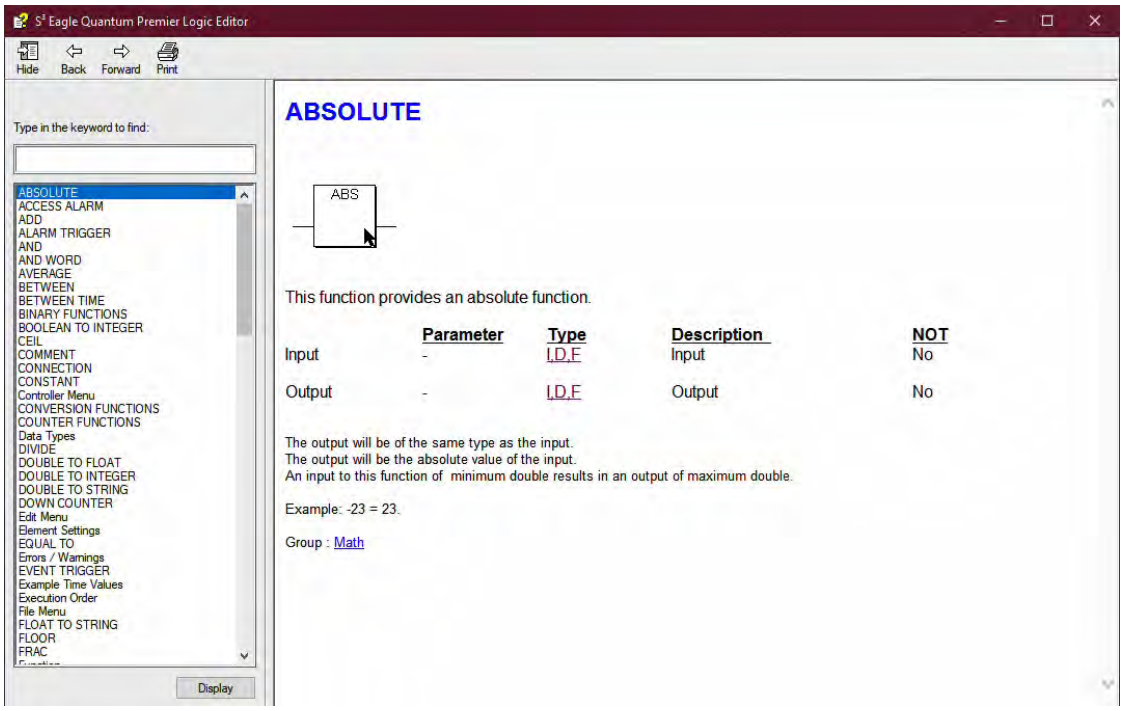
13.8.1 Standard Functions

This portion of the help system covers all available logic operators available for use in the logic editor. Selecting this menu item will open a hypertext linked help window featuring all available logical operators.



To access detailed information on a subject, click on a library function and the information will be displayed.

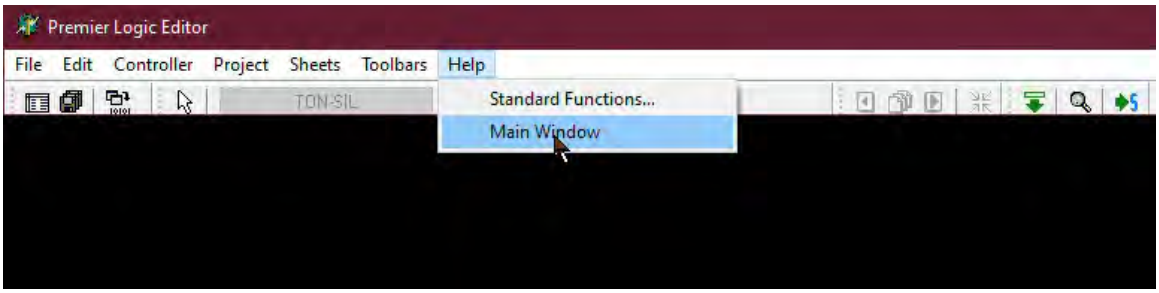
In the example below, the “Absolute” function was selected and the details of how to use this function are shown.



Use the Contents, Index, Back and Print buttons below the help windows menu bar to navigate the help system and print hard copies as required. *Tip*: When programming logic, the operator can click on the logic gate and press F1 to access the gates functional description.

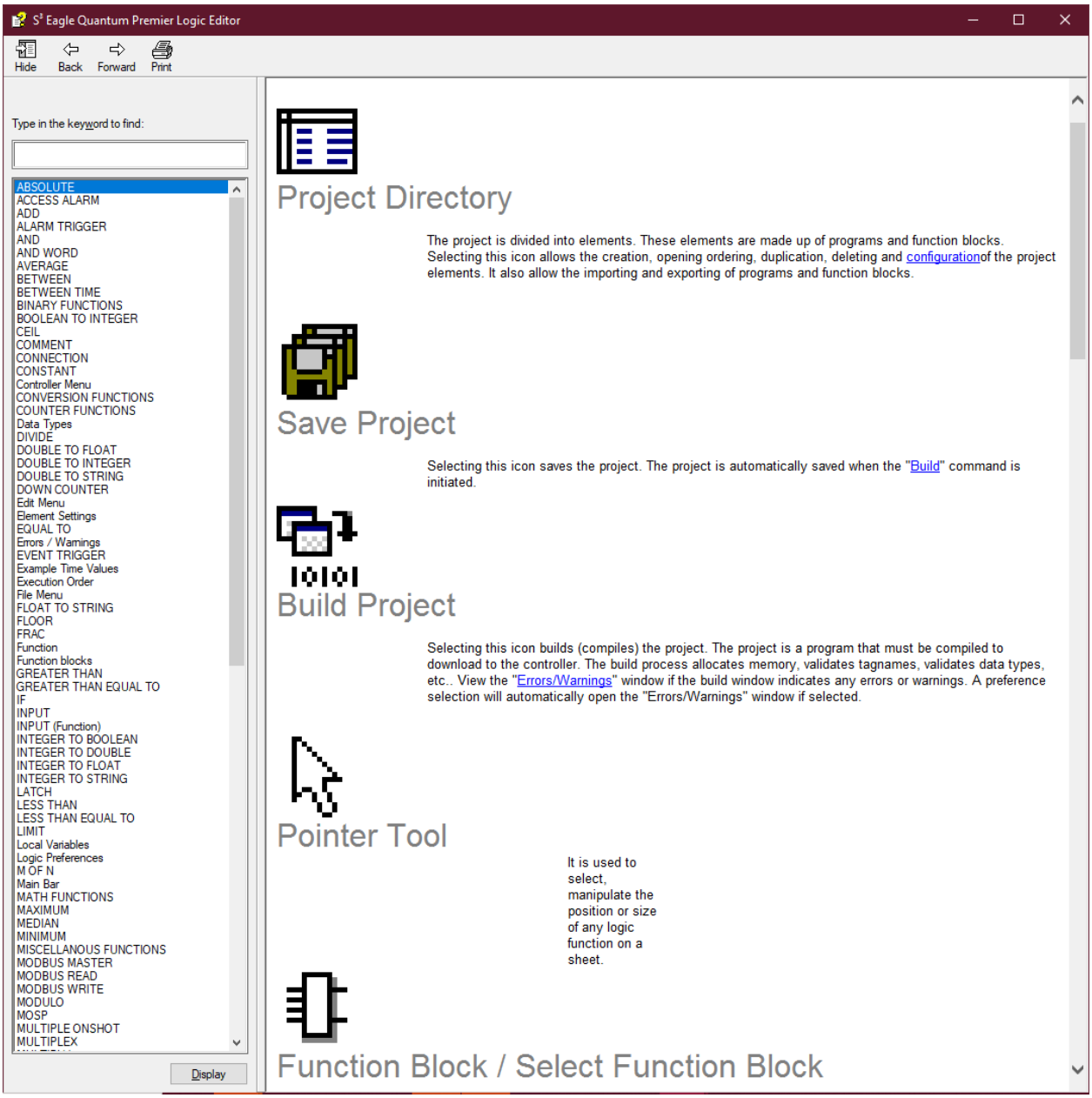
Main Window

This portion of the help system covers the description and operation of the icons in the logic editors tool bar.



Pictures of the tool bar icons are shown along with a description of their functions.

Use the Contents, Index, Back, and Print buttons below the help windows menu bar to navigate the help system and print hard copies as required.



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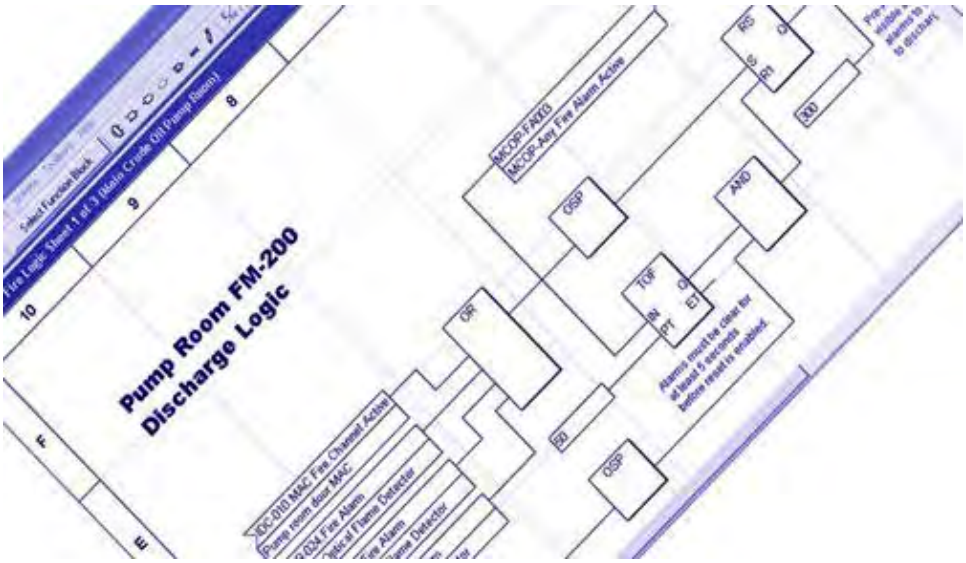
13.9 Logic Creation

13.9.1 Overview

The S³ Logic Editor provides a modern full featured IEC-61131-3 style environment to generate, test and document user programmable logic for Eagle Quantum Premier controller.

S³ utilizes the “Function Block Diagram (FBD) Language”.

FBD is a graphically oriented language that corresponds to block logic diagrams. The elements used in this language appear as blocks wired together to form logic circuits. The wires can communicate binary and other types of data between FBD elements. In FBD programming, a group of elements visibly interconnected by wires is known as a network. An FBD diagram may contain one or more networks. In the S³ programming environment these networks can span multiple sheets within a program or function block element.



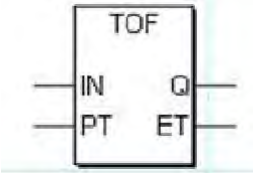
13.9.2 Definitions

13.9.2.1 Programs

Programs are the highest-level executable elements within an S³ project. Programs can invoke functions or function blocks but cannot invoke other programs. Projects are typically partitioned into multiple programs based on the operational requirements of an installation.

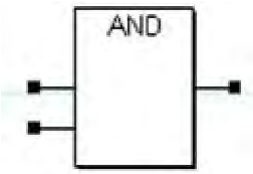
13.9.2.2 Function Blocks

In S³ a function block is an executable element that yields one or more values and is generally used to perform repetitive operations. Variables within a function block persist from one evaluation of the function block to the next, so that the values calculated for one evaluation can be used in the next. Therefore, invocation of the same function block with the same input values may not yield the same output values. Examples of such function blocks are timers and counters like the Timer OFF delay (TOF).



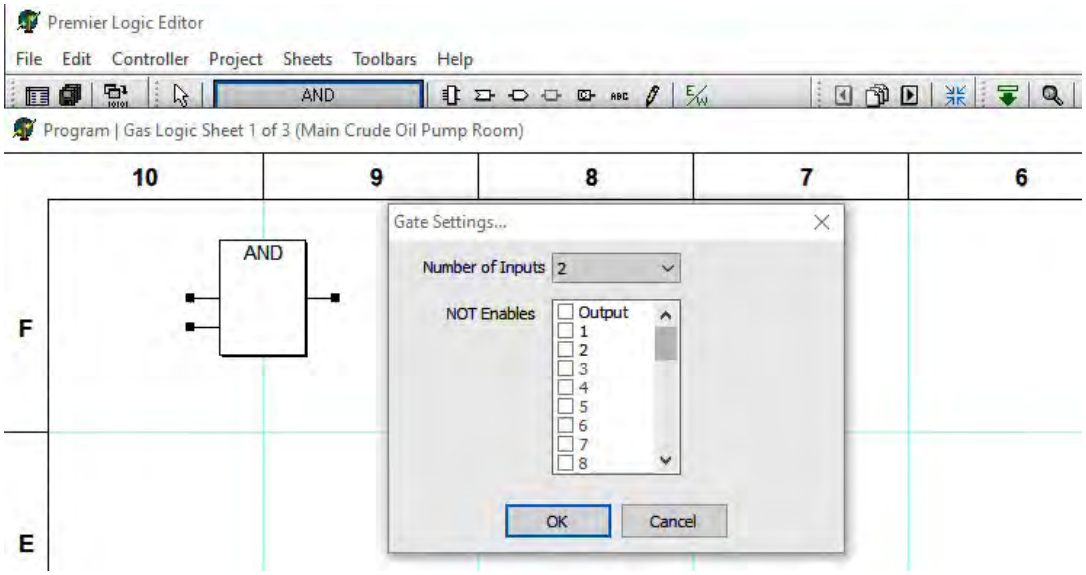
13.9.2.3 Functions

A function is an executable element that yields exactly one result. Unlike function blocks, variables in a function do not persist from one evaluation to the next. An example of a typical function is the Boolean “AND” gate. Two or more inputs are evaluated and result in a single output.



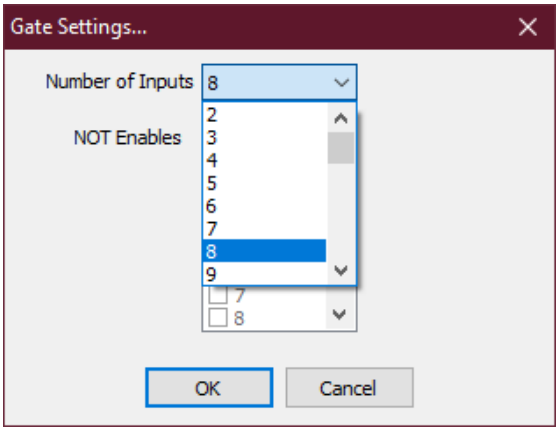
13.9.2.4 Extensible Functions

These functions have a minimum of two (2) inputs and can have a maximum of thirty-two (32). The number of inputs into the function can be adjusted by double clicking on it.

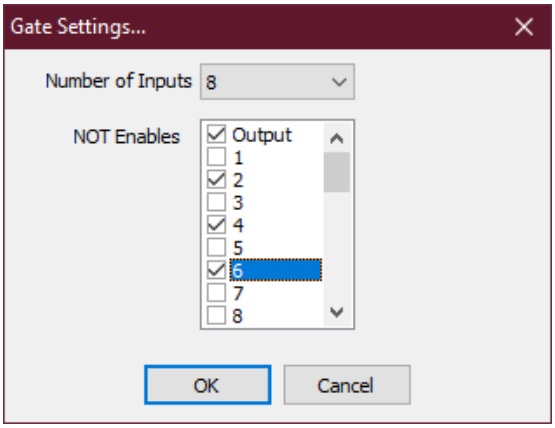


This will open a dialog box allowing the input number to be set and may allow inverting any or all inputs, as well as the output.

In the AND gate example to the right, the default of two non-inverted inputs and a non-inverted output are shown. To change the extensible number of inputs, click on the arrow to the right of the "Number of Inputs" field.

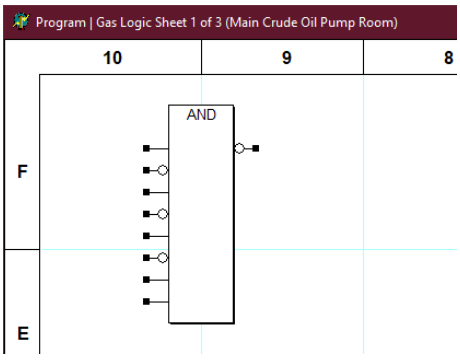


The "Gate Settings..." dialog box provides a scrolling pull-down menu from which the number of inputs can be adjusted anywhere between Two (2) and Thirty-Two (32).



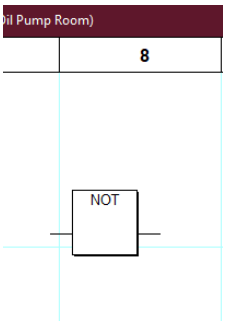
In the examples above and to the left, eight inputs were selected and then inputs Two (2), Four (4) and Six (6) were inverted by clicking on the "NOT Enable" checkbox corresponding to those inputs. In addition, the output was inverted in the same manner.

Once these selections were made, clicking on the "OK" button closes the "Gate Settings..." window and the re-configured function appears as in the example to the left.



Note the small circles on the output and input "pins". They indicate that these signals are "Inverted" from their normal state.

13.9.2.5 Non-Extensible Functions

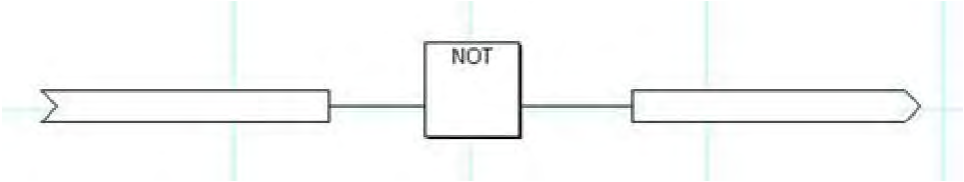


These functions have a single non expandable input. One example of a non-extensible function is the Boolean "NOT" gate, as shown in the example to the right. A single input with a single output.

13.9.2.6 Placing Logic Operators on a Sheet

To develop a program, the user must be able to use the Logic Editor to place functions, function blocks, variables, inputs, and outputs on a sheet within an element and then connect them together into viable networks.

Below is an example of one of the simplest networks possible, a non-extensible function with a single input and a single output.



To create this network, open a sheet within a created element and place the three logic operators on the sheet and connect them together.

1. All logic operators are selected via the icons on the "Gates Toolbar" shown above and described earlier in this section.

2. Click on the "Input Variable" icon on the Gates Toolbar.

3. Place the Input Variable on the sheet by positioning the mouse cursor over the sheet and clicking the left mouse button.

   The cursor will return to the "Arrow" symbol and this tool can be used to move the placed Input Variable to the desired location on the sheet. It may also be moved using the arrow keys.

4. Activate the Select Function Block button on the "Gates Toolbar" to open the "Function Selection..." dialog box.

5. Scroll down the list of available logical operators (function blocks or functions) and locate the binary "NOT" operator.

NOTE

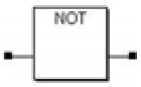
If the name of the desired operator is known, it can be located quickly by typing its name. once typing has begun, S³ will automatically reposition the scrolling list.

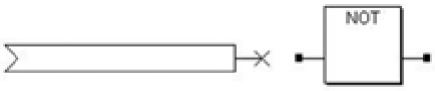
6. Select **NOT** and click "OK".

   The cursor will change to a miniature function block symbol when positioned within the drawing area of the current sheet.

7. Place the “NOT” function on the sheet by positioning the mouse cursor over the sheet and clicking the left mouse button.

   The cursor will return to the “Arrow” symbol and this tool can be used to move the placed function to the desired location on the sheet. It may also be moved using the arrow keys.

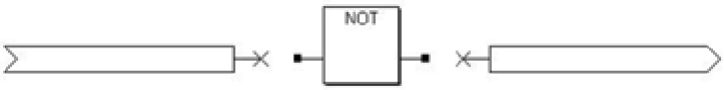




8. Click on the “Output Variable” icon on the Gates Toolbar.

   The cursor will change to a miniature output variable symbol when positioned within the drawing area of the current sheet.

9. Place the Output Variable on the sheet by positioning the mouse cursor over the sheet and clicking the left mouse button.

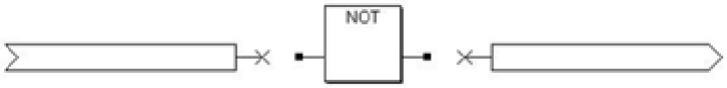


   Once all three logic operators are placed on the sheet, they must be connected before the program can be considered finished and ready to be compiled.

13.9.2.7 Connecting Logic Operators

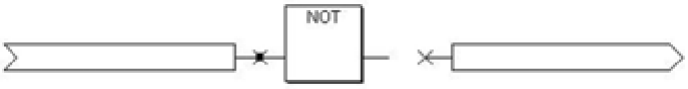
Inputs, outputs, constants, functions, function blocks, etc. can be connected to each other either directly or by using “wires”.

In the example to the right, connections must be made between the input, output and NOT gate.



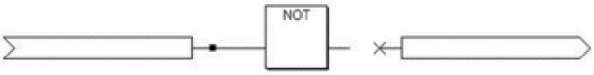
13.9.2.8 Direct Connection

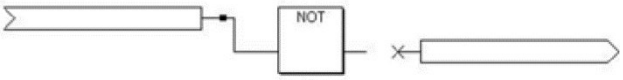
To use the “direct connect” method, use the mouse to select the Input Variable and drag it to the right until its output connector mates with the NOT gates input connector as shown below.



At this point, the S³ has linked the Input Variable to the input of the NOT gate and moving the Input Variable away with the mouse will automatically create a “wire” to keep the connection, as shown to the left. *Tip:* Right-click any function block and you can select between pointer and wire connection tool or protect the logic.

Once this connection is established, the input variable can be repositioned anywhere left of its connection point and the connection wire will change size and shape to keep the connection.

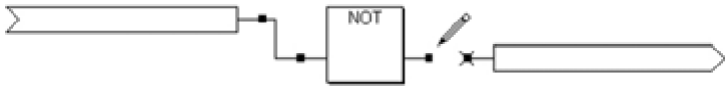




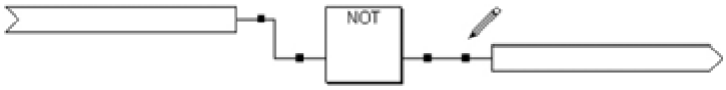
13.9.2.9 Using Wires

Click on the “Wire Tool” to activate it. The cursor changes to a miniature wire tool or pencil when it is positioned anywhere within the drawing area of the sheet. This means that wires can be drawn from one logic operator to another to connect them.

When active, the wire tool appears as in the example below. Using the wire tool, connect the output of the NOT gate to the input of the Output Variable. This will complete the drawing of this three-logic operator network.

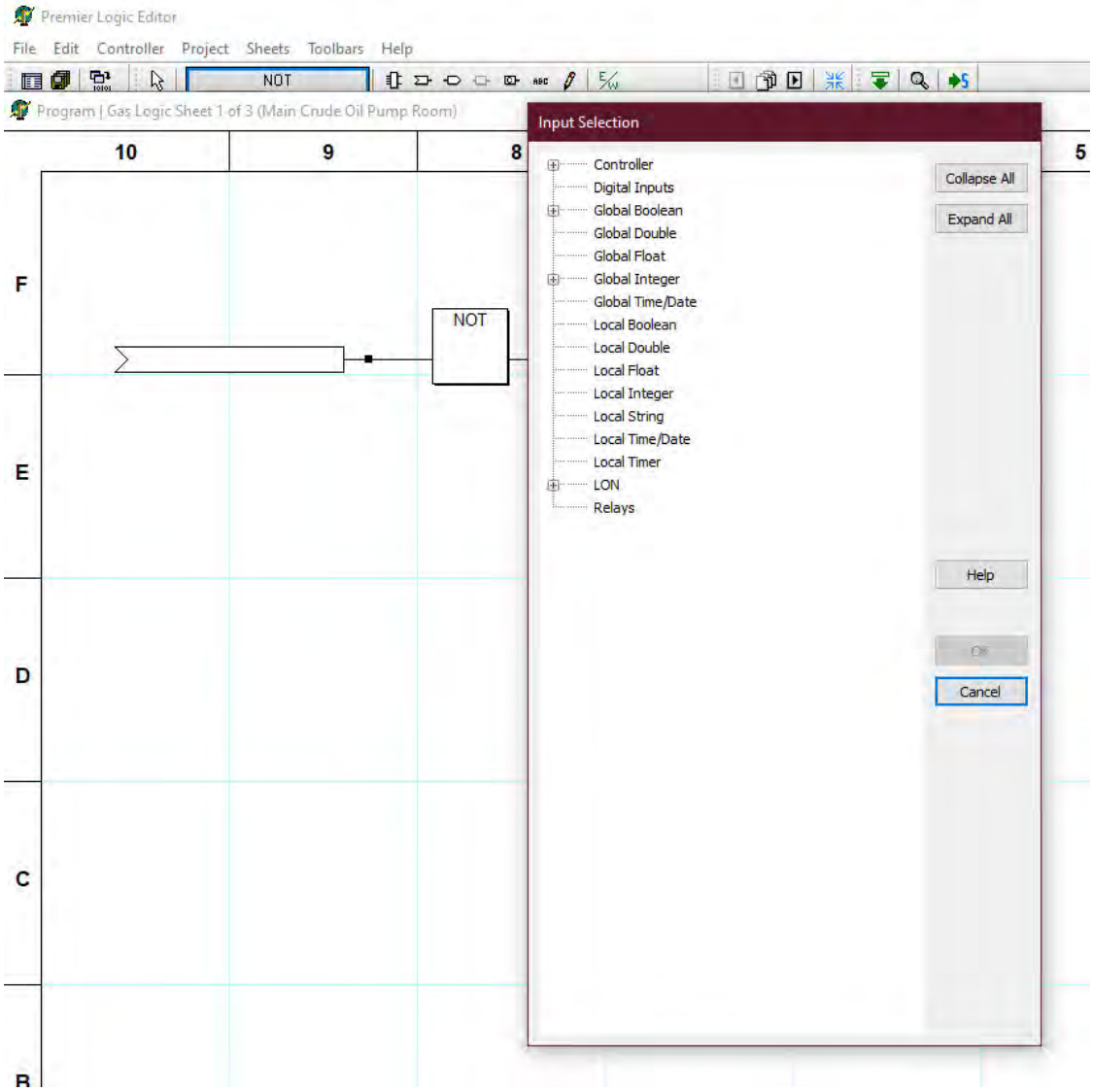


Next, the Input Variable and Output Variable must be “linked” to an appropriate I/O point or memory location in the controller.



13.9.2.10 Linking Variables

Input and output variables must be linked to compatible field device or controller memory data. Using the three-logic operator “example network” created on the previous page, double-clicking on the “Input Variable” will open the “Input Selection...” dialog box which provides access to the Eagle Quantum Premier’s database.



The “Input Selection...” dialog box presents the database as a hierarchical list of sources. Any item on the list that has a “+” before it has subordinate items and clicking on the “+” will expand the list showing all items that make up that category.

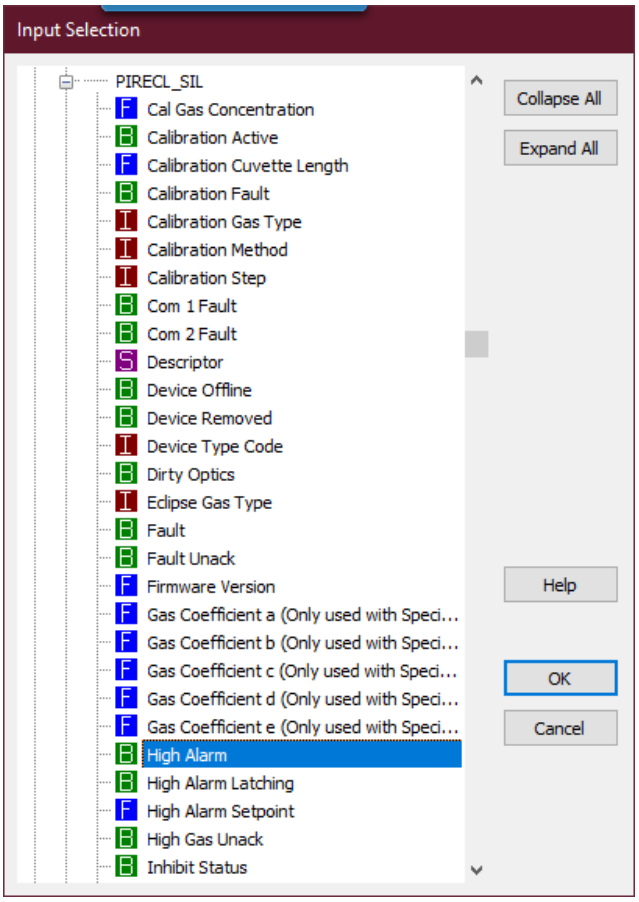
To the right of the list are two buttons that can “Collapse All” or “Expand All” subordinate items in the list for easy viewing. The first nineteen items on the list provide access to controller status information and the globals database. The “LON” item will allow access to all field device information, the “Relays” item is for accessing the controllers onboard relay status.

In the example to the right, the “LON” category has been expanded to reveal the field devices and then a Point IR Gas Detector (PIRECL) tagged “PIRECL_SIL” has been expanded. The data available for this device exceeds the window length and the list has become “scrolling” to accommodate the expanded data.

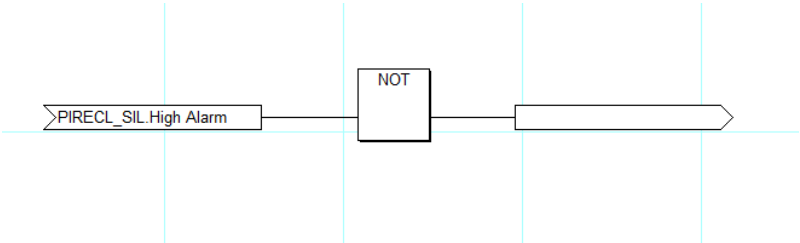
In this example, a “Boolean*” or “Binary” data element named “High Gas Alarm” has been selected by clicking on it with the mouse. Its selection is noted by its text description being highlighted.

The “block” with a letter preceding the data points name indicates the “Data Type” for that point.

The NOT gate in our example network requires a “Binary” data type for both inputs and outputs. The “High Gas Alarm” selected meets this criteria.



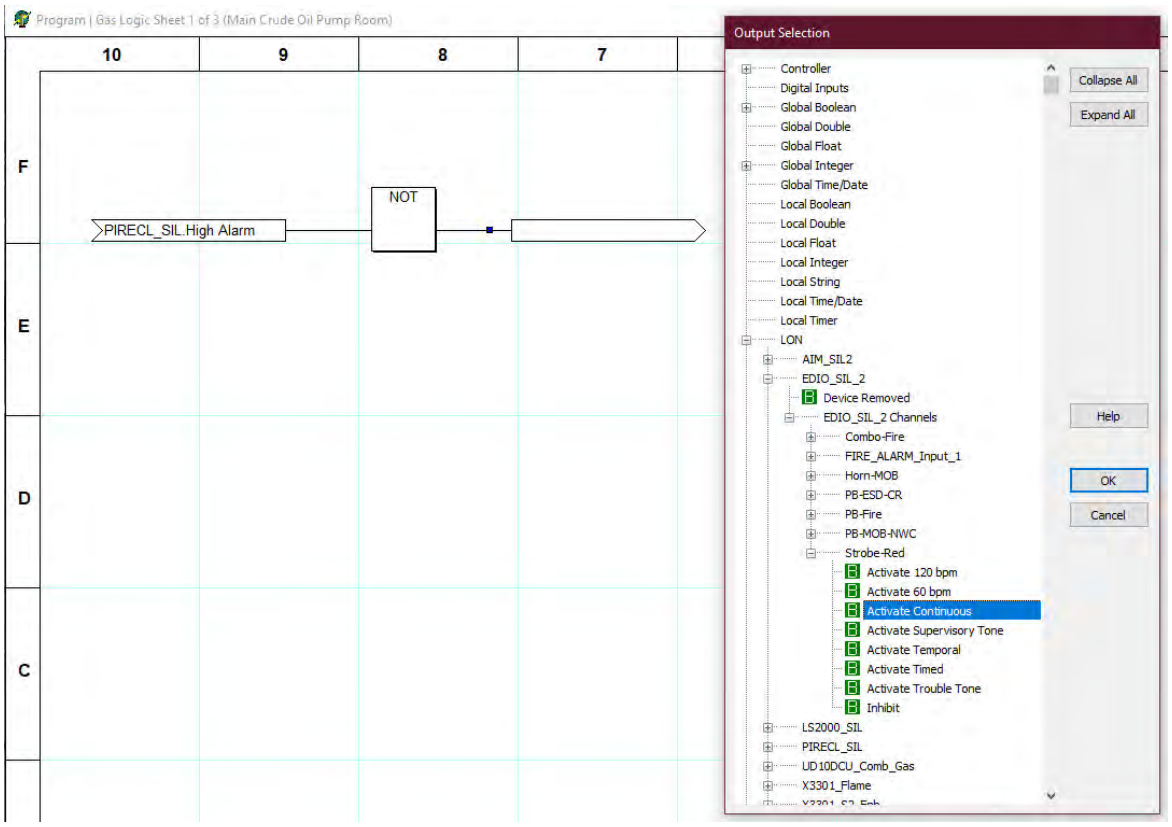
Selecting the “OK” button closes the “Input Selection...” dialog box and “links” the “PIRECL_SIL.High Alarm” to the “Input Variable” of the example logic, as shown below.



**NOTE*

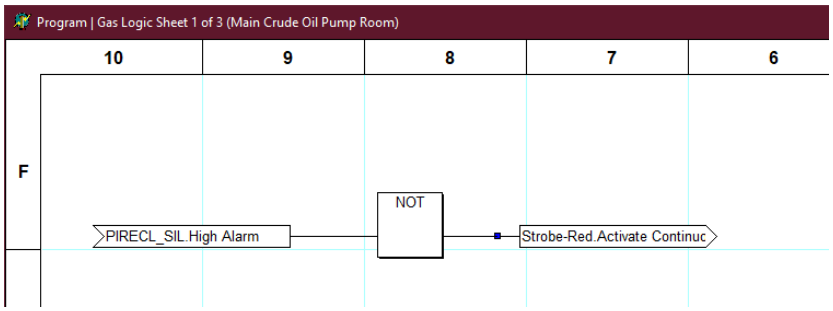
For detailed “Data type” definitions, structures, and ranges, refer to Section 13-67.

The final step in completing the example logic is to link the NOT gates output variable to an appropriate point. Double clicking on the “Output Variable” opens the “Output Selection...” dialog box.



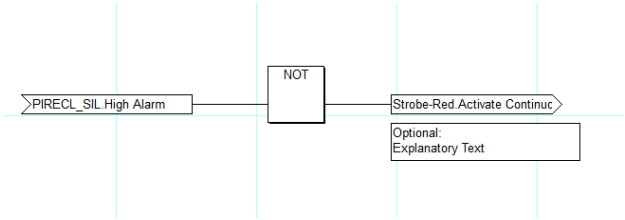
This dialog box presents the database in the same manner as described on the previous page for the input selection process.

For this example, the LON data structure has been expanded, an Enhanced Discrete IO (EDIO) Module with the tagname “EDIO_SIL_2” has been expanded, and the Binary data point “Activate Continuous” for the Lamp output has been selected. Selecting the “OK” button will close the “Output Selection...” dialog box and link this output to the output variable, as shown below.



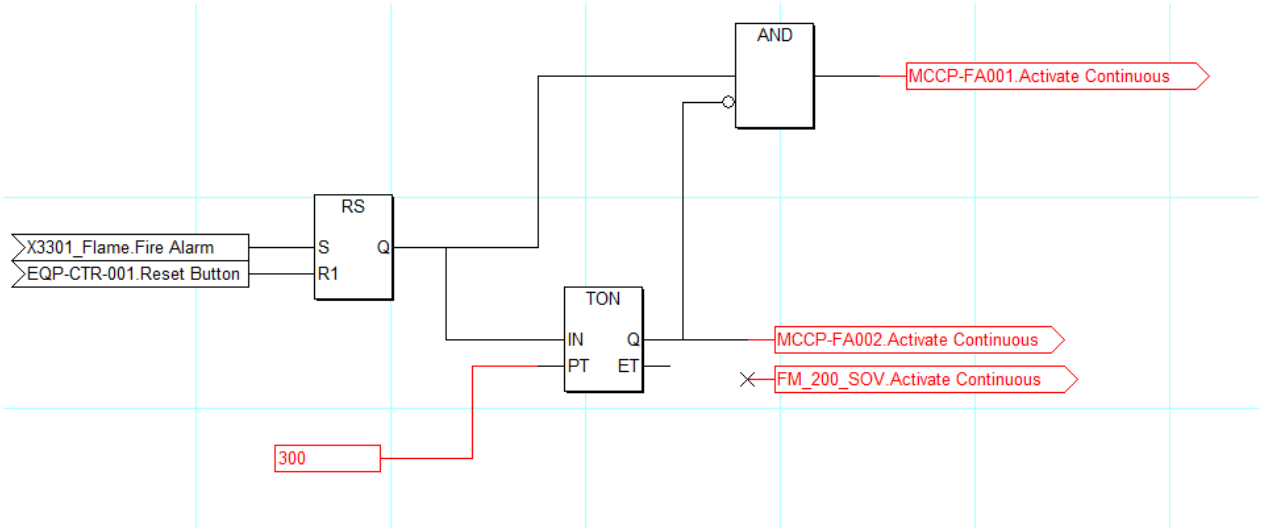
The network is now complete, when the High Gas Alarm for PIRECL_SIL goes “ON” the lamp controlled by EDIO_SIL_2 goes “OFF”.

Using the “Comment Tool” a description can be added to explain the purpose of the output.

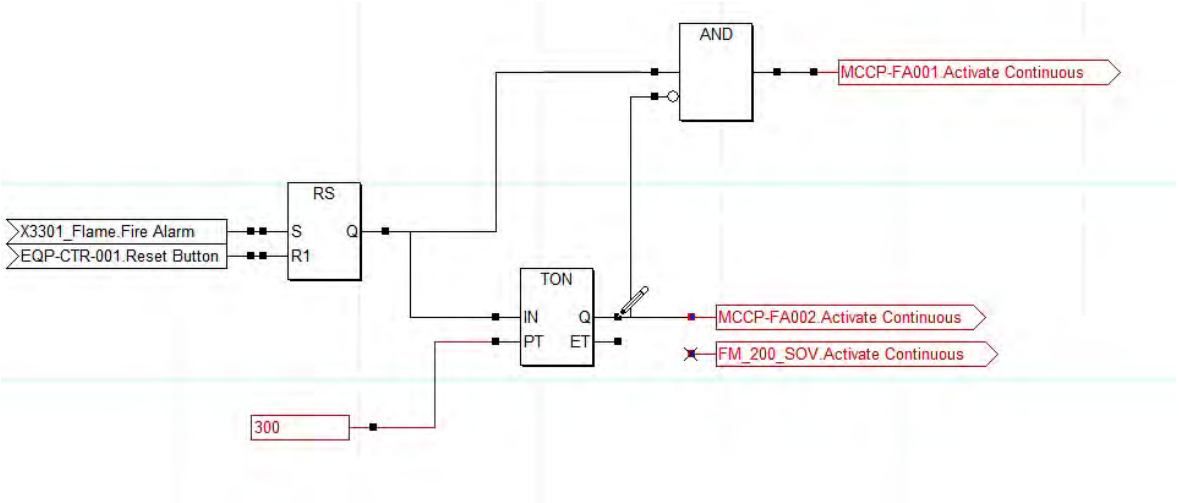


13.9.2.11 Wire-on-Wire

This type of connection is used when a single signal needs to be routed to multiple destinations as in the example below.

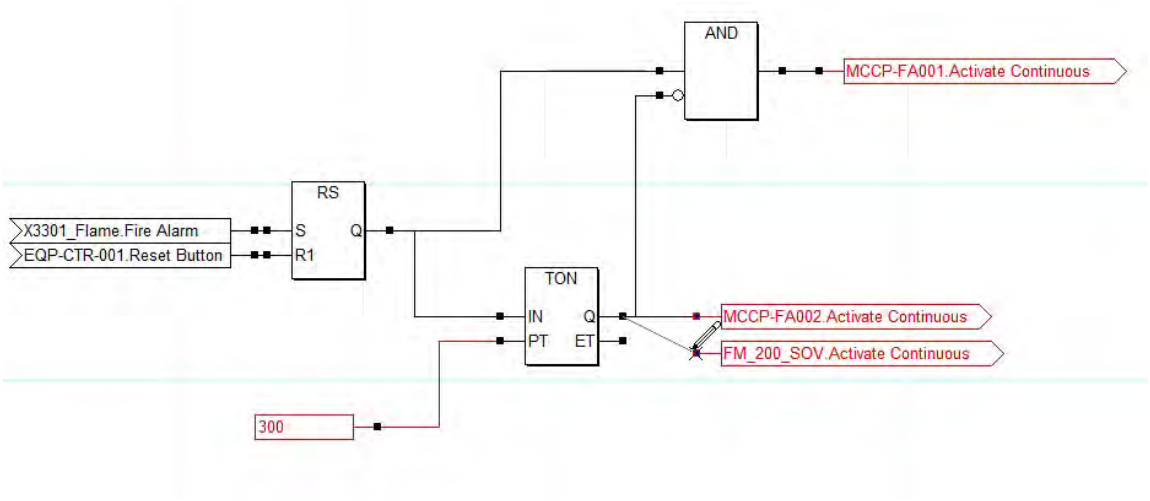


In this example, the output “Q” of a “Reset-Set (RS)” block needs to be routed to the input of an “AND” gate, to the input of a timer (TON) and to output locations on EDIO_SIL_2. The first connection to MCCP-FA001’s audible alarm is complete, the second connection to EDIO_SIL_2’s FM_200_SOV output needs to be created.

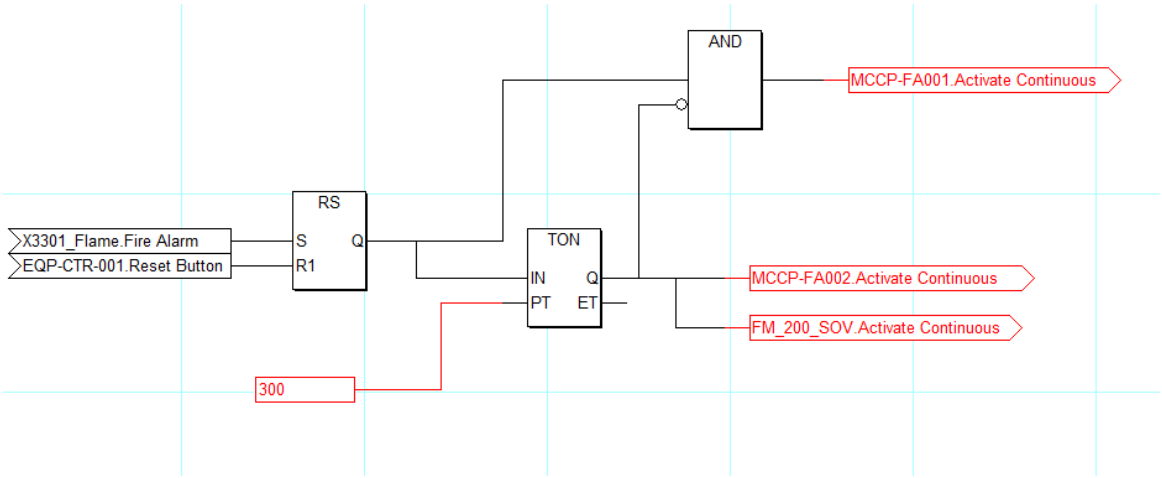


To accomplish this type of connection the “Wire Tool” is used. Select the “Wire Tool” and place it on an existing “wire” where a connection is desired.

Click to and drag to make the connection and create a wire. Draw the wire from the initial wire-to-wire connection point to the input of the desired variable.



The completed circuit will look like the example below.

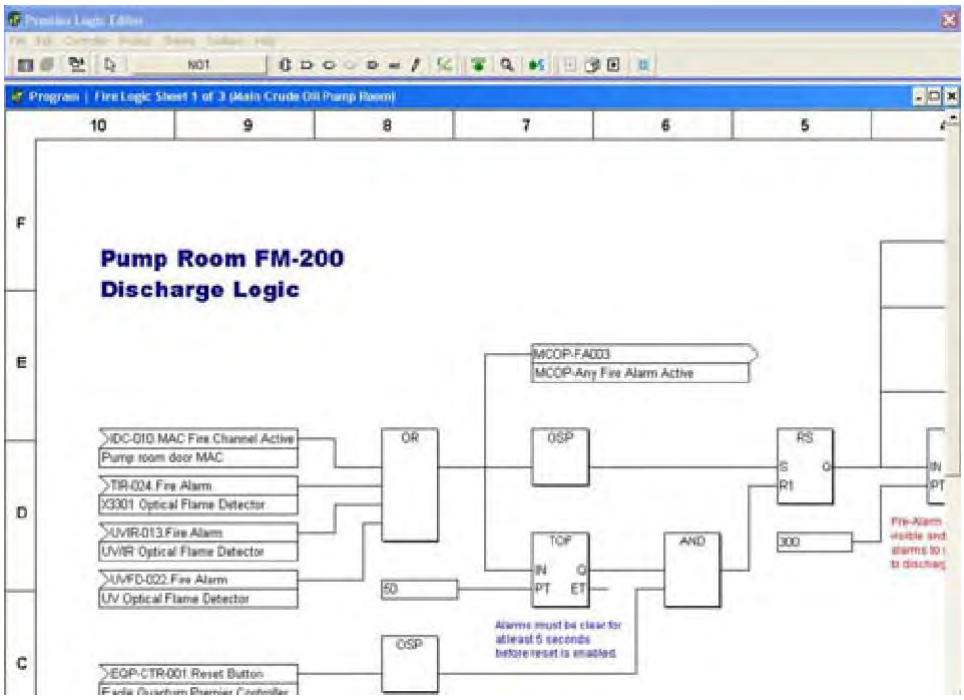


If the mouse button is released while “drawing” the wire, before completing the connection, an incomplete line segment will be created. To complete this segment, use the arrow tool to click and drag the incomplete end of the wire to its desired destination.

NOTE

Wire connections between input to input and output to output are not valid. Real I/O will not allow the connection. Internal Global I/O will allow the connection without errors but should not be used.

Combining the techniques described in the last few pages with the comprehensive standard set of S^3 functions and function blocks. Virtually any kind or complexity of logic can be created quickly and easily.

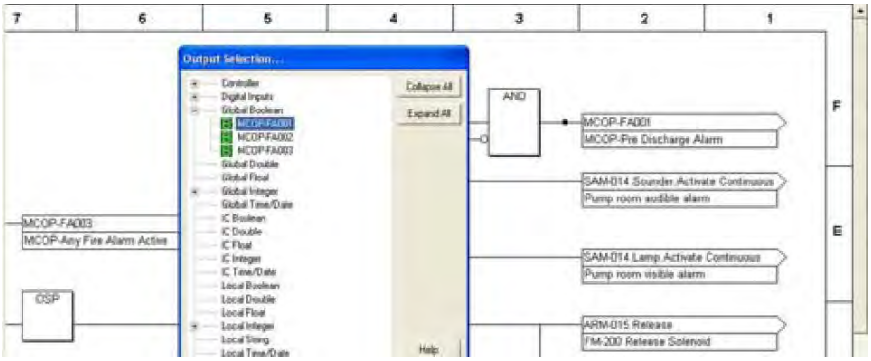


The example above utilizes a binary OR a One-Shot Pulse (OSP), a binary AND, a Reset/Set (RS) and text comments to create a portion of the protection logic for a pump room. In some cases, the complexity of the logic being designed or just the number of logic operators required may use more room than is available on the selected sheet size.

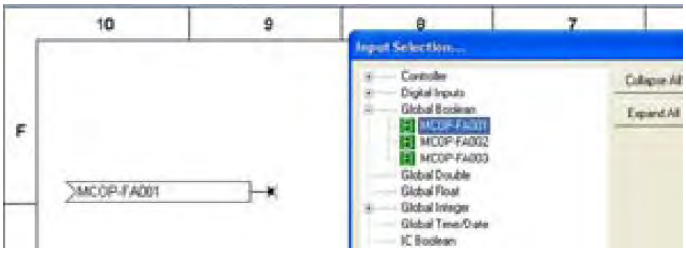
In these cases, the sheet can be made larger by selecting the “Settings” item of the “Sheets” menu. Sheet size can be increased from the minimum “A” size up to a maximum “D” size. If once the desired sheet size has been selected more room for logic is still required, information can be sent “between” the sheets in an element.

13.9.2.12 Sheet-to-Sheet Network Linking

For very complex logic situations, it may be necessary for a logic network to span more than one sheet. This is fully supported and easy to implement. By assigning an “Output Variable” to a compatible “Global Variable” memory location in the controller, the value can then be accessed on another sheet.



In the example to the below, an Input Variable was placed and linked to a global memory point “MCOP-FA001”.



The value for this point was generated on the preceding sheet where it was assigned to the global database. Once placed in the global database, the value of “MCOP-FA001” can be used as an “Input Variable” on any other sheet in the project.

13.9.2.13 Data Types

Functions and Function blocks typically require a specific data type to be attached to their input and output pins. The S^3 online help file provides detailed information on both the data type compatibility requirements as well as how each logic operator functions. Below is a definition of the available data types within the S^3 database. These types are represented as follows:

B = Boolean

I = Integer

D = Double

F = Float

S = String

T = Time/Date

13.9.2.13.1 Data Type Ranges

Name	Type	Values/Range	
Boolean	Boolean	8-bit value, 1 = True, 0 = False	
Integer	Integer	2 bytes, 16 bit value, -32,768..32,767	
Double	Double Integer	4 bytes, 32 bit value, 2,147,483,648..2,147,483,647	
Float	Real	4 bytes, 32-bit value (IEEE 754 single precision) Most positive number 3.4028E+38 Least positive number 1.1754E-38 Least negative number -1.1754E-38 Most negative number -3.4028E+38	
	NOTE *When floats are used in a comparison for equal (=), the comparison will be true if the values are within 0.01 of each other.*		
String	String	80 bytes (not supported as an I/O variable)	
Time/Date Undefined	Item ID	Data	Type
	1	Seconds (0-59)	Integer
	2	Minutes (0-59)	Integer
	3	Hours (0-23)	Integer
	4	Day (1-31)	Integer
	5	Month (1-12)	Integer
	6	Year	Integer
	When displayed as a string, the format is mm/dd/yyyy.hh:mm:ss		
Structure	Structure	A structure that does not have a fixed length	

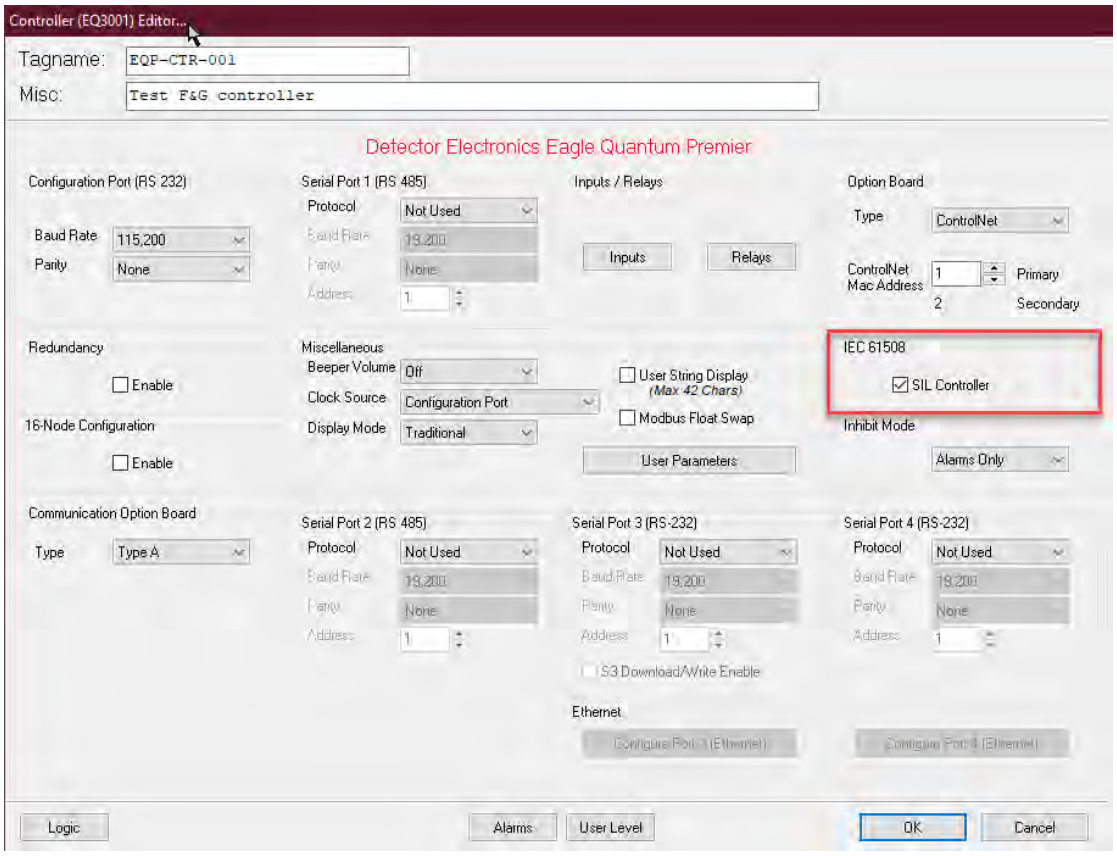
13.9.3 Creating a SIL 2 Project

NOTE

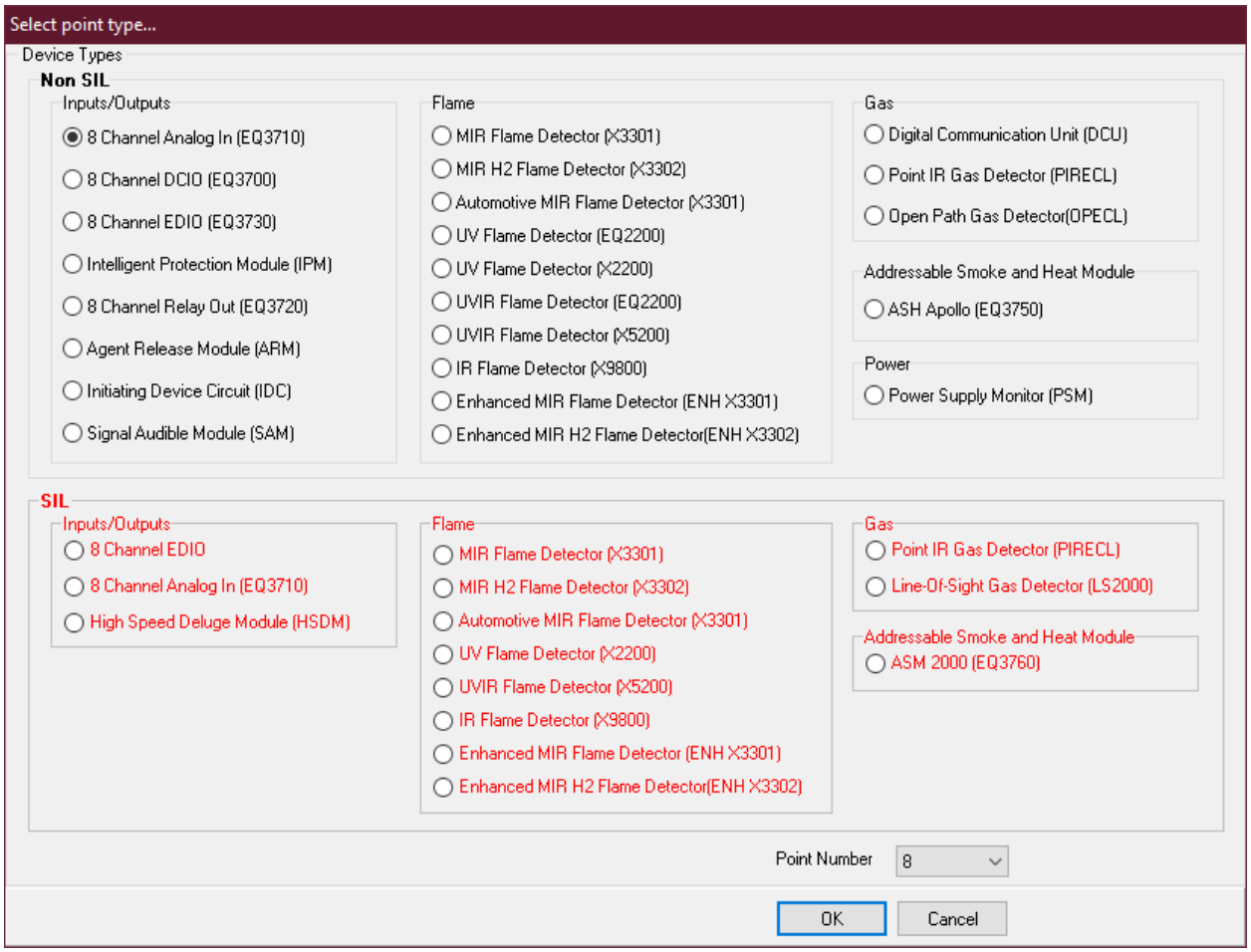
See EQP Safety Manual 95-8599 for implementing a SIL 2-capable safety system.

As specified by IEC 61508, there are 4 levels of safety performance necessary for a safe functioning system. Det-Tronics supports a SIL 2 program when using S^3 version 6.x.x.x or higher to build a project and downloading to controller version 6.xx or higher. Creating a SIL 2 project is like any other project in S^3, with a few extra steps. Follow these steps to create a SIL 2 project:

1. From the "Configure a controller…" screen, check "SIL Controller" as seen to the right.



2. From the "New Device" screen, select the desired devices for a project. Note that the SIL devices are in red.

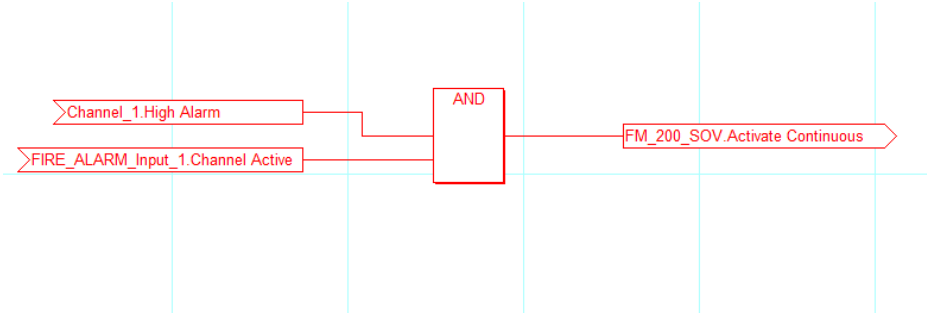


3. Once the controller is set as a “SIL Controller” and a SIL device is chosen, the screen should look like that of the figure below. If a device’s name is not in red text, then the project is not SIL 2-compliant, this is also true for the controller.

If there is difficulty reading red text on a black background, it is possible to change the background color by clicking the “Point Color” button, as seen on the example screen above.

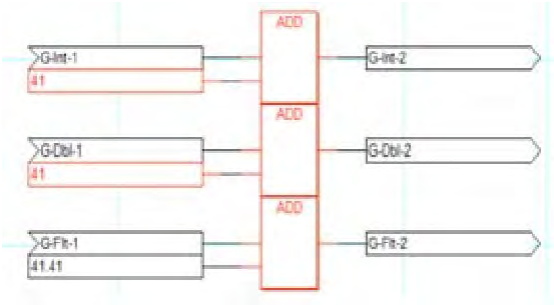
13.9.3.1 SIL Logic

The "Premier Logic Editor" within S³ is designed to make life easy for the user to create and determine if a logic program complies with SIL 2. The program or custom function block will comply with SIL 2 if all the logics in the program are red, except for the connecting paths, comments, and user defined functions. Custom user defined functions are always in black regardless of whether the function is SIL 2-compliant or not. If the plan is to include a user defined function block in a SIL 2 program, it must be manually verified as SIL 2-compliant. The figures below display some examples of SIL 2 and non-SIL 2 logic.

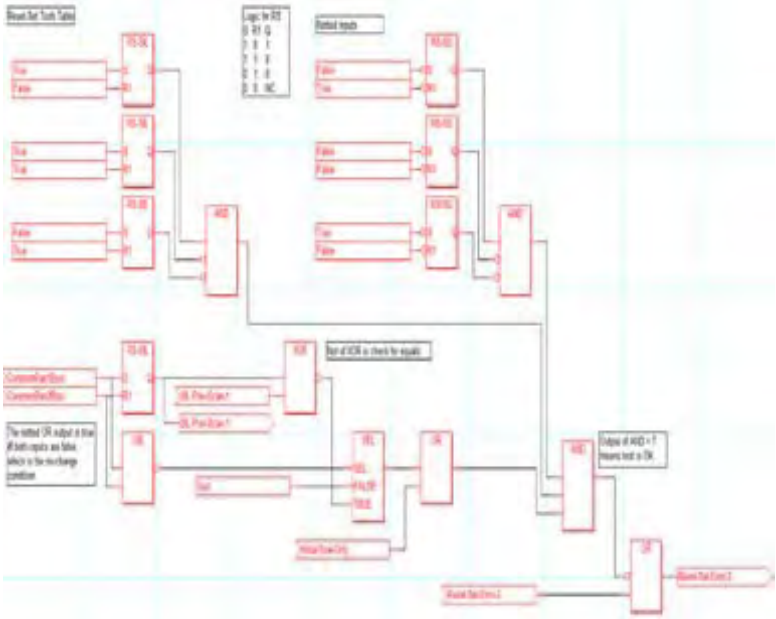


NOTE

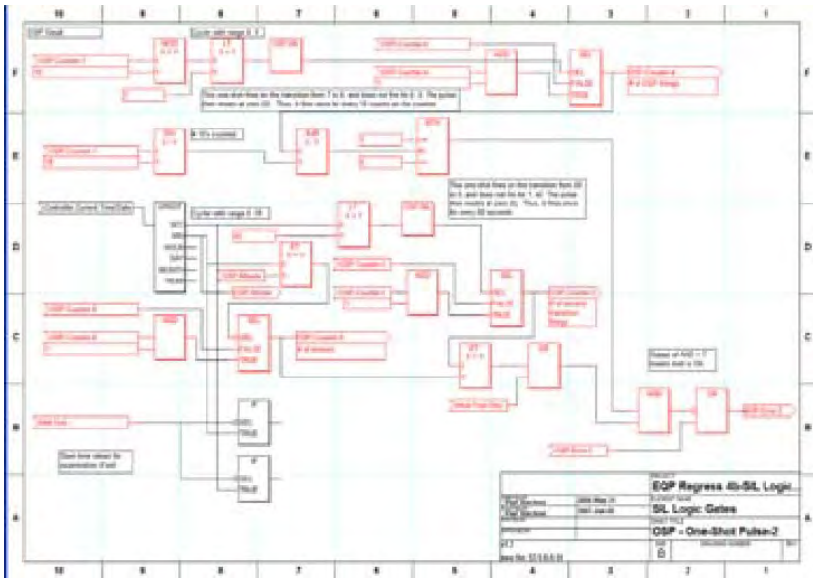
An IO channel originating from a SIL EDIO is only SIL-capable if supervision is enabled.



The above is NOT SIL 2-compliant. There are non-red colored inputs and outputs.



The above is SIL 2-compliant. Everything is colored red except the comments.



The above is NOT SIL 2-compliant. Mixed usage of black logic gates with red logic gates.

13.9.3.2 Function/Logic Gates

13.9.3.2.1 SIL Capability

SIL Capability indicates whether a gate is suitable for use within an IEC 61508 approved configuration. Gates that utilize stored values, which are not duplicated, or that depend on the floating-point or string libraries, are not safety rated. For detailed information about a gate, reference the help file for that gate in the S^3 EQP logic window. In the below table, the gates are categorized, and their SIL Capability meanings are as follows:

SIL: Item is SIL 2-capable. Function block is always RED.

False: Item is *NOT* SIL 2-capable. There is a SIL equivalent. Function block is always BLACK.

No: Item is *NOT* SIL 2-capable. There is no SIL equivalent. Function block is always BLACK.

Conditional: Item may be SIL 2-capable, provided the Controller is SIL 2-capable, and whether the inputs/outputs are from/to a SIL 2-capable source. Function block will turn RED if SIL criteria are met, otherwise BLACK.

Not Applicable: A SIL capability is not applicable to this item. Always BLACK.

S^3 Name	Logic Function	SIL Capability
ABS	ABSOLUTE	Conditional
ACCLAIM	ACCESS ALARM	No
ADD	ADD	Conditional
ALMTGR	ALARM TRIGGER	No
AND	AND	Conditional
ANDW	AND WORD	Conditional
AVE	AVERAGE	Conditional
BINT	BOOLEAN TO INTEGER	Conditional
BTW	BETWEEN	Conditional
BTWT	BETWEEN TIME	No
CEIL	CEIL	No

S³ Name	Logic Function	SIL Capability
CTD	DOWN COUNTER	False
CTD-SIL	DOWN COUNTER SIL	SIL
CTU	UP COUNTER	False
CTU-SIL	UP COUNTER SIL	SIL
CTUD	UP/DOWN COUNTER	False
CTSU-SIL	UP/DOWN COUNTER SIL	SIL
	COMMENT	Not Applicable
	CONNECTION	Not Applicable
	CONSTANT	Conditional
DIV	DIVIDE	Conditional
DBLFLT	DOUBLE TO FLOAT	No
DBLINT	DOUBLE TO INTEGER	Conditional
DBLSTR	DOUBLE STRING	No
ET	EQUAL TO	Conditional
EVTTGR	EVENT TRIGGER	No
FLR	FLOOR	No
FLTSTR	FLOAT TO STRING	No
FRAC	FRAC	No
GE	GREATER THAN EQUAL TO	Conditional
GT	GREATER THAN	Conditional
IF	IF	No
	INPUT	Conditional
INTBOL	INTEGER TO BOOLEAN	Conditional
INTDBL	INTEGER TO DOUBLE	Conditional
INTFLT	INTEGER TO FLOAT	No
INTSTR	INTEGER TO STRING	No
LE	LESS THAN EQUAL TO	Conditional
LMT	LIMIT	Conditional
LT	LESS THAN	Conditional
MAX	MAXIMUM	Conditional
MBREAD	MODBUS READ	No
MBWRT	MODBUS WRITE	No
MEDIAN	MEDIAN	Conditional
MIN	MINIMUM	Conditional
MOD	MODULO	No
MOFN	M OF N	Conditional
MOSP	MOSP	No
MUL	MULTIPLY	Conditional
MUX	MULTIPLEX	Conditional
NBITS	NUMBER OF BITS	Conditional
NOT	NOT	Conditional

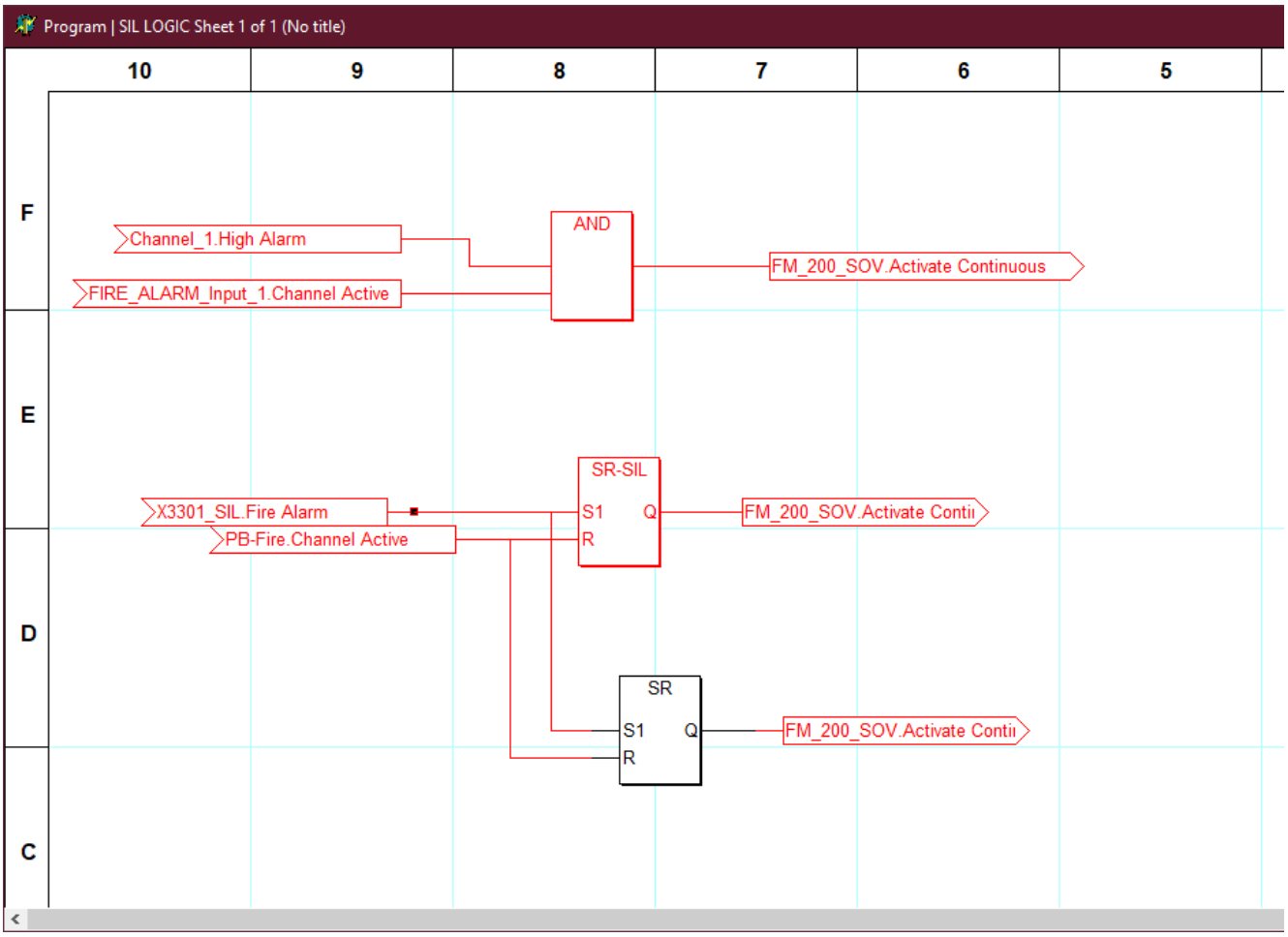
S^3 Name	Logic Function	SIL Capability
ODD	ODD	Conditional
OR	OR	Conditional
ORW	OR WORD	Conditional
OSP	ONE-SHOT	No
OSP-SIL	ONE-SHOT SIL	SIL
	OUTPUT	Conditional
PACK16	PACK 16	Conditional
PKDT	PACK DATE/TIME	No
PULSER	PULSER	No
RND	ROUND	No
RS	RESET/SET	False
RS-SIL	RESET/SET SIL	SIL
RTM	RETENTIVE TIMER	False
RTM-SIL	RETENTIVE TIMER SIL	SIL
SCALE	SCALE	No
SEL	SELECTOR	Conditional
SETCLK	SET CLOCK	Not Applicable
SQR	SQUARE	No
SQRT	SQUARE ROOT	No
SR	SET/RESET	False
SR-SIL	SET/RESET SIL	SIL
STNCPY	STRING N COPY	No
STRAPD	STRING APPEND	No
STRCPY	STRING COPY	No
STREQ	STRING EQUAL	No
SUB	SUBTRACT	Conditional
S^3 MON	S^3 MON	No
TDSTR	TIME/DATE TO STRING	No
TOF	OFF TIMER	False
TOF-SIL	ON TIMER SIL	SIL
TON	ON TIMER	False
TON-SIL	ON TIMER SIL	**SIL**
TRUNC	TRUNCATE	No
UNPK16	UNPACK16	Conditional
UPKDT	UNPACK DATE/TIME	No
XOR	EXCLUSIVE OR	Conditional
XORW	Bitwise XOR	Conditional

13.10 Device Items Reference

As described earlier, inputs and outputs to the logic must be “linked” to variables in the S^3 database for the controller in which the logic resides. When the database is “browsed” to locate the desired variable for a LON device, controller or memory location, a very large array of device “items” will be listed.

These items are listed in alphabetic order under each tagname in the database. Many of these items are common, like the standard “fire & gas” device types “Fire Alarm”, “Lo Gas Alarm” etc. Other items like “Neuron ID” and “Firmware Version” are not common.

In addition to the standard F&G alarms, each LON device, and the controller itself, have a great deal of additional status and diagnostic information that can be utilized in logic. The following pages of this user guide provide a reference to over 300 of these “Device Items” so that the programmer can determine whether they could be used to enhance the user program being worked on.



13.10.1 Item Descriptions

Bool = Boolean, Int = Integer

R = Read only, W = Write only, R/W = Read or Write

Description	Data Type	User Type	R/W	Description
Abort Calibration	Bool	Control	W	This control item is used to abort the calibration sequence.
AC Failed	Bool	Fault	R	The field device sets this item to indicate missing AC power input.
AC Fault Threshold	Int	Status	R	This is the AC fault threshold value for alarming.
Acknowledge (LED State)	Bool	Status	R	This bit tracks the state of the controller Acknowledge LED.
Acknowledge Button (True for min of one logic scan)	Bool	Status	R	This item tracks the state of the acknowledge button on the controller faceplate and is intended for use by user logic.
Activate 120 bpm	Bool	Control	W	Setting this control item instructs the field device output to turn on in the 120-bpm mode.
Activate 60 bpm	Bool	Control	W	Setting this control item instructs the field device output to turn on in the 60-bpm mode.
Activate Acknowledge (Edge triggered, self-clearing)	Bool	Status	W	Setting this control bit activates the controller acknowledge status bit, LED, and silences the internal beeper. The LED and status bit will stay true until the controller is reset. However, the beeper will resound if new alarms are received. The controller clears this control bit after the action is taken.
Activate Beacon	Bool	Control	W	For the Apollo ASM, this activates the beacon on a Loop Powered Beacon loop device.
Activate Continuous	Bool	Control	W	Setting this control item instructs the field device output to turn on in the continuous mode.
Activate Fire Alarm	Bool	Control	W	Setting this control item in the controller activates the fire alarm output. When this bit is set in a field device the output signals the temporal fire alarm pattern.
Activate High Gas Alarm	Bool	Control	W	Setting this control item in the controller activates the high gas alarm output.
Activate Low Gas Alarm	Bool	Control	W	Setting this control item in the controller activates the low gas alarm output.
Activate Relay 1	Bool	Control	W	For the Apollo ASM, this activates the Relay on an Input/Output Unit and on a Switch Monitor Input/Output Module and activates the Opto Output on a Switch Monitor Plus.
Activate Relay 2	Bool	Control	W	For the Apollo ASM, this activates Relay 2 on an Input/Output loop device. This item is currently not used.
Activate Relay 3	Bool	Control	W	For the Apollo ASM, this activates Relay 3 on an Input/Output loop device. This item is currently not used.

Description	Data Type	User Type	R/W	Description
Activate Remote LED	Bool	Control	W	For the Apollo ASM, this activates the remote LED on a loop device.
Activate Reset	Bool	Control	W	Setting this control item instructs the controller to send a reset command to the field device.
Activate Silence (Edge triggered, self-clearing)	Bool	Control	W	Setting this control bit activates the controller silence status bit and LED. The LED and status bit will stay true until the controller is reset. The controller clears this control bit after the action is taken.
Activate Sounder	Bool	Control	W	For the Apollo ASM, this activates the sounder on one of the Sounder loop devices.
Activate Supervisory	Bool	Status	W	Setting this control bit activates the controller supervisory output, status bit and LED. The output, LED and status bit will stay true until the controller is reset. The controller clears this control bit after the action is taken.
Activate Supervisory Tone	Bool	Control	W	Setting this control bit will cause the field device output to output the supervisory pattern.
Activate Temporal	Bool	Control	W	Setting this control item instructs the field device output to turn on in the temporal mode.
Activate Timed	Bool	Control	W	Setting this control item instructs the controller to activate an output in the timed mode.
Activate Trouble Output	Bool	Control	W	Setting this control item in the controller activates the trouble output. When this bit is set in a field device the output signals the trouble pattern.
Activate Trouble Tone	Bool	Control	W	Setting this control bit will cause the field device output to output the trouble pattern.
Activate Walk Test	Bool	Control	W	This is the control to start and stop the walk test.
Activation Time	Int	Status	R	The output hold on time can be set with this variable.
ADC Saturation	Bool	Fault	R	The Open Path receiver and receiver are too close together.
AIC Enabled	Bool	Status	R	This enables the Automatic Integrity Check for the ASM loop devices.
Alarm Direction High (1 = alarm above, 2 = below)	Int	Status	R	This item determines if an alarm should be signaled as the signal level is increasing or decreasing. If this item is set to 1 the alarm will be active while the signal is above the threshold. If this item is set to 2 the alarm will be active while the signal is below the threshold.
Alarm Direction Low (1 = alarm above, 2 = below)	Int	Status	R	See 'Alarm Direction High'.
Alarm Hold Timer	Int	Status	R	First used with the X3301A Automotive detector. Refer to the X3301 Automotive specification for details on this parameter.
AM/PM (False = AM, True = PM)	Bool	Status	R	This variable is intended for use by user logic to determine the time of day, 1 equals PM and 0 is AM.
Analog Value	Int	Status	R	This represents the process variable for Apollo loop devise.

Description	Data Type	User Type	R/W	Description
Battery Current	Float	Status	R	This variable represents the battery charge or discharge current level. Positive values indicate battery charging while negative values represent battery discharge.
Battery Fault	Bool	Fault	R	The field device sets this item to indicate a fault with the battery.
Beam Block	Bool	Fault	R	The Open Path receiver has been blocked of all flash events.
Beam Block Delay (Default = 60)	Int	Fault	R	The beam block delay is used with Open Path. This is the amount of time that must go by before a blocked beam fault is declared. The delay is configurable from 1 minute to 60 minutes.
Beeper Status	Int	Status	R	The status of the internal audible beeper is reflected with this variable.
Beeper Volume (1..4 Off, low, med, high)	Int	Status	R	The volume level of the internal beeper can be adjusted with this variable. Values from 1 (lowest) to 4 (highest) are allowed.
Bin Disable	Bool	Status	R	A field device sets this status bit to indicate that the bin fire detection mode is disabled.
Blinding IR Fault	Bool	Fault	R	0
Blinding IR Fault Enabled	Bool	Status	R	Disables the Blinding IR Fault from being activated
Blocked Sensor Fault	Bool	Critical	R	The Oi returns for 1 or more sensor is below 3%
Blocked Sensor Fault Enabled	Bool	Status	R	Disables the Blocked Sensor Fault from being activated
Cal Active at Start	Bool	Fault	R	This fault is active when the switch input, which pin 13 on the terminal board, is closed during power up. This fault is not active for a reed switch closure at startup.
Cal Gas Concentration (20 to 100% LEL) (Default = 50)	Float	Status	R	The allowable range is from 20% to 100% with 50% as the default.
Calibration Active	Bool	Status	R	Field devices set this bit to indicate that the sensor calibration process is active.
Calibration Cuvett Length (1.0 to 150.0 mm) (Default = 150)	Float	Status	R	1.0 to 150.0 mm, default 150mm
Calibration Fault	Bool	Fault	R	This bit is set when a fault is detected during the calibration process.
Calibration Gas Type	Int	Status	R	Calibration gas type is selected with this code.
Calibration Level	Float	Status	R	This variable determines the calibration point for the 4 to 20 ma input. Valid values are in the range of 20 to 100% of full scale.
Calibration Method	Int	Status	R	standard or Cuvett
Calibration Step	Int	Status	R	This item is used to indicate the calibration step. Each device type can define the meaning of each step.
Channel Active	Bool	Status	R	This item tracks the state of an I/O channel.

Description	Data Type	User Type	R/W	Description
Channel Active Unack	Bool	Status	R	This is a flag that is used for any channel of a multi-channel field device. When a new channel active event occurs, the channel active unacknowledged flag is set for that field device. When the Acknowledge button on the Controller is pressed, the channel active unacknowledged flag is cleared for the channel of that field device.
Channel Fault Warning	Bool	Fault	R	This is a fault that is associated with each channel of a multi-channel field device. This item is activated when there is any fault that affects the channel, whether it is a channel-level fault or a device-level fault.
Channel Open	Bool	Fault	R	This item indicates when an I/O channel is open.
Channel Shorted	Bool	Fault	R	This item indicates when an I/O channel is shorted.
Channel Type	Int	Status	R	This variable can be tested to determine channels type. See Section 13.10.1.1.
Com 1 Fault			R	Each field device contains two network relays used to isolate network wiring faults. A status item is provided for each relay and is set when the fault isolation circuitry has detected and isolated a wiring fault.
Com 2 Fault	Bool	Fault	R	See 'Com 1 Fault'.
Comm. Option Board Fault	Bool	Fault	R	This item is used to signal a fault with the communications option board. This fault is true when the communications option board is missing, or the wrong board type is selected/installed.
Communication Option Board Type	Int	Status	R	This configuration item determines what type of Communication Option Board is attached.
Config Port Relay Control	Bool	Status	R	This status item is used to control a relay that switches the configuration port serial line from a primary controller to a secondary controller. The item goes true when the serial line should be connected to the secondary controller. The serial line is normally directed to the master controller except during the configuration process. In user logic this bit should be connected to one of the controller relays. The normally open contacts of the two relays (one from each controller) should be paralleled together to drive an external relay that switches the Rx and Tx comm lines.
Configuration Port Baud Rate	Int	Status	R	The Serial baud rate for the configuration port can be read with this variable. A code is used to represent each rate (0-7). See Section 13.10.1.2.
Configuration Port Parity	Int	Status	R	The configuration port parity setting can be read with this variable. A code is used to represent each type.
Consecutive Failed Oi Tests for Fault (3-1000, Default = 3)	Int	Status	R	This configuration parameter determines how many consecutive Oi tests must fail before a fault is generated.

Description	Data Type	User Type	R/W	Description
Control Message Fault	Bool	Fault	R	Control messages are LON messages sent from the Controller to field devices to turn on outputs, such as an EDIO output channel. Control messages are an acknowledged type of message, which means that if an acknowledgement does not come back from the field device, the Controller will send the message again. The Controller will retry up to 3 times, with an acknowledge wait time of about 200ms. The control message is transmitted from the controller every 20 seconds or immediately when there is a change in the state of an output channel. The control message timer in the field device is reset every time a control message is received. If the field device does not receive a control message within 2 minutes, a control message fault is triggered for that field device.
Controller Display Mode	Int	Status	R	European approvals (EN54) and China approval bodies require specific information to be displayed by the controller. Approval requirements also specify modes of operation that differ from Premier's traditional operation. This item is used to select the proper mode of operation. This list may grow over time to fulfill requirements from different markets.
Controller Fault	Bool	Fault	R	This fault LED is set when the Controller is reset due to a Watch Dog Reset. This may also be caused by a short, momentary loss of power. It may only be cleared by a power cycle.
Controller Inhibit Mode	Bool	Status	R	In Alarms only mode, the inhibit feature inhibits only the alarms. The Alarms and Fault Mode inhibits all faults that trigger the Controller fault relay as well as alarms. The Alarms and Fault Mode also complies with EN54.
ControlNet Mac Address (1..99) Default value = 17	Int	Status	R	The ControlNet MAC address is set with this variable. Values range from 1 to 99.
CPU Fault (the "OR" of many internal faults)	Bool	Critical	R	The item indicates a problem with a processor or memory system. The cause of this fault is device dependent.
Critical Voltage Fault	Bool	Fault	R	For the HSDM, if the power supply voltage falls below 17V, the inputs are no longer monitored.
Current Time/Date (Real Time Clock)	TimeDate	Status	R	The controller real time clock can be set or read with this variable.
Day of Week (1=Sunday, 7 = Sat)	Int	Status	R	This variable is intended for use by user logic to determine the day of week, the value is 1 for Sunday and 7 for Saturday.
DCU Type Code (1 = Ex, 3 = Universal)	Int	Status	R	See the DCU section for a description of this variable.
Descriptor	String	Status	R	User defined 42-character null-terminated string.
Detection Disabled	Bool	Critical	R	This item is used to indicate that a detectors ability to detect a fire is disabled. First used with the X3302 detector.

Description	Data Type	User Type	R/W	Description
Device Download Active	Bool	Fault	R	The controller sets this variable while it is downloading configuration information. A new diagnostic has been added to version 17.xx of the Controller. First navigate to the Download Active item in the Controller properties menu. Then press the Enter button. The menu will display the last 100 network variable selector numbers that were downloaded to field devices, along with the corresponding LON address and timestamp.
Device Offline	Bool	Critical	R	Three offline items are provided for enhanced fault diagnostics. The controller maintains offline timers for every device on the network. The controller sets the LON x device offline item when it has not received messages from the device on that channel, A or B. The device offline fault item is set when both LON A and B offline bits are set (totally offline). The controller will not attempt to talk to devices that are offline. The items are automatically cleared when status messages are received.
Device Removed	Bool	Status	R/W	The user sets this bit when the device has been removed from the system. Configuration information shall be retained in the controller to allow the device to be added later. If the removed bit is set when program mode is exited, the status will be saved during a power cycle. This item is used to tell the controller a device has been removed from the network. The controller will signal the “Extra LON Device” fault if the device is on-line when the removed item is set.
Device Type Code ()	Int	Status	R	Each device type has a unique code associated. See table in Sect.13.10.1.3 for Device Type Codes.
Diminished Detection	Bool	Fault	R	This item is used to signal that a detector has diminished detection ability. First used with the X3302 detector.
Dirty Optics	Bool	Critical	R	A device sets this item to indicate that the optics need to be cleaned.
Display Text Line 1	String	Status	R	This variable holds the ASCII text string on the controller faceplate.
Display Text Line 2	String	Status	R	This variable holds the ASCII text string on the controller faceplate.
Display Text Line 3	String	Status	R	This variable holds the ASCII text string on the controller faceplate.
Display Text Line 4	String	Status	R	This variable holds the ASCII text string on the controller faceplate.
Drift Warning Flag	Bool	Fault	R	This is a fault warning when an Apollo detector has drifted beyond the allowable range.
DSB Alert	Bool	Control	W	For the Apollo loop, this command activates the alert tone for DSB devices.
DSB Alert with Beacon	Bool	Control	W	For the Apollo loop, this command activates the alert tone and the beacon for DSB devices.

Description	Data Type	User Type	R/W	Description
DSB Beacon Only	Bool	Control	W	For the Apollo loop, this command activates only the beacon.
DSB Evacuate	Bool	Control	W	For the Apollo loop, this command activates the evacuate tone for DSB devices.
DSB Evacuate with Beacon	Bool	Control	W	For the Apollo loop, this command activates the evacuate tone and the beacon for DSB devices.
DSB Global Alert	Bool	Control	W	Discovery Global Command to sound all general alert tone
DSB Global Alert with Beacon	Bool	Control	W	Discovery Global Command to tun on all beacons with alert tone
DSB Global Beacon Only	Bool	Control	W	Discovery Global Command to tun on all beacons
DSB Global Evacuate	Bool	Control	W	Discovery Global Command to sound all evacuate tone
DSB Global Evacuate with Beacon	Bool	Control	W	Discovery Global Command to tun on all beacons with evacuate tone
Earth Fault	Bool	Fault	R	For some of the Apollo addressable loop devices, this is like a ground fault.
Eclipse Gas Type	Int	Status	R	This field can be read to determine the Eclipse gas type. See Section 13.10.1.4.
Enable Heater Control	Bool	Control	W	This item is used to control the optics heater from user logic. This allows the user to disable the heater when AC power is lost.
Engineering Full Scale Value	Float	Status	R	Full scale range corresponds to the 20-ma value on the sensor input. For example, if 20 ma equates to 900.0 MPH of air flow, the engineering zero value should be set to 900.0.
Engineering Zero Value	Float	Status	R	Zero range corresponds to the 4-ma value on the sensor input. For example, if 4 ma equates to 10.0 MPH of air flow, the engineering zero value should be set to 10.0.
Extra LON Device	Bool	Fault	R	This item is used to signal that the controller has detected an extra device on the LON.
Extra Loop Device	Bool	Fault	R	For the ASM, it is used to signal that the ASM module has detected an extra loop device on the loop.
Fault	Bool	Fault	R	The controller performs a logical OR of all field device faults to control this item.
Fault Unack	Bool	Status	R	This is a flag that is used for any field device that has a fault attribute. When a new fault event occurs, the fault unacknowledged flag is set for that field device. When the Acknowledge button on the Controller is pressed, the fault unacknowledged flag is cleared for that field device.
Fire Alarm	Bool	Alarm	R	Fire alarm is indicated with this item. For the controller, this item represents the state of the fire alarm LED and relay.

Description	Data Type	User Type	R/W	Description
Fire Alarm Unack	Bool	Status	R	This is a flag that is used for any field device that has a fire alarm attribute. When a new fire alarm event occurs, the fire alarm unacknowledged flag is set for that field device. When the Acknowledge button on the Controller is pressed, the fire alarm unacknowledged flag is cleared for that field device.
Firmware Version	Float	Status	R	The firmware version is represented as a floating-point number. In multi-processor units like the Eclipse and X3301 this represents the version of the software running on the main processor, not the neuron chip.
First Scan (True during the first logic scan)	Bool	Status	R	This item is intended for use within user logic, it is true only during the first scan of user logic after program mode is exited.
First Stage Alarm	Bool	Alarm	R	First alarm output from a X3301A Automotive detector.
Flash Fire	Bool	Alarm	R	A field device sets this status bit to indicate that it has detected a flash type fire.
Flash Fire Detection Enabled	Bool	Status	R	Enables the 3-second detection from indicating an alarm
Full Scale Value (Value = 80)	Int	Status	R	The Engineering unit full scale value is configurable and must match the current rating of power supply monitor. Only one model has been defined, 80 Amp, with a range of -16 Amps to +80 Amps.
Gas Coefficient a (Only used with Special Gas Type)	Float	Status	R	Used for programming a special gas type.
Gas Coefficient b (Only used with Special Gas Type)	Float	Status	R	Used for programming a special gas type.
Gas Coefficient c (Only used with Special Gas Type)	Float	Status	R	Used for programming a special gas type.
Gas Coefficient d (Only used with Special Gas Type)	Float	Status	R	Used for programming a special gas type.
Gas Coefficient e (Only used with Special Gas Type)	Float	Status	R	Used for programming a special gas type.
Gas Diode Gain	Int	Fault	R	This is the current setting of the programmable amplifier used for the Open Path gas sensors. The setting may be a value from 1 through 7.
Gas Mode	Int	Status	R	Gas Mode is used to determine if static logic should activate high and low gas alarms. When mode 1 is selected, static logic will activate the controller gas alarms. Mode 2 should be used for non-gas detector inputs.
Ground Fault -	Bool	Fault	R	A device sets this item to indicate a ground fault on the negative side of the power supply.

Description	Data Type	User Type	R/W	Description
Ground Fault +	Bool	Fault	R	A device sets this item to indicate a ground fault on the plus side of the power supply.
Hangar Mode/Sustained Fire Mode	Bool	Status	R	This mode is designed to ignore momentary or flash fires, such as an engine's backfire, a propane heater's ignition flash, or the application of ignition to a starting turbine engine. Response times between 6 – 10 seconds are normal, depending on sensitivity setting, fire size, and distance. Not available with Hi Speed, Automotive, or Persistent detection mode.
Heater Power (0 to 100%)	Int	Status	R	This configuration parameter determines what percent of power will be used for the optics heaters.
High Alarm	Bool	Alarm	R	High alarm is indicated with this item. For the controller, this item represents the state of the high gas alarm LED and relay, if programmed for the alternate function.
High Alarm Deadband (Eng units)	Float	Status	R	This item determines the amount of deadband that should be used for the high alarm.
High Alarm Latching (1 = latching)	Bool	Status	R	When this configuration variable is set, high alarms are latched until the unit is power cycled or a reset command is issued.
High Alarm Setpoint	Float	Status	R	Alarm setpoints must be within the limits listed on the DCU type code table. Alarm determination is done at the DCU not the controller. However, user logic could be created within the controller to allow for many more alarm levels.
High Energy Fault	Bool	Fault	R	A field device sets this status bit to indicate that high energy was detected for a sustained period.
High Gas Unack	Bool	Status	R	This is a flag that is used for any field device that has a high gas attribute. When a new high gas event occurs, the high gas unacknowledged flag is set for that field device. When the Acknowledge button on the Controller is pressed, the high gas unacknowledged flag is cleared for that field device.
HSSL Communication Fault	Bool	Fault	R	This item is true when the master controller loses communication with the standby controller.
I/O Hardware Fault	Bool	Critical	R	This fault bit is set when hardware diagnostics detects a hardware related problem. First used with the EDIO-SIL device.
Inhibit Control	Bool	Control	W	Setting this control item instructs the controller to inhibit the device or channel associated with this item. Clearing the item will remove the inhibit. Inhibit control and status resides in the controller, not the field devices. Only the primary alarm or input status is affected. Inhibits do not trigger a fault condition. When a device or a channel is inhibited, the controller will illuminate one of two LEDs. When inputs are inhibited the Inhibit led will be activated and when an output channel is inhibited the Out Inhibit led will be activated. Inhibits can be controlled from S^3, user logic or from the faceplate. To change the inhibit state from the faceplate, navigate to the "Control Inhibit" property for the

Description	Data Type	User Type	R/W	Description
				device or channel and press the enter button, inhibit control will toggle. Resetting the controller or field device will not change the inhibit state. Inhibits will persist through a download as long as the same device type remains at the address. Inhibits will be lost during a loss of power or after a watchdog reset. For SIL-rated devices, the master inhibit controller must be enabled to allow inhibits to activate. See static logic function for controller digital input #4 for more information. For the HSDM, since the actual inhibit control is at the HSDM, the inhibit command needs to be refreshed periodically in case of a power cycle on the HSDM. The inhibit command is sent every 20 seconds.
Inhibit Status	Bool	Status	R	This item is set when a device or channel has been inhibited.
Integrity Check Active	Bool	Status	R	This is active if the Integrity Check is active on any loop device.
Integrity Check Fault	Bool	Fault	R	For Apollo addressable loop devices, this is active when the integrity check has failed.
Internal Comm Fault	Bool	Critical	R	A device sets this item to indicate that a fault has occurred in the communications between the LON and host processors.
Internal Voltage Fault	Bool	Critical	R	This fault bit is set when hardware diagnostics detects a problem with one of the internal power supplies. First used with the EDIO-SIL device.
Invalid Configuration	Bool	Fault	R	This item is set on new units, when the address is changed, or when invalid data is transferred to the device. A valid configuration must be downloaded to clear the item.
Invalid Device Parameter	Bool	Fault	R	This item is used to signal that a device configuration is invalid. First used with the X3302 detector. See Test Results for the EQP System and T mode.doc for more details. There is a mismatch between the configuration that is held in the NFP LON Interface and the sensor.
IR Automatic Oi Fault	Bool	Fault	R	This item is set when the field device fails an automatic optical integrity test on the IR detector.
IR Manual Oi Fault	Bool	Fault	R	The field device sets the item to indicate that a manual Oi test failed.
IR Sensitivity ()	Int	Status	R	This value can be tested to determine the detectors IR sensitivity – see table in Section 13.10.1.5.
Last Direction 0 = A, 1 = B	Bool	Status	R	The controller has two LON channels A and B. In normal operation, both channels receive status messages from all devices. However, during network fault conditions messages will only be received from one side. This item indicates the last side status information was received from. This along with the offline bits can be used in determining the location of a network break. When the bit has a

Description	Data Type	User Type	R/W	Description
				value of 0, channel A was the last side, a value of 1 indicates channel B was the last side.
Latching Alarm LED ()	Bool	Status	R	0 = non-latching output. 1 = latching output.
Logic CheckSum (was Unique Configuration Number)	Double	Status	R	Each configuration will be assigned a unique number by the configuration software. This can be used to identify the configuration.
Logic Engine Fault	Bool	Critical	R	The controller sets this variable true when a fault is detected in the user program.
Logic Error Code	Int	Status	R	If the controller detects an error in user logic, an error number is stored in this item. See table in Section 13.10.1.6 for a list of codes.
Logic Error Reference Number	Int	Status	R	If the controller detects an error in user logic, the last trace number is stored in this item.
Lon A Counter	Double	Status	R	Within the controller object, this status variable holds the number of heartbeat messages received. Resetting the controller will also reset this counter. When this variable is used with a field device it shows the number of received status messages. The counters are helpful for diagnosing wiring problem on the Lon network.
LON A Interface Fault	Bool	Fault	R	This bit is set when a problem is detected with LON interface channel A. This is considered more of a hardware fault. Normally, fault injection is needed to trigger this fault.
LON A, Device Offline	Bool	Fault	R	This item is set when the controller has not recently received status messages from the device on the first Lon channel.
LON Address	Int	Status	R	Each device on the LON network must have a unique address. Valid controller addresses are in the range of 1 to 4. Field device addresses are in the range of 5 to 250. Primary controllers will set this variable to 1 while secondary controllers will have a value of 2 which is determined by the redundancy cable. User logic and external interfaces can use this variable to determine which controller is currently the master.
LON B Counter	Double	Status	R	Within the controller object, this status variable holds the number of heartbeat messages received. Resetting the controller will also reset this counter. When this variable is used with a field device it shows the number of received status messages. The counters are helpful for diagnosing wiring problem on the Lon network.
LON B Interface Fault	Bool	Fault	R	This bit is set when a problem is detected with LON interface channel B.
LON B, Device Offline	Bool	Fault	R	This item is set when the controller has not recently received status messages from the device on the second Lon channel.

Description	Data Type	User Type	R/W	Description
LON CPU Memory Fault	Bool	Critical	R	A field device sets this status bit to indicate that it has detected a problem with the memory used with the LON CPU.
LON Diagnostic Fault	Bool	Fault	R	The controller will issue this fault when the percent of missed status messages from a device is greater than 10% from both channels. This fault only applies when both the Controller and the device are SIL versions. The percentage of missed status messages is recalculated every 5 minutes.
LON Fault	Bool	Fault	R	A LON Fault is triggered by either of 2 mechanisms; loss of heartbeat messages or a low DC voltage. HEART BEAT The Controller sends heartbeat messages out both LON communication channels every 250ms. This means that heartbeat messages are sent out on Com 1 and received by Com 2 and heartbeat messages are sent out on Com 2 and received by Com 1. Each channel manages the transmission and reception of these messages independently. Each channel has a 5-second timeout timer. When a channel receives a heartbeat message, the 5-second timer is reset back to 5 seconds. If either channel receives no heartbeat messages within a 5-second period, a LON Fault is triggered. LON VOLTAGE A 15V DC bias is set on the Com 1 channel to detect ground faults and is also monitored on the Com 2 channel for correct polarity. If the voltage measured on Com 2 falls below 10 Volts or the polarity is reversed, a LON Fault is triggered. A LON Fault is typically caused by either an open wire on the LON or the A and B terminals wired backwards. An intermittent LON Fault can be caused by loose wiring or interference on the LON cables.
LON Ground Fault	Bool	Fault	R	When this item is true, the controller has detected a ground fault.
LON Overload Fault	Bool	Fault	R	This item is used to indicate that user logic is attempting to write more data to LON output devices then the LON can accommodate.
LON Pattern Test	Bool	Critical	R	This fault bit is set when the LON pattern message is incorrect or missing. Periodic end-to-end LON test patterns are used to detect faults in LON transceivers and buffers within the LON field loop, particularly in Network Extenders. A walking one in a field of zeros and a walking zero in a field of ones test is used. The test data size is 16 bytes. The message pattern alternates between two patterns. The first pattern is a walking 1 in the first 8 bytes and a walking zero in the second 8 bytes. The second step uses a walking zero in the first 8 bytes and a walking one in the second 8 bytes. The test is stopped when a LON fault is detected and restarted one minute after the fault is repaired. Normally, the test message is sent every 10 seconds. The test message is transmitted in only 1

Description	Data Type	User Type	R/W	Description
				direction, out from the Com 1 side and received at the Com 2 side. The test message can be viewed with a LON network protocol analyzer. The network selector value for the variable is 0x1038. The LON pattern fault is triggered 2 different ways; 1) if there is a single occurrence of a corrupted LON pattern test message this can be caused by a Network Extender regenerating the message incorrectly 2) if a LON pattern test message is not received by the Controller 8 times in a row there are certain disturbances on the LON, such as series resistance in 1 wire of a LON channel, where messages may make it through the channel in 1 direction, but not in the opposite direction since the LON pattern test messages are transmitted in only 1 direction, this may happen.
LON Rogue Device	Bool	Fault	R	There are 2 methods used to determine if there is a rogue device. The first method uses a 5-minute period to count the number of status messages that the Controller receives from each field device. Since the Controller knows how often status messages are expected, it can calculate the percentage of status messages received for a 5-minute period. If the percentage is over 150%, a rogue device fault is triggered. If there are 2 devices at the same address, there will be twice the number of status messages than expected (200%). The second method checks for the correct status message ID. If the ID does not match the expected value, a rogue device fault is triggered right away.
Loop Device Fault	Bool	Critical	R	This is the general fault indication when a loop device has any fault.
Loop Device ID Number (DEC)	Int	Status	R	This is the ID number assigned to Apollo loop devices by DEC. See table in Section 13.10.1.7.
Loop Device Offline	Bool	Fault	R	This item provides the status of the loop device offline, or loop device missing, at 2 different levels; at the ASM module level (main point display) and at the ASM loop level (sub point display).
Low Alarm	Bool	Alarm	R	Low alarm is indicated with this item. For the controller this item represents the state of the low gas alarm LED and relay, if programmed for the alternate function.
Low Alarm Deadband (Eng units)	Float	Status	R	This item determines the amount of deadband that should be used for the low alarm.
Low Alarm Latching (1 = latching)	Bool	Status	R	When this configuration variable is set, low alarms are latched until the unit is power cycled or a reset command is issued.
Low Alarm Setpoint	Float	Status	R	Alarm setpoints must be within the limits listed on the DCU type code table. Alarm determination is done at the DCU not the controller. However, user logic could be created within the controller to allow for many more alarm levels.

Description	Data Type	User Type	R/W	Description
Low Gas Unack	Bool	Status	R	This is a flag that is used for any field device that has a low gas attribute. When a new low gas event occurs, the low gas unacknowledged flag is set for that field device. When the Acknowledge button on the Controller is pressed, the low gas unacknowledged flag is cleared for that field device.
Low Level Detection Enabled	Bool	Status	R	Enables the low-level detection from indicating an alarm (applies only to VH sensitivity)
mA Range High (0..24 mA)	Float	Status	R	This value defines the full-scale point for a 4 to 20 mA input channel. A typical value would be 20.0.
mA Range Low (0..24 mA)	Float	Status	R	This value defines the low/zero point for a 4 to 20 mA input channel expressed in mAs. Typical values would be 0.0 or 4.0.
Manual Oi Test Started	Bool	Status	R	The field device sets the item to indicate that a manual Oi test has started. The bit is self-clearing when the test completes.
Manufacture Date	Date	Status	R	Date of device manufacture.
Master Controller	Bool	Status	R	This item is set true when the controller controls the LON outputs, master mode. A controller in standby mode (hot back-up) will clear this item.
Memory Fault	Bool	Critical	R	When this item is true, a fault has been detected in the memory system.
Modbus Float Swap	Bool	Status	R	This is a selection for the Controller. If selected, any Modbus floating point values are swapped. This means that the least significant word is swapped with the most significant word when the data is moved from Modbus memory to global memory or from global/local memory to Modbus memory.
Narrow Oi Return	Int	Status	R	The Oi count is available from any 2-board X3301/2 that is configured as an Enhanced type.
Neuron Firmware ID (8 Chars max)	String	Status	R	The controller automatically polls LON devices for an ID string. The ID string contains an abbreviated device name and firmware version. As an example, “DCU 3.01” is the ID string for a DCU. The first three characters hold the device ID, and the last 5 characters hold the firmware version. In multi-processor units like the Eclipse and X3301 this represents the version of the software running on the neuron chip. For the controller, this variable holds the version of the main program, not the neuron firmware. Firmware version is used to determine device type and available functionality.
New Fire Alarm	Bool	Status	R	The bit is set for one scan of logic when new alarms occur. This is intended for resounding silenced alarms in user logic.
New High Gas Alarm	Bool	Status	R	The bit is set for one scan of logic when new alarms occur. This is intended for resounding silenced alarms in user logic.
New Low Gas Alarm	Bool	Status	R	The bit is set for one scan of logic when new alarms occur. This is intended for resounding silenced alarms in user logic.

Description	Data Type	User Type	R/W	Description
New Supervisory Alarm	Bool	Status	R	The bit is set for one scan of logic when new alarms occur. This is intended for resounding silenced alarms in user logic.
New Trouble	Bool	Status	R	The bit is set for one scan of logic when new alarms occur. This is intended for resounding silenced alarms in user logic.
No Oi High Energy Fault	Bool	Status	R	A field device sets this status bit to indicate that the No Oi High Energy Fault is true.
Noise Fault	Bool	Fault	R	This is an interference fault. It does not typically occur by itself.
Non-Ratio Mode Fault	Bool	Fault	R	A field device sets this status bit to indicate that a non-ratio mode fault occurred.
OEM Device Code	Int	Status	R	This code is used to synchronize software features to a customer. This item can only be set at the factory by the controller final test fixture. It is not part of the user configuration.
Open Lamp	Bool	Critical	R	A device sets this item to indicate an open lamp fault.
Open Loop	Bool	Fault	R	This indicates that there is an open wire on the ASM smoke loop.
Option Board Fault	Bool	Fault	R	The controller sets this item true when a fault is detected in the controller option board.
Option Board Type	Int	Status	R	This variable defines the type of option board installed.
OS Queue Overflow Fault	Bool	Critical	R	This indicates when the LON 0 or LON 1 high priority queue overflows.
Out of Range High Fault	Bool	Fault	R	This item comes true when the analog input reading is above the “Out of Range High Level”.
Out of Range High Level (0 to 24mA)	Float	Status	R	This value defines the high-level current threshold for the out-of-range high fault.
Out of Range Low Fault	Bool	Fault	R	This item comes true when the analog input reading is below the “Out of Range Low Level”.
Out of Range Low Level (0 to 24mA)	Float	Status	R	This value defines the low-level current threshold for the out-of-range low fault.
Output Inhibit	Bool	Status	R	This controller sets this status variable when any outputs are inhibited, this includes the controller and field device outputs.
Output Logic	Int	Status	R	This is the Output Logic configuration of a HSDM channel. This defines which input channels activate which output channels.
Power Fail 1	Bool	Fault	R	This controller sets this status variable when low voltage is detected on the power input #1.
Power Fail 2	Bool	Fault	R	This controller sets this status variable when low voltage is detected on the power input #2.
Power Supply Fault	Bool	Fault	R	A device sets this item to indicate a fault on the power supply.
Power-up	Bool	Status	R	This bit is set during the power up time delay.

Description	Data Type	User Type	R/W	Description
Process Variable	Float	Status	R	Normalized process variable holds the analog value read from the device as a floating-point value. For devices with adjustable ranges, values are calculated by using the zero and full-scale range values.
Process Variable (Raw)	Int	Status	R	Raw process variable holds the analog value read from the device as an integer value. For devices with adjustable ranges, values are calculated by using the zero and full-scale range values. When the raw integer format is used, values are in the range of 0 to 4095.
Program Mode	Bool	Critical	R	This bit is set while the Controller is in program mode, else it is cleared.
Pulse Sounder	Bool	Control	W	For the Apollo ASM, this pulses the sounder on a one of the Sounder loop devices.
PV Change Deadband	Float	Status	R	The process variable dead-band can be adjusted with this variable. This is only used during “Online” operation and is expressed as a percentage of full scale. When the host computer instructs the controller to operate in online mode the controller sends exception messages to the host computer when device variables change. However, many analog values are constantly changing which may cause an abundance of unneeded messages. The “PV Change Dead-band” variable is provided to limit how often the value is sent. The value must change by the “PV Change Dead-band” amount or more for the value to be sent.
PWM Fault	Bool	Critical	R	This fault bit is set when hardware diagnostics detects a hardware problem with the PWM (Pulse Width Modulator). First used with the EDIO-SIL device.
Quick Fire	Bool	Alarm	R	A field device sets this status bit to indicate that it has detected a quick type fire.
Quick Fire Enable	Bool	Status	R	Setting this configuration parameter enables quick fire detection method.
Redundancy Enable	Bool	Status	R	This item determines if the controller is part of a redundancy pair. The system will fault if redundancy is selected, and the controllers are not working together. This item should be set to 0 on non-redundant systems and 1 for a primary redundant controller.
Redundancy Fault	Bool	Fault	R	This item indicates a fault has been detected with redundancy. See the Redundancy Fault Code (item 291) for details on the cause of the fault.
Redundancy Fault Code	Int	Status	R	This value (0-20) can be used to determine the cause of a Redundancy fault. See table in Section 13.10.1.8.
Request Manual Switch	Bool	Control	W	This control item is only used with a redundant controller configuration. When this bit is set in a Master controller a switch to the standby controller is

Description	Data Type	User Type	R/W	Description
				initiated. The switch will only occur if the standby controller is online and in a healthy state.
Reset Button (True for min of one logic scan)	Bool	Status	R	This item tracks the state of the Reset button on the controller faceplate and is intended for use by user logic. This item also goes TRUE when digital input 1 is configured for the reset function and is activated, or the activate reset item is set from S^3. This item is latched by the Controllers static logic until the current logic scan is complete. If the faceplate-reset button is still pressed at the end of the scan, the variable will be held TRUE for the next scan.
Resistance Value	Int	Status	R	The resistance value of a HSDM channel.
Rogue Loop Device	Bool	Fault	R	This item provides the status of the rogue loop device type, or multiple loop devices, at 2 different levels; at the ASM module level (main point display) and at the ASM loop level (sub point display).
RS485 Ground Fault	Bool	Fault	R	This item is used to signal a ground fault on the RS485 port on the communications option board.
RTC Fault	Bool	Fault	R	When this item is true, the real time clock needs to be set, or the clock circuitry has malfunctioned.
Second Stage Alarm	Bool	Alarm	R	Second alarm output from a X3301A Automotive detector.
Sensor Fault	Bool	Critical	R	Field devices set this bit to indicate a sensor related fault. Older field devices may also set this fault to signal invalid configuration data.
Sensor Fault	Bool	Fault	R	For all Apollo sensors, if the analog value is 7 or less, this fault is triggered. It basically means that the sensor must be replaced.
Serial Number	Double	Status	R	This location holds a unique serial number used for device identification.
Serial Port 1 Address	Int	Status	R	The address field is only used for Modbus protocol. Valid Modbus addresses are in the range from 1 to 247. The default address is 1.
Serial Port 1 Baud Rate	Int	Status	R	Serial baud rate for the controller RS485 serial port is set with this variable. The default baud rate is 9600.
Serial Port 1 Parity	Int	Status	R	The controller second serial port parity setting is set with this variable. The default parity is “None”.
Serial Port 1 Protocol	Int	Status	R	The second serial port protocol is set with this variable.
Serial Port 2 Address	Int	Status	R	This address field is used for Modbus protocol; valid Modbus addresses are in the range from 1 to 247 with a default value of 1.
Serial Port 2 Baud Rate	Int	Status	R	The baud rate for the second configurable serial port is set with this variable. The allowed selections are listed below.
Serial Port 2 Parity	Int	Status	R	The parity setting for the second configurable serial port is set with this variable. The default parity is “None”. Refer to the data type section of this document for the parity data values.

Description	Data Type	User Type	R/W	Description
Serial Port 2 Protocol	Int	Status	R	The second configurable serial port protocol is set with this variable.
Serial Port 3 Address	Int	Status	R	The address field is only used for Modbus protocol. Valid Modbus addresses are in the range from 1 to 247. The default address is 1.
Serial Port 3 Baud Rate	Int	Status	R	Serial baud rate for serial port 3 is set with this variable. The allowed selections are listed below.
Serial Port 3 Parity	Int	Status	R	Serial port 3 parity is set with this variable. The default parity is “None”. Refer to the data type section of this document for the parity data values.
Serial Port 3 Protocol	Int	Status	R	1= Not Used, 2= Modbus Slave, 3=Modbus Master, 4=S3
Serial Port 4 Address	Int	Status	R	The address field is reserved for future use.
Serial Port 4 Baud Rate	Int	Status	R	Serial baud rate for serial port 3 is set with this variable. The allowed selections are listed below.
Serial Port 4 Parity	Int	Status	R	Serial port 3 parity is set with this variable. The default parity is “None”. Refer to the data type section of this document for the parity data values.
Serial Port 4 Protocol	Int	Status	R	1= Not Used, 2= Modbus Slave, 3=Modbus Master
Short Oi Return	Int	Status	R	The Oi count is available from any 2-board X3301/2 that is configured as an Enhanced type.
Shorted Loop	Bool	Fault	R	This indicates that there is a short circuit on the ASM smoke loop.
SIL Device	Bool	Status	R	When this config bit is set it tells the Controller or field device that it should have compliance with IEC61508 (SIL 2) operation. Controllers are configured with the factory test fixture for SIL operation. When the Controller is set for SIL operation extra diagnostics are performed on an ongoing basis. The controller will signal the “wrong device type” if the factory configuration does not match the configuration setting downloaded from S^3.
Silence (LED State)	Bool	Status	R	This bit tracks the state of the controller Silence LED.
Silence Button (True for min of one logic scan)	Bool	Status	R	This item tracks the state of the Silence button on the controller faceplate and is intended for use by user logic.
Small Fire DelayTimer	Int	Status	R	First used with the X3301A Automotive detector. Refer to the X3301 Automotive specification for details on this parameter.
Smoke Pre Alarm	Bool	Status	R	This is a pre-alarm state for detectors on the Apollo smoke loop. This item is only available in logic.
Sounder Active	Bool	Status	R	For the ASM, this is a feedback status item that indicates whether a sounder is active.
Spur Topology Enabled	Bool	Status	R	For Apollo addressable loop devices, this allows for loop devices to be wired in a spur topology, as opposed to a loop topology.

Description	Data Type	User Type	R/W	Description
Stage 2 Delay Timer	Int	Status	R	First used with the X3301A Automotive detector. Refer to the X3301 Automotive specification for details on this parameter.
Standby Controller Fault	Bool	Fault	R	This item is true when the standby controller has been reset by a Watch Dog Reset.
Standby LON Fault	Bool	Fault	R	The standby controller sets this item when a Lon fault is detected.
Standby LON Ground Fault	Bool	Fault	R	When this item is true, the standby controller has detected a ground fault.
Standby Power Fault 1	Bool	Fault	R	The standby controller sets this status variable when low voltage is detected on the power input #1.
Standby Power Fault 2	Bool	Fault	R	The standby controller sets this status variable when low voltage is detected on the power input #2.
Start Calibration	Bool	Control	W	This control item is used to initiate calibration of a device.
Start Integrity Check	Bool	Control	W	For the Apollo ASM, this initiates an Integrity Check on a particular loop device or at the module level (all devices). The alarm is annunciated.
Start LED Test	Bool	Control	W	This command activates all Controller faceplate LEDs for 3 seconds. This command is only available from logic.
Start Manual Oi Fire Test	Bool	Control	W	Setting this control bit will instruct the flame detector to conduct an Oi test and activate the fire alarm output if the unit passes the test. This feature must be password protected.
Start Manual Oi Test	Bool	Control	W	Setting this control item instructs the controller to send a start manual Oi test command to the field device.
Start Passive Integrity Check	Bool	Control	W	For the Apollo ASM, this initiates an Integrity Check on a particular loop device or at the module level (all devices). The alarm is not annunciated.
Static Logic Mode	Int	Status	R	Can be read for each IO modules Input channel to determine which alarm activation mode is used. See table in Section 13.10.1.9.
Supervision Option Select	Int	Status	R	An I/O channel can be configured with or without supervision.
Supervisory	Bool	Status	R	This item tracks the state of the controller Supervisory LED and relay, if programmed for the alternate function.
Supply Voltage	Float	Status	R	Field device supply voltage as measured at the device can be read with this item.
Supply Voltage Fault	Bool	Fault	R	This item is set when the field device input voltage is below 17.5 volts but still has enough voltage to operate. Many devices can read the input voltage.
Suppression Timer	Int	Status	R	First used with the X3301A Automotive detector. Refer to the X3301 Automotive specification for details on this parameter.

Description	Data Type	User Type	R/W	Description
Sustained Fire (OR of Bin Fire, Low Level Fire and Non-Ratio Mode fire)	Bool	Alarm	R	A field device sets this status bit to indicate that it has detected a sustained type of fire. In the X3301 this is the ORED status of Bin fire, low level fire, and non-ratio fire bits.
Tag Name	String	Status	R	User defined 20-character null-terminated string.
Temperature (°C)	Float	Status	R	The temperature in degrees C can be read with this variable.
Temperature Out of Range Fault	Bool	Fault	R	This item is set for a temperature out of range fault
Temperature Setpoint C° (-55 to +75) (Default 35°)	Int	Status	R	This configuration parameter determines the temperature at which the internal heaters are activated.
Time and Date of Configuration	TimeDate	Status	R	The time and date of the configuration information is saved in this variable.
Time Remaining	Int	Status	R	The activation time remaining of a HSDM channel timed output.
Trouble	Bool	Status	R	This item represents the state of the trouble LED and relay on the controller.
Tx Lamp Fault	Bool	Fault	R	This Open Path fault is set when the receiver has determined that the transmitter is flashing in the fault mode. This mode indicates that the transmitter lamp B is currently active.
Unable to Configure	Bool	Fault	R	This item is set when the controller is unable to successfully transfer configuration information to the field device. The Controller periodically reads back the configuration parameters from each field device. If there is a mismatch, the Controller sends the configuration again. If there is a mismatch 4 times in a row, the Controller stops trying and annunciates an Unable to Configure fault. This may be an indication of an intermittent LON connection.
Units text	String	Status	R	This field holds the engineering units as a text string. The text string shall be displayed with the process variable on the faceplate display. Future versions of DCUs with on board displays may also utilize this information for display.
User Defined Status 01	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 02	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 03	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is

Description	Data Type	User Type	R/W	Description
				transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 04	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 05	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 06	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 07	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 08	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 09	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 10	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 11	Bool	Status	R/W	User defined status is provided as a method to exchange information between the controller and the ControlNet/DLR interface. Information placed here is transmitted on ControlNet/DLR along with other scheduled data. See the ControlNet/DLR specifications for more details.
User Defined Status 12	Bool	Status	R/W	See 204.

Description	Data Type	User Type	R/W	Description
User Defines Status 13 - 64	Bool	Status	R/W	This is an additional set of user parameters; 104 more. User parameters can be used as part of a self-configuration process. The values are saved in flash memory when program mode is exited.
User Events	Int	Status	R	Count of the total number of User Events.
User Logic Scan Time (time in µs)	Double	Status	R	This status variable holds the number microseconds needed to complete the user logic.
User Name (20 Chars max)	String	Status	R	Name of the user that was logged into S^3 when the project was built.
User Parameter Number 1 – 16	Int	Status	R	User parameters can be used as part of a self-configuration process. The values are saved in flash memory when program mode is exited.
User Parameter Number 17 – 120	Int	Status	R	These items reflect the state of the release outputs. First used with the IPM (DCIO smoke) module.
User String Display Enable	Bool	Status	R	When this configuration item is true the controller descriptor text (item 9) will be displayed on the controller faceplate while in normal mode (scrolling marque).
Volume at LEL (Only used with Special Gas Type, Default = 5)	Float	Status	R	Used for programming a special gas type, the default value is 5%.
Walk Test Alarm	Bool	Fault	R	When the walk test mode is active, and one of the loop devices is in alarm, this item will be active.
Walk Test Mode	Bool	Status	R	For the ASM, this is active if the Walk Test is active. When the Walk Test is active, the Controller will be in fault.
Warm-up	Bool	Status	R	A device sets this item during the warm-up period.
WatchDog Timer Fault	Bool	Critical	R	This fault bit is set when the power-up test detects that the watchdog timer is not working properly.
Wide Oi Return	Int	Status	R	The Oi count is available from any 2-board X3301/2 that is configured as an Enhanced type.
Wiring Fault	Bool	Fault	R	For some of the Apollo addressable loop devices, there are certain wiring errors that cause this fault.
Wiring Method	Int	Status	R	This value can be read to determine the HSDM channel configuration. See Table in Section 13.10.1.10.
Wrong Device Type	Bool	Fault	R	This item signals that the controller has detected a wrong device type.
Wrong Loop Device Type	Bool	Fault	R	This item provides the status of the wrong loop device type at 2 different levels; at the ASM module level (main point display) and at the ASM loop level (sub point display).
Zero Drift	Bool	Fault	R	This item is set when a gas detector goes negative to the point of a fault.

13.10.1.1 Channel Type

This variable can be tested to determine the channels type.

Value	Definition
1	Input
2	Output
3	Smoke Detector
4	Class A Output A (First of the pair)
5	Class A Output B (Second of the pair)
6	Class A Input A (First of the pair)
7	Class A Input B (Second of the pair)
8	Solenoid Output
9	Class A Solenoid Output A (First of the pair)
10	Class A Solenoid Output B (Second of the pair)
11	Class A Smoke Input A (First of the pair)
12	Class A Smoke Input B (Second of the pair)

13.10.1.2 Configuration and Serial Ports

Baud Rate Codes

Code	Speed
1	2400
2	4800
3	9600*
4	19.2K
5	38.4K
6	57.6K
7	115.2K

*Default value

Parity Codes

Code	Type
1	None
2	Odd
3	Even

Protocol Codes (Serial Ports)

Value	Description	Serial Port 1	Serial Port 2	Serial Port 3	Serial Port 4
1	Port not used	✓	✓	✓	✓
2	Modbus Slave	✓	✓	✓	✓
3	Modbus Master	✓	✓	✓	✓
4	S3	—	—	✓	—
5	ASCII Output (for line Printers) - transmits alarm event log data - uses only 2400, 4800 and 9600 bauds - uses none, even and odd parity - the serial port address is not applicable	✓	—	—	—

13.10.1.3 Device Type Code

Device Code	Device
1	EQ2200DCU
2	EQ2200IDC
3	EQ2200UV
4	EQ2500SAM
5	EQ2500ARM
6	EQ2200UV/IR
7	EQ2100PSM
8	EQ3700DCIO
9	EQ3720RM

Device Code	Device
10	EQ3710AIM
11	8 Point Pulsed Input Module
12	PIRECL (Eclipse)
13	X3301
14	X2200 (UV)
15	X9800 (IR)
16	X5200 (UV/IR)
17	EQ3740IPM
18	EQ3730EDIO
19	X3302
20	EQ3750ASM
21	X3301A
22	EDIO-SIL
23	X3301-SIL
24	Eclipse-SIL
25	Open Path
26	UD10
27	SDIO
28	AIM SIL
29	SDIO SIL
30	X3302 SIL
31	X2200 SIL
32	X9800 SIL
33	X5200 SIL
34	X3301A SIL
35	ASM SIL
36	Enhanced X3301

Device Code	Device
37	Enhanced X3301 SIL
38	HSDM SIL
39	Not Used
40	Not Used
41	Enhanced X3302
42	Enhanced X3302 SIL
100	EQ3000 (Premier Controller)

13.10.1.4 Eclipse Gas Type

Code	Description
1	Methane (Default)
2	Ethane
3	Propane
4	Ethylene
5	Propylene
6	Butane
7	Not used
8	Not used
9	Not used
10	Not used

13.10.1.5 IR Sensitivity

Value	X5200/9800	X3301
1	Low	Low
2	Medium	Medium
3	High (Default)	T-Low
4	Very High	Very High (Default)
5	Not Used	High

13.10.1.6 Logic Error Code

Code	Description
1	No Error
2	Unknown Instruction Type
3	Unsupported Address Mode
4	Unsupported Data Type
5	Unsupported Instruction
6	A parameter error was detected
7	Too many items on the stack for this operation
8	User Program is too large
9	First Scan Program too large to complete
10	Initial CRC was incorrect
11	Failed Background CRC Test

13.10.1.7 Loop Device ID Code

DEC ID No.	Device Category	Device Name	Part Numbers
0	Default Loop Device ID Number		N/A
1	Beacon	Beacon	55000-877
2	Sounders	Sounder	55000-274 55000-278 55000-041 55000-374MAR
2	Sounders	Sounder Beacon	55000-293 55000-298 55000-398MAR
3*	Sounders	Sounder Beacon	55000-293
4*	Sounders	Sounder Beacon	55000-278
5	Interface	Sounder Control Unit	55000-852 55000-182 55000-181MAR

DEC ID No.	Device Category	Device Name	Part Numbers
6	Interface	XP95A Sounder Control Module	55000-825 55000-825DET
7	Interface	XP95 I/O Unit	55000-847 55000-847SIL
8	Interface	XP95A I/O Module	55000-820 55000-820DET
9	Detector	Ionization Smoke	58000-500 58000-550 58000-550DET 58000-500MAR 58000-500SIL
10*	Detector	Ionization Smoke	5800-550
11	Detector	CO Detector	58000-300
12	Interface	Switch Monitor Plus	55000-841 55000-772MAR
13	Detector	Optical Smoke	58000-600 58000-650 58000-650DET 58000-600MAR 58000-600SIL
14*	Detector	Optical Smoke	58000-650
15	Detector	Multisensor	58000-700 58000-750 58000-750DET 58000-700MAR 58000-700SIL
16*	Detector	Multisensor	58000-750
17	Detector	Heat Detector	58000-400 58000-450 58000-450DET 58000-400MAR 58000-400SIL
18*	Detector	Heat Detector	58000-450

DEC ID No.	Device Category	Device Name	Part Numbers
19	Interface	XP95A Priority Switch Monitor Module	55000-806 55000-806DET
20	Manual Call	Manual Call	58100-908 58100-908SIL 58100-951 58200-910 58200-950 55000-775MAR* 58200-971MAR
21*	Manual Call	Manual Call	58100-951
22	Interface	Mini Monitor Module	55000-765* 55000-765DET*
23	Interface	Priority Mini Monitor Module	55000-765* 55000-765DET*
23	Manual Call	Manual Pull	56000-005
24	Sounders	Discovery Sounder Beacon	58000-005 58000-011
25	Interface	Relay Output Module	55000-863 55000-863DET
26	Interface	DIN Rail Output Unit	55000-804 55000-771MAR
27	Interface	3-Channel I/O Unit	55000-588
28	Interface	XP95A 120V I/O Module	55000-859
29	Interface	Zone Monitor	55000-845 55000-812 55000-773MAR
30	Interface	Switch Monitor	55000-822 55000-775MAR*
31	IS Device	Ionization Smoke	55000-540
32	IS Device	Optical Smoke	55000-640
33	IS Device	Heat Detector	55000-440

DEC ID No.	Device Category	Device Name	Part Numbers
34	IS Device	Manual Call	55100-940 55000-960 55000-970
35	Interface	DIN Rail I/O Unit	55000-803 55000-774MAR

*Denotes ASH module response.

13.10.1.8 Redundancy Fault Code

Code	Description	Action
0	No Fault	No action
1	No HSSL Communication	Check HSSL cable and connections
2	Firmware Version Mismatch	Check controller firmware versions are the same
3	Parser Error	If active Cycle power
4	Communication Acknowledge Error	If active Cycle power
5	Standby Fault	Check status of Standby controller
6	Program Flow Error	If active Cycle power
7	LON A Interface Fault	Check LON A connections
8	LON B Interface Fault	Check LON B connections
9	User Logic Memory Error	If active Cycle power
10	Application Memory Error	If active Cycle power
11	User Logic Error	If active Cycle power
12	Invalid Configuration	If active Cycle power
13	LON communication fault between controllers	Check LON Connections at controllers
14	Message Error	If active Cycle power
15	Duplicate LON Addresses	Check HSSL cable and connections, and power cycle.
16	Too Much Memory to Move	Check size of program
17	Dead LON	Check LON Connections at controllers
18	SIL Flag check error	Check the SIL flag on both controllers
19	Controller Fault	Check status of controller

Code	Description	Action
20	Reduced Node flag check error	Check controllers are same node count

13.10.1.9 Static Logic Mode Code

Mode	Definition
0	Invalid
1	Fire Alarm
2	Trouble
3	Low Gas Alarm
4	High Gas Alarm
5	Supervisory
6	Other

13.10.1.10 Wiring Method Select Code

Mode	Definition
1	Input/Output not Used (Default)
2	Class B
3	Class A
4	Unsupervised
5	Cascaded

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User Types: Status - **Reads (R),** Fault – **Reads (R),** Critical – **Device may not be able to perform its primary safety function,** Alarm – **Reads (R),** Control – **Writes (W) that can be written to/from user logic.**

Device Attributes	**Data Type**	**User Type**	**Controller LED**		**Field Devices**																						
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Abort Calibration	Bool	Control									W	W							W									
AC Failed	Bool	Fault	Trouble																	R								
AC Fault Threshold	Int	Status																		R								
Acknowledge (LED State)	Bool	Status		R																								
Acknowledge Button (True for min of one logic scan)	Bool	Status		R																								
Activate 120 bpm	Bool	Control											W		W													
Activate 60 bpm	Bool	Control											W		W													
Activate Acknowledge (Edge-triggered, self-clearing)	Bool	Status		W																								
Activate Beacon	Bool	Control								W																		
Activate Continuous	Bool	Control											W		W													
Activate Fire Alarm	Bool	Control		W																								
Activate High Gas Alarm	Bool	Control		W																								
Activate Low Gas Alarm	Bool	Control		W																								
Activate Relay 1	Bool	Control								W																		
Activate Relay 2	Bool	Control								W																		
Activate Relay 3	Bool	Control								W																		
Activate Remote LED	Bool	Control								W																		
Activate Reset	Bool	Control									W	W		W		W	W		W				W	W	W	W	W	W
Activate Silence (Edge-triggered, self-clearing)	Bool	Status		W																								
Activate Sounder	Bool	Control								W																		
Activate Supervisory	Bool	Status		W																								
Activate Supervisory Tone	Bool	Control											W		W													
Activate Temporal	Bool	Control											W		W													
Activate Timed	Bool	Control											W		W													
Activate Trouble Output	Bool	Control		W																								

User Types: Status - **Reads (R),** Fault – **Reads (R),** Critical – **Device may not be able to perform its primary safety function,** Alarm – **Reads (R),** Control – **Writes (W) that can be written to/from user logic.**

Device Attributes	**Data Type**	**User Type**	**Controller LED**		**Field Devices**																							
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Activate Trouble Tone	Bool	Control											W		W													
Activate Walk Test	Bool	Control							W																			
Activation Time	Int	Status											R		R			R										
ADC Saturation	Bool	Fault	Trouble																R									
AIC Enabled	Bool	Status							R																			
Alarm Direction High (1 = alarm above, 2 = below)	Int	Status			R		R																					
Alarm Direction Low (1 = alarm above, 2 = below)	Int	Status			R		R																					
Alarm Hold Timer	Int	Status																						R				
AM/PM (False = AM, True = PM)	Bool	Status		R																								
Analog Value	Int	Status								R																		
Battery Current	Float	Status																		R								
Battery Fault	Bool	Fault	Trouble																	R								
Beam Block	Bool	Fault	Trouble																R									
Beam Block Delay (Default = 60)	Int	Fault																	R									
Beeper Status	Int	Status		R																								
Beeper Volume (1..4 Off, low, med, high)	Int	Status		R																								
Bin Disable	Bool	Status																					R		R	R	R	R
Blinding IR Fault	Bool	Fault	Trouble																						R	R		R
Blinding IR Fault Enabled	Bool	Status																							R	R		R
Blocked Sensor Fault	Bool	Critical	Trouble																						R	R		R
Blocked Sensor Fault Enabled	Bool	Status																							R	R		R
Cal Active at Start	Bool	Fault	Trouble																R									
Cal Gas Concentration (20 to 100% LEL) (Default = 50)	Float	Status									R	R																
Calibration Active	Bool	Status									R	R							R			R	R	R	R	R	R	R

User Types: Status - **Reads (R),** Fault – **Reads (R),** Critical – **Device may not be able to perform its primary safety function,** Alarm – **Reads (R),** Control – **Writes (W) that can be written to/from user logic.**

Device Attributes	**Data Type**	**User Type**	**Controller LED**	*Controller	**Field Devices**																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Calibration Cuvett Length (1.0 to 150.0 mm) (Default = 150)	Float	Status									R	R																
Calibration Fault	Bool	Fault	Trouble								R	R							R			R	R	R	R	R	R	R
Calibration Gas Type	Int	Status									R	R																
Calibration Level	Float	Status																				R						
Calibration Method	Int	Status									R	R																
Calibration Step	Int	Status									R	R							R									
Channel Active	Bool	Status	Programmable							R			R		R			R										
Channel Active Unack	Bool	Status								R			R		R			R										
Channel Fault Warning	Bool	Fault			R		R			R			R		R			R										
Channel Open	Bool	Fault	Trouble										R		R			R										
Channel Shorted	Bool	Fault	Trouble										R		R			R										
Channel Type	Int	Status											R		R													
Com 1 Fault	Bool	Fault				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Com 2 Fault	Bool	Fault				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Comm. Option Board Fault	Bool	Fault	Trouble	R																								
Communication Option Board Type	Int	Status		R																								
Config Port Relay Control	Bool	Status		R																								
Configuration Port Baud Rate	Int	Status		R																								
Configuration Port Parity	Int	Status		R																								
Consecutive Failed Oi Tests for Fault (3-1000, Default = 3)	Int	Status																					R	R	R	R	R	R
Control Message Fault	Bool	Fault	Trouble						R					R		R					R							
Controller Display Mode	Int	Status		R																								
Controller Fault	Bool	Fault	Trouble	R																								
Controller Inhibit Mode	Bool	Status		R																								

User Types: Status - **Reads (R),** Fault – **Reads (R),** Critical – **Device may not be able to perform its primary safety function,** Alarm – **Reads (R),** Control – **Writes (W) that can be written to/from user logic.**

Device Attributes	**Data Type**	**User Type**	**Controller LED**		**Field Devices**																						
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
ControlNet Mac Address (1..99) Default value = 17	Int	Status		R																								
CPU Fault (the or of many internal faults)	Bool	Critical	Trouble																				R	R	R	R	R	R
Critical Voltage Fault	Bool	Fault	Trouble														R											
Current Time/Date (Real Time Clock)	TimeDate	Status		R																								
Day of Week (1=Sunday, 7 = Sat)	Int	Status		R																								
DCU Type Code (1 = Ex, 3 = Universal)	Int	Status			R		R															R						
Descriptor	String	Status		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Detection Disabled	Bool	Critical	Trouble																					R				R
Device Download Active	Bool	Fault	Trouble	R																								
Device Offline	Bool	Critical	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Device Removed	Bool	Status				R/W		R/W	R/W		R/W	R/W		R/W		R/W	R/W		R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Device Type Code ()	Int	Status		R		R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Diminished Detection	Bool	Fault	Trouble																					R				
Dirty Optics	Bool	Critical	Trouble								R	R							R									
Display Text Line 1	String	Status		R																								
Display Text Line 2	String	Status		R																								
Display Text Line 3	String	Status		R																								
Display Text Line 4	String	Status		R																								
Drift Warning Flag	Bool	Fault	Event						R	R																		
DSB Alert	Bool	Control								W																		
DSB Alert with Beacon	Bool	Control								W																		
DSB Beacon Only	Bool	Control								W																		
DSB Evacuate	Bool	Control								W																		
DSB Evacuate with Beacon	Bool	Control								W																		

User Types: Status - **Reads (R),** Fault – **Reads (R),** Critical – **Device may not be able to perform its primary safety function,** Alarm – **Reads (R),** Control – **Writes (W) that can be written to/from user logic.**

Device Attributes	**Data Type**	**User Type**	**Controller LED**	*Controller	**Field Devices**																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
DSB Global Alert	Bool	Control							W																			
DSB Global Alert with Beacon	Bool	Control							W																			
DSB Global Beacon Only	Bool	Control							W																			
DSB Global Evacuate	Bool	Control							W																			
DSB Global Evacuate with Beacon	Bool	Control							W																			
Earth Fault	Bool	Fault	Event						R																			
Eclipse Gas Type	Int	Status									R	R							R									
Enable Heater Control	Bool	Control																							W	W		W
Engineering Full Scale Value	Float	Status			R		R															R						
Engineering Zero Value	Float	Status			R		R															R						
Extra LON Device	Bool	Fault	Trouble	R																								
Extra Loop Device	Bool	Fault	Event						R																			
Fault	Bool	Fault			R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Fault Unack	Bool	Status			R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Fire Alarm	Bool	Alarm	Fire	R																			R		R	R	R	R
Fire Alarm Unack	Bool	Status																					R	R	R	R	R	R
Firmware Version	Float	Status		R							R	R							R									
First Scan (True during the first logic scan)	Bool	Status		R																								
First Stage Alarm	Bool	Alarm	Fire																					R				
Flash Fire	Bool	Alarm																					R		R	R	R	R
Flash Fire Detection Enabled	Bool	Status																								R		R
Full Scale Value (Value = 80)	Int	Status																		R								
Gas Coefficient a (Only used with Special Gas Type)	Float	Status									R	R							R									
Gas Coefficient b (Only used with Special Gas Type)	Float	Status									R	R							R									

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Device Attributes	Data Type	User Type	Controller LED	*Controller	Field Devices																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Gas Coefficient c (Only used with Special Gas Type)	Float	Status									R	R							R									
Gas Coefficient d (Only used with Special Gas Type)	Float	Status									R	R							R									
Gas Coefficient e (Only used with Special Gas Type)	Float	Status									R	R							R									
Gas Diode Gain	Int	Fault																	R									
Gas Mode	Int	Status			R		R															R						
Ground Fault -	Bool	Fault	Trouble						R											R								
Ground Fault +	Bool	Fault	Trouble						R											R								
Hangar Mode/Sustained Fire Mode	Bool	Status																							R	R		R
Heater Power (0 to 100%)	Int	Status																					R	R	R	R	R	R
High Alarm	Bool	Alarm	High Gas	R	R		R				R	R							R			R						
High Alarm Deadband (Eng units)	Float	Status			R		R																					
High Alarm Latching (1 = latching)	Bool	Status									R	R							R									
High Alarm Setpoint	Float	Status			R		R				R	R							R			R						
High Energy Fault	Bool	Fault	Trouble																				R	R	R	R	R	R
High Gas Unack	Bool	Status			R		R				R	R							R			R						
HSSL Communication Fault	Bool	Fault	Trouble	R																								
I/O Hardware Fault	Bool	Critical	Trouble					R	R							R	R											
Inhibit Control	Bool	Control			W		W		W	W	W	W	W		W			W	W			W	W	W	W	W	W	W
Inhibit Status	Bool	Status	Inhibit	R	R		R		R	R	R	R	R		R			R	R			R	R	R	R	R	R	R
Integrity Check Active	Bool	Status							R	R																		
Integrity Check Fault	Bool	Fault	Event						R	R																		
Internal Comm Fault	Bool	Critical	Trouble						R		R	R					R		R				R	R	R	R	R	R
Internal Voltage Fault	Bool	Critical	Trouble					R								R	R											

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Device Attributes	Data Type	User Type	Controller LED		Field Devices																							
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Invalid Configuration	Bool	Fault	Trouble	R		R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Invalid Device Parameter	Bool	Fault	Trouble					R				R				R			R					R		R	R	R
IR Automatic Oi Fault	Bool	Fault	Trouble																				R	R	R	R	R	R
IR Manual Oi Fault	Bool	Fault																					R	R	R	R	R	R
IR Sensitivity ()	Int	Status																					R		R	R	R	R
Last Direction 0 = A, 1 = B	Bool	Status				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Latching Alarm LED ()	Bool	Status								R													R		R	R	R	R
Logic CheckSum (was Unique Configuration Number)	Double	Status		R																								
Logic Engine Fault	Bool	Critical	Trouble	R																								
Logic Error Code	Int	Status		R																								
Logic Error Reference Number	Int	Status		R																								
Lon A Counter	Double	Status				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
LON A Interface Fault	Bool	Fault	Trouble	R																								
LON A, Device Offline	Bool	Fault	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
LON Address	Int	Status		R																								
Lon B Counter	Double	Status				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
LON B Interface Fault	Bool	Fault	Trouble	R																								
LON B, Device Offline	Bool	Fault	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
LON CPU Memory Fault	Bool	Critical	Trouble						R		R	R							R				R	R	R	R	R	R
LON Diagnostic Fault	Bool	Fault	Trouble					R				R				R	R									R	R	R
LON Fault	Bool	Fault	Trouble	R																								
LON Ground Fault	Bool	Fault	Trouble	R																								
Lon Overload Fault	Bool	Fault	Trouble	R																								
LON Pattern Test	Bool	Critical	Trouble	R																								
LON Rogue Device	Bool	Fault	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Loop Device Fault	Bool	Critical							R	R																		

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Device Attributes	**Data Type**	**User Type**	**Controller LED**	*Controller	**Field Devices**																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Loop Device ID Number (DEC)	Int	Status								R																		
Loop Device Offline	Bool	Fault	Event						R	R																		
Low Alarm	Bool	Alarm	Low Gas	R	R		R				R	R							R			R						
Low Alarm Deadband (Eng units)	Float	Status			R		R																					
Low Alarm Latching (1 = latching)	Bool	Status									R	R							R									
Low Alarm Setpoint	Float	Status			R		R				R	R							R			R						
Low Gas Unack	Bool	Status			R		R				R	R							R			R						
Low Level Detection Enabled	Bool	Status																							R	R		R
mA Range High (0..24 mA)	Float	Status			R		R																					
mA Range Low (0..24 mA)	Float	Status			R		R																					
Manual Oi Test Started	Bool	Status																					R	R	R	R	R	R
Manufacture Date	Date	Status									R	R							R									
Master Controller	Bool	Status		R																								
Memory Fault	Bool	Critical	Trouble	R		R		R	R		R	R		R		R	R		R		R							
Modbus Float Swap	Bool	Status		R																								
Narrow Oi Return	Int	Status																							R	R		R
Neuron Firmware ID (8 Chars max)	String	Status				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
New Fire Alarm	Bool	Status		R																								
New High Gas Alarm	Bool	Status		R																								
New Low Gas Alarm	Bool	Status		R																								
New Supervisory Alarm	Bool	Status		R																								
New Trouble	Bool	Status		R																								
No Oi High Energy Fault	Bool	Status	Trouble																				R	R	R	R	R	R
Noise Fault	Bool	Fault	Trouble																R									
Non-Ratio Mode Fault	Bool	Fault	Trouble																				R	R	R	R	R	R

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Device Attributes	**Data Type**	**User Type**	**Controller LED**		**Field Devices**																							
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
OEM Device Code	Int	Status		R																								
Open Lamp	Bool	Critical	Trouble								R	R																
Open Loop	Bool	Fault	Trouble						R																			
Option Board Fault	Bool	Fault	Trouble	R																								
Option Board Type	Int	Status		R																								
OS Queue Overflow Fault	Bool	Critical	Trouble	R																								
Out of Range High Fault	Bool	Fault	Trouble		R		R																					
Out of Range High Level (0 to 24mA)	Float	Status			R		R																					
Out of Range Low Fault	Bool	Fault	Trouble		R		R																					
Out of Range Low Level (0 to 24mA)	Float	Status			R		R																					
Output Inhibit	Bool	Status	Output Inhibit	R																								
Output Logic	Int	Status																R										
Power Fail 1	Bool	Fault	Trouble	R																								
Power Fail 2	Bool	Fault	Trouble	R																								
Power Supply Fault	Bool	Fault	Trouble																	R								
Power-up	Bool	Status																				R						
Process Variable	Float	Status			R		R				R	R							R			R	R	R	R	R	R	R
Process Variable (Raw)	Int	Status			R		R															R						
Program Mode	Bool	Critical		R																								
Pulse Sounder	Bool	Control								W																		
PV Change Deadband	Float	Status			R		R				R	R							R			R						
PWM Fault	Bool	Critical	Trouble					R								R	R											
Quick Fire	Bool	Alarm																					R		R	R	R	R
Quick Fire Enable	Bool	Status																					R		R	R	R	
Redundancy Enable	Boolean	Status		R																								

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Device Attributes	Data Type	User Type	Controller LED	*Controller	Field Devices																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Redundancy Fault	Boolean	Fault	Trouble	R																								
Redundancy Fault Code	Int	Status		R																								
Request Manual Switch	Bool	Control		W																								
Reset Button (True for min of one logic scan)	Bool	Status		R																								
Resistance Value	Int	Status																R										
Rogue Loop Device	Bool	Fault	Event						R	R																		
RS485 Ground Fault	Bool	Fault	Trouble	R																								
RTC Fault	Bool	Fault	Trouble	R																								
Second Stage Alarm	Bool	Alarm	Fire																					R				
Sensor Fault	Bool	Critical	Trouble								R	R							R			R						
Sensor Fault	Bool	Fault	Event						R	R																		
Serial Number	Double	Status		R					R		R	R							R									
Serial Port 1 Address	Int	Status		R																								
Serial Port 1 Baud Rate	Int	Status		R																								
Serial Port 1 Parity	Int	Status		R																								
Serial Port 1 Protocol	Int	Status		R																								
Serial Port 2 Address	Int	Status		R																								
Serial Port 2 Baud Rate	Int	Status		R																								
Serial Port 2 Parity	Int	Status		R																								
Serial Port 2 Protocol	Int	Status		R																								
Serial Port 3 Address	Int	Status		R																								
Serial Port 3 Baud Rate	Int	Status		R																								
Serial Port 3 Parity	Int	Status		R																								
Serial Port 3 Protocol	Int	Status		R																								
Serial Port 4 Address	Int	Status		R																								
Serial Port 4 Baud Rate	Int	Status		R																								

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Device Attributes	Data Type	User Type	Controller LED	*Controller	Field Devices																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Serial Port 4 Parity	Int	Status		R																								
Serial Port 4 Protocol	Int	Status		R																								
Short Oi Return	Int	Status																							R	R		R
Shorted Loop	Bool	Fault	Trouble						R																			
SIL Device	Bool	Status		R																								
Silence (LED State)	Bool	Status		R																								
Silence Button (True for min of one logic scan)	Bool	Status		R																								
Small Fire DelayTimer	Int	Status																						R				
Smoke Pre Alarm	Bool	Status								R																		
Sounder Active	Bool	Status							R	R																		
Spur Topology Enabled	Bool	Status							R																			
Stage 2 Delay Timer	Int	Status																						R				
Standby Controller Fault	Bool	Fault	Trouble	R																								
Standby LON Fault	Bool	Fault	Trouble	R																								
Standby LON Ground Fault	Bool	Fault	Trouble	R																								
Standby Power Fault 1	Bool	Fault	Trouble	R																								
Standby Power Fault 2	Bool	Fault	Trouble	R																								
Start Calibration	Bool	Control									W	W							W									
Start Integrity Check	Bool	Control							W	W																		
Start LED Test	Bool	Control		W																								
Start Manual Oi Fire Test	Bool	Control																					W	W	W	W	W	W
Start Manual Oi Test	Bool	Control																					W	W	W	W	W	W
Start Passive Integrity Check	Bool	Control							W	W																		
Static Logic Mode	Int	Status								R			R		R			R										
Supervision Option Select	Int	Status											R		R			R										
Supervisory	Bool	Status		R																								

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Device Attributes	**Data Type**	**User Type**	**Controller LED**		**Field Devices**																							
Description				*Controller	AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
Supply Voltage	Float	Status				R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Supply Voltage Fault	Bool	Fault	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Suppression Timer	Int	Status																						R				
Sustained Fire (OR of Bin Fire, Low Level Fire and Non-Ratio Mode fire)	Bool	Alarm																					R		R	R	R	R
Tag Name	String	Status		R	R	R	R	R	W		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Temperature (°C)	Float	Status									R	R							R				R	R	R	R	R	R
Temperature Out of Range Fault	Bool	Fault																					R	R	R	R	R	R
Temperature Setpoint C° (-55° to +75°) (Default 35°)	Int	Status																					R	R	R	R	R	R
Time and Date of Configuration	TimeDate	Status		R																								
Time Remaining	Int	Status																R										
Trouble	Bool	Status	Trouble	R																								
Tx Lamp Fault	Bool	Fault	Trouble																R									
Unable to Configure	Bool	Fault	Trouble			R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Units text	String	Status			R		R				R	R							R			R						
User Defined Status 01	Bool	Status		R/W																								
User Defined Status 02	Bool	Status		R/W																								
User Defined Status 03	Bool	Status		R/W																								
User Defined Status 04	Bool	Status		R/W																								
User Defined Status 05	Bool	Status		R/W																								
User Defined Status 06	Bool	Status		R/W																								
User Defined Status 07	Bool	Status		R/W																								
User Defined Status 08	Bool	Status		R/W																								
User Defined Status 09	Bool	Status		R/W																								
User Defined Status 10	Bool	Status		R/W																								
User Defined Status 11	Bool	Status		R/W																								

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Device Attributes	**Data Type**	**User Type**	**Controller LED**	*Controller	**Field Devices**																							
Description					AIM Ch	AIM Module	AIM SIL Ch	AIM SIL Module	ASM SIL	ASM SIL Ch	Eclipse	Eclipse SIL	EDIO Ch	EDIO Module	EDIO SIL Ch	EDIO SIL Module	HSDM	HSDM Ch	LS2000	PSM	Relay Module	UD10 DCU	X3301	X3301 Auto	X3301 En	X3301 En SIL	X3301 SIL	X3302 En SIL
User Defined Status 12	Bool	Status		R/W																								
User Defines Status 13 - 64	Bool	Status		R/W																								
User Events	Int	Status		R																								
User Logic Scan Time (time in us)	Double	Status		R																								
User Name (20 Chars max)	String	Status		R																								
User Parameter Number 1 – 16	Int	Status		R																								
User Parameter Number 17 – 120	Int	Status		R																								
User String Display Enable	Bool	Status		R																								
Volume at LEL (Only used with Special Gas Type, Default = 5)	Float	Status									R	R																
Walk Test Alarm	Bool	Fault							W																			
Walk Test Mode	Bool	Status	Trouble						R																			
Warm-up	Bool	Status									R	R							R				R	R	R	R	R	R
WatchDog Timer Fault	Bool	Critical	Trouble	R																								
Wide Oi Return	Int	Status																							R	R		R
Wiring Fault	Bool	Fault	Event						W																			
Wiring Method	Int	Status																R										
Wrong Device Type	Bool	Fault	Trouble	R		R		R	R		R	R		R		R	R		R	R	R	R	R	R	R	R	R	R
Wrong Loop Device Type	Bool	Fault	Event						W																			
Zero Drift	Bool	Fault	Trouble								R	R							R									